

ISTANBUL TECHNICAL UNIVERSITY ★ GRADUATE SCHOOL OF SCIENCE
ENGINEERING AND TECHNOLOGY

**‘ECO-VILLAGES’:
ECOLOGICAL AND SUSTAINABLE NEIGHBORHOOD DESIGN LESSONS
FROM PRACTICES**



M.Sc. THESIS

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Department of Urban Design

Urban Design Programme

MAY 2019

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İSTANBUL TEKNİK ÜNİVERSİTESİ ★ FEN BİLİMLERİ ENSTİTÜSÜ

**UYGULAMADAN GELEN EKOLOJİK VE SÜRDÜRÜLEBİLİR
MAHALLE TASARIM DERSLERİ:
‘EKOKÖYLER’**

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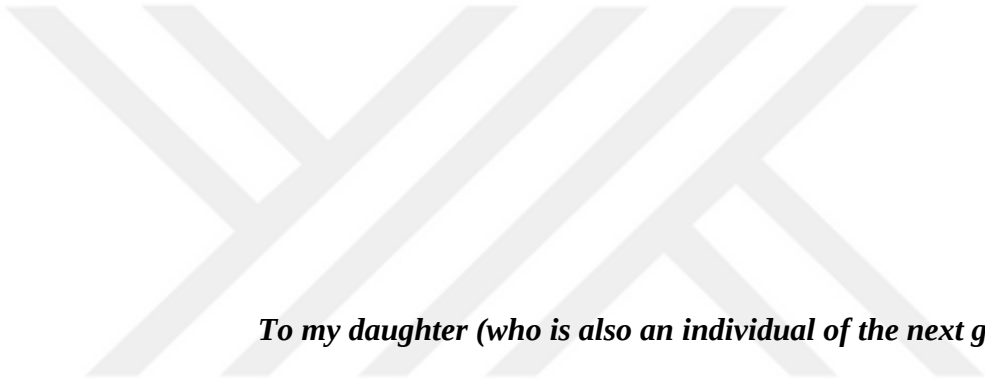
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To my daughter (who is also an individual of the next generation),



FOREWORD

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Cansın Günseli MAÇAOĞLU
Architect



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ABBREVIATIONS

EV	: Eco-Village
GEN	: Global Eco-village Network
UN	: United Nations
UN DESA	: United Nations Department of Economics and Social Affairs
US	: United States
UK	: United Kingdom





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‘ECO-VILLAGES’: ECOLOGICAL AND SUSTAINABLE NEIGHBORHOOD DESIGN LESSONS FROM PRACTICES

SUMMARY

As a result of urbanization processes, each day, we cause a fatal, irreversible destructions for next generations of all living ecosystems. We waste sources, we cause loss of productive soil and global warming by disturbing the

balance of nature. We use health-threatening policies in many fields. We alienate humans from nature and destroying the values of society as well. For that reason when cities are being (re)designed, we must be caring more about ecology and its systems’ integration with the built environment if we would like to change our pessimistic future.

In this study, eco-villages are emphasized as guiding communities at the neighborhood design scale. Eco-villages are one of the settlements, which have understood the importance of these ecological systems, use them wisely and partly succeeded in realizing the principles of sustainability.

Within the scope of the study, it is significant to contribute and discuss, in order to make cities livable and adaptable for future needs using wisely the experiences and information acquired from the ecovillage concept.

This thesis interrogates the applicability of eco-village approach in urban context, focusing on the neighborhoods as the scale that the eco-village approach can be applied. The study reviews eco-village design and the neighborhood definitions and concepts, to reveal the concept of eco-village and principles of design and to introduce neighborhood design principles in the comprehension of sustainability and in neighborhood scale.

With this respect, this study is structured around seven sections.

In the first part, the purpose, methodology and expecting results of the study are given.

The second part includes definitions and a timeline related with ecology and sustainability in urban design in order to understand the contemporary situation.

In the third part, sustainable communities and the concept of permaculture following with the concept of urban permaculture are described. The origin of the ecovillage is investigated and the global ecovillage network (GEN) is reviewed.

In the forth part, ecovillage cases are elaborated. In this thesis, main aim is to prepare neighborhood design principles for cities, taking the advantages of existing practices of ‘eco-villages’ which are successful, contemporary ecological and sustainable site planning models in small scales. To achieve this goal, in this part of the study, eco-village initiatives as ten worldwide case-studies -Auroville (India), Findhorn Eco-village (Scotland), Ithaca EV (New York, US), Damanhur (Italy), Crystal Waters

Permaculture Village (Australia), Sieben Linden EV (Germany), MBAM (Senegal), The Farm Ecovillage (Tennessee, US), Marmariç Permakültür (Turkey) ve Dutlar Köyü & İmece Evi (Turkey)- were evaluated in details by twenty parameters in the context of their physical, cultural and social characteristics. These twenty parameters are resulted in seven titles as physical dimensions, uniquenesses, impacts to the system's cycles, use of sources & designs, social dimensions, values and economic dimensions.

For application process of this principles to cities, 'neighborhood' scale is found appropriate as to use as 'city scale patches' in urban design projects. It is hypothesized that only if we divide the city in sustainable small parts we can make it sustainable.

In the fifth part, neighborhood design definitions and concepts are reviewed and compared.

In the sixth part, urban design requirements of neighborhoods are compared and combined with the ecovillages' results, with these results, neighborhood design principles for urban neighborhoods is listed, categorized in four main titles as site design, building scale, sustainability features and socio-economic dimension.

In the seventh part, with the purpose of being used in the future neighborhood projects, ecological and sustainable neighborhood design principles are discussed drawn from eco-village concept. The idea differs in this thesis is the adaptation type of the principles. The principles are provided from the existing practices in small scales, to be used in a 'city scale'. It is hypothesized that cities can be transformed with a neighborhood movement.

It is hoped that this thesis can be useful for a better future and can make these ecological experiences and principles visible for urban designers, architects and many others that care about the planet and the future generations.

UYGULAMADAN GELEN EKOLOJİK VE SÜRDÜRÜLEBİLİR MAHALLE TASARIM DERSLERİ: ‘EKOKÖYLER’

ÖZET

Günümüz koşullarında özellikle son asırda artan modenleşme, endüstrileşme ve kentleşme süreçlerinin bir sonucu olarak, birbirine bağlı olarak yaşayan doğal ekosistemler üzerinde geri dönülemez yıkımlara neden olunmaktadır. Doğal kaynaklar tüketilerek, üretken toprağın kaybına neden olunarak, suya, havaya ciddi boyutta zararlar verilerek, birçok alanda sağlığı tehdit eden politikalar kullanılarak doğal denge bozulmakta, küresel ısınmaya ve iklim değişikliğine yol açmaktadır. İnsanlar doğadan yabancılaştırılmakta ve aynı zamanda topluluk değerlerine zarar verilmektedir. Dünyadaki bu ve benzeri olumsuz çevresel ve toplumsal gelişmeler, 1940’larda hava, toprak, su kirliliği ile başlayan, 70’lerden sonra petrolün de eklenmesi ile daha da gözle görülür şekilde artan, dünya krizlerinin çok daha kötülerini ile devamına alt yapı sağlayacaktır.

İnsanlar olarak temiz hava, su, besin, sığınak, uygun hava koşulları, ilişkiler ve güvenlik gibi temel ihtiyaçlarımız vardır. Bu ihtiyaçlar sağlanırken yapı gereği insanlar tabi ki tamamen üretici olamayacaklardır; ancak bu kadar hızlı tüketiciler de olmadan, ikisinin ara kesitinde kalmaları gerekmektedir. Ayrıca insanlığın günümüzde ihtiyaçlarını karşılarken, tüm organizmalar için gelecekte yaşamın devamlılığının sağlanabilmesi gibi bir sorumluluğu da vardır. Bahsedilen temel ihtiyaçlar dışında, kentlerde yaşayan bireylerin, fazla nüfusla birarada yaşamaktan kaynaklı birtakım ihtiyaçları ortaya çıkmaktadır. Bu ihtiyaçlar arasından, kentlinin özellikle de nüfus arttıkça ortaya çıkan konut, enerji, altyapı, sağlık ve eğitim gibi ihtiyaçları vurgulanabilir.

Dünya nüfusunun önemli bir çoğunluğu kentlerde yaşamakta ve bu kentlerdeki yapıli çevreler oldukça geniş alan kaplamaktadırlar. Ayrıca kentler ciddi tüketicilerdir ve bu bağlamda çevrelerine, hatta tüm gezegene ciddi etkileri bulunmaktadır. Bu nedenle, eğer karamsar geleceğimizi değiştirmek istiyorsak, çözüm, her açıdan sürdürülebilirliği sağlayan, eşitlikçi ve işbirlikçi çeşitli alanlara yayılmış olan komünitelerin sosyal dönüşümünde gizlidir. Şehirler (baştan ya da yeniden) tasarlanırken, sosyal yapı da gözönünde bulundurularak ekoloji ve onun sistemlerinin yapıli çevre ile bütünleşmesine, aralarındaki güçlü doğal döngüye önem verilmelidir. Kentsel tasarım ve kent kurma becerisi bu çerçevede çok önemli bir rol oynamaktadır.

Ekolojik kentler kurma isteği literatüre bakıldığında çok daha eskilere dayanmaktadır. Hipokrat’tan, Vitruvius’tan Frederick Law Olmstead ya da Ebenezer Howard’a, Patrick Geddes’ten, Lewis Mumford’tan Ian McHarg’a, Kevin Lynch’e veya Jane Jacobs’a kadar birçok araştırmacı, düşünür ve tasarımcı bu konu üzerinde çalışmıştır. Yüzyıllar boyunca önceki araştırmaların üstüne bilgiler eklenerek bugüne gelinmiştir. Bu yaklaşımların dışında, 70’lerden sonra permakültür kavramı da bir yaşam biçimi, mevcut bilgi birikimi ve tecrübeler ışığında doğal ekosistemin

dengelerini korumayı amaçlayan önemli bir sistematik method olarak ortaya çıkmıştır.

80'lerden sonra ekolojik bilinçlenme dönemi ile sayıca az ama her geçen gün artan bir grup komünite giriřimi olarak ekoköyler, bu ekolojik ve sürdürülebilir yaşam şeklini kendi hayat tarzlarına uyarlamaya çalışmaktadırlar. Bunun bir sonucu olarak bu çalışmada 'ekoköyler' kentsel tasarım ölçeğinde, izi sürülebilir topluluklar olarak vurgulanmıştır. Ekoköyler, bahsedilen ekolojik sistemlerin önemini kavramış ve bu sistemleri gündelik yaşamlarında kullanan yerleşimlerdir. Bu bağlamda sürdürülebilirlik prensiplerini uygulamayı da kısmen başarmışlardır.

Yapılan çalışma kapsamında şehirlerin geleceğın öngörülen ihtiyaçlarına uygun, yaşanabilir duruma getirilmesine katkıda bulunmak, bu konuyu tartışmaya açmak önemsenmiş, eko-köy bağlamında geçmişten günümüze gelen öğrenimler, deneyimler irdelenmiştir.

Bu tez, ekoköy yaklaşımının kentsel içerikte uygulanabilirliğini sorgulamaktadır. Ekoköy yaklaşımının uygulanabileceğı ölçek olarak mahalle ölçeğine odaklanmaktadır.

Çalışmada, sürdürülebilirlik kapsamında ve mahalle ölçeğinde, ekoköy kavramının tasarım ilkelerini ortaya çıkarmak ve bunları mahalle tasarım ilkeleri ile buluşturmak için eko-köy tasarımı ve mahalle tanımları, kavramları detaylıca incelenmiştir.

Bu amaç doğrultusunda çalışma yedi bölümde yapılandırılmıştır.

Tezin birinci giriş bölümünde çalışmanın amacı, kapsamı, yöntemi, önemi ve beklentileri açıklanmıştır.

İkinci bölümde, güncel olarak bulunulan durumun ortaya konması için kentsel tasarımda ekoloji ve sürdürülebilirlik ile ilgili tanımlamalar yapılmış ve ekolojik gelişime ait bir zaman çizelgesi verilmiştir.

Üçüncü bölümde, sürdürülebilir topluluklar, bu toplumlarda zaman zaman benimsenmiş olan permakültür kavramı ve bu kavramın kentsel ölçekteki karşılığına değinilmektedir. Devamında bu tezde öne çıkarılan sürdürülebilir toplum örneğı olan ekoköy yaklaşımı açıklanmış, hangi amaçla, kim tarafından, hangi tarihlerde ortaya çıktıkları ve Küresel Ekoköyler Ağı (GEN) incelenmiştir.

Dördüncü bölümde ekoköy örnekleri detaylandırılmıştır. Bu tezde amaç, küçük ölçeklerde başarılı ve güncel, ekolojik ve sürdürülebilir bölge planlama modelleri olan ekoköylerin mevcut uygulamalarından faydalanarak, şehirler için bir kentsel tasarım rehberi oluşturmaktır. Bu amaca ulaşmak için, örnek alan araştırmaları olarak dünya çağında on ekoköy giriřimi -Auroville (Hindistan), Findhorn Eco-village (İskoçya), Ithaca EV (New York, ABD), Damanhur (İtalya), Crystal Waters Permaculture Village (Avustralya), Sieben Linden EV (Almanya), MBAM (Senegal), The Farm Ecovillage (Tennessee, ABD), Marmariç Permakültür (Türkiye) ve Dutlar Köyü & İmece Evi (Türkiye) fiziksel, kültürel ve sosyal karakteristikleri bağlamında yirmi parametre ile detaylıca değeriendirilmiştir. Bu karşılaştırmalar ve özetleme sayesinde, bu kısım, bulgular ve ekoköylerin yol gösterici prensipleri ile sonuçlandırılmıştır.

Bu yirmi parametre yedi başlıkta; fiziksel boyut, kendine has özellikler, sistemin döngülerine etkisi, kaynak kullanımı ve tasarım, sosyal boyut, değerieler ve ekonomik boyut şeklinde özetlenmiştir.

Beşinci bölümde, tezin sonucunda oluşturulacak kentsel tasarım rehberinin uygulanma süreci için, mahalle tasarımı kavramı incelenmiş, ‘mahalle’ ölçeği ve karakteristiği düşünülmüş ve kentsel tasarım projelerinde ‘kent ölçeğinde yamalar’ olarak kullanılmak üzere uygun bulunmuştur. Bir şehrin, ancak küçük sürdürülebilir parçalara bölünmesi halinde sürdürülebilir olarak dönüşebileceği öne sürülmüştür. Bu bölümde mahalle tasarım tanımlamaları ve kavramı iredelenmiş ve kıyaslanmıştır.

Altıncı bölümde, mahallelerdeki kentsel tasarım gereksinimleri ile ekoköylerinki karşılaştırılmış ve birleştirilmiştir. Araştırmalardan çıkan sonuçlara göre, dört ana başlıkta (alan tasarımı, yapı ölçeği, sürdürülebilirlik özellikleri ve sosyo-ekonomik boyut) toplanmış olarak mahalleler için bir kentsel tasarım rehberi listelenmiştir.

Yedinci bölümde, gelecekteki kentsel mahalle projelerinde de kullanılmak üzere, eko-köy kavramından elde edilen ekoloji ve sürdürülebilirliğe dayalı mahalle tasarım prensipleri tartışılmıştır.

Bu tez çalışmasında öne sürülen fikrin farklılığı rehberin adapte ediliş şeklinden kaynaklanır. Tasarım prensipleri, kent ölçeğinde kullanılmak üzere, küçük ölçekteki mevcut uygulamalardan edinilmiş bilgilerden uyarlanmıştır. Kentlerin kentsel mahalle hareketi ile dönüşebileceği savunulmaktadır.

Bu tezin daha iyi bir gelecek için yararlı olması ve bu ekolojik deneyimleri ve ilkeleri, şehir tasarımcıları, mimarlar ve gezegene, gelecek nesillere önem veren diğer birçok kişi için görünür kılması umulmaktadır.

1. INTRODUCTION

In our urbanized lives of the 21st century, commonly, we do not realize how much we harm our planet, sometimes even space. Increasing levels of population, globalization, urbanization, on-going capitalism-based processes, industrialization, development of technologies, they all assist destruction of rural /natural lands, water sources, air quality and the lives attached to them (Beddington, 2010; Rose, 2014; Dawson, 2006). Cities and people become more and more ‘consumption-dependent’ entities everyday with the globalization processes and capitalist formations (Rose, 2014). As consumerist societies, we consume a lot of sources like energy, food, water, clean air (oxygen) irreversibly causing global warming. In addition to this, we cause enormous loss of productive land (soil) and produce a huge amount of waste (Kellog & Pettigrew, 2007). As a consequence of our conventional food systems, health threatening policies increase each year (Beddington, 2010). Besides disturbing the balance of ecosystems, adding unsustainable, unnatural and impermeable materials like concrete and asphalt etc. in urban design also alienates people from nature (Ghavami, 2005). Because of the system, the values of societies are being destroyed and the sense of being a part of community is getting lost (Rose, 2014). Many more physical and psychological negative effects can be added to these inferences of urbanized world.

“He treats the world as a storehouse existing for his delectation; he plunders, rapes, poisons, and kills this living system, the biosphere, in ignorance of its workings and its fundamental value.” – Ian McHarg

In today’s pessimistic framework to sustain our lives and to build a healthier future solution is hidden in social transformation of communities, which are sustainable in all dimensions and consist of equal and collaborated cultures (Kellog & Pettigrew, 2007; Beddington, 2010). And there is a small -but ascending- number of people/communities trying to adapt their lifestyles to an ecological and sustainable way of living (Dawson, 2006). This thesis focuses on particularly the eco-village movement from those communities, reveals the principles that define an eco-village,

by looking the implemented cases all around the world, and offers design principles that are adapted from eco-village concept.

Dawson (2006) advocates that eco-villages made influence all around the world. They are aware and beyond, by technological developments in good use and using traditional techniques combining them with scientific ones. They are successful and sometimes also awarded, proved by important institutes, governments, for minimizing their impacts to world by consuming less energy sources, using renewable energy and living with principles based on a shared/regenerative/against consumption lifestyle.

1.1 Purpose of Thesis

In urbanism, we have significant needs as buildings, squares, transportation, energy, water, food etc. (Krieger & Saunders, 2009). On the other hand, we produce a lot of waste. As a result of density of human population and these needs there is nowhere around the world it is more obvious that we affect the ecosystem negatively more than in our cities and towns (Walker, 2016).

The purpose of thesis is to investigate the eco-village concept and to question if the components of the eco-villages can be adapted to neighborhood design as they represent ecological and sustainable solutions. With this respect, it is aimed to propose design principles, which can be directly applied to the neighborhood design in the urban context.

The aim is to make our cities livable, qualified, and adaptable for the future, using wisely what the past has offered us, discussing all the given experiences and information that ecovillages had and to create neighborhood principles that will provide some structure to field.

In order to achieve this goal, eco-village initiatives as case studies and neighborhood design researches were evaluated to develop design principles, which is basically focuses on the design of sustainable neighborhoods.

1.2 Methodology

As a methodology of use, comparative study has been done. Qualitative research is based on research techniques such as analyzing books, articles, news, documents.

Up-to-date web sources, especially web sites of organizations and associations have been followed, their documentaries, speeches have been taken in consideration. To compare and clarify the case studies that have chosen to be reviewed, twenty ecological and sustainable neighborhood design parameters of them examined. The parameters are concluded by a comparison chart that based on these reviews to interpret the lessons that we should learn in urban design perspective for future designs (Figure 1.1).

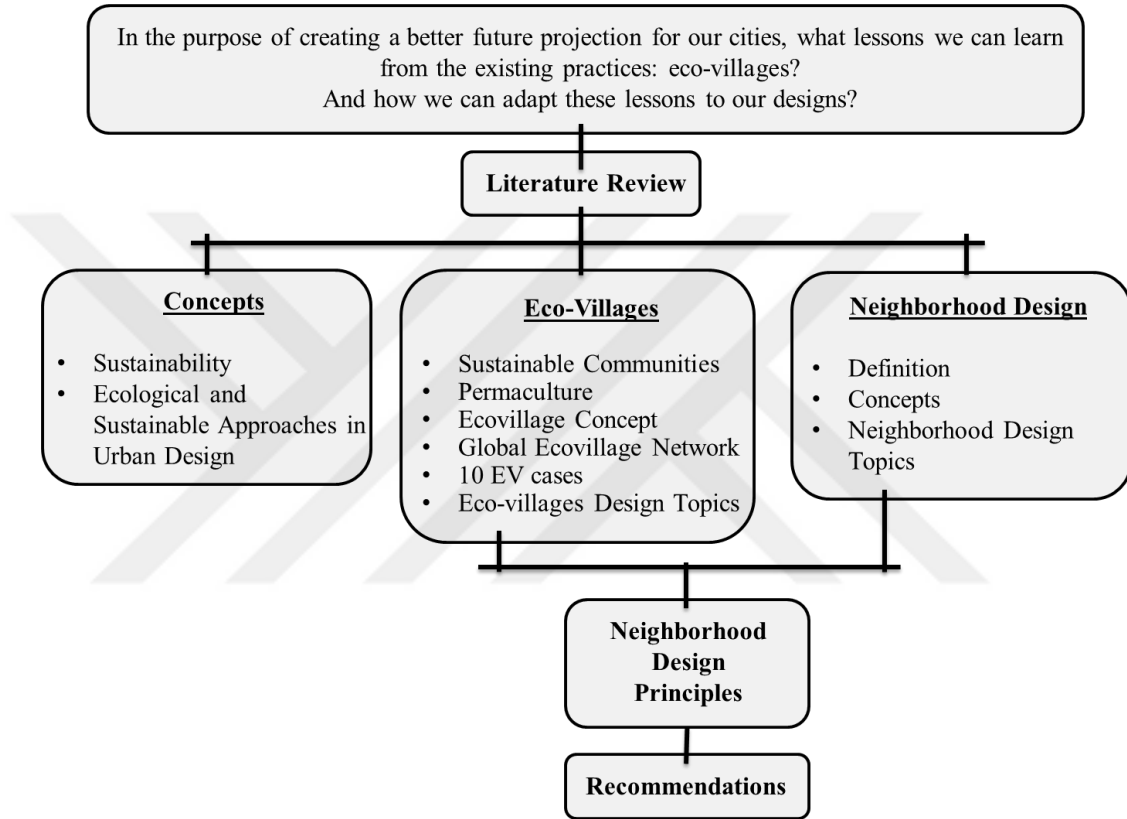


Figure 1. 1 : Diagram of Methodology.

Auroville (India), Findhorn Eco-village (Scotland), Ithaca EV (New York, US), Damanhur (Italy), Crystal Waters Permaculture Village (Australia), Sieben Linden EV (Germany), MBAM (Senegal), The Farm Ecovillage (Tennessee, US), Marmariç Permakültür (Turkey) ve Dutlar Köyü & İmece Evi (Turkey) have been chosen to be examined, to compare, as worldwide communities. Having variable locations like being a part of different continents, different nations and having some unique specialties were the main factors that have influenced the choice to pick these locations. Also factors as having impacts to ecology, sustainability, guidance for the future have affected the selection of the cases. Twenty parameters, categorized in seven titles, are examined for each eco-village. The parameters determined are

related with ecological, social, sustainable and economic solutions of eco-villages, which can relate with neighborhood design:

1. Year/Location/Size/Population (Physical Dimensions),
2. Significance in all Eco-villages/Unique Features (Uniquenesses),
3. Food Production/Waste Management/Water Management (Impacts to the System's Cycles),
4. Energy Sources/Architectural Design/Materials Used/Technologic Solutions (Use of Sources & Designs),
5. Public Space/Social Life/Transportation (Social Dimensions),
6. Values of Society/Educational Values (Values),
7. Economy/Currency (Economic Dimensions).

Following the data collected from the cases, a summary chart is developed. All the data gathered from the compared cases are included in a matrix, which is developed to reveal design principles, similar and different approaches.

After summarizing these ecovillage cases around the world, existing neighborhood definitions and neighborhood design concepts are reviewed with the purpose of understanding the scale and relation between the ecovillage cases and the urban neighborhoods.

As to use in the following urban neighborhood projects, neighborhood design principles for neighborhoods have been listed with integrated data that is gained from ecovillages and neighborhoods.

The titles are reviewed from ecovillage cases, which can be used for creating the matrix for the principles are mainly about sustainability features as; food systems, waste management, water management, energy sources and technological solutions. Also principles as architectural design, materials used, values of society, educational values, economy & currency have significant references from ecovillage cases.

The titles are reviewed from the neighborhood concepts, which can be used for creating the matrix for the principles as boundaries, density, central area & central area functions, open spaces & green areas, mixed-land uses. Also principles as local

identity, local culture & historical background & traditional character of place added to these parameters because of their significances.

When we check both investigations' results, we can see that they also have some essential titles in common as transportation and public space & life.

In the projected principles, 19 urban design parameters for urban neighborhoods listed in four main titles as:

1. Site Design,
2. Building Scale,
3. Sustainability Features,
4. Socio-Economic Dimension

To conclude, ecological and sustainable neighborhood design principles have been listed to be a considered in discussions of future studies.

1.3 Significance and Expecting Results

Clarifying the definitions and examining, comparing these cases have importance in terms of literature. To discuss what we can do for our planet by noticing what has been done before, gives us the chance of improving our visions and helping to next generations with solutions.

The idea differs in this thesis is the adaptation type of the principles. The principles are provided from the existing practices in small scales, to be used in a 'city scale' using neighborhood scale as city scale patches.

The expecting results are to reveal and discuss contemporary ecological and sustainable approaches for a better future and make these ecological experiences and principles visible for urban designers, architects and many others that care about the planet and future generations.



2. ECOLOGY AND SUSTAINABILITY IN URBAN DESIGN

Why do we need ecology and sustainability in Urban Design?

In the natural cycle of the world's ecosystems everything is crucial for life and regenerates itself; organic matters decay in soil, soil brings organic matters to back to life. It does not need any help from outside to be sustained (Hemenway, 2009). However, especially after the modernization era with the capitalism-based industrial systems and the extreme population growth, they all supported each combined with greed and selfishness, human invasion of ecology and destruction of land have started (Walker, 2016). Then humankind noticed (-except there are still some that could not yet-) to change the balance of the planet gave birth to too many unacceptable consequences and will be concluded as worldwide crises (Dawson, 2006).

Population

Each day world population is increasing exponentially. UN reports explains it had taken all of human history (approximately 200.000 years) to reach 1 billion until 1800 and in the following 200 years, 1 billion population increased to 7 billion by the year 2000. UN Department of Economic and Social Affairs (2017) reported in its newspaper report called the “World Population Prospects: The 2017 Revision” that world's population is projected that by 2045, will be 9.5 billion and by 2100 it will peak 11 billion. After the 19th century industrial revolution caused serious scale migrations from rural areas to urban centers. UN survey (2014) reveals in “2014 revision of the World Urbanisation Prospects” report that today, more than half of the world's population lives in urban areas and rural population decreases as urban populations continue to grow. Kramers et al. (2014) argues that in the near future, the human race will have to deal with challenges about the needs of growing urban population for sure, like housing, energy, transportation, infrastructure, as well as other needs like health, education etc. That is what makes urban design significant today and what will make city building skills much more significant in the future.

And in the near future as a result of running out of sources for providing these needs, sustainable and ecological urban design solutions will be crucial for us.

Crises

There have been some cases as milestones in which these degenerative societies, beginning with the industrial revolution, have since been forced to take lessons about ecological systems. Even some societies took lessons from that cases and started to care about sustainability many years before, and conservation laws have been put in place in the world, conferences, seminars given worldwide, on these issues, communities which had not experienced somehow or lived that situations still do not know the value of what treasure we have on this planet in our hands. And unfortunately, some of these communities are victims of the current capitalist system. We can mention the following cases;

- The consequences of air pollution in Donora, Washington County, Pennsylvania, US occurred at the end of the 1940s, caused the death of 20 people in 3 days. The significance of clean air on human life is understood. (Barr, 2008)
- As a result of water pollution caused by the industrial wastes in Cleveland, Ohio, United States, Cuyahoga River is burnt into flames at the end of 1960s. The importance of clean water on human life is understood. (Stradling & Stradling, 2008)

Today, however, air, soil and water pollution are still affecting the health of people of serious dimensions such as those of Beijing / China, Guiyu / China and Citarum River / Indonesia (Dasari et al., 2016).

John Wilmoth (2014), director of UN DESA, declares that managing urban areas has become one of the most important development challenges of the 21st century and their success or failure in building sustainable cities will be a major factor in the success of UN's annual development agendas.

2.1 Sustainability

As humans when we start to think about if there is another way of living than being consumerist in all directions, the word 'sustainability' is derived from 'sustain' and 'ability'. And it is firstly mentioned, accepted by UN as the use of today, as Sustainable Development in Brundtland Report in 1987: "development that meets

the needs of the present without compromising the ability of future generations to meet their own needs''. From this explanation for the last few decades sustainability affected many disciplines principally ecology, economics and sociology including the design of cities and the formations of the communities. Moreover, it became a very popular term, which is also that much prone to be misunderstood and to be abused. So we should initially get clear about the meaning of 'being sustainable'.

As mentioned in a permaculture lesson of Toby Hemenway in Duke University, published in 2010, when we use the words 'being sustainable' for example for a marriage or a relationship, that means it is not so good but it is just handling the situation for that moment. Correspondingly 'being sustainable' does not mean that we are doing something hilarious for today's or tomorrow's situation, indeed it means that it is crucial and inevitable for the continuity of life's itself.

Unfortunately as human beings in 21st century, our configuration is not able to be completely regenerative, but instead our tendency is being completely degenerative and dragging the world to an end as a result of man's 'ego'. And sustainability is between these two edges (being degenerative or regenerative), is just simply providing the continuity while meeting the needs of all organisms (Hemenway, 2010).

In other words, 'sustainability' means maintaining our lives, keeping our existence, while not reversibly consuming the nature and the sources that we have, considering/comprehending that soon we will have to share/leave this planet to next generations (Hemenway, 2010).

Needs

Mentioning maintaining our lives, keeping our existence as humans we have some principal needs. These needs are, in order, breathing (clean) air, drinking (clean) water, take nourishments, shelter, appropriate temperature, social relationships, security and so on...

According to Hemenway (2010), in consequence of our praxis/habitual actions, in contemporary situation and in today's society we may be struggling without a car, a house, a telephone, a computer or internet.

Only if we cannot reach one of the basic principal needs we mentioned above, none of them will make sense and come to mind, as in Maslow's (1943) theory of 'Hierarchy of Needs'.

Significance, Global Warming, Climate Change and Carbon Footprint

Degenerative communities, along with over population growth and urban migration, are destined to extinct in the future, failing to meet these needs in a healthy way, and perhaps worst; to suffer in a long term consequences. (Kellog & Pettigrew, 2007)

Beside the ecological local problems given in the ecology part, this misuse of planet for centuries also caused to global warming and climate change. As indicated in the journal 'Transactions of the American Clinical and Climatological Association' by Prudent et al. (2009) climate change science points to an increase in sea surface temperature, increases in the severity of extreme weather events, declining air quality, and destabilizing natural systems due to increases in greenhouse gas emissions.

One of the important issues is the rising levels of 'carbon footprint'. As Goodier (2010) explained, the carbon footprint is a measure of the total amount of Carbon Dioxide (CO₂) and other greenhouse gas emissions that are directly or indirectly caused by an activity, or which are accumulated over the life span of a product, person, an organisation, or even a city or state.

Not just using a vehicle is responsible for carbon footprints; we release toxic carbons while extracting the energy from underground, using all types of transportation, for refinements in factories, in other deliveries and any types of manufacturing. That means everything manufactured or distributed have a carbon footprint and more or less they have a negative impact on the planet (Schroeder et al., 2012). As a result, in urbanized areas like cities, it is an impossible target to reset the carbon footprint, but it is possible to reduce it in a significant amount.

In addition to this type of ecological crises, in 1973 the oil crisis emerged, people noticed that we would need a fuelless future eventually (Rebeggiani, 2012). In contemporary situation of urbanized areas, fuel means transportation of needs and in absence of fuel we cannot reach any of crucial elements and relatedly it threatens the life's itself (Dawson, 2006).

No more imagination is needed to see what future will bring. It is the right of every individual (even as a consequence, right of existing in the world) to live a healthier life (fresh air, clean water, even food access) by taking lessons from the mistakes, criticisms and such cases happened in the past.

Sustainability has three domains: economic, environmental and social sustainability (James & Magee, 2017). One of the most common mistakes today is to have ecological sustainability, while the same institutions, companies and communities have negative effects on economic and / or social sustainability. While supporting sustainable ecology, they should not reject their social responsibilities; they should be able to balance the three elements in ethical rules. It is a serious contradiction to ignore human, child and / or animal rights in order to conserve humanity and nature by making low energy consumption, and it cannot go beyond being just an ecological demonstration (Food and Agriculture Organization of the UN News, 2014).

To conclude our contemporary situation, we thought, developed, created, discovered, resulting with being 'industrial', 'capitalist', 'technological'. We became distant from the balance of nature and the world, we consumed, polluted. We criticized the consequences and learned from the results of these, but we must learn more, as we learn we must solve and apply. From now on, we must abandon capitalism and individual interests; we must all work to make the world more and more livable, healthier and qualified (Kellog & Pettigrew, 2007; Beddington, 2010; Rose, 2014).

In the following part of this thesis, the study focuses on people and communities that try to change this pessimistic view opposite.

2.2 Ecological and Sustainable Approaches in Urban Design

Ecological approaches in urban design are not new, they origin to old, even ancient times and got roots from basic concepts and principles of leading architects, designers (Spirn, 2012). Moreover, for the last century as a result of urban design's contemporary concerns repressed by the rapid ascending population growth, to ensure the livability of cities, a new era is born in urban design.

In urbanized areas, buildings and other artificial structures (built environment) are primarily responsible for the usage of planet's limited sources in high percentages. That is a key how urban design can change the world's future (Ren et al., 2018).

In design issues such as urban settlements, transportation decisions, building planning, solutions that provide functional and ease of use should be proposed in order to change the existing unsustainable habits (Sarkis et al., 2009).

This contemporary situation in planning set a stage for the birth of approaches that take place around the term 'ecological urbanism' which design criterias are mainly based on ecology and sustainability in urban planning (Ruano, 1998).

In this initial descriptive part of the study, ecological and sustainable approaches in urban design are plainly reviewed.

From the beginning, ecological urbanism is born, developed or led by significant people such as Hippocrates, Vitruvius to Frederick Law Olmsted or Ebenezer Howard, from Patrick Geddes, Lewis Mumford to Ian McHarg, Kevin Lynch or Jane Jacob and many more recent researchers, thinkers or designers that reaches today Spirn (2012). In her essay written for publication as a chapter in Resilience in Ecology and Urban Design, Spirn (2012) summarizes roots of '*Ecological Urbanism*'. She claims that ecological urbanism is a broad approach to urban design and planning; related to it are aspects of multiple interrelated movements: ecological design, environmental art, landscape planning, sustainable design and planning, green architecture, green infrastructure, green urbanism, landscape urbanism, and industrial ecology.

In the previous studies (Figure 2.1), we see many concepts and approaches related to ecological urban design following more than two thousand years. These main constituent concepts and approaches initially were mostly individual; they promoted health, safety, discussed orientation of buildings and streets, relation of them with sun and wind, character of place, human improvidence in earth, addition of green areas such as urban parks.

Figure 2. 1 : Timeline of Ecological Urbanism (Spirn, 2012)

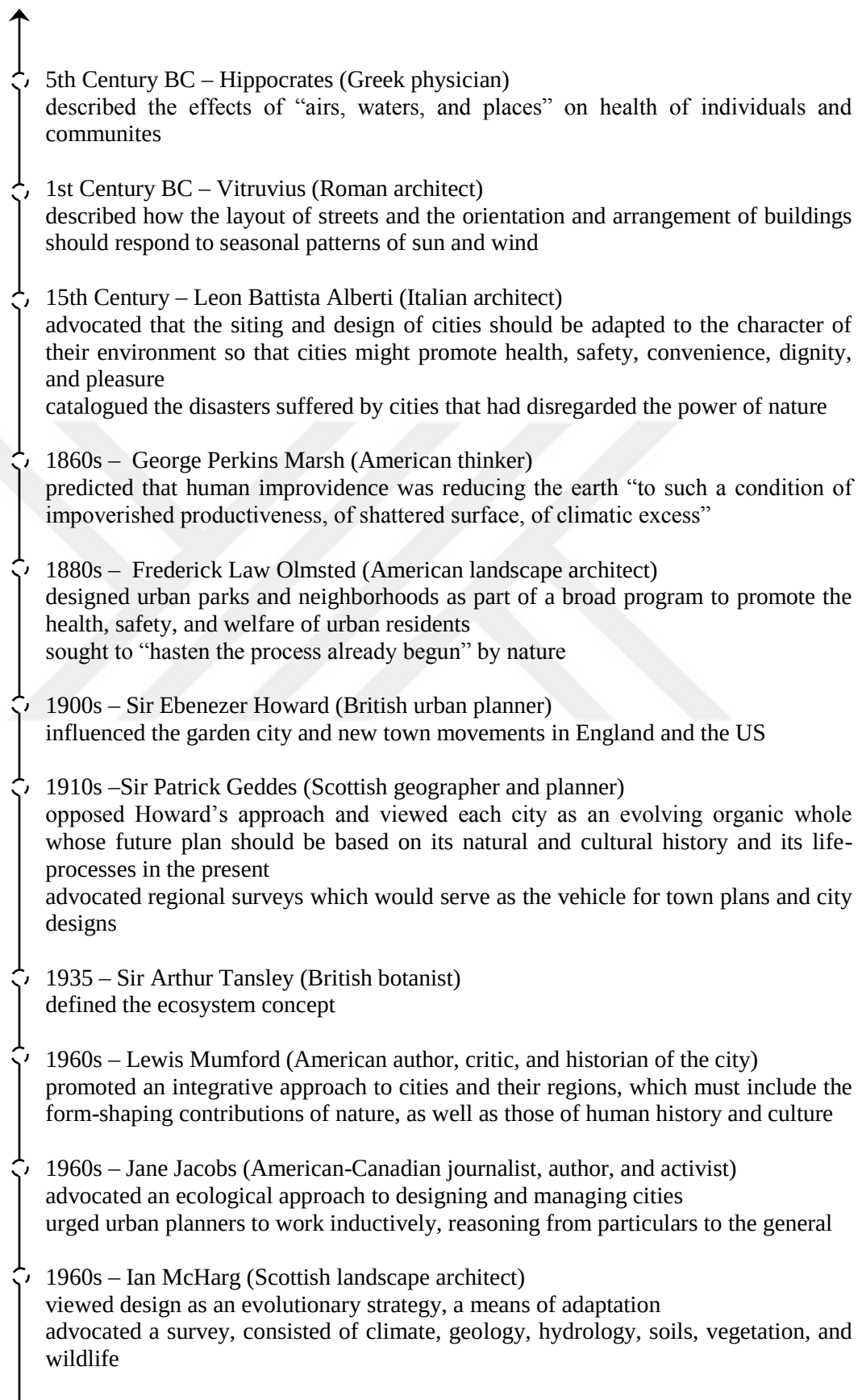
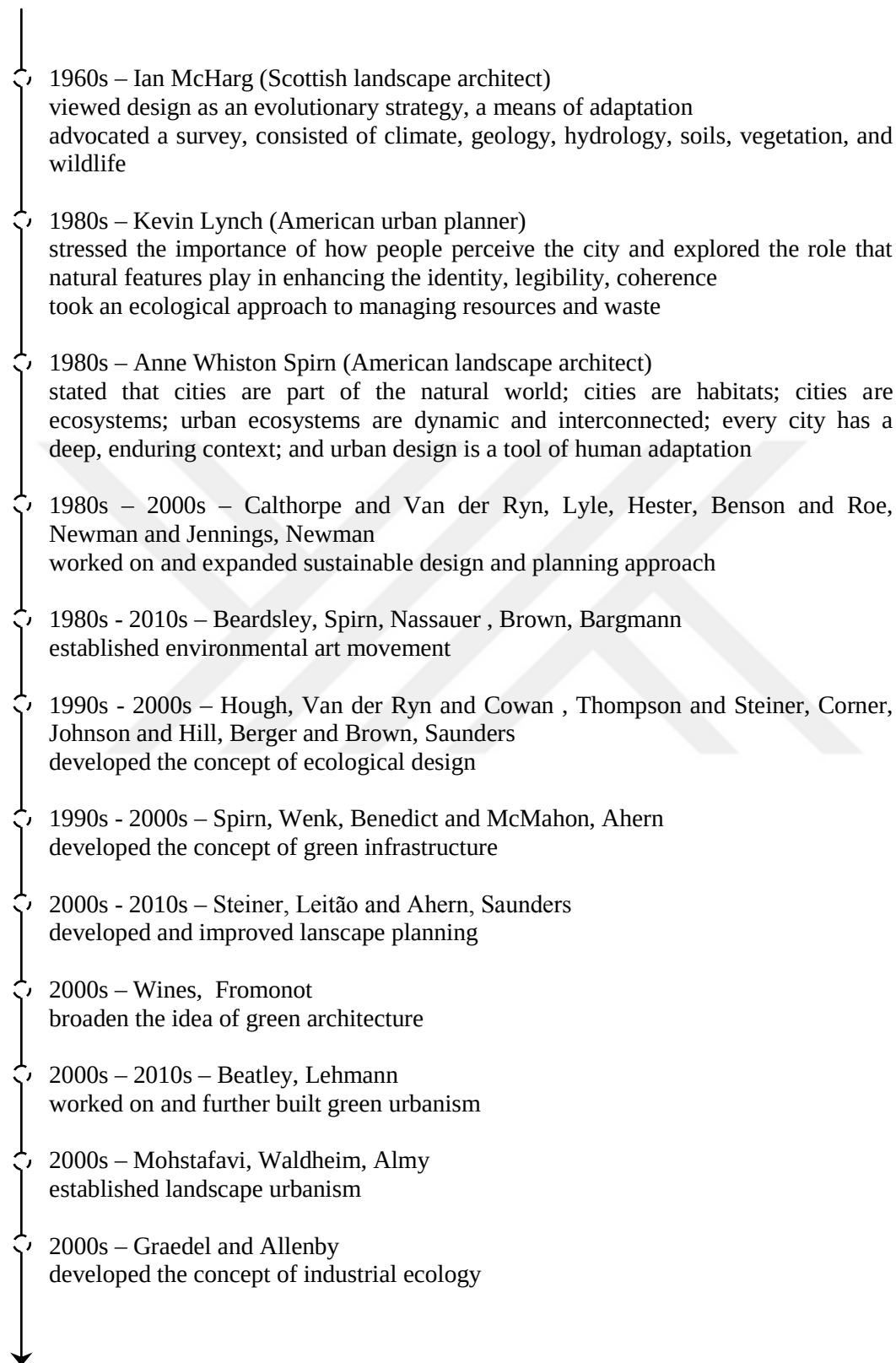


Figure 2. 2 (continued): Timeline of Ecological Urbanism (Spirn, 2012)



As ecological urban design continues to develop, the concepts and approaches became more multi-disciplinary; discussing and promoting much more of the earlier studies such as natural and cultural history, garden cities and new towns, natural and cultural history of organic cities, significance of earth's ecosystems, contributions of nature (including climate, geology, hydrology, soils, vegetation and wildlife), perception of cities, identity, legibility, coherence, managing resources and waste, urban ecosystems, sustainable design and planning, environmental art, ecological design, green infrastructure, landscape planning, green architecture, green urbanism, landscape urbanism and industrial ecology.

Eco-village movement differs from this timeline in a way. As a term, it has a very old origin but can be examined from 60's and 70's, with the burgeoning green movement (Lucas, 2006). After 80's, with the rise of ecological anxiety and understanding the importance of sustainability, by some conscious and active communities, eco-village movement emerged (Dawson, 2006). This movement pursued immediate action and the villages are settled by activist founders around the world, in different times and without knowledge of one another at first.

Spirn (2012) concludes with stating ecological urbanists' role is essential, besides producing safer and healthier urban habitats, they also should make legible and tangible the systems that support life and change the perception of what is possible.

Since the contemporary aim in literature of ecological urban design is to produce safer, healthier urban habitats, make legible and tangible ecosystems and change the existing perception and getting this knowledge to action. In this thesis, eco-village initiatives found adequate to be examined and appraised for actualization processes of future ecological and sustainable urban designs.

Designing for ecological systems and sustainability

If we can intelligently combine urban design and architecture with morphology, science, and typology as elements, if we can benefit from past / future and tradition / technology, we can arrive at a number of conclusions that will not cause any extra damage to the natural balance and could also reduce the energy expenditure potential and the embodied energy (Griffin et al., 2010; Dawson, 2006; Hemenway, 2010; Walker, 2016).

Architectural design can contribute for ecological systems and sustainability by these titles (Kellog & Pettigrew, 2007; Griffin et al., 2010):

- Reducing energy consuming (use of passive solar energy, heat exchanger, capturing/keeping the heat with isolation techniques in warm climates, use of passive ventilation, keeping the heat outside in order to reduce cooling system dependency in cold climates and using natural lighting etc.)
- Renewable energy (use of photovoltaic solar panels, wind tribunes, low carbon release)
- Embodied energy of the structure (natural, reusable, reversible, recyclable use of materials, low energy consumption for transportation, production, removal, destruction stages)

Urban design can contribute for ecological systems and sustainability by these titles (Ghavami, 2005; Jou, 2012; Dawson, 2006; Mollison, 1991; Hemenway, 2010; Seçkin, 2018):

- Transportation arrangements (determination of road level suitable for topography, reduction of automobile-based urbanization, use of public transport, planning walkable and cycle-able areas, improving mobility) (reducing carbon emissions and carbon foot print)
- Control and reduction of electricity consumption and use of electricity generation which does not harm nature and any communities
- Use of sun and wind data and requirements for lighting and air conditioning systems (use of passive and active systems)
- Beware of unnecessary non-permeable surface applications as concrete and asphalt, land/soil conservation
- Recycling waste organization
- Reuse of materials and use of the local elements and materials of traditional structures in planning and construction
- Permaculture assimilation

While we are applying these rules, organisms, social structure, culture, history must be underestimated as well (Mollison, 1991; Walker, 2016).

3. ECO-VILLAGES

In this part of the study, eco-village concept is elaborated. Initially, in order to understand the ecovillage concept, associate concepts; sustainable communities and permaculture are reviewed. Further definition and birth of the ecovillage concept, the Global Ecovillage Network is also investigated.

3.1 Sustainable communities

By the world's awareness of ecological and sustainability concerns some communities are born and raised. Maryland Department of Planning (2019) summarizes the aims of these sustainable communities' as "to conserve resources; providing green spaces and parks for recreation and especially for agriculture; offering many options for transportation; using natural and cultural resources wisely for future generations and considering the social and economic needs of all residents".

Sustainable Communities Act (2010) and Sustainable Community Network (2019) emphasizes the significance of creating and maintaining community's economic and environmental health, promoting social equity and fostering broad-based citizen participation in planning and implementation to keep it really sustainable. In sustainable communities some important entities like job creation, energy use, housing, transportation, and education and health supplements should work as a whole of a piece. Sustainable Communities Network believes that with this way communities can be 'healthier, safer, greener, more livable and more prosperous'.

Power (2003) described there are three core aims of sustainable communities; a healthy environment, a prosperous economy and social well-being.

In this thesis, 'ecovillages' as one of the most important ecological and sustainable communities which is situated in all parts around the world, who try to make the life changing movement that mentioned above, is analyzed and examined.

3.2 Permaculture

Permaculture is a way of life and a significant approach to survive used in many ecovillage initiatives as well; it is even a primer principle in some of them that gives the settlement its name (eg. Crystal Waters Permaculture Village) (Garden, 2006). This lifestyle gives us a change to live in a sustainable way (Hemenway, 2010). Permaculture is a systematic method firstly mentioned by Joseph Russell Smith in late 20's, and coined in Australia in 1978 by Bill Mollison and David Holmgren (Henkel, 2015). The need of permaculture became to surface because of human destruction to lands and sources. It is derived from soil, food, nature, people relations. In Permaculture Magazine (2015), it is explained as 'a practical method of developing ecologically harmonious, efficient and productive systems that can be used by anyone, anywhere'.

The three core tenets of permaculture are (Mollison, 1988; Holmgren, 2002) (Figure 3.1):

1. Care for the earth: Provision for all life systems to continue and multiply. This is the first principle, because without a healthy earth, humans cannot flourish.
2. Care for the people: Provision for people to access those resources necessary for their existence.
3. Return of surplus: Reinvesting surpluses back into the system to provide for the first two ethics. This includes returning waste back into the system to recycle into usefulness.

In addition to core tenets, there are twelve Permaculture design principles articulated by David Holmgren (2002) in his book 'Permaculture: Principles and Pathways Beyond Sustainability' (Figure 3.1):

1. Observe and interact: By taking time to engage with nature we can design solutions that suit our particular situation.
2. Catch and store energy: By developing systems that collect resources at peak abundance, we can use them in times of need.
3. Obtain a yield: Ensure that you are getting truly useful rewards as part of the work that you are doing.

4. Apply self-regulation and accept feedback: We need to discourage inappropriate activity to ensure that systems can continue to function well.
5. Use and value renewable resources and services: Make the best use of nature's abundance to reduce our consumptive behavior and dependence on nonrenewable resources.
6. Produce no waste: By valuing and making use of all the resources that are available to us, nothing goes to waste.
7. Design from patterns to details: By stepping back, we can observe patterns in nature and society. These can form the backbone of our designs, with the details filled in as we go.
8. Integrate rather than segregate: By putting the right things in the right place, relationships develop between those things and they work together to support each other.
9. Use small and slow solutions: Small and slow systems are easier to maintain than big ones, making better use of local resources and producing more sustainable outcomes.
10. Use and value diversity: Diversity reduces vulnerability to a variety of threats and takes advantage of the unique nature of the environment in which it resides.
11. Use edges and value the marginal: The interface between things is where the most interesting events take place. These are often the most valuable, diverse and productive elements in the system.
12. Creatively use and respond to change: We can have a positive impact on inevitable change by carefully observing, and then intervening at the right time.

Permaculture is an innovative framework for creating sustainable ways of living including water resources management, regenerative, self-maintained habitat and agricultural systems modeled from natural ecosystem (Rhodes, 2012).

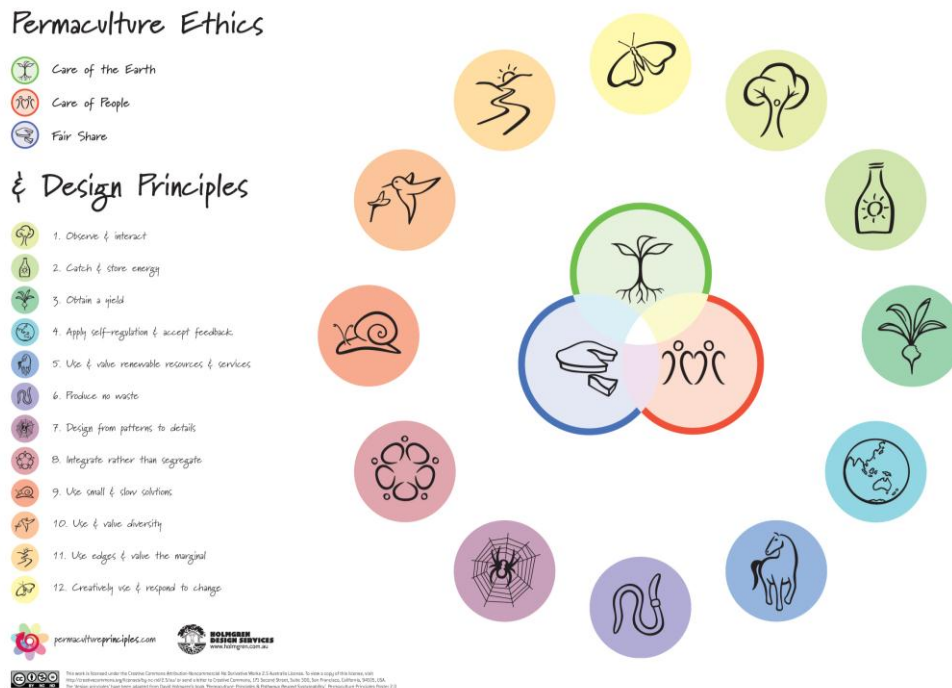


Figure 3. 1: Permaculture ethics & design principals (David Holmgreen, 2002).

From another point of view, Whaingaroa Environment Centre (WEC) (2018) explains permaculture as an integrated system of design that encompasses not only agriculture, horticulture, architecture and ecology, but also economic systems, land access strategies and legal systems for businesses and communities (Figure 3.2; Figure 3.3).

According to Hopkin's (2008) permaculture has some main aims as (from 'The transition handbook'):

- Providing our current needs
- Bringing decency and dignity to all people, (with the awareness of sufficient, the release of eager and learn to share)
- Assuring abundance for future generations
- Repairing the damage to our planet
- Reversing / Retarding Global Warming etc.

Geoff Lawton (2008) advocates that the entire world's problems, all the pollution problems, and all the supply line (nutrition) can be solved just in a garden. In fact, people do not know that and that makes most people very insecure.



Figure 3. 2 : Photographs refers to the permaculture concept (by author).



Figure 3. 3 : Photographs refers to the permaculture concept (itu24.com).

Wilson (2010), from Midwest Permaculture & Transition Town Initiatives, declares permaculture approach can be done in four ways of design; 1. Rural/Farming, 2. Suburbs, 3. Cities, 4. Commercial-Public, in their webinar series of Permaculture Design Certification (PDC) Courses.

City developments and population in urbanized areas made the need of transformation mandatory. Wilson adds that gardening in the city is one of the most revolutionary things that you can do and he gives such examples as Chicago building rooftops, Portland building rooftops, Gary Comer Youth Center's rooftop in Chicago, walls of Chicago Botanic Gardens, façade of Chicago Green Center for Technology.

Permaculture applications in urbanized areas target to regenerate communities, societies of big cities with the principles of permaculture with the collaboration of land, water, culture, fauna and flora all together.

Urban permaculture can be applied to where ever there is a soil and sunlight. Like all types of gardens, educational buildings' empty lots, public areas, apartments' terraces, balconies, roof tops even façades or streets we can have edible, different scale of gardens with respect to all other species including humans. (Wilson, 2010, Anger, 2013)

Sepp Holzer (2013) in the foreword of Judith Anger's book 'Edible Cities', stands up for we should all be 'urban gardeners' because the food origin now has importance, 'back to nature', 'pure and natural' or 'inspired by nature' labels and slogans are now trends, but there is no better way of knowing the origin of our food than growing it ourselves.

Besides these pessimistic approaches, there are also some contrary, questionable ideas about permaculture.

Hablutzel (2011) argues "permaculture has yet to gain a large amount of specific mainstream scientific acceptance," and that "the sensitiveness to being perceived and accepted on scientific terms is motivated in part by a desire for permaculture to expand and become increasingly relevant".

In his books 'Sustainable Freshwater Aquacultures' (2006) and 'Farming in Ponds and Dams' (1995), Nick Romanowski expresses the view that the presentation of aquaculture in Bill Mollison's books is unrealistic and misleading.

3.3 Definition and Birth of Ecovillages

Although the term of 'eco-village' has a very old origin (Dawson, 2006), it should be examined from the late 80's in order to define the concept's contemporary meaning as it is used today.

Eco-village movement is an intentional communal living, according to Lucas (2006) linked with the burgeoning green movement of the 60's and 70's.

Jonathan Dawson (2006), in his book 'Eco-villages: New Frontiers for Sustainability' mentions that, in 1970's people had the highest quality of life and from that times, the quality of life decreased decade by decade the increasing levels of total income of countries.

After 80's analysis of the global ecological footprint showed that we do not live in a sustainable environment with renewable sources anymore, and instead we stand already above the earth's self-renewal capacity and we are consuming its natural capital. In consequence of these, it is noticed that holes in ozone layer emerged, some species have gone extinct, destruction of land caused depletion of natural sources and

all of these negatively affected natural ecological balance of the planet (Dawson, 2006; Kellog & Pettigrew, 2007; Hemenway, 2010).

In these years of enlightenment, Hildur Jackson, a Danish activist, shared a 'co-housing model' idea which has some internal problems and could not succeed in a long term. After she realized it was not able to be fully effective for this situation, with her husband Ross Jackson, they founded 'Gaia Trust' which has a mission statement of 'bringing nature and people together' in 1987 in order to make radical experiments on living ecological samples (Jackson, 1998).

In almost the same years, from another part of the world, 'in context' magazine owner and editor, Robert Gilman and his wife Diane Gilman, investigated sustainable living communities and published the brightest ideas that they found (Garden, 2006).

Gaia Trust noticed Gilman's works and hired them in 1990 for conducting a fieldwork on sustainable communities (Garden, 2006). This collaboration of two active initiatives can be seen as a stepping-stone for the appearance of 'contemporary eco-village movement'.

In 1991, Gilman's report 'Eco-villages and sustainable communities' is published. They underlined the most successful and effective international applications. In addition, they made proposals to give the effective support to them. This report has importance of being the first publication on especially ecovillages and defines the word comprehensively. The main idea and purpose of the report was to make a synthesis from the best practices (Jackson, 1998).

Gilman (1991) defined 'an ecovillage' in in-context magazine as 'human-scale full-featured settlement in which human activities are harmlessly integrated into the natural world in a way that is supportive of healthy human development, and can be successfully continued into the indefinite future'. She also mentioned the six significant challenges of eco-village concept (Figure 3.4):

1. The bio-system challenge (preserving natural habitats, producing food, wood, and other bio-resources, waste managing, avoiding adverse environmental impacts)

2. The built-environment challenge (building with ecologically friendly materials, using renewable energy sources, handling the wastes from buildings in an ecologically friendly manner, having a minimal need for motorized transport, building in ways that have a minimal impact) (having a good balance of public space and private space, encouraging community interaction and supporting a full diversity of activities)
3. The economic system challenge (developing sustainable economic activities, sustaining the members of the community, holding parts of the community in common or private, handling the ownership of land, being economically and ecologically efficient as to reduce both expenses and environmental impact, developing business organizations, using alternatives and/or support to the money economy)
4. The governance challenge (setting up decision making authorities/methods, solving conflicts, enforcing decisions by the community, defining roles/expectations of leader-ship, relation to the government(s) in the surrounding community)
5. Glue challenge (providing unity and diversity, defining expected values, behaviors, or practices, sharing, discovering, developing and evolving a vision, specifying and developing closeness of the group interpersonally, interrelating with others outside)
6. Whole system challenge (dealing with all other challenges and stressful processes of sustaining the community)

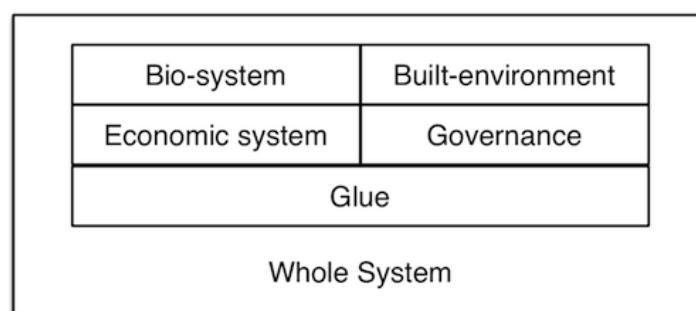


Figure 3. 4 : Eco-village challenges (Gilman, 1991).

After Gilman's report it is seen that creating an ecologically sustainable village is not satisfactory to solve the problem for becoming a sustainable community.

After Gilman's report, in Denmark, in 1991, twenty pioneer leaders of sustainable movement attended a meeting, which accelerate the eco-village movement spread and develop more (Dawson, 2006).

In 1992, Michael Boddington was commissioned to prepare a report on 'Technologies for Life, Sustainable Technologies for Ecovillages'. This report gave Gaia Trust encourage to establish the 'Gaia Technologies'. The aim of the company was to lead the development of intermediate technologies that could meet the needs of ecovillages of north and south (Dawson, 2006).

In 1994, with the support of Gaia Trust, first ecovillage training center founded in Farm Ecovillage, located in Tennessee, US (Levinson & Christensen, 2003).

In 1995, first conference based on ecovillages, 'Ecovillages and Sustainable Communities for the 21st century' was held with the participation of 400 people, in Findhorn Ecovillage, Scotland (Dawson, 2006).

In 1996, 'Global Ecovillage Network' (GEN) is inaugurated in United Nation's 'HABITAT Conference on Human Settlements' in Istanbul. GEN describes itself as 'a global confederation of people and communities that meet and share their ideas, exchange technologies, develop cultural and educational exchanges, directories and newsletters, and are dedicated to restoring the land and living 'sustainable plus' lives by putting more back into the environment than take out'(GEN, 1996).

Global Eco-village Network (GEN, 2018) represents ecovillages as 'living laboratories that united in their actions pioneering beautiful alternatives and innovative solutions' and describes them as 'intentional, traditional, rural or urban communities, which are consciously designed through locally owned participatory processes in all five dimensions of sustainability (social, culture, ecology, economy and all systems design) to regenerate social and natural environments'.

According to Lucas (2006), ecovillages are micro-communities living the lifestyle of post-consumerism, which already have the positive feedbacks from that simplified lifestyle.

Ecovillages mainly supports sustainability, locality, source managements, regenerative, productive societies & lifestyles, reduction of ecological footprint & low carbon emission, modern energy efficiency technologies, as they are against separated and estrangement communities, environmental damage, climate change & global

warming, industrialization, degenerative, consumerist societies & lifestyles (Jackson, 1998; Dawson, 2006; Lucas, 2006; Rose, 2014; Henkel, 2015; GEN, 2018) (Table 3.1).

Table 3.1 : Supports & Againsts Table of Ecovillages (Jackson, 1998; Dawson, 2006; Lucas, 2006; Rose, 2014; Henkel, 2015; GEN, 2018).

SUPPORTS	AGAINSTS
Sustainability	Separated and estrangement communities
Locality	Environmental damage
Source managements	Climate change & global warming
Regenerative, productive societies & lifestyles	Industrialization
Reduction of ecological footprint & Low carbon emission	Degenerative, consumerist societies & lifestyles
Modern energy efficiency technologies	Conventional food system & agriculture
Modern/industrial information combined with traditional information	Toxic substances and methods (in agriculture and industry)
Vibrant social structures	Capitalism
Diversity	Globalization
Low-impact, high-quality lifestyles	Malnutrition
Cross cultural outreach	Ignorance
Resilience	
Permaculture	
Organic and local food, materials, products	
Natural, vernacular buildings & environments	
Preservation of wildlife habitat	
Self-efficiency	
Communal living	
Education & evolution & research	
Culture and spirituality	
Post-agriculture	
Post-industrialism	
Free and responsible media	
Harmony of human and nature	
Human rights & equality & social justice	
Traditional, experienced knowledges	
Consciousness	

Some researchers claim that existing traditional villages have the ecological lifestyle. There are many things that ecovillages have already learned or will learn from them however, ecovillages are one-step beyond in terms of educational and evolutionary levels, implementation of permaculture elements, natural and renewable source usage, social interactions, equality of people etc. (Dawson, 2006).

Dawson (2006) adds as eco-villagers are usually in the search of same ecological, social-economic and cultural spiritual values. These values are what make them stay together strong. Eco-village communities are in the search of creating peaceful and equal communities besides ecology and sustainability; they see this as a probably the only way to survive in this 21st century's world (Rose, 2014). They can be called 'conscious and active groups of people' who do not want to wait for a policy or technology solving environmental problems including climate change and other issues related to the destructions of human dominance (Dawson, 2006). Besides ecological and environmental problems, destructions and their serious outcomes, global or local threads as poverty, diseases, wars, estrangement, crime, depression, drug addiction, suicide rates etc. can also be prevented with the lessons we got from ecovillages (Dawson, 2006; Rose, 2014).

3.4 Ecovillages of Global Ecovillage Network (GEN)

GEN is a registered charity, which has the main aim of promoting the evolution of sustainable settlements all around the world from its foundation until today, it also promoted new initiatives as planned. It was difficult to control from one head office the whole world so GEN separated into three main branches (ENA, GENOA and GEN Europe), which is currently 5 branches as (GENOA, GENNA, CASA, GEN Europe and GEN Africa). This separation increased range and facilitated the communication (Figure 3.5) (GEN, 2018).

GEN (2018) categorizes EV into three general categories:

- **urban** – communities or eco-neighborhoods with a common vision to reinvent life in the city to become more sustainable, collaborative and participatory;
- **traditional** – existing rural villages and communities that decide to design their own pathway into the future, using participatory processes to combine life-sustaining traditional wisdom and positive new innovation
- **intentional** – created by people who come together afresh with a shared purpose or vision.’

Kunze & Avelino (2015) describes GEN as active in education, networking and information dissemination with political organisations like the EU and UNESCO.

In the following part of this thesis, (ten) eco-village cases, which are predicted to be able to give direction to neighborhood design, were discussed in details. Having variable locations like being a part of different and diverse geographical circumstances, nations, local and cultural acquisitions, histories, scales, populations were the main factors that have influenced the choice to pick these locations. However, in somehow, despite all the differences they have been dealing with, they all stand for the same critical vision of saving the earth, living in peace. On the other hand, the variations that they have (differences of climate, flora, fauna, socio-cultural structure, economy etc.) provide us to make comparisons between each other.

The factors that affected the selection of cases are; having impacts to ecology, sustainability, having some unique specialties, leaderships, successes (in ecovillages or globally), guidance for the future. The ecovillages which were selected in this context were examined in twenty parameters categorized in seven titles, which is claimed to be effective in ecological and sustainable neighborhood design.

The information about ecovillage samples were taken from the books, magazine articles, the ecovillages’ official web sites or and especially from the organizations such as GEN (Global Ecovillage Network) and FIC (Fellowship for Intentional Community).



4. CASE-STUDIES

4.1 Cases

In this part of the study, 10 cases worldwide: Auroville (India), Findhorn Eco-village (Scotland), Ithaca EV (New York, US), Damanhur (Italy), Crystal Waters Permaculture Village (Australia), Sieben Linden EV (Germany), MBAM (Senegal), The Farm Ecovillage (Tennessee, US), Marmariç Permakültür (Turkey) ve Dutlar Köyü & İmece Evi (Turkey) are investigated and compared. Cases are determined by the comparison of locations like being a part of different continents, nations or having some unique specialties and with factors as having impacts to ecology, sustainability, and guidance for the future.

Twenty suggested parameters, categorized in seven titles, are examined for each selected eco-village. The parameters are determined by following ecological, social, sustainable and economic solutions of eco-villages in the literature, which can relate with neighborhood design.

4.1.1 Auroville

Year/Location/Size/Population (<https://www.auroville.org>)

Auroville is founded in 1968. It is situated in southern India near the city of Pondicherry. The area of the village is about 546 hectares and its current population is approximately 2500 inhabitants.

Significance in all Eco-villages/Unique Features (Dawson, 2006)

Auroville is accepted as the most famous and successful eco-village in the world. It has a significant spiritual-orientation as the entire purpose and nature of the settlement is based on the central meditation hall, Matrimandir (Figure 4.1).



Figure 4. 1 : Matrimandir (center meditation hall) and an aerial view from around the world (<https://www.auroville.org>).

The eco-village aims to create an ideal town experiment dedicated to the unity of people. In the beginning of foundation, soil transferred from 124 countries was added to Auroville's soil and UNESCO approved this as collaboration of cultures.

Food Production/Waste Management/Water Management

(<https://www.auroville.org>)

All dairy products, half of fruits and vegetables consumed in the eco-village are produced by inhabitants in organic ways. There is a seed bank available that contains various seeds of vegetables and trees. Waste water is recycled and more than 60 natural waste water treatment systems are in use in Auroville. Most recycling systems combine a pre-treatment device, a main treatment planted filter, and a post-treatment holding facility, usually consisting of one or more ponds. Waste water treatment systems used include CSR, Aqua engineers, and others. Soil erosions prevention is important and provided by water dams and dikes.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(<https://www.auroville.org>)

The first inhabitants used windmills for energy; however, current energy systems include renewable energy systems like wind, solar, biomass (Figure 4.2; Figure 4.3). It is the biggest alternative energy center of India.

Design and management of building infrastructure is important, as the buildings are integrated with rainwater harvesting systems, domestic waste water treatment plants and for energy demands renewable energy systems are integrated to the buildings as well.



Figure 4. 2 : Biomass and rain harvesting natural water management systems
(<https://www.auroville.org>).



Figure 4. 3 : Solar energy systems (<https://www.auroville.org>).

Architecture is expressed by the dreams and aspirations of a nation or a community and Auroville stands as an expression of its core values in matter.

The eco-village covers various aspects of architecture, and includes building materials, building technology, eco-friendly architecture, climate responsive designs, integration with natural surroundings, cost-effective buildings, geomancy and geometry, as well as the design of spaces themselves, including experimenting with the lifestyle of the user (Figure 4.4).



Figure 4. 4 : Architectural styles and materials of Auroville
(<https://www.auroville.org>).

Materials like straw, terracotta and water are used for construction. It values technologic solutions and uses technology for lighting systems and solar energized water pumps, which are exported to North India by the partnerships of inhabitants with various companies (Figure 4.5).



Figure 4. 5 : Cooperative construction with eco-friendly materials
(<https://www.auroville.org>).

Public Space/Social Life/Transportation (Dawson, 2006)

The main center of Auroville houses the huge meditation dome called Matrimandir which is a great landmark of the eco-village. Around Matrimandir there is the surrounding gardens in the central Peace Area, which are open to the public by appointment. Radiating from this center are four "zones" of the City Area: the "Residential Zone", "Industrial Zone", "Cultural (& Educational) Zone" and "International Zone".

Around the City or the urban area, lies a Green Belt, which is an environmental research, and resource area that includes farms and forestry, a botanical garden, seed bank, medicinal and herbal plants, water catchment bunds, and some communities. Trees are used as space creators and there are more or less 2 million trees in Auroville (Figure 4.6). Electrical cycling is supported and the residents avoid motor vehicles.



Figure 4. 6 : Trees, bushes and stones as space creators

(<https://ourworld.unu.edu/en/>).

Values of Society/Educational Values (Dawson, 2006)

Common values and spiritualism is at the heart of community, which holds it as a whole. Meditation is the one powerful value and activity that brings society together (Figure 4.7). The philosophy of the Mother and Sri Aurobindo, and consequently the birth of Auroville, is based on the belief that Humanity is not the last rung of the terrestrial creation. Evolution continues and man will be surpassed. It is for each individual to know whether he wants to participate in the advent of the new species. For those who are satisfied with the world as it is, Auroville obviously has no reason to exist.

The community has a research center called ‘Auroville Center for Scientific Research’ which is an international voluntary organization and has had important contributions to the field of renewable energy systems (wind, solar, biomass), appropriate architecture & building technologies, waste water recycling and sanitation, and the transfer of these technologies through training programs.



Figure 4. 7 : Meeting around Matrimandir (<https://spiritegg.com/>).

Economy/Currency (<https://www.auroville.org>)

In Auroville, all incomes are collected in a common pool. The eco-village has 125 initiatives exporting technologies related with the fields of construction, energy, waste management technologies alongside the fields of arts and crafts and food production.

Instead of paper and coin currency, residents are given account numbers to connect to their central account. Visitors, however, are requested to get a temporary account and an Aurocard (India Times, 2016).

4.1.2 Findhorn Eco-Village

Year/Location/Size/Population (<https://www.findhorn.org>)

Findhorn Eco-village is founded in 1985. It is located in North East Scotland, UK. The area of the village is about 42 hectares and it has approximately 400 inhabitants.

Significance in all Eco-villages/Unique Features (Dawson, 2006)

Findhorn has developed a unique, environmentally sound, energy efficient construction system using natural materials. One of its most significant features is having a special society banking system and currency. The eco-village has a focus on healthy lifestyles, preventative healthcare, or complementary medicine.

Food Production/Waste Management/Water Management (Dawson, 2006)

The villagers' farming system, EarthShare, based on organic and biodynamic farming methods, was established in Findhorn to increase their use of local produce as well as to enhance the quality of their food (Figure 4.8). Farms of the eco-village cooperate with its market gardens and spread over three sites. They currently provide much of the community's temperate vegetables requirements as well as supplying 140 individual households. EarthShare also joins in the efforts to raise public awareness of the dangers of genetically modified foods. Organic cheese, eggs and meat are produced for the community and bioregional consumers by its farms. With cows, sheep, chickens and dairy facilities, the farms are providing solutions to reduce food miles, while combining the best of traditional methods with 21st century technology.

Living Machine is an ecologically engineered sewage treatment plant. It is used and designed to treat sewage from 500 inhabitants. (Findhorn Foundation, 2000-2017)



Figure 4. 8 : Greenhouses of Findhorn (<https://www.findhorn.org>).

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Dawson, 2006; <https://www.findhorn.org>)

Numerous homes and community buildings incorporate solar panels for hot water heating. Findhorn's foundation has installed their own 75 kW wind turbine at the Park and commissioned three additional wind turbines, which now supply all of the Park's electricity (Figure 4.9).



Figure 4.9 : Wind tribunes and solar panels (<https://www.findhorn.org>).

Findhorn currently has 56 ecological buildings erected on the Park site. Initially, the settlements begun as caravans, many of them in poor condition, that are still used by many residents today. As a result of caravans not being very suitable for long term living, the community split into different developments. The eco-village has a variety of housing options: some houses are made from old whisky barrels, straw bale, and

tires (Figure 4.10). In the last few years Findhorn decided that the best houses for the climate and affordability are timber frame with high insulation.



Figure 4. 10 : Housing types of Findhorn (<https://www.selfbuild-central.co.uk/>).

Public Space/Social Life/Transportation (<https://www.findhorn.org>)

The eco-village has a ‘Community Centre’ in which community meetings are held. It has a sunny garden, and includes a kitchen, a dining room and space for social occasions (Figure 4.11). Findhorn’s Foundation runs three buses for the residents and guests who want to travel.



Figure 4. 11 : Community gathering (<https://www.findhorn.org>).

Values of Society/Educational Values (<https://www.findhorn.org>)

Findhorn Eco-village seeks to understand ‘the soul of place’.

‘Living machine’, the sewage system, provides a research and educational facility to promote ecological water treatment technology throughout the world.

The village promotes it as ‘working with the intelligence of nature’.

Economy/Currency (Dawson, 2006; <https://www.findhorn.org>)

Findhorn's foundation consists of people who work within 'the Park' and some private residents who have built their homes on the site. It runs almost 200 week-long courses every year, as well as conferences and training sessions. There are other businesses that are on the site and these include publishers, a café, printers, charities and arts and crafts. Its education programs provide the main revenue for income. The eco-village supports growing private businesses, private land ownership and wealth, alongside co-workers on very low wages. There is no obligation to share personal money.

Findhorn has its own local currency – Eko – which helps keep wealth in the region.

4.1.3 Ithaca EV

Year/Location/Size/Population (<https://ecovillageithaca.org>)

Ithaca EV is founded in 1991. It is situated in northern NY, United States. The area of the village is about 70 hectares and it has approximately as 160 adults and 60 children, totally 220 inhabitants.

Significance in all Eco-villages/Unique Features (Dawson, 2006)

Ithaca EV is the most famous eco-village in North America and it has a significant contribution of cohousing experience (Figure 4.12; Figure 4.13).



Figure 4. 12 : Settlement plan of common houses/co-houses
(<https://ecovillageithaca.org>).

The village has many remarkable studies on education and is pioneer on developing partnerships with local education institutions.



Figure 4. 13 : Settlement plan and an aerial view of common houses/co-houses (<https://ecovillageithaca.org>).

Food Production/Waste Management/Water Management (Dawson, 2006; Walker, 2005; <https://ecovillageithaca.org>)

The ecovillage has three organic farm areas (which covers %95 land of the ecovillage with pastures, forests, wetlands) which use permaculture principles. Farms are able to feed 1000 inhabitants a week with its organic vegetables and fruits. With the help of permaculture principles, tree planting and species selection is vice, on the edges where meadow meets forest. The settlement has community garden plots for all families and most of the food production is produced in the appropriate season.

One of Ithaca's farms; operating on 10 acres of EVI land, West Haven Farm sells produce at the local farmers' market and through its CSA (Community Supported Agriculture) and has been a significant model in organic farming (Figure 4.14).



Figure 4. 14 : West Haven farm with biodiversity (ecovillagebook.org).

In Ithaca for the purpose of saving water supply and managing waste, some houses have dry compost toilets and the others have flush system that use limited water. In addition to this, binary pipe system exists in houses, toilet wastes and other wastes separate by this system.

In water management, lakes have importance in terms of preventing floods and droughts, they also create wildlife habitats (with woods and wetlands), support biodiversity as they are also used for fishing and swimming.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Dawson, 2006; Walker, 2005; <https://ecovillageithaca.org>)

In Ithaca, solar PV panels are used as a green energy source. On the other hand, the passive solar design provides most of their space heating, with backup from tube solar collectors, which also provide hot water. In the village in order to conserve energy, hyper-efficient energy technologies are used as sharing hot water and heating facilities connecting with 4 energy centers (including natural gas systems). Moreover, a smart metering system that allows residents to monitor daily energy use and track energy usage over time, helping them to conserve energy.

The architectural and physical design, the layout and features of the homes and community advance the eco-villagers' goal to exemplify a 'new' way to live optimally and sustainably on the planet and with each other, by reducing (energy) consumption while encouraging social interaction. For this aim houses clustered and walls are insulated for minimum heat loss in winter, homes were designed with big south facing windows so as to take full advantage of passive solar energy (Figure 4.15).



Figure 4. 15 : Photographs of ecological and sustainable housing
(<https://ecovillagebook.org/>).

In the village, beside the use of high-tech construction materials, natural construction techniques as using straw bale, wooden scaffolding and material uses from local trees are supported.

Public Space/Social Life/Transportation (Walker, 2005;
<https://ecovillageithaca.org>)

Residents share certain spaces and facilities such as a laundry room and a large kitchen and dining areas in the two common houses, where community meals are held up to four times a week, meetings are done, the common houses also have kids play areas.

In the transportation system, being pedestrian and cycling friendly is one of the main aim. To provide this aim, villagers have car pool systems that allows to share owned cars, hybrid cars are used. Moreover, Ithaca Biodiesel recycles use veggie oil from restaurants and makes it into a fuel suitable for cars.

Values of Society/Educational Values (Dawson, 2006; Walker, 2005;
<https://ecovillageithaca.org>)

Spiritual interaction and power of love is precious as society values. Meetings and dining meetings are made at specific periods to gather and share. In Ithaca, every home is accessible to everyone in terms of sharing what they have.

The village has a grant from 'Natural Science Foundation' with the Ithaca College, through having a long-term partnership for fostering education and research using the eco-village as a "living laboratory". The collaboration with the Ithaca College is significant which is termed as "Partnerships for Sustainability Education" formed as Committed to Change initiative recently.

Economy/Currency (Dawson, 2006; Walker, 2005; <https://ecovillageithaca.org>)

Villagers sale food products in markets for income.

Ithaca Hours are a local currency. It's the money that is made by the City of Ithaca NY strong by building wealth and strengthening relationships among neighbors. Since Ithaca Hours can only be spent with others who accept Ithaca Hours, their value to the community multiplies every time an Ithaca Hour is spent, because they stay right there.

4.1.4 Damanhur Eco-Village

Year/Location/Size/Population (<http://www.damanhur.org>)

Damanhur Eco-village is founded in 1975. It is situated in northern Italy about 50 km to the city of Turin. It covers an area with a radius 15 km, totally about 520 hectares. The settlement's current population is approximately 600 inhabitants.

Significance in all Eco-villages/Unique Features (<http://www.damanhur.org>)

The prominence of Damanhur Eco-village is being a spiritual community, powerful with its ethical values and social dimension. It is a United Nations award-winning sustainable eco-community, known for its extraordinary subterranean work of art and architecture, a cathedral known as the 'Temples of Humankind'.

The community in Damanhur has developed an electronic device for creating the music of plants.

Another significant feature is the existence of a special society banking system and currency.

Food Production/Waste Management/Water Management

(<http://www.damanhur.org>)

The citizens of Damanhur cultivate their own organic food and livestock. Seasonal organic products from the earth are harvested such as: vegetables, fruits, grains; animals are raised: bees, chickens, rabbits, cows, ducks, and turkeys (Figure 4.16).

Compost of food waste is used to obtain fertilizer for reuse in agriculture, and meticulously recycling.

There are organic septic systems, and wetland systems constructed for grey and black water treatment. Rainwater is collected and stream water is cleaned for household use. The rainwater collected in storage basins is then reused for crop irrigation, household use and fire fighting. The residents have created biotopes by digging lakes and reintroducing biocompatible plant species, according to the principles of permaculture.



Figure 4. 16 : Photographs from organic farm (<http://www.damanhur.org>).

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Dawson, 2006; <http://www.damanhur.org>)

Energy systems used in Damanhur include renewable energy sources, such as solar and photovoltaic panels, geothermal and biomass heating (Figure 4.17). High thermal insulation and solar panel installation is present in most buildings and old and abandoned buildings are reconstructed accordingly. Green building principles are used for construction. Passive houses are constructed which produce all the necessary energy for everyday consumption like electricity, heating, etc.

While constructing houses, ecological building materials are used. These materials may be old and reused materials or new, eco-friendly materials such as wood and natural lime. Some houses are made with straw and clay harvested from less than 10 kilometers away or directly from the land near which the house was constructed.



Figure 4. 17 : Solar energy panels and building types (<http://www.damanhur.org>).

Damanhur's inhabitants give importance to live in contact with nature without avoiding technology; rather, they use it in a way that is most intelligent-for humans and for the environment.

Public Space/Social Life/Transportation (<http://www.damanhur.org>)

By the use of individual talents, a working system called "ways of service" is encouraged. The social and spiritual experience of Damanhur is based on four main "pillars": the School of Meditation, the Social pillar, the Game of Life (stimulates and promotes the value of change) and Tecnarcatò (encourages a path of personal inner transformation).

The community has a carpool system for transportation.

Values of Society/Educational Values (<http://www.damanhur.org>)

The goal of the residents of Damanhur is to appreciate life in all its forms, while leaving the lowest possible impact on the environment. Religious values like the usage of sacred spaces such as temples are very important.

Natural healing methods and a holistic view of wellness is preferred among those who live in the eco-village. It also works as a laboratory for experimenting with sustainable ways of living, in harmony with nature and its elements and forces (Figure 4.18).



Figure 4. 18 : Inhabitants of the village that gathered for the same values
(<http://www.damanhur.org>).

Economy/Currency (Dawson, 2006; <http://www.damanhur.org>)

The economic system and work at Damanhur balances entrepreneurship, solidarity and sharing. Some villagers have created companies in the fields of renewable energy, eco-clothing, food production, and much more.

The eco-village has its own constitution, banking system and currency, the Credito.

4.1.5 Crystal Waters Permaculture Village

Year/Location/Size/Population (<https://crystalwaters.org.au>)

Crystal Waters Permaculture Village is founded in 1989. It is located in Australia. The area of the village is 260 hectares. Its population is currently over 200 inhabitants.

Significance in all Eco-villages/Unique Features (<https://crystalwaters.org.au>)

Crystal Waters EV has a prominent emphasis on ecologically-oriented development. The eco-village is significant in terms of being the first that used permaculture principles as a guide, in a sustainable community. It is one of the most illustrious, educational and followed settlements. In 1996, the settlement was a finalist in the World Habitat Awards by the Building and Social Housing Foundation for its "pioneering work in demonstrating new ways of low impact, sustainable living". In 1998, it was included in the "World's Best Practices" database of the United Nations organization.

Food Production/Waste Management/Water Management

(<https://crystalwaters.org.au>)

Organic and local food produced in the Crystal Waters Permaculture Village is supported by the principles of permaculture. Most residents maintain home gardens and orchards, many have chickens and some have bees, cows, sheep, pigs, geese.

A significant feature is the recycling of food that they cannot eat. They use the composts they acquire from recycling as fertilizer to help grow plants or to feed their animals or pets. The residents try to make little as possible go to waste.

Additionally, the eco-village has ponds and built dams to collect water, irrigate farms, grow aquaculture and provide recreation. The ponds serve as backup water storage, fire control, recreation and wildlife habitat. Water is provided both through rainwater runoff collection and through reservoirs.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(<https://crystalwaters.org.au>)

The eco-village encourages its residents to plan well when designing their homes. Most houses use materials where the impact at the source is considered (for example rainforest timber is avoided, local and recycled timber are popular). In addition, they avoid potentially toxic materials (eg: off-gassing of plastic and composite timbers). Site placement and house design aim to maximize passive solar possibilities (Figure 4.19). Only materials that can be recycled are used including timber, straw bale, rammed earth, block work, bamboo, mud brick and compressed earth bricks.



Figure 4. 19 : Photographs from building types which has constructed with permaculture principles (<https://ecovillagebook.org/>).

Public Space/Social Life/Transportation (<https://crystalwaters.org.au>)

Social life at the Crystal Waters Permaculture Village is very important for society. The café serves regular meals on Friday evenings and for Sunday brunch. Residents write and produce concerts. People meet for working bees, yoga, permaculture, theatre, music, volleyball, and discussion of community issues (Figure 4.20). Many residents have established projects within their cluster, which they work on together. The eco-villages' popular meeting places are the children's play areas and the café.

Despite all the gains that it made by electricity, food, and water, transportation adds significantly to the village's ecological footprint. The sprawling nature of the eco-village necessitates driving to get around, there is no shortcuts or straight lines in addition to buildings have long walking distances between them. The settlement is not supported by public transportation.



Figure 4. 20 : Inhabitants of the village in an event (<https://crystalwaters.org.au>).

Values of Society/Educational Values (<https://crystalwaters.org.au>)

The inhabitants of Crystal Waters do not really follow a religion. They do follow a specific rule, which is that everything they do has to be useful for the earth, or cannot harm it. They are very strong about keeping the earth a very safe place for everyone. The eco-village has proved to be a model from which lessons can be learned. Many visitors come here from all corners of the world to see that small changes in our personal lives can be made relatively painlessly, that there are viable alternatives to suburban isolation, and to experience the realities of living lightly on the earth.

Economy/Currency (<https://crystalwaters.org.au>)

Crystal Waters EV uses 'home occupation' zoning, as by working from home, in order to save time and energy. Many businesses operate within the eco-village. Residents employ each other rather than non-residents whenever possible. Several businesses here are providing steady employment for other residents and many have a trickledown effect. For example, many of the residents run courses in the settlement's facilities. These not only pay the teachers but also administrators, cooks, cleaners, food growers and accommodation businesses.

There is a 'Local Exchange Trading System', which allows residents to trade goods and services with each other locally. The currency is pegged to the Australian dollar and can be traded only within the community. This system keeps wealth circulating in the community and provides a backup financial system.

4.1.6 Sieben Linden Ökodorf

Year/Location/Size/Population (Dawson, 2006)

Sieben Linden Ökodorf is founded in 1997. It is located in Germany. The area of the village is 44 hectares. Its population is about 100 inhabitants and growing rapidly for the last years.

Significance in all Eco-villages/Unique Features (Dawson, 2006;

<https://siebenlinden.org>)

The settlement primarily aims to 'realise collaborative and holistic sustainable lifestyles that connect a small ecological footprint with a high quality of life'.

The ecovillage focuses on closed energy and resource cycles. Waste production and use of energy is about 1/3 the German average.

Food Production/Waste Management/Water Management (Dawson, 2006;

<https://siebenlinden.org>; <https://permacultureglobal.org>)

Permaculture principles are adopted as closing cycles of material flow, avoiding production waste, using renewable and locally available sources and creating diversity. Organic farming is done. The main land use functions of 80 hectares are forest, garden and farmland.

The village has a treatment plant for sewage and villagers only use composting toilets (compost to be used for tree planting).

Rainwater is partly used to fill the firewater lake and a pond; partly just filters into the ground. Inhabitants provide fresh drinking quality water from two wells. They built a closed water cycle as a reedbed system, which filters the water, later uses the filtered water for watering the gardens and their wastewater is not connected to the sewerage system of the municipality. For fresh water drip-irrigation system is used. Due to these features, they only use 2/3 of the amount of water that the average german uses and produce much less pollution of water.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Dawson, 2006; <https://siebenlinden.org>)

Local energy and material cycles are provided. Inhabitants avoid fossil fuel usage. Photovoltaic panels produce 85% of the electricity consumed in a year.

Heating is solved by the water heated through solar panels in a system that is supported by wood burning stoves. About half of the wood comes from their forest, and the other half (mostly hard wood) is bought from outside, preferably grown and harvested ecologically (Figure 4.21).



Figure 4. 21 : The wood stocks for heating and eco-houses of the village
(<https://siebenlinden.org>).

Inhabitants generally live in multi-family dwelling houses which made from straw-bales or from construction trailers (Figure 4.22).



Figure 4. 22 : The 'Strohpolis' house in the ecovillage of Sieben Linden - Europe's largest house made out of bales of straw (<http://www.environmentandsociety.org>).

Natural materials as local straw, clay and timber is used to build naturally. They also search for alternative materials to construct for instance in a house they used reused concrete slabs from road constructions instead of new concrete.

Insulation solutions are taken care of significantly to preserve energy.

Public Space/Social Life/Transportation (Dawson, 2006; <https://siebenlinden.org>)

There is an ecologically restored farmhouse in the middle of the village that accommodates the community and seminar rooms.

Cooking and eating is being done communally as a part of social life. There is a buffet system, a team of cooks provides lunch for the community and also seminar guests.

Horse carriages are used for near destinations. Cars are shared and they are parked at the border.

Values of Society/Educational Values (Dawson, 2006; <https://siebenlinden.org>)

Villagers dedicate themselves to humaneness and to the responsibility for the world express their connection with the Earth and its earthlings. They also adapted 'unity of the variety' concept which allows agreement in community.

In the village a seminar house is runned for the purpose of sharing ideas. Events are organized to present the village and to discuss about the titles that villagers are into as nonviolent communication and straw bale building. Villagers welcome others and also offer some international courses.

Economy/Currency (<https://siebenlinden.org>)

Villagers aim to keep the added value inside the village, trying to circulate the incoming money before it leaves the village. There are many job labor opportunities attached with some employers (for example SiGe (forest,garden), WoGe (administration), Freundeskreis Ökodorf (seminar center), Naturwaren (food co-op), Einfach Gut Leben (eurotopia book) and except this there are many also many freelancers that work inside or outside the settlement.

4.1.7 MBAM

Year/Location/Size/Population (<https://theecologist.org>)

Mbam is located near the town of Foundiougne in Senegal, Africa. Transition process of MBAM for an ecovillage starts in the beginning of 2000. It hosts nearly 3000 residents and covers 377 hectares of land and forest.

Significance in all Eco-villages/Unique Features (Dawson, 2006)

A unique feature of MBAM is the fact that it has not been established as an eco-village but converted later on with accreditation and support by the Global Ecovillage Network (GEN). Since the early 2000's in the aim of re-planting its damaged mangroves and rebuild its eco-system through permaculture and sustainable living. The mangrove forestation and restoration is an important factor for the philosophy and sustainability.

Without offending traditional beliefs, it aims to restore the surrounding eco-system and promote the eco-village movement. Overtime the community of MBAM has evolved into an inspirational example for other communities in the fields of education, research and practice.

MBAM also provides an educational platform for multi-cultural appreciation and mutual learning for students across the world with the help of various exchange programmes.

Food Production/Waste Management/Water Management (Dawson, 2006; <https://theecologist.org>)

The aim of converting MBAM into an eco-village includes using "more sustainable farming techniques" and solar ovens. It is a substantial task to respect the principals of conservation while ensuring that the needs of the local community are being met in terms of household needs and economics. Food is produced through various different practices such as "fish farming, oyster farming, low intensity agriculture, beekeeping, breeding, arboriculture and forestry".

The eco-village also deals experiments with the topics of water management, reforestation, and permaculture. They have a system, which recycles greywater

through the separation of organic material and water (Figure 4.23). The organic material is then used for compost and water is filtered for household use.



Figure 4. 23 : One of the recycling grey water techniques of MBAM's inhabitants (<https://gretacairemoore.wordpress.com/>).

Energy Sources/Architectural Design/Materials Used/Technologic Solutions (Dawson, 2006; <https://theecologist.org>)

MBAM Eco-village supports the usage of renewable energy technologies such as solar energy, vegetable fuel and local animal biomass. The use of renewable energy also reduces deforestation, which helps the village's restoration campaign of the mangroves.

Local and natural materials are used for vernacular constructions (Figure 4.24).



Figure 4. 24 : Vernacular architecture of MBAM (<http://summerinsenegal.blogspot.com>).

New methods and technologies regarding permaculture, salinisation of waterways and soil erosion are being developed. The inhabitants of MBAM contribute to the development and design process.

Public Space/Social Life/Transportation (Dawson, 2006; <https://theecologist.org>)

Villagers in MBAM differ from other ecovillages with their cultural and social lifestyle (Figure 4.25). They are residents of a relatively poor region compulsorily trying to sustain themselves, aided by GEN owing to their motivation of change.



Figure 4. 25 : Community meetings from MBAM (<https://gaiadergi.com>).

For transportation, they mainly walk in the village or sometimes they are transported on Indian bamboo stretchers. They use public transportation for accessing near centers (Figure 4.26). However, in emergency cases such as health care, transportation system is insufficient.



Figure 4. 26 : Transportation to MBAM (<http://summerinsenegal.blogspot.com>).

Values of Society/Educational Values (Dawson, 2006)

In order to battle forced migration to the cities, in Senegal, the Global Ecovillage Network has encouraged its affiliated villages, including MBAM, to continue researching ways to become sustainable in health, agriculture, culture, spirituality, and economy. This is why the community values and empower these concepts as well as their interests as a community. It does not only promote a sustainable lifestyle but also provides a platform.

It is expected that GEN Senegal will declare MBAM a regional research and training center for "demonstration of intermediate technologies and sustainable lifestyles".

Economy/Currency (Dawson, 2006)

The main source of income for the residents of MBAM is agriculture, specifically rice, mango, cashew and peanut production.

As a currency, 'micro-credit' is available for local entrepreneurship.

4.1.8 The Farm Evo-Village

Year/Location/Size/Population (thefarm.org)

The Farm was founded in 1971 by Stephen Gaskin and 320 San Francisco hippies. It is situated in Tennessee, United States. The land is approximately 777 hectares. The eco-village has currently around 200 inhabitants.

Significance in all Eco-villages/Unique Features (<https://thefarm.org>; <https://permacultureglobal.org>)

In the beginning of its foundation, the "settlement was built entirely from salvaged, recycled, and local material". At this time, the residents were allowed only \$1 per day and could become "agriculturally self-sufficient within 4 years". There was a 'changeover' in the early 80s which saw the community turn to permacultural farming methods and sustainable living.

Significance of the eco-village is the fact that the community hosts courses on "permaculture, organic certification professions, herbalology, installing solar electricity and water heating, and yurt, bamboo, cob, earthbag, roundpole, and strawbale construction, biofuels, midwifery, an annual children's camp, and ongoing

demonstrations in alternate energy, hybrid vehicles, constructed wetlands, horse farming and sustainable, carbon-negative agriculture’’.

Food Production/Waste Management/Water Management (<https://thefarm.org>; <http://thefarmcommunity.com>)

Due to its hippie roots, before the 80s, the Farm only supported food production through agriculture and no animals were raised on the settlement for the aim of consumption. Even after the ‘changeover’, most inhabitants continued to live a vegetarian or vegan life style, with the exception of egg production and consumption being introduced. The residents of The Farm produce their own foods in a sustainable fashion and the crops the produce include; strawberries, blackberries, squash, sweet Potatoes, onions, and more. Their most important crop is soy, which they helped become popular as a vegan alternative in the 70s. The farms of the eco-village use sustainable methods. They have bamboo groves, a food forest and edible landscaping. They make farm market days to share food.

The eco-village is responsible of maintaining their own roads, municipal buildings, and public water system. Wetlands have been constructed in order to treat all water wastes and rainwater catchment, bio filters, and swales are available.

The eco-village has pioneered in experimenting with composting, recycling, conservation, rainwater collection and wastewater treatment.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions (<https://thefarm.org>; <http://thefarmcommunity.com>)

Inhabitants use microclimates as a design concept to avoid unnecessary energy consumption as in permaculture. They use the earth’s thermal mass with solar gain, they build green roofs and as a source use solar photovoltaics (Figure 4.27).



Figure 4. 27 : Solar Photovoltaics (<http://greenliferetreats.com>).

The buildings in the community mostly built by homeowners, designed with green construction and building principles. Energy efficiency is a significant factor in designs. Insulated concrete, local timber, recycled brick, steel, cob, strawbale and wood are used as materials.

The buildings in the Farm support many different architectural styles, such as the Deltec style, Earth Shelter or log cabin style; however, they all use the aforementioned principles (Figure 4.28).

Many homes were constructed during the 70's, when working with recycled building materials was both an ideological choice and an economic necessity. Some use earth's thermal mass with solar gain, some constructed only from recycled materials.



Figure 4. 28 : Housing types from the Farm Eco-village (Deltec style, Earth Shelter, recycled home and log cabin style) (greenliferetreats.com).

Public Space/Social Life/Transportation (<https://thefarm.org>;
<http://thefarmcommunity.com>)

The Farm has many communal spaces such as the Training Center, Community Center, and the meadow. Ecovillage hosts people from outside in an EcoHostel which is located in The Ecovillage Training Center (Figure 4.29).



Figure 4. 29 : A view from EcoHostel which is located in The Ecovillage Training Center (<https://thefarm.org>).

On weekends, many residents meet up for group meditation and religious services. Any policy regarding community life is put into action through an elected board. Decisions are also discussed and voted upon as a community.

The ecovillage is pedestrian friendly. For transportation they also use bicycles.

Values of Society/Educational Values (<https://thefarm.org>;
<http://thefarmcommunity.com>)

There is a learning center specialized on sustainability, eco methodologies and green technologies called ‘the Ecovillage Training Center’. The center is a living workshop environment which teaches about organic food production, natural building, permaculture and restoration ecology to students from more than 50 nations. Main aim of trainings is to create and live in harmony within the means of nature.

The ecovillage hosted the Alternative Energy Fair.

Although the community has transformed into a sustainable living community, they still keep the hippie beliefs from the 70s as a foundation of their societal values.

The community believes in inner peace, freethinking, pacifism, and spiritualism. While everyone is free to practice religion, there is no official religion of the community.

Ecovillage has a one-room school, a K-12 educational resource center housed in a beautiful passive solar building serving day students from The Farm community and the surrounding area and over a thousand home-based learners through The Farm School Satellite Campuses Program (Figure 4.30).



Figure 4. 30 : Children growing and tasting organic farming products from raised beds in The Farm School (<https://thefarmschool.community>).

Economy/Currency (<https://thefarm.org>; <http://thefarmcommunity.com>)

All inhabitants of the eco-village must be committed to the financial maintenance of the community. There are monthly dues paid by the residents, which is usually around \$100. Some residents work independently, and some in nearby towns. Most of them work in local industries such as The Book Publishing Company, The Birth Gazette, and The Soy Dairy. Others are involved in community services like The Farm School, The Farm Store, The Welcome Center, The Farm Clinic, WUTZ-FM, and our community government.

There is no special currency for the farm; the residents use US dollars for daily exchanges.

4.1.9 Marmariç Permakültür (Eko-Yerleşkesi)

Year/Location/Size/Population (<http://permacultureturkey.org>;
<http://www.habitat.org.tr>; <https://www.tatuta.org>)

Marmariç Permakültür is founded in 2003. It is located in İzmir, western Turkey. The area of the village is 2.2 hectares. Its population is about 11 inhabitants including 2 children. Village is hosting groups of people.

Significance in all Eco-villages/Unique Features (Güleryüz, 2013; Güleryüz Çohadar, 2014; <http://www.bugday.org>)

Comparing the ecological settlements in Turkey, Marmariç consists of the most organized and conscious group of people. The pioneer inhabitants aimed to revive a traditional village abandoned 20 years ago on the basis of permaculture and to establish a model sustainable settlement.

Food Production/Waste Management/Water Management (Güleryüz, 2013; Güleryüz Çohadar, 2014; <http://www.bugday.org>; <http://permacultureturkey.org>; <https://www.tatuta.org>)

Permacultural principals are adopted for food production. Green areas that does not occupied with buildings are arranged as to be used for growing organic fruits and vegetables from ancestry seed (Figure 4.31).



Figure 4. 31 : Permaculture implementations in raised beds
(<http://permacultureturkey.org>).

In some buildings of the site there are compost toilet usage for waste management.

Rainwater is collected in the constructed lakes and dikes and used for irrigation of the fields. Dikes were constructed by taking advantage of the slope of the land harmoniously with the nature.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Güteryüz, 2013; Güteryüz Çohadar, 2014; <https://www.tatuta.org>)

Buildings are designed with passive energy systems and permaculture principals. Solar panels are used to heat the household water. As heating solution wood stoves are used.

Old buildings are restored with slate and soil plaster for insulation. Additional buildings are designed as bungalows in which local wood is used.

Vernacular building techniques and wooden frames are used for construction, straw bales and soil are used as architectural materials (Figure 4.32).



Figure 4. 32 : Permaculture implementations using natural materials as sources
(<http://www.bugday.org>).

Public Space/Social Life/Transportation (Güteryüz, 2013; Güteryüz Çohadar, 2014; <http://www.bugday.org>; <http://www.habitat.org.tr>; <https://www.tatuta.org>)

The old housing and school buildings have a court style open space which used as a social space.

There is an other communal social space has a connection with the courtyard, in a circle shape made by stones which can be defined as ‘the square of the settlement’.

Old school building is restored and functioned as to use as a communal building with the purpose of gathering members of the foundation and hosting courses of Permaculture Research Institute. An other communal building for especially hosting visitors is planned to be built from the ruins of an old building as well, for the following years.

The village is open to public with a version of eco-turism called TaTuTa which allows people to join and share daily tasks of the village in appropriate times of the year.

The area of the village is small and relatively pedestrian friendly.

Values of Society/Educational Values (<http://www.bugday.org>;
<http://www.habitat.org.tr>; <https://www.tatuta.org>)

The villagers believe in earth care, fair share and people care which are universal permaculture ethics. Their aim is to exhibit a sustainable village using permaculture principles and share the experiences gained in this process with others (Figure 4.33).



Figure 4. 33 : One of the meetings of permaculture education in Marmariç (Milliyet Newspaper, 09.04.2014).

The village hosts its own foundations called ‘Marmariç Ekolojik Yaşam Derneği’ and ‘Turkey Permaculture Research Institute’ (Türkiye Permakültür Araştırma Enstitüsü).

Economy/Currency (Güleryüz, 2013; Güleryüz Çohadar; 2014;
<http://www.bugday.org>; <http://www.habitat.org.tr>; <https://www.tatuta.org>)

In the begging of settlement process two people from the group stayed in the village taking care of the renovations and making other crucial physical repairs.

Other participants stayed in city center to earn the capital and finance the repairs needed.

In 2010 they sent a permaculture application project to UN and it is accepted, and they financially supported the village.

4.1.10 Dutlar Köyü & İmece Evi

Year/Location/Size/Population (Güleryüz, 2013; Güleryüz Çohadar, 2014; <http://www.bugday.org>; <http://www.habitat.org.tr>; <https://www.tatuta.org>)

Dutlar Collective is founded in 2007 in the purpose of revitalization of abandoned Dutlar Köyü (current name as Turgutlar Köyü) which is located in İzmir, western Turkey. The area of the village is 8 hectares. The collective started with 10 people, the number rose to 18 in a short time. Unfortunately, after 6 months, the collective is disassembled and just one of the founders of the village continued its purpose as İmece Evi whose area is near to Dutlar Köyü. Village is hosting groups of people nowadays. If renovated, Dutlar Köyü is capable of hosting 70-100 people.

Significance in all Eco-villages/Unique Features (Güleryüz, 2013; <http://www.imeceevi.org>; <https://www.tatuta.org>)

Dutlar Köyü was an old abandoned village (abandoned 30-40 years before) which has been trying to be transformed into an ecological village by a group of people. And İmece Evi is a continuation of a failed attempt of Dutlar Köyü.

Ecovillagers aim is to seek if there is a peaceful life exists to be lived collective, simple and ecologic.

Food Production/Waste Management/Water Management (Güleryüz, 2013; <http://www.imeceevi.org>; <https://www.tatuta.org>)

Organic farming is done with ancestry seeds with co-op farming style. Traditional techniques combined with modern techniques are used for productions. Olive, olive oil and soap produced from olive oil is important.

They use sundry techniques for the products that they got from organic farming, to avoid decomposition.

Compost is made from organic wastes to be used in farms.

Natural spring water and rainwater is collected and used for irrigation. Drinking water need is provided from state water works.

Energy Sources/Architectural Design/Materials Used/Technologic Solutions

(Güteryüz, 2013; <http://www.imeceevi.org>; <https://www.tatuta.org>)

Solar panels and bicycles are used for producing energy. In the near future, it is projected wind tribunes to be added to energy sources as well. For heating energy, wooden stoves are used.

İmece Evi is initially set as a camping place and later converted to a farm with just one hosting building that is constructed from straw bale, wood and earth plaster. Another building is constructed as a continuation, called as Taş Ev (Stone House) from wood and stone which has just a room and a bathroom. The only room it has is used for multi-functions like educational, hosting, relaxing, bedroom, kitchen as a common space for co-housing.

The main buildings are old, masonry structured; traditional buildings and sometimes they are as ruins or in bad condition. Some of them have adobe roofs collated with straw, which are in healthier situation than other roof tiled ones.

About learning traditional master building techniques, they ask surrounding villagers.

They use technology as cell phones, web etc. in case to communicate and share.

Public Space/Social Life/Transportation (Güteryüz, 2013;

<http://www.imeceevi.org>; <https://www.tatuta.org>)

Village has what a random village needs as existed in Dutlar Köyü (for instance houses, a mosque, a school, fountains, and old style ovens). They gather for community meetings, sharing daily tasks, dining, resting etc.

The village is open to public with a version of eco-turism called TaTuTa which allows people to join and share daily tasks of the village in appropriate times of the year (Figure 4.34).

İmece Evi does not have any road arrangement and far from other villages. It is isolated from its environment and it is a separated structure from Dutlar Köyü as well. But inside the area of the village is small and relatively pedestrian friendly.



Figure 4. 34 : Welcoming style of İmece Evi to guests (source: Yeşim Özbirinci, 2017)

Values of Society/Educational Values (Güleryüz, 2013; <http://www.imeceevi.org>; <https://www.tatuta.org>)

Villagers believe in the power of working together within the harmony of nature, as a community and for the community. Sharing ideas, experience, knowledge, limiting consumption and producing as much as possible what they need instead buying them from outside is their motivation.

Some of the participants of separated cooperative think that there were unsolvable conflicts in the group, different cultures, lifestyles made agreements and adaptations much more harder. Instead of ‘ecological’ first initiative became ‘egoistical’.

The aim of the new settlement is to set a sustainable traditional ecological village combining both Dutlar Köyü and İmece Evi area, which has building groups and ateliers, which allow for practising ecological solutions.

They tried eco-turism, which gives opportunity for education, training and sharing but for some reasons it is failed to achieve. Now the settlement just accepts voluntary visitors of Tatuta.

Economy/Currency (Güleryüz, 2013; <http://www.imeceevi.org>; <https://www.tatuta.org>)

The settlement is dependent to outside especially for materials used to build or clothes; they are hoping that in the future they will be self-sufficient and independent. They provide necessary materials from fleamarket of İzmir.

Organic farming products, olive, olive oil and soap over produced is used for earning revenue. Nevertheless, they only sell products for special customers, which participated the village before, because they believe that who has participated before, will know the worth of the harvested products.

Labor force for crucial works, is partly provided from voluntary visitors. In addition to volunteers, occasionally they request surrounding villagers about labor.

4.2 Results and EV Development Principles

Comparison chart of ten ecovillages is evaluated and as results of examination of the cases, common values and approaches can be summarized as follows (Table A.1):

1. Physical dimensions: Foundations are barely new, especially in Turkey this approach has started for the last few decades. Locations are variable from all around the world. Sizes are variable but maximum as a village dimensions. Turkish cases are located in a very small land, comparing the worldwide ones. Ecovillages' populations are generally about hundreds; just some of them are above a thousand. However, Turkish eco-villages' populations, comparing to others, are very low, almost about a dozen. In Turkish examples visitors mainly come to help the village in season with the aim of learning rural life and implementations as they are not permanent residents for rest of the year.

2. Uniqueness: They all have unique features, characteristics and have significances on succeeding their paths. As Dawson (2006) advocated, examination of cases endorses that, ecovillages are successful, awarded, proved by institutions for minimizing their impact to world and living with principles based on a shared/regenerative/against consumption lifestyle. Cases examined focus on/developing special systems, have spiritual/ethical/religious values, have significant contributions to education sometimes being awarded, transform/revitalize a village and generally host courses.

3. Impacts to the system's cycles: As Beddington (2010) declared, as a consequence of conventional food systems health threatening policies increase. These cases have solutions for changing this by using sustainable, local and organic farming techniques. Agriculture has a place in a big part of the land. As Mollison (1991) and Hemenway (2010) defend permaculture assimilation should be

considered for settlements, permaculture principles are crucial in most of these cases. Seed banks with ancestry seeds, local market sells, consuming seasonal products, arboriculture and forestry, food forests/edible landscapes, sundry techniques, co-op farming, living vegan or vegetarian lifestyle are the most prominent elements.

As Walker (2016) mentioned as a result of the accelerating needs of human population we produce a lot of waste disturbing the ecosystem negatively. Ecovillage cases are aware of these problem thus waste managing, water managing are taken care in all eco-villages, they are crucial elements for keeping environment balanced and have a resilient settlement. Hemenway (2009) explains the organic materials' cycle, and submits it does not need help from outside to be sustained if figured wisely and these initiatives use this information. Samples for waste recycling systems from cases are binary pipe system, compost toilets, composts as organic fertilizers, treatment plants for sewage, using/returning grey water. In addition to waste managing, water management techniques are adding such as designing with water dam and dikes, ponds, wetlands, biotopes, planted biofilters, wells, swales and other technological solutions.

It can be argued that Turkish ecovillages may improve themselves on waste and water managing techniques comparing worldwide cases.

4. Use of sources & designs: Kellog & Pettigrew (2007) discourse as consumerist societies we consume a lot of source irreversibly. As Krieger & Saunders (2009) add in urbanism, we have a built environment and energy that should be sustainable solved. Ecovillages have their solutions to this situation. Ecovillage initiatives take care of that by using renewable energy sources, using passive energy systems, use sun and wind data as their main concern (including Turkish eco-villages) thus all cases use technology, science and tradition together in harmony and precisely. Wind mills, biomass, solar panels, measuring system, geothermal energy, vegetable fuel, using thermal mass, green roofs, using bicycles as energy source, avoiding fossil fuel and using microclimates can be counted as energy saving/producing elements.

And Ghavami (2005) advocates unsustainable, impermeable and unnatural elements have an enormous negative effect to the planet. In cases, ecological architectural planning, design and construction techniques (including use of geometry and

vernacular designs), using local / reusable or recycled / eco-friendly / high-tech constructed materials (for instance use of wood, clay, straw, cob, timber, steel, slate, soil plaster, soil and reused brick or concrete), reconstructions of old and abandoned buildings, co-housing are crucial for all settlements are important. In some of the cases, inhabitants mainly use existing caravans, buildings, but in some others, they mainly build new sustainable buildings. In Turkish cases, restoration plays an essential role, as they are a continuation of abandoned old villages; the main aim is to revive/revitalize them, as a sustainable settlement.

5. Social dimensions: Public shares/places are very significant for all eco-villages, as they always need each other for daily survival. Gathering and enriching social life are a leading factor, residents gather for daily tasks/routines as dining, cleaning, meeting, even meditating, praying and resting. They mostly have community and training centers or community houses; some have meditation or religious halls/structures as main landmarks. Generally, nature and existing buildings are used to determine public spaces. In Turkish cases, traditional Turkish village elements are elaborated for public spaces; a mosque, a school, fountains and court style open spaces between buildings and eco-tourism is a principal source of income and cooperation. In some there is an elected board system for administration.

Schroeder et al. (2012) specifies carbon footprints substantially mount up because of the production and transportation processes. Since the limiting carbon footprint is a target, in ecovillages there are important regulations for transportation. Ghavami (2005) and Jou (2012) argues there should be arrangements for transportation, the surface, land/soil should be regarded. In response, transportation decisions of the ecovillage are pedestrian and cycling based. They avoid the use of automobiles and other motor vehicles. Some of them have public transportation, hybrid cars, horse carriages and some of them have a car pool system allows to share motorcycled vehicles. In some of locations, community has difficulties to access centers.

6. Values: As Dawson (2006) advocated these villages are in search of same ecological, socio-economic and cultural spiritual values make them stay strong together, their social interactions and equality of residents are crucial. These eco-villages generally do not have a certain religion, nation, or language; but they have powerful common values. They accept humanism, values and empower sustainability in all dimensions, their belief in earth care, sharing, cooperating and sustaining

themselves without harming nature, working within the harmony of nature are a couple of these common values of the societies. Some of them especially believe in permaculture ethics revealed, listed by Mollison (1988); care for the earth, care for the people, return of surplus.

In almost all ecovillages, research, education centers and/or partnerships exist and they are usually international. Sharing the gathered information from past and today is significant. Some of the cases even have companies related with researches, under development technologies. Experimental learning is important. The residents have their own foundations and/or they organize fairs, events, workshops, ateliers to be used as educational platforms, which promote green technologies and sustainable lifestyles. They all welcome people from outside of the village. In Turkish cases there is even a programme called Tatuta for welcoming cooperative hosts to practice and help for daily tasks.

7. Economic dimensions: James & Margee (2017) explains that sustainability has three domains and one of that is the economic sustainability, which is also a leading factor holds the community together. Sustainable Communities Act (2010) and Sustainable Community Network (2019) defines as job creation is an important element. So in ecovillages there are some solutions, arrangements for economy and currency. Mostly they have their own economic system, because they are agreed that capitalism/the money as the way we know -is the beginning of evil-. They created solutions as income pool, educational/rewarding funds, supports from organizations as UN, income from agricultural products, using own banking system, trying to keep the value inside the village, using labor force from volunteers and neighbor villagers. In some cases, there are job opportunities, inhabitants have businesses, sometimes they work as freelancers or some villagers work outside the village to financially support for income. Entrepreneurships and solidarity is powered.

Some of them use their own currency (as eko, Ithaca hours, credito, micro-credit), some of them have their type of local exchange trading systems, and some of them even use hours to trade. In Turkish cases, it is not possible to mention about a closed economic system between villagers, and they are not environmentally independent yet, aiming to be one in the following future.

In literature review part of this thesis, Gilman's (1991) ecovillage challenges were given, after examining cases; may not have reached the final point but it is distinguishable that communities get advanced in years. They have their traditional or technological solutions for the bio-system, built environment, economic system, governance, glue and whole system challenges.

Unfortunately according to the results, considering that, cases are chosen from the most famous and successful ones, we can make inferences that Turkish examples are far behind comparing the initiatives worldwide, as it is almost not possible to call them as an ecovillage or a community. It is a very new approach in Turkey, and people may not have many experience of being a sustainable community yet. Nevertheless, in terms of having a certain concern for the planet, taking action and experiencing another side of living, the initiatives are significant for future researches and actions as they are creating an ideal ground for discussion.

To conclude this part, in this thesis, main aim is to reveal some guiding principles to be used in future urban design projects with the data collected from these ecovillage cases. In this context, the titles of principles emerged from these ecovillage cases are mainly about sustainability features as; food systems, waste management, water management, energy sources and technological solutions. In addition, titles as transportation, architectural design, materials used, public space & public life, values of society, educational values, economy & currency are selected as they may have significant contributions from ecovillage cases.

5. NEIGHBORHOOD DESIGN

5.1 Neighborhood Definitions

The definition of a neighborhood of the city or the town in the literature is provided by a consensus as the smallest settlement with a separate life dynamics with certain limits of an area. It is a place where a group of community lives, the surrounding area of their homes including the spaces that their daily life routine takes place.

In Wisconsin's Comprehensive Planning law (2015), the traditional neighborhood design (for both city neighborhoods and traditional small towns) is described as 'a compact, mixed use neighborhood' where residential, commercial, educational, civic buildings and civic spaces (like plazas, parks, and squares) are within close proximity (walking distance) to each other.

Brower (2011) explains neighborhood in his book 'Neighbors & Neighborhoods: Elements of Successful Community Design' as in its most general sense, 'the geographic area that residents perceive as an extension of their home'. He defines a neighborhood-based community as 'a group of people bound together by interests that stem directly from the condition of being residents of the same neighborhood'.

Hunter (1979) describes a neighborhood as a social/spatial unit of social organization, and that is larger than a household and smaller than a city. According to Barker (2003) a neighborhood is where the residents share certain characteristics, values, mutual interests, or styles of living.

In the book 'the Return of the Neighborhood: as an urban strategy', Janet L. Smith (2015) from University of Illinois describes neighborhoods as real places where people live, work and play. She expresses that the neighborhoods function as sites for investigating urban dynamics and launching policy interventions, providing a space to implement and study change (as improve things) overtime.

Jacobs (1961) in her epoch-making book '*The Death and Life of American Cities*' argued that a city, or neighborhood, or block, cannot succeed without diversity: diversity of residential and commercial use, racial and socioeconomic diversity,

diversity of governing bodies (from local wards to state agencies), diverse modes of transportation, diversity of public and private institutional support, diversity of architectural style. Great numbers of people concentrated in relatively small areas should not be considered a health or safety hazard; they are the foundation of a healthy community. She also discussed about human-scale neighborhood designs comparing with superblocks and modern isolated neighborhoods in cities of that time.

Lynch (1960) mentioned about 'districts' importance for perception as one of the five main elements of a city, in his pioneer book 'The Image of the City', and he stated that districts are medium to large parts of the city that share the same characteristics style-spatial form, topography –colors- texture, urban fabric (Figure 5.1).

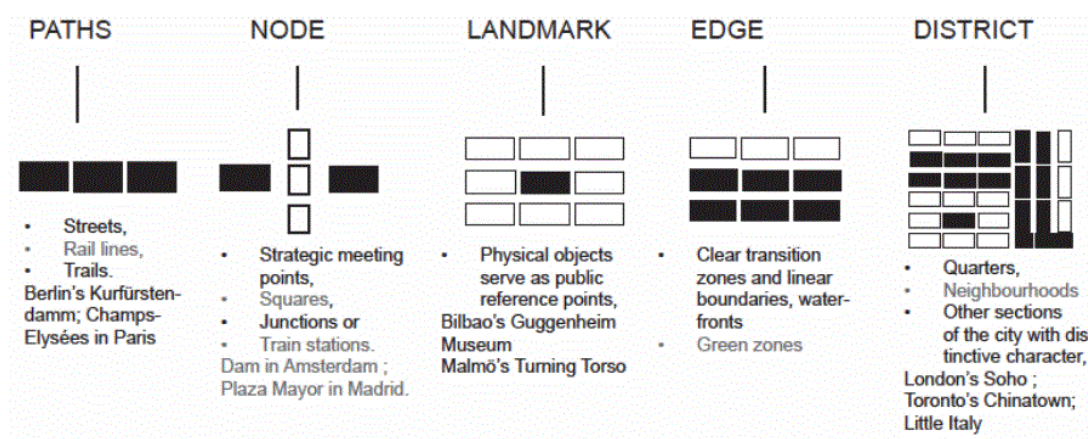


Figure 5. 1 : Kevin Lynch's diagram of the "Five Physical Elements" (Lynch, 1960).

According to Lynch, districts may have clear edges, or soft uncertain ones gradually fading away into surrounding areas. He also argued about mental maps, placemaking, spatial legibility, cognitive maps and imageability of neighborhoods.

Ebenezer Howard, Patrick Geddes, Lewis Mumford, Le Corbusier and many others also have significant contributions to design for neighborhood unit.

As to conclude city and neighborhood scale differ in many respects. Comparing two scales can be in fact contradictory (Table 5.1).

Table 5.1 : Comparison of city scale vs neighborhood scale (Jacobs, 1961, Lynch, 1960, Alver, 2013).

CITIES	NEIGHBORHOODS
Barely perceptible	Perceptible
Large-scale (non-human scale)	Human-scale
Mixed identity	Local identity
Diverse cultural/historical background and traditional character	Local cultural/historical background and traditional character
Alienation between society (depending on the scale)	Intense relationships and interactions between inhabitants
Not suitable for having rapid feedbacks	Adaptable to changes and suitable for interventions, suitable for having rapid feedbacks
Not able to reflect explicitly local social habits and daily life routines of inhabitants	Reflect local social habits and daily life routines of inhabitants

5.2 Turkish Neighborhoods

According to the provisions of the Turkish municipal law (Law No. 5393, 2005), the neighborhood is the administrative unit, managed by a headman ('muhtar'), within the municipal boundaries, whose needs and priorities have similar characteristics, which have a neighborhood relation between the residents.

'Mahalle' (Turkish translation of neighborhood) is derived from the word 'mahal', which is originally Arabic, comes from the same root as the word means the place of residence (Palabıyık & Atak, 2000). Afterwards, the neighborhood became more specific and became a district of a city (Karamers, 1976).

On the other hand, Turkish 'mahalle' concept has a much deeper meaning than these types of explanations in the daily life routine of Turkish residents. As to investigate the Turkish neighborhood concept ('mahalle') in the literature, Anatolian Turkish cities and Ottoman cities with the social-physical interactions of their communities, has significance to shape today's neighborhoods (Yerasimos, 1999).

Yaşar Güneş defines neighbourhood administration in Turkish Administration Journal (Vol. 465, December 2009) as constituent of the civil, urban and judicial organizations in the Ottoman Empire came into being as a natural result of political, social and administrative needs of Turkish society and a versatile institution with its various features transferred from the Ottoman tradition to the Republic of Turkey.

Lapidus (1969) groups social organization levels of Ottoman Empire in four groups including the neighborhoods defining them as neighborhood units with a socio-economically and religiously homogeneous character.

Yerasimos (1999) declares that neighborhoods of Turkish culture are developed organically with the influence of Islamic laws, which stressed the importance of individual rights over property, at the time of Ottoman Empire. The existence of narrow and twisting streets and *cul de sacs* denoted a common space open to use by the residents of a street, in contrast to an abstract notion of “boundary” set forth by Roman law, were a direct result of Islamic property rights and the importance attributed to privacy in these societies.

The neighborhood in the Ottoman city administration; school, madrasa, mosque, square, fountain, coffeehouse, market and even the bath was a social whole (Eryılmaz, 1988).

Alver (2013) extends this by stating that the neighborhood with its street, housing, mosque, bazaar, coffeehouse, grocery store, fountain and park forms a big whole and the community that keep this whole standing strong that cannot be ignored.

Alver (2013) defines neighborhood as an outstanding example of living together and coexisting together. He emphasizes the importance of neighborhood culture, ‘the foundation of the neighborhood is space and human, space and human’s integration with life. It is not just space or human; it is a new unity, a new life scene that people and space touch together, hand in hand’. Neighborhood has its own identity, character and essence that emerging from its own stories and experiences.

Büyükmihçı (2014) advocates that there are obvious differences between the Western and Ottoman neighborhoods which is the order that the civilized world targets and tries to re-establish, under the name of the neighborhood unit. In Ottoman community, neighborhood concept is not just an administrative category; it is also a lifestyle, a culture pattern that expresses a public life with a common culture. Neighborhood may contain people from various ethnicities, religions, social strata, wealth levels, and professions; however, the point is it is a social unit that gathers these differences under a roof, which is based on cooperation and solidarity.

5.3 Neighborhood Design Concepts

In neighborhood design, most remarkable neighborhood design concepts belong to Clarence Perry (as Neighborhood Unit) and Clarence Stein & Henry Wright (as Radburn Model) (Patricios, 2002).

According to Clarence Perry's 'Neighborhood Unit Concept' (1929) which became the base of New Urbanism Concept and other sustainable neighborhood approaches today (Perry, 1929) (Figure 5.2):

- city or town should be divided into more or less equal divisions or subdivisions and neighborhoods should have clear boundaries
- the dense of buildings and people should be higher comparing the low-dense settlements
- the town should be pedestrian oriented while adapting the automobile age, the roads should connect where possible, boulevards should take place around the neighborhood unit and the network of internal streets should be hierarchical
- in the center of the town, necessary central area functions should be easily accessed by the ideal number of people calculated

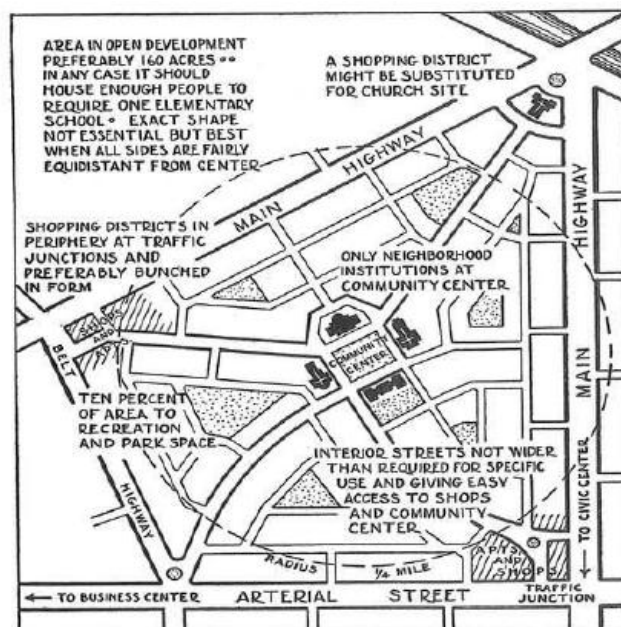


Figure 5. 2 : Neighborhood unit concept (by Clarence Perry).

- Open spaces for social interactions, which should be distributed around the unit, as green areas, parks, plazas, playgrounds, parking lots, parking corridors

- town should provide mixed-use, street anchored shopping districts, neighborhood shops and institutions, shopping centers -at high traffic intersections-, workshops and offices along boulevards in addition to school that should be shared by adjacent neighborhood

On the other hand, according to Regional Planning Association of America members Clarence Stein & Henry Wright's 'Radburn Model' in New Jersey (1928) that mostly influenced from Ebenezer Howard's Garden City Movement and known as 'a town for the motor age' (Stein, 1957; Birch, 1980) (Figure 5.3):

- neighborhoods should have clear boundaries as well (as neighborhood units of Clarence Perry)
- the dense of buildings and people should be higher comparing the low-dense settlements (as in neighborhood units of Clarence Perry)
- the town is pedestrian oriented while adapting to the motor age with a specialized, separated road/traffic system, principally designed using walking distances, dead-ends and cul-de-sacs with parking areas are used as well
- town should have a tangible central area that contains schools, markets, commercial centers, local centers, a community center etc.
- open spaces for social interactions are significant, they should be mainly around/among the residential units or nearby other functions of the town, green areas, walkways, interior parklands, gardens, family playgrounds, pools, sport areas, car free roads/zones and even woods should be in the center of the town or the city, these areas should be well-balanced and spread over the neighborhood area
- town should provide mixed land uses
- residential areas are designed as clusters of blocks and especially superblocks that save space, allows community gatherings creates safety comparing to private garden housing, provides recreational facilities
- the areas that have community feeling has the security feeling that the neighborhood needs



Figure 5. 3 : Radburn concept (by Clarence Stein & Henry Wright).

These two significant and successful neighborhood design concepts influenced town-planners for the following decades. They had disadvantages in some circumstances but they were very important stepping-stones as well.

5.4 Results and Neighborhood Development Principles

As a conclusion comparing the ‘Neighborhood Unit’ of Perry and the ‘Radburn Model’ of Stein and Wright, in epitome their concerns and suggestions are about (Perry, 1929; Stein, 1957; Birch, 1980):

(may refer to the neighborhood principles in the next chapter of proposal, under the titles of Site Design/Building Scale/Socio-economic Dimension)

- clear neighborhood boundaries, more or less equal divisions or subdivisions
- high-density, residential blocks/superblocks (uncovers space for recreational facilities)

- transportation system, about separation, connection and hierarchy of road/traffic system (including internal streets), having boulevards in designs, adaptation to automobile age
- pedestrian oriented design, designing units with walking distance, dead-ends and cul-de-sacs with parking areas
- tangible, reachable central area and central area functions (as schools, markets, commercial centers, local centers, a community center), (buildings or functions should be sufficient for the population/potential population of the settlement), sharing of these communal places by adjacent neighborhood (integration of adjacent neighborhoods)
- mixed-land uses (as street anchored shopping districts, neighborhood shops, institutions, shopping centers, workshops, offices) (low or high traffic sections and boulevards should be evaluated diversely)
- well-balanced and spread open spaces and green areas (as parklands, plazas, playgrounds, walkways, gardens, pools, sport areas, car free roads/zones, woods, parking lots, parking corridors), distribution of them in the center and around units
- community feeling/social interactions (around/among residential or other functioned units) (provides the security feeling)

In summary, the neighborhood designs mainly deal with urban form, built environment/architectural design, transportation systems, public/open spaces, social life and social interactions.

In these design concepts, each neighborhood has to be a 'unit' of the city that is solved by itself (Perry, 1929; Stein, 1957). And in this study, the idea of a neighborhood unit's self-sufficiency is hypothesized as the most ideal scale that can form a whole city.

When it comes to sustainability, the principles that come from neighborhood concepts are not sufficient. The dean of the UC Berkeley College of Environmental Design, Harrison Fraker (2013) refers to inevitability of energy, water, food and waste systems in sustainable settlements, as well as other famous elements of urban design as urban form, transportation, green space and a social agenda in his book 'The Hidden Potential of Sustainable Neighborhoods'. He describes neighborhood

scale as, 'urban metabolism', expresses that this scale plays/engages an expanded role to urban landscape to deliver the eco-services.

In sustainable design of neighborhoods, especially the materials and technologic solutions used are significant as in the ecovillage cases.

In Turkish culture, neighborhood has a deeper meaning as it necessarily includes social-interactions of their communities and expands organically with the needs/regulations of culture (Yesarimons, 1999). Alver (2013) expands it as neighborhoods are not just space and human, they are a life scene that people and space touch together as they have their own characteristics and identity.

Turkish traditional neighborhoods include structures as streets, squares, mosques, madrasas, schools, marketplaces, baths, coffeehouses, grocery stores, fountains, parks and housing (Eryılmaz, 1988; Alver, 2013).



6. THE PROPOSAL: NEIGHBORHOOD DESIGN PRINCIPLES

Before industrialization and urbanization, vast amount of the world's population was living in the rural areas like villages. In rural areas/villages there is production and regeneration because they have to feed and sustain themselves without any support from the outside. However, after industrialization, urbanization process accelerated, most of the rural population immigrated to urban areas/cities. As a result, urban population grew rapidly. In the near future, it is projected that most of the population will be living in urban areas. Existing cities have limited amount of production and they are mainly consumption-dependent and destructive. They need support from outside, from rural part of the world, but on the other hand rural part cannot supply for this vast amount of population without harming natural sources/lands or without using herbicides, pesticides, hormones, GDO's. As a consequence, cities/urban areas must be transformed into another situation. They must be much more productive, more regenerative, and more self-sufficient. And for an easier transformation process, cities should be divided in achievable parts/pieces which can be considered as a whole in the end, when the transformation process completed.

These small parts/pieces of cities must be self-sufficient zones -like the ecovillage examples-. Cities consist of neighborhood units and they are actually clusters of them. Considering the scale of a self-sufficient zone in a city, 'neighborhood scale' is likely to achieve this goal as Smith (2015) mentioned they have a great potential for investigating urban dynamics and launching policy interventions, providing a space to implement and study change overtime, with its separate life dynamics and certain limits of an area. Neighborhoods can be designed as self-sufficient urban zones as they are the smallest city units that have the capability of what ecovillage cases achieved. They have special identities, traditional and cultural backgrounds, they are urbanized but perceptible, human-scale settlements, they have administrative and economic parameters, their physical elements are adequate for self-sufficiency, and they have significant social relationships, interactions as well. These are the reasons why neighborhood scale is selected as to transform a city (Figure 6.1).

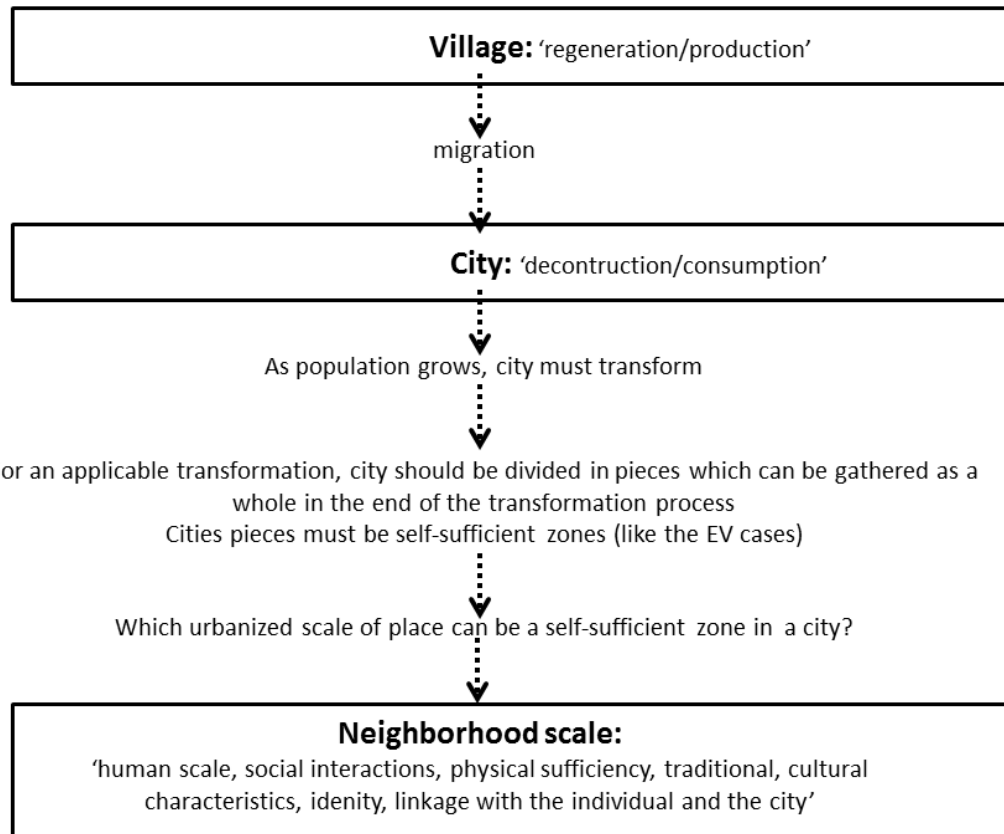


Figure 6. 1 : Village-city-neighborhood scale relations.

Integration of EV Concept to Neighborhood Design

In this thesis, ten eco-village cases were examined and different characteristics were summarized in the form of a chart, which has twenty parameters for each ten cases as to figure if there are some guiding elements that contain ecological and sustainable solutions, which can help us to design and organize our cities, using the scale of neighborhoods.

After examining existing ecovillage cases, existing neighborhood design definitions, concerns and concepts were investigated to capture the scale for neighborhood design.

A matrix is created from the result titles of ecovillages and the titles provided from neighborhood design definitions or concepts. They are summarized as the principles to be used in neighborhood designs.

Principles have a strong reference from ecovillage cases are mainly about sustainability features as; food systems, waste management, water management,

energy sources and technological solutions. Also principles as transportation, central area & central area functions, open space & green areas, architectural design, materials used, public space & public life, values of society, educational values, economy & currency have significant references from ecovillage cases.

Boundaries are not a leading design issue in ecovillage designs comparing with the neighborhood design concepts, they usually depends on economical state of the founder community and the land's ownership. Density and mixed-land uses are also not a main design issue as well, they grow, emerge organically with the communities itself in time.

The principle of mixed-land uses is not especially a design issue in ecovillage settlements as they organically, simultaneously grow in time, and they generally do not have rigid divisioned, densified zoning areas.

For ecovillage cases, local identity, local culture & historical background & traditional character of place are the weakest titles to have reference as they have multi-cultures, multi-historical backgrounds. They care about locality but do not have a strong local identity comparing with the traditional neighborhoods.

Principles have a strong reference from neighborhood concepts are mainly about site design which creates the urban form as; boundaries, density, central area & central area functions, open spaces & green areas, mixed-land uses. Also principles as transportation, public space & public life, values of society, local identity, local culture & historical background & traditional character of place have significant leading references from neighborhood concepts as they are the principal elements what makes a neighborhood 'a genuine neighborhood'. Architectural design and materials used in building scales also have references from neighborhood designs.

In existing traditional neighborhood design concepts sustainability features are not common. There are sustainable neighborhood designs, but they are new approaches not proven yet and not mentioned in this study.

In traditional neighborhood designs, educational values do not have a leading role in designs comparing the eco-village concepts. Since the eco-village concepts are established to share their experiences with humanity worldwide, they are general planned with this direction.

In this study, economy & currency refers for an eco-village or a neighborhood to have its own economy and currency, since the traditional neighborhoods do not have that type of specialization, it is not possible to compare, but that title is preserved to be used for proposed principles.

Ecovillages and neighborhoods, both cannot succeed without the integration of all types of diversity; they even get nourishment from those differences. Neighborhood concept is not just an administrative category; a lifestyle, a pattern, a common culture with its various ethnicities, religions, social stratus, wealth levels, and professions as Büyükmihçi (2014) expressed similar as the ecovillage cases. Ecovillages have common values with Turkish neighborhood concept evaluated, as having significant interactions in community and expanding its boundaries organically with the needs or regulations of the society. Both concepts have the convenient and perfect potential for a transformation process, which begins with community since they are human based, flexible, living concepts.

When we check both investigations' results, it is noticeable that they have essential titles in common as; transportation, central area & central area functions, open spaces & green areas, architectural design, materials used, public space & life, values of society.

Even the matrix is created to clarify where the principles are derived from, in this study, it is not possible to have a certain limitation for its borders for example we can not state as the neighborhood concepts do not have sustainability features or the eco-villages do not have a local identity. The table of matrix is made according to the concentration of the base effective principles derived from each concept. Blanks in the table refers that the reference from that title is weak comparing the other concept.

As a result, the leading titles following the eco-villages, integrated to neighborhood design concepts, to be used as neighborhood design principles (Table 6.1).

Table 6. 1 : Neighborhood Design Principles' Matrix.

	Titles	Eco-villages' Results	Neighborhood Concepts
Site Design			
1	Boundaries	☐	✓
2	Density	☐	✓
3	Transportation	✓	✓
4	Central Area & Central Area Functions	✓	✓
5	Open Spaces & Green Areas	✓	✓
6	Mixed-land uses	☐	✓
Building Scale			
7	Architectural Design	✓	✓
8	Materials Used	✓	✓
Sustainability Features			
9	Food Systems	✓	☐
10	Waste Management	✓	☐
11	Water Management	✓	☐
12	Energy Sources	✓	☐
13	Technological Solutions	✓	☐
Socio-economic Dimension			
14	Public Space & Public Life	✓	✓
15	Values of Society	✓	✓
16	Local Identity	☐	✓
17	Local Culture & Historical Background & Traditional Character of Place	☐	✓
18	Educational Values	✓	☐
19	Economy & Currency	✓	☐

6.1 Site Design

➤ Boundaries of application area, in this study's case, boundaries of the projected 'neighborhood area' should be clear. It should also provide potential to

communicate beyond its boundaries, with the adjacent neighborhoods, especially if the project is in an urbanized area like cities.

- Density, population and area of the application area should be considered. High density is mostly preferable for sustainable settlements but on the other hand, for self-sufficiency, the ratio should be calculated.
- Transportation has significant impacts to community life besides carbon footprints. Neighborhood designs should be pedestrian oriented, should have separation and hierarchy between its traffic and road systems. Natural analysis such as slope, morphology, topography should be taken into account when determining the route. A successful neighborhood design should include walking routes, cycling routes, electrical cycling or cars, car pools, and public transportation that provide appropriate travelling comfort. If it is possible, for inevitable daily works/tasks primarily walking or cycling distances should be regarded.
- Central Areas and Central Area Functions should be applied with care in a successful neighborhood project; these should be tangible and easily reachable. For central area functions, functions that gather residents and other neighborhoods' residents together and bring out the community spirit should be preferred.
- Open Spaces and Green Areas for social interactions are significant, they should be mainly around/among the residential units or nearby other functions of the town, green areas, walkways, interior parklands, permaculture gardens, family playgrounds, pools, sport areas, car free roads/zones and even woods/fruit forests should be in the center of the town or the city, these areas should be well-balanced and spread over the neighborhood area. They should be implemented in design as much as possible, or as in ecovillage concepts, they should be the most dominant element of design.
- Mixed-land uses provide safety, vitality and expose other important interactions; they carry city/space dynamics on a higher level. On the other hand gathering variable functions in nearby places increase the level of accessibility and it gives opportunity to use less transportation.

6.2 Building Scale

- In Architectural Design, ecological, sustainable, permaculture, cohousing (if possible) principles should be used as pathfinders. Passive solar systems should be used, unified with geometry and design tactics, relations with land/nature should be considered in settlements. Reconstructions and reuses of old buildings should be encouraged. And clustered and shareable buildings waste less.
- Recycled, recyclable, local, eco-friendly Materials (for example reclaimed timber, recycled wood, bamboo, recycled metal, recycled glass, natural stones, straw bale etc) should be Used in designs.

6.3 Sustainability Features

- Food Systems must be considered; as in cities many people live together, population accelerates each day. People need to be fed, but impacts including the carbon food print should be minimized for sake of planet. As an eco-village solution, permaculture principles, biodiversity should be implemented in all around the city including empty lots (and also there should be numerous farming plots inside parts the city to have local organic food), maybe roofs, terraces, gardens, facades, community gardens can be used, saving soil/water/clean air should be encouraged by municipalities, governors. Consumerist must see and work for how it produces/grows/breeds, to notice not to consume what is not needed.
- Waste Management technologies and compost recycling systems should be implemented in the city, educations of that management techniques should be given to both authorized people and public (initially to the residents of the application project).
- Water Management technologies, scientific solutions and using sources/land to design for resilient cities and renewability (like permacultural or ecological systems' techniques such as ponds, wetlands, rainwater collectors, etc.) should be indispensable in designs. Bio-swales should be adapted in the convenient places with the functional and efficient vegetation to decontaminate surface run-off water from pollution and debris.
- Use of Renewable & Ecological Energy Sources (wind tribunes, solar systems, biomass, biodiesel etc.) must be implemented as considering land

specialties. Counting the consumed energy of the residents (or facilities) and comparing that consumed energy in societies can raise awareness and help reducing the use of energy.

- Technological uses and Solutions for energy saving/producing systems, high-tech building technologies should be encouraged in cities.

6.4 Socio-economic Dimension

- Public Space and Public Life has importance even it is a small village, neighborhood or a metropolitan city center. As in eco-villages, cities of people also should have community buildings, squares, parks, farms etc. where they can share life. If possible, there can even be some certain place that they can share daily tasks like dining, cleaning or recreational activities. An in neighborhood concepts we see that wherever there is a powerful community feeling, the design counts that much successful.

- Values of Society (like language, race, religion, denomination etc.) should be accepted and respected by all. Love, soul of the place, care for earth and care for others should be accepted as a main aim by the community, supported by the design. The design should be addressed to all groups without any discrimination such as disabled, child, elderly, female, male, or upper/lower income group

- Local Identity of the neighborhood should be protected and promoted by respecting existing floor heights, building materials and elements. Residents' existing lifestyles, their senses of places, memories and tracks should not be damaged by design only if they should be improved and developed.

- Local Culture, Historical Background and Traditional Character of Place should be regarded in designs. Cultural, artistic activities that exist in the local culture of the neighborhood should be supported. For this, existing buildings can be functioned for public spaces. Historical buildings, if exist, can be evaluated as museums open to public access.

- If possible, the town/neighborhood should be specified in some subjects for a better future, has centers for researches (because there is always more to learn) about its Educational Values. Educational areas should also be used as limited public realm

besides being a simple educational facility. And importance should be given to share knowledge, science, technology for others.

➤ Neighborhood design also has effects to Economy and Currency. For example, use of places/plots as urban farms can change economic situation in a positive way or trading hours/products can encourage people to care more about sustainable life.





7. CONCLUSION

For the last century, globalization, industrialization, urbanization processes and capitalist systems, had crucial negative impacts for our future. If consumerist, self-thinking, modernized, urbanized communities, go on consuming, harming/destroying/disturbing natural systems –instead of using them precisely and taking act with learning from them-, as Dawson (2006) expresses the changed balance of the ecosystem will proceed causing many unacceptable consequences as worldwide crises. These type of ecological crises rooted after 40's, beginning with serious air pollutions continuing with harsh soil and water pollutions that resulted with tragedies around the world, after 70's, crises continued with oil deficiency, needs' integration with transportation and manufacturing processes, resulted with many negative results as well and it is projected to be worse in the near future. This misuse of the planet increased the carbon footprint levels, and as a continuation, it emerged problems as global warming and climate change which irreversibly disturbs the ecosystem balances (Prudent et al., 2009) and still remaining to destroy all the living creatures attached to the system.

As humans, we have some principal needs to meet, as clean air, water, nourishment, shelter, temperature, relationships, and security. According to Hemenway (2010), our configuration may not able to be completely regenerative, but instead of being degenerative, we can stand at the point between these two, as being sustainable and maintaining the continuity while meeting the needs of all organisms. The concept of sustainability has three domains. Unfortunately, while promoting ecological sustainability, some institutions, companies or communities have negative effects on economic or/and social sustainability. Besides conserving humanity and nature, other dimensions of the concept should also be regarded. On the other hand, there are also needs of growing human population in the context of urban design as housing, energy, infrastructure, health, education (Kramers et al., 2014). Whereby urbanized areas and their built environment (and impacts to surroundings) cover considerable space, they are vastly responsible for the change. Solving this contemporary problem

sustainably, limiting the consumption in cities with city building skills is the point makes urban design significant today. Ecological urbanism is a conclusion of this quest. From the beginning, ecological urbanism led by significant names as Hippocrates, Vitruvius to Frederick Law Olmsted or Ebenezer Howard, from Patrick Geddes, Lewis Mumford to Ian McHarg, Kevin Lynch or Jane Jacob and many more recent researchers, thinkers or designers. By centuries, the concepts and approaches became more multi-disciplinary, discussing and promoting earlier studies such as; from natural and cultural history, garden cities and new towns, perception of cities, identity, legibility, coherence, managing resources and waste, urban ecosystems to green urbanism, landscape urbanism and industrial ecology (Spirn, 2012). Excluding these approaches of ecological urbanism's literature, permaculture concept is arisen after 70's, defined as a way of life, a significant systematic method within the aim of maintaining the balances of natural ecosystem using its gathered information wisely.

At this point, especially after 80's with the rise of ecological consciousness, some sustainable communities have emerged around the world. The solution for future is hidden in social transformation of communities, which are sustainable in all dimensions and consist of equal and collaborated cultures (Kellogg&Pettigrew, 2007; Beddington, 2010). Since ecological urbanism design seeks to produce safer, healthier habitats, make legible and tangible ecosystems and change existing perception, getting in action (Spirn, 2012), in this pessimistic era, eco-villages are sufficiently thriving communities, experimenting in their own path, to achieve the same targets as ecological urbanism, consist of equal, collaborated cultures and using permaculture concept.

In this thesis, eco-village initiatives analyzed and appraised for actualization processes of future ecological and sustainable urban designs. These initiatives are successful and sometimes also awarded, proved by important institutes, governments, for minimizing their impacts to planet by consuming less energy sources, using renewable sources and living with principles based on a shared/regenerative/against-consumption lifestyle. It is noticed that they are aware and beyond, using technological developments and using traditional techniques combining them with scientific ones in their designs. They have some challenges to deal, as Gilman (1991) summarized; bio-system, built-environment, economic

system, governance, glue and whole system challenges, but they have developed themselves and keep developing still today from their experiments.

As a case study, ecological and sustainable lessons learned from ecovillage communities are detailed and summarized in a chart, which has twenty parameters for each ten cases, related with physical dimensions, uniquenesses, impacts to the system's cycles, use of sources & designs, social dimensions, values and economic dimensions of eco-villages. These twenty parameters (year, location, size, population, significance in all eco-villages, unique features, food production, waste management, water management, energy sources, architectural design materials used, technologic solutions, public space, social life, transportation, values of society, educational values, economy and currency) determined considering the potential of relation with neighborhood design.

This thesis interrogates the applicability of eco-village solutions in the urban context, focusing on the neighborhoods as the city scale patches that the eco-village approach can be applied. It examines particularly the eco-village movement and neighborhood designs, reveals the principles that define an eco-village and a neighborhood, by looking the implemented cases, definitions and experiences around the world including Turkish cases.

A matrix is generated with the purpose of clarifying the integration of the ecovillage cases and the urban neighborhoods, understanding the scale and relation between them and to offer design principles that are adapted from both concepts.

Comparing two concepts, they both have deeper expansions than their plain explanations. They are not just an ecological settlements or administrative/spatial units, they are a culture pattern, a lifestyle, a public life with common shares, values, identities. They both nourish from diversity, solidarity, cooperation and human interactions as well as their built and natural environment. Their self-sufficiency resembles. Regarding their common sides, these two concepts also have different specialized strong sides, with the purpose of creating a sustainable, healthy environment in cities, only one concept did not accepted satisfactory. For instance, ecovillage cases may be much more developed in sustainability features, but on the other hand traditional neighborhood designs are arbiter for site design regulations, socio-economic dimensions as identity or locality.

As a result, to be discussed for future urban design projects, ecological and sustainable neighborhood design principles are proposed. These principles are under four main titles and detailed in proposal part of the study as; site design (boundaries, density, transportation, central area & central area functions, open spaces & green areas, mixed-land uses), building scale (architectural design, materials used), sustainability features (food systems, waste management, water management, energy sources, technological solutions) and socio-economic dimensions (public space & public life, values of society, local identity, local culture & historical background & traditional character of place, educational values, economy & currency).

Clarifying all these definitions and examining, comparing these cases, concepts have importance in terms of literature. To discuss what we can do for our planet by noticing what has been done before, gives us the chance of improving our visions and helping with solutions.

As a conclusion, within the scope of the study, the purpose is to contribute and expose a discussing platform, in order to make cities livable and adaptable for future needs while using wisely the experiences and information acquired from the ecovillage concept and utilizing neighborhoods as a transition scale tool for urban areas.

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APPENDICES

APPENDIX A: Comparison chart of ten eco-villages.



APPENDIX A

Table A.1 : Comparison chart of ten eco-villages.

Parameters	Auroville	Findhorn	Ithaca	Damanhur	Crystal Waters	Sieben Linden	Mbam	The Farm	Marmarış	Dutlar Köyü & İncece Bui
1. Year	1968	1985	1991	1975	1989	1997	2000*	1971	2003	2007
2. Location	India	Scotland	NY, US	Italy	Italy	Germany	Senegal	Tennessee, US	Turkey	Turkey
3. Size (ha)	546	62	70	520	250	80	377	777	2,2	8
4. Population	2500	400	220	600	200	100	4000	200	11	1
5. Significance in all Eco-villages	most known and successful	developed environmental systems	most famous in North America educational contributions	has UN award in sustainability	one of the most illustrious, educational and followed settlement	focuses on closed energy and resource cycles	a converted village through permaculture and sustainability. Inspirational example for other eco-communities. provide an educational platform for multi-cultural appreciation. replanting its damaged mangrove forest. forestation and restoration as important factors.	home sources on organic food production, natural buildings, permaculture and restoration ecology	organized and conscious group of people	a continuation of a failed attempt of another ecovillage
6. Unique Features	spiritualism ethic values	health care currency and banking system	renewing and common housing model	solidarism ethical values currency and banking system	using of permaculture principles as a guideline	warm production and use of energy is about 1/3 the German average	using sustainable farming techniques. fish farming, organic farming. low intensity agriculture. bookkeeping. agroforestry & forestry.	built entirely from salvaged, recycled, and local material. become agriculturally self-sufficient within 6 years.	revive a traditional village abandoned on the basis of permaculture and to establish a model sustainable settlement	revive a traditional village abandoned on the basis of permaculture and to establish a model sustainable settlement
7. Food Production	organic and local farming seed bank	organic and local farming local market sells	organic and local farming local market sells use of permaculture principles seasonal products	organic and local farming seasonal products	organic and local farming use of permaculture principles	organic and local farming use of permaculture principles	using sustainable farming techniques. fish farming, organic farming. low intensity agriculture. bookkeeping. agroforestry & forestry.	most of their live veges to vegetable blossoms. food forest and edible landscapes. organic and local farming. use of permaculture principles. farm market days.	organic and local farming use of permaculture principles ancient seed	organic and local farming with co-op farming style ancient seed sundry techniques used to avoid decomposition
8. Waste Management	recycling systems	Living Machine: special sewage treatment plant	binary pipe system compost toilets	composts use as organic fertilizers	composts use as organic fertilizers. food waste also serves as animal feed	treatment plant for sewage compost toilets	special system employs greywater through the separation of organic material and water. organic materials used for compost.	composting recycling conservation	compost toilets	composting
9. Water Management	water dams and dikes treatment planted filter ponds	wetlands technological systems	ponds, wetlands	collect rainwater and clean stream water for household. biotopes, planted filters	ponds and built dams rainwater runoff collection reservoirs	firewater-lake pond two wells use of a closed water cycled de-ionization system	special system recycles greywater through the separation of organic material and water. filtered water is used for household use.	ponds, wetlands, biofilters, swales wastewater treatment	lakes and dikes harmoniously with nature	natural spring water and rainwater collection
10. Energy Sources	windmills solar biomass	solar panels solar tubulars	solar panels 4 energy centers radioactive solar systems smart metering (measuring system)	solar photo-cathodic panels geothermal and biomass	passive solar systems	local energy and material cycles avoid fossil fuel usage solar photovoltaic panels wood burning stoves	solar panels vegetable fuel local animal biomass	microclimates using the earth's thermal mass with solar gain green roofs solar photovoltaic panels	passive energy systems solar panels wood stoves	solar panels biodes as energy source wood stoves
11. Architectural Design	use of geometry and design tactics	caseworks and other types of ecological buildings	in housing hybrid design, layout and features support ecological design principles. houses are elevated. use of high insulation.	reconstructing old and abandoned buildings. green building principles. use of high insulation.	well a must for houses. ecological planning techniques	multi-family dwelling houses construction trailers use of high insulation	vernacular design	built by homeowners designed in different architectural styles with green construction and building principles. energy efficiency is significant. have different architectural styles, such as the Dutch style, Earth shelter or log cabin style.	restoration of existing buildings. vernacular building techniques. ancient houses with hangover style.	restoration of existing buildings. vernacular building techniques
12. Materials Used	local and recyclable materials	local and recyclable materials	high tech construction materials. natural construction techniques. local materials	local and eco-friendly or/and recycled/reused materials	local materials avoiding toxic materials is important	natural materials as local straw-bales, clay and timber reused concrete walls from food constructions	local and natural materials	recycled materials use of insulated concrete, local timber, recycled brick, steel, cob, strawbale and wood	slate and soil plaster for insulation of existing buildings. use of local wood, straw bales and soil	use of local wood, straw bales and soil
13. Technologic Solutions	for every systems and buildings	for every systems and buildings	for every systems and buildings	for every systems and buildings	for every systems and buildings	for every systems and buildings	new methods and technologies used regarding permaculture, utilization of microways and soil erosion inhibitors contribute to development and design process of these technological solutions	for every systems and buildings	for every systems and buildings	for every systems and buildings
14. Public Space	zoning for space hierarchy mediation hall as landmark nature is a significant element	community centers for gathering and sharing daily tasks	community houses for gathering and sharing daily tasks	has four main "pillars"	community meetings and sharing daily tasks get people together	restored farm house in the middle of the village accommodates the community and seminar rooms	has many communal spaces such as the Training Center, Community Center, and the meadow	court style open spaces between existing buildings. has a cross-shaped open-air old school restored and functioned as a communal building.	has random village buildings as houses, a mosque, a school, mosque, and old style owners	has random village buildings as houses, a mosque, a school, mosque, and old style owners
15. Social Life	gatherings beside the landmark	dining, cleaning, meetings together is important	dining, cleaning, meetings together is important	pillars which have meanings: enrich social life and share ways of service as working system	community meetings and sharing daily tasks get people together	community meetings and sharing daily tasks get people together	group meditation and religious services get people together decisions made by elected board system	community meetings, sharing daily tasks, dining, resting get people together resting get people together a version of eco-tourism called TaTuTa	community meetings, sharing daily tasks, dining, resting get people together resting get people together a version of eco-tourism called TaTuTa	community meetings, sharing daily tasks, dining, resting get people together resting get people together a version of eco-tourism called TaTuTa
16. Transportation	electrical cycling supported avoidance motor vehicles	public transportation is used	pedestrian and cycling friendly hybrid cars car pool system	carpool system	no public transportation have difficulties in transportation	horse carriages car pool system	pedestrian Indian bamboo stretchers heavy difficulties in transportation	pedestrian and cycling friendly	pedestrian	pedestrian
17. Values of Society	have strong common spiritual values	shared working life to understand soul of place	helped in power of love sharing is important	natural healing methods, holistic view of wellness, appreciate life in all forms. religious values significant	believe in earth care	dedicate themselves to humanness and to the responsibility for the world, express their connection with the Earth and its workings	barriers forced migration to the cities values and empower sustainability in health, agriculture, culture, sustainability, and economy	keep the hippie beliefs from the 70s. believes in inner peace, free thinking, pacifism, and spiritualism	believe in permaculture ethics. exhibit a sustainable village using permaculture principles and share the experiences gained in this process	believe in the power of working together within the harmony of nature, as a community and for the community
18. Educational Values	has research centers	researches significant of water management systems	has significant research and education partnerships	has companies	approved as a model significant in experimental education	sharing ideas in the seminar house organized events workshops, retreats and other international education	provides an educational platform expected to be declared as a regional research and training center for "demonstrations of innovative technologies and sustainable lifestyles"	the EcoVillage Training Center is a living workshop environment, teaches about students from more than 50 countries. hosted the Alternative Energy Fair	hosts its own foundations called "Marmarış Ökolojik Yaşam Derneği" and "Türkiye Birleşik Milletleri Barış Kurumu" which accepts voluntary guests from 141 countries	sharing ideas, experiences, knowledge is important. has archives which allow for practicing ecological solutions. accepts voluntary guests from TaTuTa
19. Economy	income pool	supports inhabitants businesses education funds has its own banking system	food production is important	working system that balances entrepreneurship, solidarity and sharing. has its own banking system	working system as income co-creation, zoning. businesses operate within the community	aims to keep the added value inside circulation of the income money is important. job labor opportunities and freedoms	income is from agriculture production	a system of monthly financial maintenance. income is mainly from birth education and support, soy production and book industry	financially supported by the villages. who work in city center. accepted to be able supported by life with their permaculture project	dependent to outside products are sold for earning money. have been from volunteers and neighbor villages
20. Currency	coconut numbers	Flko	Ithaca Hours	monies	Local Fairtrade Trading System	Farm (monies)	monies credit	US dollars (monies)	Tl (monies)	Tl (monies)

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