# SUPERIMPOSING ECO-VILLAGE PRINCIPLES ON CHILDREN'S VILLAGES FOR A HEALTHIER ENVIRONMENT

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY
FULYA TURHAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
BUILDING SCIENCE IN ARCHITECTURE

MARCH 2016

Approval of the thesis:

SUPERIMPOSING ECO-VILLAGE PRINCIPLES ON CHILDREN'S VILLAGES FOR A HEALTHIER ENVIRONMENT

Submitted by **FULYA TURHAN** in partial fulfillment of the requirements for the degree of **Master of Science in Building Science in Architecture Department, Middle East Technical University** by,

Prof. Dr. Gülbin Dural Ünver _____
Dean, Graduate School of Natural and Applied Sciences

Prof. Dr. Elvan Altan _____
Head of Department, Architecture

Prof. Dr. Soofia Tahira Elias Ozkan _____
Supervisor, Architecture Dept., METU

**Examining Committee Members:**

Asst. Prof. Dr. Ayşegül Tereci _____
Architecture Dept., KTO Konya Karatay University

Prof. Dr. Soofia Tahira Elias Ozkan _____
Architecture Dept., METU

Assoc. Prof. Dr. Arzuhan Burcu Gültekin _____
Real Estate Dev. & Manag Dept., Ankara University

Assoc Prof. Dr. Sinan Erdoğan _____
Civil Engineering Dept., METU

Asst. Prof. Dr. Gülsu Ulukavak Harputlugil _____
Architecture Dept., Çankaya University

**Date:** 11.03.2016

**I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct. I have fully cited and referenced all material and results that are not original to this work.**

Name, Last name : FULYA TURHAN

Signature :

## ABSTRACT

### SUPERIMPOSING ECO-VILLAGE PRINCIPLES ON CHILDREN'S VILLAGES FOR A HEALTHIER ENVIRONMENT

Turhan, Fulya

M.Sc. in Building Science, Department of Architecture

Supervisor: Prof. Dr. Soofia Tahira Elias Özkan

March 2016, 149 pages

In this study, the applicability of the principles of existing eco-villages to children's villages that shelter homeless children has been investigated. The main goal is to present an environment to children where they can grow up with an awareness of their rights and duties as responsible individuals who can take their future in their own hands. To have a sustainable future they need to become conscious of the ingredients of sustainability and try to incorporate them into their own lifestyle.

The premise of this study was that, the principles of eco-villages, whose main vision is to create sustainable and self sufficient communities can be adapted for implementation into children's villages. These principles were first determined by a literature review. and then an in-depth evaluation based on these principles was conducted for five case studies selected from well-known applications of eco-villages in Europe. The selected case studies are Findhorn, Tamera, Sieben Linden, Dyssekilde and Damanhur Eco-Villages; The one in Damanhur in Italy was also visited to gather first hand information on the eco-village. Further, in order to understand the structure of children's villages and the steps to be taken to ensure sustainable living for children, a thorough literature review was conducted and three case studies from children's villages, i.e. SOS Children's Village Imst/Tyrol, SOS

Children's Village KKTC and Bolluca Children's Village were investigated; while a site visit was also conducted to Bolluca in Istanbul, since it is one of its kind in Turkey. Furthermore, three case studies on “sustainable living for children”, i.e. Hazlewood Eco Center, Sustainable Schools Project and Eco-Healthy Child Care Program® were investigated. According to the information gathered from the aforementioned studies, a model was formulated as a guideline for the integration of sustainability features into children's villages, and a checklist compiled to achieve this aim. Finally, based on the guidelines and checklist a proposal for the application of sustainability features in Bolluca Children's Village in order to transform it into an ecological children's village has been presented.

This study suggests that providing homeless and orphan children a self sufficient and sustainable environment could help them gain the skills to be self sufficient themselves, and in turn become responsible individuals who are sensitive to the sustainability of their natural environment, as well as to their own future.

**Keywords**: Eco-villages, Children's Villages, Living in Touch with Nature, Sustainable Living for Children

# ÖZ

## DAHA SAĞLIKLI BİR ÇEVRE İÇİN ÇOCUK KÖYLERİNE EKOKÖY PRENSİPLERİNİN İŞLENMESİ

Turhan, Fulya
Yüksek Lisans, Yapı Bilimi, Mimarlık Bölümü
Tez Yöneticisi: Prof. Dr. Soofia Tahira Elias Ozkan

Mart 2016, 149 sayfa

Bu çalışmada dünyada mevcut ekolojik köy prensiplerinin, ailesinden ayrılmak zorunda kalan çocukların yerleştirildiği çocuk köylerine uygulanabilirliği çalışılmıştır. Ana amaç, çocukların kendi gelecekleri hakkında söz sahibi olabilmelerini ve mevcut ekolojik sorunlara çözüm odaklı yaklaşabilmelerini sağlayacak bilinci, bilgiyi ve donanımı sağlayacak ortamı onlara sunmaktır.

Bu amaç doğrultusunda ana vizyonu kendi kendine yetebilen ve sürdürülebilir topluluklar yaratmak olan ekolojik köylerin genel prensipleri kaynak araştırmaları ile belirlenmiş, bu belirlenen prensipler ise Avrupa'daki uygulamalardan seçilen beş vakanın detaylı bir biçimde değerlendirilmesine baz oluşturmuştur. Seçilen vakalar Findhorn, Sieben Linden, Dyssekilde ve Damanhur Ekolojik Köyleri olup Damanhur Ekolojik Köyü'ne yerinde bilgi alabilmek için gezi düzenlenmiştir. Bununla birlikte, çocuk köylerinin yapısını anlamak ve çocuklara sürdürülebilir yaşamın sunulmasını sağlayacak uygulamaları keşfetmek amacıyla kaynak taraması ve çocuk köyleri için Imst/Tyrol SOS Çocuk Köyü, KKTC SOS Çocuk Köyü ve Bolluca çocuk köyü olmak üzere üç vaka incelemesi yapılmış, Bolluca Çocuk Köyü'ne Türkiye'deki tek örnek olması sebebiyle gezi düzenlenmiştir. Çocuklar için sürdürülebilir yaşamla ilgili ise Hazlewood Eco Center, 'Sustainable Living for Children' ve Eco-Healthy

Child Care Program olmak üzere yine üç adet vaka incelemesi yapılarak, belirlenen ekolojik köy prensiplerinin ve bu prensiplerle ilgili uygulamaların çocuk köylerine entegre edilebilmesi için kılavuz görevi görecek bir model ve kontrol listesi oluşturulmuştur. Son olarak bu model ve kontrol listesi baz alınarak Bolluca Çocuk Köyü'nün ekolojik bir çocuk köyüne dönüştürülebilmesi için uygulama önerileri sunulmuştur.

Bu çalışma ile sürdürülebilir ve kendi kendine yetebilen bir ortamda büyüyen ailesinden ayrılmış çocukların, en çok ihtiyaç duydukları kendi kendine yetebilme becerilerini kazanacakları ve dünyaya, dolayısıyla kendi geleceklerine duyarlı ve sorumluluk alabilen bireyler haline dönüşecekleri savunulmaktadır.

**Anahtar Kelimeler**: Ekolojik Köy, Çocuk Köyü, Doğa ile İç İçe Yaşamak, Çocuklar için Sürdürülebilir Yaşam

*To all children and my soon to be born niece,*

*Nehir Turhan, for the light in their eyes*

## ACKNOWLEDGEMENT

I would like to express my deepest gratitude to Prof. Soofia Tahira Elias Ozkan, who has never given up on me and given me countless opportunities, too much of her time, very valuable education, wise and thoughtful guidance, encouragement, respect, love and understanding and I would especially like to thank her for being the constant and biggest support of my dream.

I would like to thank Francoise Summers, my motivation on my decision to apply to this program, for her passion and for showing me a route to be passionate about, for her work in Kerkenes Eco Center and for having me understand why and for what we should take action.

I would like to thank the staff of Bolluca Children's Village and the Koruncuk Foundation as a person for the work they do especially for the one impression the village has left on me which is the light, happiness, and confidence I witnessed in the eyes of children. I would also like to thank Hatip Uzun, the institution manager, Emre Esen, the social service specialist, and Mustafa, one of the beautiful children in the children's village for the valuable information they provided, for their kindness and their time.

I would like to thank Cemil Demircioğlu, Kürşat Erk, Fatih Kart, Meltem Ataoğlu and all my co-workers in the past four years for their patience, encouragement and support.

I would like to thank my dear friend Buğra Tetik for bringing me back on track with this study in the exact right time.

I would like to thank my dearest F. Eymen Toprak for her constant support and encouragement throughout this study and for her wonderful friendship in my life.

I would also like to express my deepest gratitude for my cousins, Öznur Söylem and Serkan Söylem for sharing hope and experiencing it anew in our visit to Bolluca with me and for their wise guidance and friendship throughout my life.

Lastly, I would like to express my gratitude and deepest love to my family, Sezer, Nilgün, Serkan and Özlem Turhan for their patience, understanding, encouragement and love in the process of my study as at all times and for being the way they are, rendering me the luckiest person alive.

## TABLE OF CONTENTS

# LIST OF TABLES

## TABLES

## LIST OF FIGURES

### FIGURES

# CHAPTER 1

# INTRODUCTION

## 1.1. Argument

As humanity, we have come to a point that every aspect of our lives depends on the intensive consumption of resources. Although our land is full of resources of food, energy, materials for shelter and such, every part of it has its own limit. With urbanization, the land on which the city is built becomes overpopulated in a way that the resources the land provides cannot fulfill the needs, and the waste produced cannot be assimilated naturally. Hence, neither the land nor the people on that land can be self-sufficient.

One of the many reasons of urbanization is the migration from villages due to economic and social constraints besides the appeal of urban areas. Rural areas are being destroyed every day causing the urban areas to become even more dense. In order to help villagers be satisfied in their village, the reasons behind their inclination to move gain importance. Sustainability concept helps understand both the problems and solutions in that matter. Since it covers every aspect of life and covers being self-sufficient in every aspect of it, the concept has been used and its principles have been integrated with villages. An Eco-village is a model of a sustainable-self sufficient community that tries to bring an answer to every question regarding ecological, economic and social problems. With this model, it is aimed to either save the villages that face destruction or to build sustainable villages anew in a way that the residents do not become dependent outside of the village on food, energy, education, water, material, entertainment, social activities or economy.

Another aspect of urbanization in our time is the alienation of people which renders them susceptive to any suggestion of hostility or fear. With the perception of rights and wrongs that have been suggested, people may start observing one another as 'different'. All living creatures tend to show fear against what is different from them and anger follows fear every single time. A society full of hostility and hatred cannot be socially sustainable; hence, the rural way of living has a better chance to survive socially with a greater opportunity of solidarity between human beings.

All the sustainability discourses address the future of our world and the future of the children today. Even though there are arguments claiming that it is not fair to give the burden of our deeds on earth to children, they have a right and a responsibility to act for their own future. It is important for them to be aware of the situation and learn the ways to make it right.

Children learn from observing and experiencing more than they learn from the things they have been told. They form their characters again by the help of feelings ignited from their own experiences. They interpret the actions of people by observing their interactions with other people, animals, and environment. It is really important what messages they are given and how clear that message is. Hence education of sustainability in optimum could be through living in a sustainable environment, living in touch with nature and experiencing adventures in it.

There exists a model of a village for children in need; children's villages. These villages aim to provide home and family to abandoned children in need, in a loving environment with brothers and sisters and a loving mother that every single child on earth deserves. These homes are located in a village where everyone supports each other and acts as a community in cooperation. These children do not only have a core family but also have a wide family with aunts and friends of their age.

Superimposing eco-village principles with children's villages, that are basically socially, economically and ecologically self sufficient children's villages, can present the education field to children where they can learn nature using all their five senses helping their cognitive development, and learn sustainable way of living as a life

style. This way it would be more likely to raise self sufficient adults who are aware of their responsibility on earth.

### 1.2. Objectives

Driven by the concerns regarding the future of the earth, the future of children, the aim of this study is to integrate eco-village principles into children's villages while investigating ways to create a sustainable living environment for children. In order to achieve this aim, this study holds 5 objectives.

1. To determine the features of eco-villages that renders them sustainable and self sufficient.
2. To determine the features and the structure of children's villages.
3. To determine the requirements for sustainable living for children.
4. To combine the results of aforementioned studies to propose a model and a checklist for ecological children's villages.

To investigate the adaptability of the model to Bolluca Children's Village.

### 1.3. Methodology

In the light of the objectives of this study, the following methodology was adopted.

A detailed literature review has been carried out to understand the main determinants of this study which are eco-villages, children's villages and sustainable living for children.

Following the literature review, five successful eco-villages located in Europe holding the three main determinants, ecological, economic and social sustainability, have been selected and presented as case studies.

Three successful children's villages, one located in Turkey, have been selected and presented as case studies.

Three projects focusing on sustainable living for children have been studied and presented as case studies.

Finally, the information gathered from the above mentioned studies has been used for a meta-analysis to present a model of ecological children's village; and this model's applicability to Bolluca Children's Village located in Istanbul has been discussed.

### 1.4. Disposition

This introduction chapter being the first, the information covered in this study has been presented in six chapters.

In the second chapter the detailed literature review on eco-villages, children's villages and sustainable living for children has been presented. It covers and forms a basis for the sustainability features to be integrated into children's villages.

In the third chapter the materials and the method used to conduct this study have been defined in detail.

In the fourth chapter, features of the selected case studies of eco-villages, children's villages and projects regarding sustainable living for children have been explained in detail.

In the fifth chapter, the results of the case studies, a model for the integration of eco-village features into children's villages, proposals for the integration of the determined features into Bolluca Children's Village and a checklist for ecological children's villages have been presented.

The sixth and the last chapter is the conclusion in which the study is summarized.

In addition to the References, that lists the resources used in this study, a Bibliography is presented which lists some resources that have not been used in this study; however, that could be helpful for one to reach more information about the subjects covered.

# CHAPTER 2

# LITERATURE REVIEW

## 2.1. Eco-Villages

From the beginning of time as we know it, human beings evolved by changing their environment and achieved what they desired by struggling with it (Bener and Babaoğul, 2008). The authors indicate that the positive results in the development of humanity have been achieved by the generous use of resources of nature.

During this development, Sassi (2006) points out that, humans had a drastic effect on the flora and fauna supported by the nature; and human activities have changed the nature of the landscape which can lead to serious disasters for the living organisms dependent on these habitats. Such changes on land, threaten all the services we receive from nature itself which are listed by the author as follows:

- Food, fuel and fibre supply,
- Shelter and building material supply,
- Air and water purification,
- Waste decomposition and detoxification,
- Climate stabilization and moderation,
- Flood, drought, temperature extreme and wind force moderation,
- Soil fertility generation and renewal,
- Plant pollination,
- Pest and disease control,
- Genetic resource maintenance,
- Cultural and aesthetic benefits,

- Adapting and changing ability.

As the major reason of the impacts on nature, the extreme use of energy in the 20th century comes to the forefront since it leads to massive waste and the lack of natural resources (Sev, 2009). As Sev (2009) points out, due to the insensible use of fossil fuels, $CO_2$ and other greenhouse gases are the main reasons of global warming. The author indicates that what needs to be done for the future is to reduce the use of fossil fuels and greenhouse gas emissions.

However, every land has its own limits of resources in terms of being built on, being covered by roads, forests and being used for agriculture (Sassi, 2006). Sassi (2006) mentions 'ecological footprint' as a concept, developed by William Rees and Mathis Wackernagel, which is explained as ' a measure of the amount of land required to sustain human activities, in the long term, by providing food, water, energy and materials and by assimilating waste.' (p: 12). The author also indicates that today the ecological footprint of most cities and some countries are way larger than the land available and gives the example of UK with an ecological footprint three times greater than its surface area.

The reason can be seen as urbanization and the increase of population in urban areas considering that, as Sev (2009) mentions, people living in urban areas constitute 75% of the total human population living on earth and only 2% of earth is constituted by urban areas. The author points out that urbanization is increasing with full speed by destroying the green areas, consuming energy resources intensely which results in air pollution and poisonous waste. As a result, in an urban environment today, the resources are consumed faster than they can regenerate and waste is produced faster than they can be assimilated naturally without giving harm to the environment or to humans (Sassi, 2006).

In order to avoid overpopulation in urban areas and avoid the increase of ecological footprint of them, migration from rural areas to urban areas should be prevented by presenting a self-sufficient, sustainable and satisfying environment to the people living there. In this case three factors need being considered:

- Ecological Design
- Social Design
- Economic design

### 2.1.1. Ecological Design

Non-industrial societies need to live in harmony with the land as they have no other choice but to use local or low-cost materials, energy and water and have to be aware of their sustainable supply, according to Pearson (2005). The author indicates that harmony with the land on a global scale, depends on transforming all our human habitats into 'eco-habitats' which includes below mentioned aspects,

- Replicating the natural balance of ecocyclical resource-generating and degrading processes,
- Using rain water and surface water instead of ground water,
- Recycling used water and materials instead of using new supplies,
- Re-using old buildings instead of always building new,
- Harness energy from sun, wind, and water instead of fossil fuels,
- Returning all nutrients to the soil instead of adding artificial fertilizers,
- Integrating human needs for food and shelter in harmony with the indigenous ecosystem instead of creating alien and adverse environments,
- Having a sense of place in its placement in its surroundings and in relation to the subtle energies of the ground beneath.

In this chapter the above mentioned aspects will be discussed integrated into the topics; Green Buildings; materials, water efficiency, and energy efficiency, and Organic and Local Agriculture.

#### 2.1.1.1. Green Buildings

To constitute a ground for green buildings, there are two objectives; one is ecology and human health and the other is human psychology.

Sev (2009) points out that building activities consume an important portion of the natural resources both during the usage and the destruction phases. According to the author, building activities constitute 5% of the energy consumed in construction sector and more than 45% of it is consumed in the usage, maintenance and restoration phases and calls for the attention of engineers and architects to work with nature instead of working against it.

Sev (2009) also refers to the physical and psychological effects of buildings on humans, pointing out that an outstanding building increases the productivity and health of the people within and is beneficial in the social scale while an unqualified building has the opposite effect. Accordingly Pearson (2005) assimilates the relation between a healthy building and ecological and spiritual sensitivity to that of the wellbeing of one's body and wellbeing of its spirit.

Considering these interpretations, in order to propose a high quality of life to rural people in their own areas, buildings gain importance. In this chapter, the objectives to achieve 'a green building' which is conscious to the environment and to the people living in it will be discussed.

**A. Materials Used**

For a sustainable new town, the choice of material has a very important role (Battle & McCarthy, 2001) while it also has an important impact on buildings from the building aesthetics to the building cost and buildability (Sassi, 2006). The life-cycle of materials (resourcing, manufacturing, transport, use and final disposal) may lead to substantial environmental and social damages as Sassi (2006) lists;

- Global warming,
- Pollution,
- Depletion of natural resources,
- Destruction of natural habitats,
- Extinction of plant and animal species,
- Waste production,
- Destruction of communities,
- Health problems.

Considering these potential damages, the author suggests that during the selection of any material, the chain reaction and long term effects must be considered.

Sev (2009) suggests that the material to be chosen should be of renewable resources like the forests that are grown with sustainable methods unlike petroleum and mines. Meanwhile, if the renewable materials are over-harvested, like cork and timber, it may ultimately be depleted since they also have regeneration cycles (Sassi, 2006). Due to this fact Sassi (2006) proposes that although renewable materials should be used rather than non-renewable ones, it is important that the renewable resources are sustainably managed.

According to Sev (2009), the method of extraction of the raw materials that are used for manufacturing, should not give harm to ecology which are accepted as, as Sassi (2006) points out, air, water and ground pollution. Also this phase requires energy that is mostly derived from fossil fuels which leads to global warming and pollution (Sassi, 2006). The author suggests natural materials of which the processing is minimal before use like adobe brick that is of earth and water and dried in the sun using manual labor and the heat of sun instead of burning fossil fuels. Sassi (2006) also gives the opposite examples which are metals and plastic, mentioning that in terms of toxic emission leading to pollution, metal smelting industries and the chemical industry constitute the top two.

In order to reduce the transportation and the related energy and pollution, the materials should be selected locally (Sev, 2009). By this way the embodied energy, that Sassi (2006) explains as the total amount of energy consumed during extraction, manufacture, transportation, maintenance and disposal, is reduced.

Another criteria for the selection of materials is the embodied energy which should be low (Battle & McCarthy, 2001). However, Sassi (2006) warns that low embodied energy should not be taken into care as the only criteria and the total energy consumption of a building during its entire life cycle must be taken into account. The author explains his concern with the example of extruded plastic insulants with high embodied energy that have a significant impact on reducing the running energy of a

building. As a result Sassi (2006) comes to the same solution with both authors on local materials to lower the embodied energy of a building.

Sev (2009) proposes one other criteria that is selecting recyclable, long-lasting materials and materials that require less maintenance and repair to reduce the consumption of resources. Sassi (2006) proposes the same criteria from a different point of view by mentioning that to disintegrate waste from loadfill and other polluting waste disposal options, designing to enable the reuse and recycling and use of reclaimed and recycled materials have important role.

In order to help the material specifiers, Sassi (2006) mentions the Environmental Profile Methodology and Database, developed by Building Research Establishment. The author explains this methodology to be designed to evaluate the environmental impacts of construction elements. According to the author, this system evaluate the impacts in terms of climate change, fossil fuel depletion, ozone depletion, waste disposal, water and mineral extraction and pollution to humans and ecosystems. However, Sassi (2006) adds that with all the perfection, this system also has its flaws since it does not consider biodiversity, social issues or resource depletion other than fossil fuels. Due to this fact what is proposed for the designers is to first develop a basic understanding of the materials in terms of sustainability issues and after referring to information resources to determine the materials considering their own priorities and personal views.

Below is the comparison of the proposals for the material selection of authors; Battle & McCarthy (2001), Sev (2009) and Sassi (2006):

**Table 2.1.** Comparison of proposals

| **Proposal** | **Sassi (2006)** | **Sev (2009)** | **Battle & McCarthy (2001)** |
|---|---|---|---|
| Renewable materials | ● | ● | |
| Plentiful resources instead of scarce resources | ● | | |
| Materials mined, harvested, or extracted with minimal impact on the environment | ● | ● | |
| Materials with low manufacturing pollution | ● | | |
| Materials with low levels of $CO_2$ emissions considering their impact on saving running energy | ● | | ● |
| Considering manufacturer's environmental policies, track, record and reporting | ● | | |
| Materials that do not pollute the indoor air | ● | | |
| Local origin | ● | ● | ● |
| Materials that utilize local skills for construction | | | ● |
| Recyclable materials | | ● | ● |
| Materials that are appropriate for the chosen structural regime | | | ● |
| Long-lasting materials | | ● | |
| Materials that require less maintenance and repair | | ● | |

## B. Water Efficiency

Water is a very precious resource and is one of the most important resources of nature (Broadbent & Brebbia, 2008). It is essential for plants to grow and the animals to survive (Sassi, 2006). As Broadbent and Brebbia (2008) indicate, the quantity of clean water is 1% of our planet and is distributed unequally. For this reason the authors propose that a study on hydric surface and underground resources should be performed considering the cycle of the water, its quality and use.

Broadbent and Brebbia (2008) mentions that today fresh water is one of the most critical issues and despite this fact, we still use it in the unwise and wasteful traditional way. Also there has been an increase of water cost over the last decade so water efficiency measures will reduce water costs as well as energy costs (Broome, 2008).

Broome (2008) points out that 65% of the total water consumption is constituted by domestic consumption and water efficiency measures can reduce this amount by up to 50% which cannot be ignored. The author suggests three steps to be taken for the efficient use of water which are;

Water conservation,

Recycling water,

Rainwater collection.

### a- Water Conservation

According to Kats (2010), to reduce the water consumption of a building depends on indoor fixture use, outdoor irrigation use and process use.

Broome (2008) explains that flushing toilets constitute over one third of the total water consumption of a building and dual flush and low flush can reduce the total consumption by 20%. According to Sev (2009), urinals that use a chemical liquid instead of water, vacuum operated and biocomposite toilets can reduce water consumption in a large scale. The author explains the advantage of biocomposite

toilets as treating the waste water on site and use the refined water for garden irrigation or transmit the water after treated to the sewer system which reduces the water treatment load in the big picture. Vacuum toilets run with air instead of water and contribute water conservation, however the energy use must be compared to the water savings since they use electricity to operate (Sassi, 2006).

As for urinals Sassi (2006) suggests person detector or an integrated sensor to activate the flush and adds that 1 lt flushes save 65% water comparing to normal urinals. The author also mentions waterless urinals by which 236000 liters of water can be saved from one urinal in a year. Also Kats (2010) points out that, waterless urinals can eliminate the application of some water lines which reduce the maintenance and construction costs.

One other objective for water conservation is the use of showers. According to Broome (2008) 'water saver' showerheads give the feel of a good shower with half the flow rate of a conventional shower, generating finer droplets; however, the author adds that they are not for everyone's taste and they can lead to 'cold feet effect'. Broome (2008) also proposes thermostatic shower mixers to reduce the water wasted while balancing the temperature with separate hot and cold controls.

8% of the domestic water consumption is associated with washbasin and 80% of it can be saved by fitting spray taps (Broome, 2008). Sassi (2006) mentions about a similar fitting which is aerated taps, mixing water with air and providing a normal water volume with less water. The author indicates that aerated basin taps use 3,6 lt instead of 20 lt of water per minute. However, according to Broome (2008) these taps are okay for rinsing hands and brushing teeth but are time consuming for filling the basin to wash. The author mentions about a new invention to overcome this flaw which is called 'Tapmagic' insert which has a metric thread or round outlet which provides a spray pattern at low volume and as flow increases the device provides unrestricted flow. Another model the author suggests is the single-lever ceramic cartridge taps. Sassi (2006) also proposes the automatic basin taps with integrated sensor that identifies a hand under the tap reducing the water wasted by unconscious use.

With flow regulators the amount of water coming out of a tap can be limited (Sassi, 2006). However, if the users are already conscious about controlling the flow manually, it will make only little difference (Broome, 2008).

In terms of water conservation, plumbing layout gains importance as well. What Broome (2008) suggests is that low water use fittings should have only the supply pipes with the necessary sizes and not larger than needed and adds that the fittings should be as near as possible to the hot water source to decrease the water waste while waiting the water to be heated up.

20% of the water consumption of a building is associated with washing machines, the highest consumption rate after toilet flushes (Broome, 2008). In order to save water in use of washing machines, water-efficient equipments should be selected, which can be identified by the Eco-label in Europe (Sassi, 2006). According to Sassi (2006), efficient washing machines consume 50 lt per wash while inefficient models consume more than 100 lt.

As a management issue, regular checks for leaks and immediate repairs of dripping taps and valves are important (Broome, 2008).

For landscaping, drought tolerant species can be selected to reduce the water needed for irrigation and automatic irrigation that have moisture sensors reduce the water wasted with unnecessary irrigation (Sassi, 2006).

**b- Recycling Water**

The waste water created by rinsing hands, washing dishes and laundry don't require such delicate treatment like the waste water created from toilets and for this reason it can be treated and used for irrigation or other uses (Sev, 2009). Hence, waste water from the bath, shower and wash basin can be collected in an external underground tank, be treated then pumped to a header tank and used for flushing the toilets (Broome, 2008). According to Sassi (2006), the treated water can be used for both irrigation and flushes and also for washing laundry which will save around 40% of water needs; however, the author warns not to use the treated water with sprinklers on acid-loving plants, raw eaten plants and on seedlings.

Sassi (2006) points out that with the basic system, one can also recycle waste water from kitchens but since it will contain oil, fat and food matter, the treatment will be extensive unlike water from basins, baths and showers which are expected to contain only hair, skin, detergent and soap.

**c- Rainwater Collection**

In many parts of the world, devices that help collecting the rainwater from the surfaces of the buildings have been developed by which the water collected is stored and treated and meet some part of the water needed (Sev, 2009).

Sassi (2006) points out that the untreated rainwater can be used for irrigation or for cleaning cars and gives the example Australia where it can be drunk without any health risks, so it can be interpreted that the use should be decided considering the region. The simplest and inexpensive system is water butts which can be freestanding or fixed to the wall with the capacity of 100-200 lt (Sassi, 2006). The system will offset the use of mains water in the garden which is associated with 5% of total water consumption.

Sassi (2006) indicates that if the rainwater is filtered, it can be used for toilet flushes, laundry and hand washing and it can be purified successfully to be drinking water. The author also mentions about the disadvantages which are firstly this system does not reduce the sewage volume like recycling and secondly the irregular occurrence which requires large storage containers when rainwater is the only water source.

Rainwater systems provide potential savings of 50% of the yearly costs for mains supplied water (Sassi, 2006). However the situation changes with the introduction of washing machine and toilet efficiency features.

**C. Energy Efficiency**

Under the context of economic development, the energy sources are being consumed in a wasteful way in contemporary societies and while the countries containing fossil fuel resources are a few, after the opening of the huge Asian market, the appetite for energy is growing (Broadbent & Brebbia, 2008).

Aside from the threat of depletion of energy resources, Sassi (2006) mentions that for powering construction and operation of buildings, fossil fuels are being burned which have buildings contribute to the global $CO_2$ emissions with a rate of 30% worldwide, while it is 50% for the UK. The author depicts that $CO_2$ is one of the greenhouse gases that are the main cause of global warming and it contributes to global warming with a rate of 50% by itself. The author explains that these greenhouse gases let solar radiation into the lower atmosphere, absorb and re-radiate a portion of the infrared radiation emitted from the earth, so more heat is trapped in the lower atmosphere leading rise in global temperatures that is called global warming.

The things to be done to minimize $CO_2$ emissions and pollution are suggested by Sassi (2006) as follows:

Reduce energy requirements,

Use energy efficiently,

Use ‘green’ energy resources.

**a- Reduce Energy Requirements**

Reducing energy requirement can be achieved by the measures taken on the building envelope and spatial design (Sassi, 2006). Sassi (2006) calls these measures as passive measures and lists what they include as follows:

Orientating the building in relation to sun, the wind and site characteristics,

Insulating the building and providing heat storage according to climatic needs,

Integrating systems to passively cool and ventilate the building,

Providing appropriate natural light to minimize the need for electrical lighting.

According to Kats (2010), energy savings with such design strategies can reach from 20% to 50%.

Sassi (2006) explains that heating is the dominant energy use worldwide and in order to minimize the energy consumed for heating, making use of solar radiation and retaining the heat within the building are important factors. Sev (2009) points out that, in order to take advantage of sun radiation there are various methods one of which is direct insolation (sunlight reaches an internal massive wall and provide heating). As another method, the author explains the indirect insolation for which there is left a void over the south facing exterior wall and covered by glass being called as trombe wall. By this system, heat from the sun is stored during the day and although the south wall heats up in a large extent the interior temperature stays constant and at night the heat stored is transferred inside (Sev, 2009). The author indicates that by this way, during the day cooling load and at night heating load is reduced. The thing that needs attention while designing the trombe wall is that heating speed during the day and cooling speed during the night should be equivalent (Sev, 2009).

About orientation of a building considering radiation intake, Broome (2008) suggests principal elevations to be orientated within $30^0$ of south and adds that in order to shade the south facing spaces in summer time, deciduous trees can be planted which will let the sunlight in, during winter time since the leaves will drop until then. The author warns that the trees should not be planted too densely or too close to the building in order to avoid too much shading in winter. According to Sassi (2006), the spaces that can use solar heat gain should be oriented on the south side and the ones that can remain cool on the north side of the building in the northern hemisphere. Accordingly, the author also suggests that on the north façade the glazing should be minimized while on the south it should be maximized, again in northern hemisphere. Although, one should be careful about the extreme expose to solar radiation which may cause the building to be uncomfortably hot even in the cold climates (Sassi, 2006).

Broome (2008) explains that high winds increase the infiltration of cold air while cooling the outside surface of the building. The design strategies the author proposes are as follows:

In order to reduce the exposure, orientating the narrow end of the building to the prevailing wind,

In order to maximize the sheltering effect, designing groups of buildings six times their height apart,

Placing shelterbelts of trees as high as the building with a distance of around one to three times the height,

In order to create shelter and pleasant sheltered external space, planning courtyards layouts, L shaped plans and walled gardens.

Sev (2009) argues that material selection is very important as an energy saving factor and suggests the selection of materials with low embodied energy which have been discussed in the 'materials used' section. The author also mentions that the major heat gains and losses are caused by the building envelope; hence the efficient design of the envelope saves a large amount of energy consumption by heating and cooling. The author proposes covering the roof surface with reflective materials which will eliminate the unwanted heat gain and using materials with low reflectance for the floor coverings around the building to reduce the cooling loads. Accordingly Sassi (2006) also suggests light and reflective external finishes to reduce the cooling load and adds shadings, as another suggestion, for the windows in order to reduce the radiation intake.

For the windows, which are the major cause of heat losses, high performance glazing contributes to energy savings in an important scale (Sev, 2009). Sev (2009) also gives the example of double skin facades as a method in order to reduce heat gain in hot climates and heat loss in cold climates.

In addition to the above mentioned methods for the building envelope, Sassi (2006) also proposes; proper insulation, using thermal mass in order to moderate daily temperature changes and as a heat store which will make use of summer heat during winter time, designing buffer zones like lobbies or conservatories and natural ventilation for cooling.

Broome (2008) proposes that the form of the building can reduce heat losses in various ways. Firstly, the author suggests designing a compact form and avoiding detached houses to minimize the exposed external surfaces. Another proposal is designing a low roof on the north-east side to reduce the area exposed to cold winds or sheltering the building with earth and the use of deep roof overhangs which will also protect the walls from rain.

One other issue on energy saving is electricity. As Sassi (2006) indicates, the amount of $CO_2$ emissions per kWh of energy from electricity is three times the amount of that from burning gas for heating, hence reducing cooling needs and as Broome (2008) adds, adequate daylight to avoid lighting load gain importance.

While reducing cooling load is possible by passive design strategies, Sassi (2006) points out the more natural light available, the less electricity is needed for lighting. According to a study of a lighting company in California, the highest energy cost is associated with lighting which calls attention to the importance of natural lighting for energy saving.

**b- Use Energy Efficiently**

Even if a comfortable environment is achieved by passive design strategies in a building, there will still be the need for energy for; lighting at night, operating equipment and appliances, providing hot water and in most cases moderating and ventilating the internal environment (Sassi, 2006).

What Broome (2008) suggests is; low energy lighting system with fittings compatible with low energy bulbs and low energy appliances (fridges, freezers, washing machines and dryers). Although the initial cost of energy efficient equipment is higher than the regular ones, in the long term it is apparent that they are beneficial economically and environmentally (Sev, 2009).

For space and water heating, gas-fired boilers achieve up to 75% efficiency according to Broome (2008) while Sassi (2006) depicts the efficiency as 50-70% and explains that 50-70% of the primary energy can be converted in usable heat with these boilers. Sassi (2006), points out that the modern and condensing boilers

achieve 75-85% efficiency and mentions about the combined heat and power unit (CHP) generating both heat and electricity with 90% efficiency.

**c- Use 'Green' Energy Resources**

Green energy resources may be called as renewable resources. Power from sun, wind, water, biofuels, geothermal and ground heat are considered renewable (Sassi, 2006).

**(i) Sun as a resource**

The renewable resource that has the largest potential is solar radiation considering the fact that, if 1% of the earth's deserts were covered with solar thermal plants, the total energy demand worldwide would have been covered for the year 2000 (Smith, 2007). Smith points out that, two energy domains can be obtained from solar thermal resource which are heat and electricity.

For water heating, solar collectors are very efficient systems (Sev, 2009), which consist of two types according to Smith (2007); flat bed collectors and vacuum tube collectors. Flat bed collectors heat water around $35^0$ and are most efficiently used to supply pre-heated water for a gas boiler or immersion heater, while vacuum tube collectors heat water around $60^0$ but sometimes significantly higher which shows that domestic hot water systems may not even need additional heating.

For electricity from solar energy, photons or particles of light are absorbed by semiconductors which is the basis of the photovoltaic (PV) cell (Smith, 2007). Smith points out that PVs, when mounted on suitable walls and roofs can generate up to 25% of total demand and gives the factors that affect the efficiency of PVs in a given location as:

For roof mounted PVs, compact developments with fairly consistent roof heights,

Orientation,

Potential of façade PVs for an open urban grain (overshadowing must be considered, especially in the context of seasonal changes in the sun's angle).

### (ii) Wind as a resource

One other energy source that reduces the use of fossil fuels and results in no waste is the wind (Sev, 2009). For hundreds of years, wind power has been benefited with windmills and today wind turbines are used for electricity production (Sev, 2009). For wind turbines, the most important factor is the wind speed which should be investigated for each region separately (Broome, 2008). The other factor is the height as Broome (2008) indicates, which should be at least 10m above the roof and any other obstacle within a 100 m reach like buildings or trees.

According to Smith (2007), there are some disadvantages like;

- Height of the mast,
- Substantial foundation support need when mounted on buildings,
- Possibility of large variations in wind direction and speed,
- Noise problems,
- Possibility of intrusive outlook.

Considering these disadvantages, the author suggests vertical-axis turbines, discrete and almost silent, that can be integrated into buildings.

### (iii) Water as a resource

Water is a very important source of clean electricity (Smith, 2007). The advantages, according to Smith (2007), may be listed as follows:

- Minimal impact on the environment,
- Almost zero emissions of $SO_2$, $CO_2$ and $NO_x$,
- Not causing acidification of water,
- Oxygenate rivers and streams.

While the impact of renewable energy systems on the environment is 31 times less than that of fossil based energy, one kWh produced by small scale hydro is 300 times less polluting than lignite (Smith, 2007).

### (iv) Biofuel as a resource

The total living matter within the biosphere is called biomass and it is regenerated by sun constantly through photosynthesis (Smith, 2007). Smith (2007) points out that, the conversion process of biomass at its peak to a fuel, as a store of chemical energy, is carbon neutral. Sassi (2006) explains that these fuels, which can be both biodegradable waste product or renewable plants that absorb $CO_2$ in the growing phase, emit the same amount of $CO_2$ they absorbed, when they are burnt.

The sources that biomass can produce energy from are listed below according to Smith (2007):

- Fast-growing trees and shrubs,
- Residues from agricultural crops and forest thinning and felling,
- Animal waste, liquid and solid,
- Industrial residues,
- Municipal solid waste.

In order to convert biomass to energy; direct combustion, anaerobic digestions from organic waste producing biogas and landfill gas conversion can be counted as the systems (Smith, 2007).

### (v) Geothermal energy as a resource

Sev (2009) explains geothermal energy as the energy stored as heat below the earth crust. The author puts it in other words by pointing out that it is the thermal energy of hot water, steam, gas or hot solid rocks that are beneath accumulated pressure located in various depths of earth crust. The author also points out that, since the water that creates geothermal fluid is of meteoric origin, reserves beneath the earth are recharged continuously so the resource is renewable as long as the amount of use is not higher than the recharge.

Sev (2009) divides the fluid consisting geothermal energy in three groups as; low temperature ($20^o$-$70^o$C), average temperature ($70^o$-$150^o$C) and high temperature (more than $150^o$C). The author mentions that fluids with high temperatures are used

for the production of electricity and fluids with low and average temperatures are used for heating.

Smith (2007) explains the term 'geothermal gradient' as 'the rate of increase of temperature according to depth in the ground' and that it averages 2.5 to 3.0$^{o}$C per 100m. The author depicts that this gradient may reach up to temperatures around 300$^{o}$C in the active geothermal areas which occurs if there is an upward intrusion of high temperature rocks from the magma belt. In these circumstances the author points out that at depths from 5 to 10km, a temperature of around 600$^{o}$C can be expected. This provides high pressure steam but the author asserts that at the normal geothermal gradient, useful geothermal energy is available.

In order to make use of this geothermal energy, the heat needs being brought to the surface for which water has to be injected into the hot, pervious rocks (thermal reservoir) where it circulates and absorbs heat (Smith, 2007).

Sev (2009) indicates that after 10m depth the heat of earth stays constant and accordingly suggests that vertical pumps are very useful to transmit the heat. According to the author, thanks to these pumps, heating and cooling the total building economically and ecologically is possible.

#### 2.1.1.2. Organic and Local Agriculture

Lanczi (2009) asserts that, agriculture is not an industry and all plants, animals and even soil are living beings, that according to Pearson (2005) we should work with in an harmonious way by assimilating the complexity and resilience of nature itself. This assimilation, leading to a sustainable way of living, is a harmonious integration of people and landscape that provide shelter, energy and most related to this topic; food (Pearson, 2005).

During the production and transportation of food, high amount of energy is consumed and $CO_2$ is emitted due to transportation, for which reaching food in UK may be a good example (Sassi, 2006). According to Sassi (2006), when imported and local food is compared in UK, imported food leads 650 times more $CO_2$ emission

than local food, hence with locally produced food, pollution and congestion may be reduced.

With producing food locally, fresh and seasonal yields, that present healthier diets, are much easier to be obtained and with the discard of import, risk from food related crises is reduced (Sassi, 2006). As another point of view aside from the health aspect, Sassi (2006) indicates that local production increases employment and have money recycle in the local economy while building closer links between consumers and farmers with increased community participation in production leading to a greater self sufficiency.

Farming practices affect quality of food and human health as well as environment by the use of pesticides that reduce the levels of healthy ingredients in the food, pollute ground water and reduce biodiversity (Sassi, 2006). According to the author, with organic production, pesticide levels in the environment can be drastically reduced and it is supported that the farmers should change their agricultural practices in to organic agriculture.

The advantages of organic farming may be listed as below:

- In organically managed soil, organic matter is higher that provide higher fertility and water retention and lower risk of erosion,
- Improved soil structure and rapid nutrient recycling are achieved by organic soils which have a higher biological activity,
- It does not pollute water courses with synthetic pesticides and fertilizers,
- It is more energy efficient per hectare,
- It consists more diverse and abundant wild flora and fauna,
- It provides habitats for pollinators, pest controlling birds and arthropods,
- It leads to functional and aesthetic diversity by the diverse landscape (Hattam and El-Hage Scialabba, 2002).

### 2.1.2. Social Design

While achieving sustainability, the aspect to consider can never only be architectural solutions or the economic improvement, as Sassi (2006) points out; sustainability is the way people live and all their daily actions have impact on the environment. For this reason what Lucena, Schneider and Leydens (2010) propose is to strike a balance between enhancing local social relationships with environmental concerns and development objectives for a sustainable community development.

In order to understand the concept in a better way one must understand what is a community and what constitutes the community in the first place. As a basic definition, a community can be consider as a group of people bound together by geography that have some common interests, history, characteristic and needs or desires (Lucena et al.). According to the authors, a community is determined by the relationships among its members, their relationship with the place, their differences in power and privilege and their alliances with a common purpose.

Belonging to a community is being involved with the other members of that community and it is important to realize that the nature of these relationships varies in a large context (Lucena et al.). However, as the authors indicate, no matter the manner of the relationship is, development projects should be hold with the aim of respecting and strengthening these relationships as well as the relationships of people with the space they live in. As another aspect of the authors, the projects also have to respect the differences of the community members in terms of power and privilege no matter how unequal it may seem to one's eyes and for these projects, it is also important to understand and be aware of the common purposes of the community members. As Kosha Anja Joubert, secretary general of Gen-Europe, emphasizes in her conferences and interviews, the common purpose is at most importance for a village to be ready for a change in their lifestyle while it is not such an easy thing to achieve.

As Sassi (2006) indicates, when people are accustomed to highly advertised consumerist lifestyle it is really hard to change their attitudes and values, for what reason in order to make alterations in a place, the members of the community have to

be presented with an equally satisfying lifestyle. In the case of villages though, the presented life style has to be of higher quality in order to avoid migration of the villagers. Sassi (2006) also mentions that a sustainable community should be highly desirable since only what is desirable can have a long life.

Sustainable solutions must be developed to meet the basic needs of individuals, regardless of their background, for homes, health, education, employment, attractive and safe environment, a prosperous economy with employment opportunities, good public services and open space for a sustainable community, and the sustainable community should be resource efficient, sourcing water, energy and materials from local environment as well as the services from the local communities (Sassi, 2006).

Sassi (2006) proposes enhancing quality of life as a design strategy as well, including;

- Recognition of the impact of the built environment on community activities and relationships,
- Provision of accessible cultural and leisure facilities,
- Provision of qualified public environment,
- Provision of public and private natural environments for people and wildlife,
- Provision of attractive, comfortable, safe public environments of human scale that encourage community interaction.

From the authors' words, it can be interpreted that a sustainable community should be self-sufficient in all aspects including resources, basic needs, life quality and economy.

In order to achieve the sustainable development, individuals should be educated and local people need to agree what is proposed by discussions and targets need to be set for a sustainable design with all stakeholders (Sassi, 2006). What Sassi (2006) also suggests is to design buildings, where explanations or demonstrations of the systems used can be seen interactively, as an educational tool.


**Figure 2.1.** Pillars of sustainable development (Thill, 2011)

### 2.1.3. Economic design

Sev (2009) argues that economic development may be a part of sustainability but that it is not the primary goal. However, as Thill (2011) asserts, 'the essence of sustainable development is the understanding of the interactions between the environment, economy and society' which requires economy to consider protection of environmental quality and social equity as it can be seen in Figure 2.1.

Sustainable development disregards the assumption that interests of economy and environment conflict with each other, and accepts that economic progress is only possible through environmental responsibility (Thill, 2011).

According to Dawson (2006), eco-villages require a different approach considering the fact that they tend to display a distinctive and uncommon level of importance with the expectations of bakeries, theatres, shops, and cafes attracting visitors, local organic food with low transport, crafts studios, schools and training centers, publishing houses, manufacturers of solar panels, waste water system designers, etc. The author indicates that, no matter how much of a 'success story' it sounds like,

economic situation is less impressive than it looks and points out that almost all eco-villages are inseparably tied into the wider and destructive global economy. Hence, what needs being done is really important and one should see all the possible solutions in order to achieve economic progress through environmental responsibility.

There exists some guidelines in various sources and networks for economic practices. One of them is the guideline prepared by the members of Eco-village Design Education (EDE) in 2011 of which the best economic practices are listed below:

- Significant collective ownership of land, water and resources,
- Strengthen local economy: barter systems, microcredit, local currencies, diverse income streams and green enterprise,
- Work towards economic justice and building bridges between rich and poor,
- Engage in ethical and transparent fair trade,
- Develop appropriate legal forms and transparent administration for our organizations.

The anonymous source (2011) suggests a remote system by which the government money may not be needed, hence the local economy will not be affected by the unbalance of currencies, with the help of one computer that tracks the trading in a community. The system is explained simply as the work item one gives is credited and the work item one receives is debited depending on the assumption that everyone in a community has something to offer to the others and that everyone needs the help of others.

Pearson (2005) proposes another suggestion that includes proximity of home, work, schooling, and food production would also encourage local employment and reduce transport.

Another guideline that can be retrieved is the Community Sustainability Assessment (CSA) prepared by the GEN (2011). This assessment consists of checklists by which the CSA score is given to a community and the score descriptions are divided into three as, ‘Indicates excellent progress toward sustainability’, ‘Indicates a good start

toward sustainability', 'Indicates actions are needed to undertake sustainability'. The checklist of 'Sustainable Economics - healthy local economy' may help the interpretation of what needs being done in order to achieve sustainable and healthy local economy. The interpretations may be listed as follows;

1. There needs to be explicit encouragement for community members creating businesses that enhance the local economy, do not generate pollution and do not exploit human resources,
2. Local banks should lend in support of sustainability projects,
3. Satisfactory livelihood should be proposed in order to prevent the youth leaving their hometowns,
4. Measures should be taken to prevent the community members experiencing unemployment or lack of work for which they receive funds or other exchange,
5. Measures should be taken to prevent local members having difficulty providing for their basic needs like food, shelter and clothing,
6. A system should be proposed to deal with economic inequalities among community members,
7. Below mentioned economic systems should be active in the community,

- Self sufficiency for basic needs,
- Ecologically friendly cottage industry,
- Sustainable small businesses,
- Barter and exchange systems,
- Education / programs,
- Telecommunications or other work at home,
- Volunteerism – work contribution,
- Local market days,
- Fund raising for modeling sustainable practices,
- Voluntary fund raising within the community for sustainability project development,
- Exchange with other eco-villages and sustainable communities,
- Fund raising for community operations.

8. Community members should actively engage in economic cooperation in their bioregion, in their country and with other parts of the world,
9. Community members should find their work as meaningful and fulfilling,
10. Community members should be feeling that they experience non-monetary prosperity in their lives.

As a result, there are many aspects need being regarded in economic design considering environmental and social quality.

## 2.2. Children's Villages

The worldwide applications of children's villages are mostly founded by SOS Children's Villages. SOS Children's Villages is a global welfare network that aims to give a hand to the abandoned, destitute, and spiritually and physically traumatized children on restoring the balance in their lives.

The first SOS Children's Village was founded in 1949 in Imst, Austria by Hermann Gmeiner after the Second World War to help the children in need who lost their families, homes and security during the war. Until then the organization has grown immensely and in present, it gives support to children in need all around the world. The purpose is to help children shape their futures, build families for them with whom they can build lasting relationships, guide them throughout their development, provide their basic needs and respect their background on the way (Manual for the SOS, 2004).

### 2.2.1. Vision and Principles

The organization's main notion is that "every child belongs to a family and grows with love, respect and security" as reflected in the UN Convention on the Rights of the Child (UNCRC) which holds the idea that children need to grow up in a family environment that presents a happy, loving and understanding atmosphere for the healthy development of their personalities (SOS Children's Village, 2009).

**Growing in a family**, that is the heart of a society, every child gains a sense of belonging, is protected, learns to share responsibilities and values and forms ever lasting relationships which presents them a solid foundation to build his/her life on. **Growing with love** and acceptance, the emotionally wounded child can be healed and s/he gains confidence, trust and belief in everyone including him/herself and gain self-assurance that leads to the realization and fulfillment of his or her potential. **Growing with respect** and hence being heard and taken seriously, a child is presented the opportunity to take part in making decisions affecting his/her own life and s/he is encouraged to take the lead on his/her own development. **Growing with security**, as the basic requirement for the development of children, a child has shelter, food, health care, education and is protected from abuse, neglect, exploitation, natural disasters and war ("Who We Are," 2016).

In order to provide this, SOS Children's Village's family approach focuses on four main principles (SOS Children's Village, 2009):

- Every child has a caring **mother/parent** with whom a close relationship is built and who provides love, security, stability and care. The SOS mother needs to be a professional on child-care, respecting the background of each child and guide them throughout their development (Manual for the SOS, 2004).

- Every child grows up naturally with **brothers and sisters** with different ages while the natural brothers and sisters are never separated (Manual for the SOS, 2004).

- Every child has **a house** that is the family's own home with its own harmony, providing a sense of belonging and security to the child (Manual for the SOS, 2004).

- The SOS family is a part of **the village** where families support each other and create a community. Children come to learn to participate in society by the help of the family, village and community (Manual for the SOS, 2004).

For many years the structure was defined from a facility based perspective like SOS family houses or SOS youth facilities; however, today an SOS Children's Village is a

child development program that initiates interventions aiming to enable children to become contributing members of the society and self-supporting adults by helping them to reach their full potential of development. The interventions are grouped in three main topics (SOS Children's Village, 2009).

First one is; direct essential services to meet the survival, protection, development and participation rights of the children along with education. The aim is to help children become self-supporting adults. Second one is; capacity-building to help care-givers, families, communities and other duty bearers and service providers, increase their capacity of making appropriate responses to the children's needs within a caring family environment. The third and the last type of intervention is; advocacy to enhance the framework conditions for children by changing policies and practices that undermine their rights and to promote quality family based care (SOS Children's Village, 2009).

### 2.2.2. Structure

The structure of SOS Children's Villages are built on ten standards that are;

- The SOS family child-care model provides a frame
- The SOS mother leads the SOS family
- Children find a home in an SOS family that best meets their needs
- The child's development is actively supported
- Youth programs offer self-development opportunities
- Each SOS family lives as part of the community
- Funds and property are used responsibly
- Planning and evaluation ensure a quality child-care environment
- Each co-worker's learning and growth are supported
- The village director leads the SOS Children's Village (Manual for the SOS, 2004).

In abiding by these standards, there are five groups of co-workers holding responsibilities which are;

- **Child and Youth Care Co-Workers** consisted of the SOS Mother and the Youth Leader, live with the children and youth, responsible of caring for them and guiding them through their individual development,

- **Supporting Co-Workers** consisted of SOS Aunts and SOS Family Assistants, Child Development Co-Workers, and Administrative and Maintenance Co-Workers, are responsible of strengthening the families, supporting the mothers and acting as positive role models for children,

- **Village Director**, is responsible from overall development of children, supporting mothers, managing the village in terms of finances and human resources, and reporting to the national director,

- **Village Supporting Committees** consisted of the Village Committee and Child Admission Committee, are responsible of supporting the village director in leading and coordinating the village activities and in child admission processes,

- **The National Association** consisted of the National Director and The Board, is responsible for supporting the villages in monetary issues, activity development and problem solving in every aspect (Manual for the SOS, 2004).

The key co-workers are the village director, the SOS mothers and youth leaders and they are supported by SOS aunts and family assistants, the child development co-workers, administrative co-workers and maintenance co-workers. There are two seniors one of which is the leading child development co-worker and the other is the leading administrative co-worker. These senior co-workers can act on behalf of the village director when s/he needs to be out of the village. While the SOS mothers and youth leaders report directly to the village director, supporting co-workers report to the seniors who have direct reporting relationship with the village director. The village director is also the leader of the supporting village committees and s/he reports directly to the national director (Manual for the SOS, 2004). The organization chart is depicted in Figure 2.2..

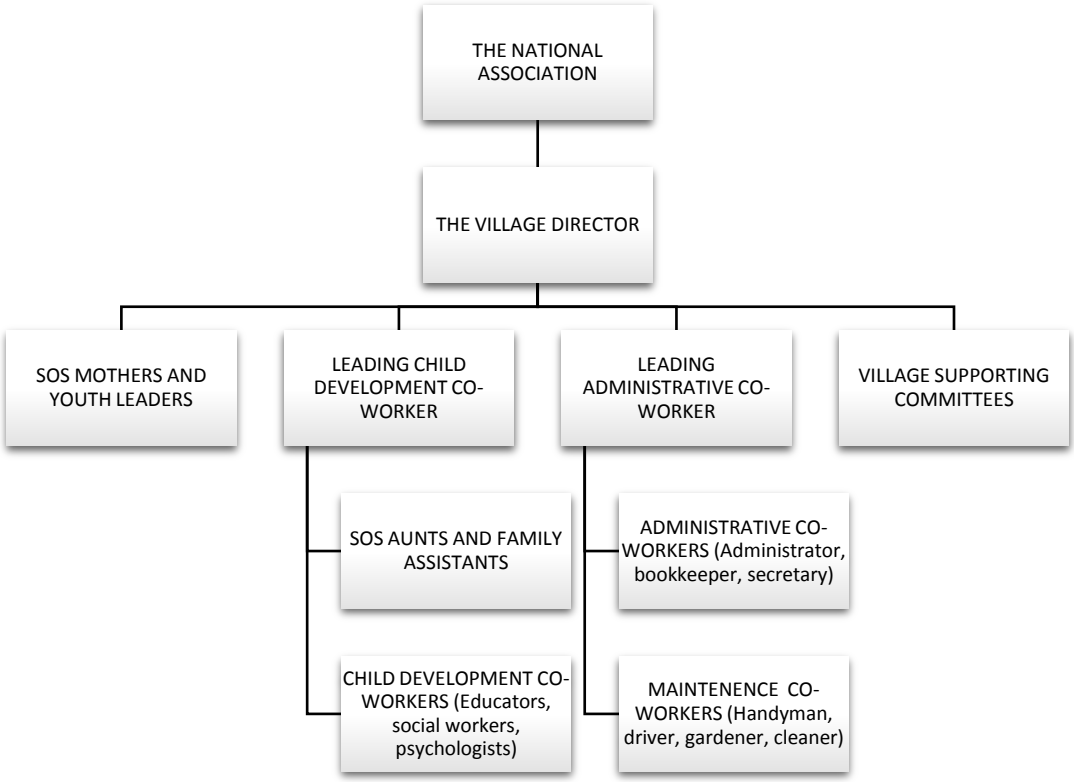


**Figure 2.2.** Organization Chart of Children's Villages

The living steps in an SOS Children's Village are child admission process, family homes, youth homes and independent life.

### 2.2.2.1. Child Admission Process

It is given a major importance that the admitted children are the ones who could benefit the most in an SOS family and the ones that need a home in a permanent family environment. The child-admission committee is the guide through child admission process in cooperation with regarding SOS mothers and in coordination with government social welfare authorities and the referring government social worker as a consultant to evaluate if an SOS family is the best care option for the child. The committee works with social welfare authorities to make sure the cases are investigated properly and all legal requirements are met. In cases when none of the two parties is able to investigate children's family background, the SOS Children's Village takes the responsibility (Manual for the SOS, 2004).

The priority in admissions is given to the orphaned and abandoned children who have no relatives to care for them. Children who have been removed from their parents legally are also considered. The age of admission is normally below ten unless the regarding child is a sibling of a younger child and since the siblings are not separated, in such cases children above ten years old are also accepted. Children with slight disabilities are considered for admission if the SOS family can meet their needs while children with severe disabilities are directed to alternative facilities that could be more effective and sufficient for their needs (Manual for the SOS, 2004).

During the admission process, the biological family of a child is fully informed of the SOS family child care model, is invited to the village to get to know the SOS mother and the family of the child and is involved in the admission process so that the family ties of the child is kept intact while s/he is living in the village (Manual for the SOS, 2004).

The children are placed in the family that is the most compatible to their cultural roots and religion so that it is easier for them to grow up according to them, and in the family that is managed by the SOS mother whose abilities and strengths are most compatible with the children's needs (Manual for the SOS, 2004).

#### 2.2.2.2. Family Homes

As Hermann Gmeiner puts it, the SOS Children's Villages are based on one single idea which is the assumption that no child can live without a family, that the child needs a family for his/her physical, mental and spiritual development. Hence the SOS family child-care model bears the four main SOS Children's Village principles than have been explained in the section 2.2.1(Manual for the SOS, 2004).

In this family model, the child lives with his/her SOS family until s/he grows up and move on with his/her individual life as an independent adult. Even then, the emotional ties are kept intact with his/her SOS family that provides care, guidance and support throughout his/her life just like a proper family (Manual for the SOS, 2004).

The SOS mother, who runs her family independently, is responsible for the development of her children including their health care, education and career

guidance. Being the permanent point of reference for the children, she guides the decision making processes regarding her children as long as they live in an SOS accommodation. According to many experience and research, children need to rely on at least one stable and long term relationship, and as long as this is assured, the quality of care between approaches that work with couples, single women or single men does not show a significant difference. The reason single women has been chosen in this model is that Hermann Gmeiner believed there are a lot of women around the world who are attracted to this job and for a long term commitment and this concept can also help women develop themselves and their skills (Manual for the SOS, 2004).

The SOS family is consisted of about seven and maximum ten children that live as brothers and sisters with the SOS mother in a house. In this house girls and boys of different ages live together and learn from each other while natural brothers and sisters are always kept in the same family. The exact size of the families are determined by the national association (Manual for the SOS, 2004).

The SOS mother needs to respect the cultural roots, religion and family background of the children and to maintain relations on a regular basis with the biological parents in case it is for the best interest of the children. A child development co-worker supports the mother in this process by overseeing the administrative and official legal requirements. In case children have no family contacts, child development co-worker also helps to find the family members and all information about their family members are given to the children unless it would be unhealthy for their well-being. In order to help children follow their own culture and religion, the mother can create opportunities for the children to attend their cultural and religious groupings again, unless it is unhealthy for the children (Manual for the SOS, 2004).

In this family model, the SOS mother respects and listens to the views of children and be sure to consider these ideas. This way children are encouraged to develop their own skills and to participate in the decision making process regarding their lives like the child development planning process (Manual for the SOS, 2004).

Each SOS family is accepted as a part of community, not as an isolated group. In case education, health and other services can be found and in case these services meet a level of quality, they should be used (Manual for the SOS, 2004).

The family model develops in consideration of the United Nations Convention of the Rights of the Child. In case there arises an incident of physical/mental violence, injury, abuse, neglect, maltreatment or exploitation of a child in the village, it is the village director's responsibility to take the immediate actions to protect the child; hence, each village should develop a clear procedure for these situations (Manual for the SOS, 2004).

#### 2.2.2.3. Youth Homes

When a child is at an appropriate age which should be above the age 14, s/he moves out from the SOS family house to a youth home that should be either in or close to the village. Youth are faced with challenges in these youth homes that help develop the needed skills for an independent life. The child is started to be prepared for it at least one year before the moving. In each youth home maximum eight to twelve youth should live sharing a kitchen and living space where they are responsible for running the household and managing the youth budget with the support of the youth leader. The maximum age for youth that live in SOS accommodation depends on the national associations and they determine who need financial support. The youth generally leaves the care of the organization at 21 but for some cases this number can go up to 23 or in exceptional cases 26, when the youth keeps receiving support for extended education or business startups. In order to keep the ties intact, when they leave the organization, both formal and informal reunions are planned (Manual for the SOS, 2004).

Because it is seen as an important milestone by an SOS Children's village when the youth takes responsibility on his/her life, employment and providing for him/herself, youth programs are offered to create learning and growth opportunities where youth can develop behavior, confidence and skills. The child development planning process identifies the needed programs for each youth individually and the cultural situation, local economic realities and available resources are taken into consideration. The youth programs are recommended to be established in the first five years of a

village's operation so that the accommodation and community resources are identified before there are a number of youth. With the experiences gained in local context and the needs identified, additional programs can be developed. Additional personal development programs may be offered to youth that are sex education, HIV/AIDS awareness, alcohol and drug abuse, communication, conflict resolution, community services in local schools, clinics and hospitals, and family house and village maintenance activities which are believed to support youth to learn skills and responsible behavior (Manual for the SOS, 2004).

For every eight to twelve youth under the age of 18, one youth leader is assigned who organizes programs and guides them. If there are four or five leaders in a village, one of them may be assigned to coordinate the activities of the leaders who report to this coordinator and the coordinator reports directly to the village director (Manual for the SOS, 2004).

At least once a year, each child and youth is provided with educational and career guidance by a career guidance counselor, SOS mothers and other village co-workers and they are encouraged to find part time jobs while their studies continue to adjust them to working conditions and for them to have an income. The village is responsible to find opportunities and invite people from different occupations to talk to the children and youth (Manual for the SOS, 2004).

#### 2.2.2.4. Independent Life

In the transition period of young adults to independent life, the organization keeps supporting them in some cases. Young adults above the age of 18 who left the youth home and have a constant income can apply for financial assistance if required for rental or ownership agreement. The assistance is provided for a maximum of three years to help the person live in an independent accommodation and is expected to pay one third of the rent or the loan him/herself (Manual for the SOS, 2004).

Head start programs may be offered to youth who could benefit the most out of it; hence, this is not a granted right for each youth. The programs to be offered are income support, for the newly employed youth whose salary is not sufficient enough, business start-up loans, for the youth who draws a solid business plan to start, and

educational scholarships, for the youth to attend an educational institution that could enhance his/her abilities and talents (Manual for the SOS, 2004).

### 2.2.3. SOS Children's Villages in Turkey

The first time SOS Children's Villages had a contact with Turkey for a possible construction was in 1970's and it was 1987 when an agreement was signed between 'Türkiye Korunmaya Muhtaç Çocuklar Vakfı' (Foundation for Children in Need of Protection) and SOS-Kinderdorf International. Regarding the agreement, the construction work for an SOS Children's Village and an SOS Kindergarten started one year later in Bolluca, Istanbul and it was completed in 1992. After the earthquake in 1999, the village was enlarged to make room for more children in need. During these processes, Bolluca Children's Village could not work under SOS name because of the national legal constraints and according to the website of the programme, SOS Children's Villages Turkey has been closed in 2011; however, Bolluca Children's Village still stands without a legal bind to SOS Children's Villages (SOS Children's Villages, 2014).

## 2.3. Sustainable Living for Children

Many research on child health and development show that it is the physical, geographical, built and natural environment besides the social and human environment children are exposed to that shape their health and well-being. In present with the arousal of socio-environmental problems like, global warming, diminishing of fresh water supplies, reliance on non renewable energy resources, rapid urbanization and the drastic increase in environmental refugees, the health problems that await the children are threatening (Cooke, 2010).

Children, with their rapid growth and metabolism, immature organs and nervous systems, developing cognition, lack of experience and behavioral characteristics, are more vulnerable against deprivation and stress caused by socio-environmental problems and their exposure to risks is more likely to have long-term reflections compared to adults. Unless any action is taken, children of today will inherit an earth

that is depleted of resources and of which the social and economic infrastructure is in decline (Davis, 2010).

As Davis(2010) quotes Timberlake and Thomas(1990), adults act as they do because they can get away with it and they will have probably left the earth when the effects of environmental problems are started to be felt. However, the children of today, who have no right to vote or a chance to challenge the decisions of decision makers, are the ones who will suffer every outcome of the decisions made today. Hence, instead of accepting children as victims, the chance to change their own future, to take action, and to shape and respond to the challenges in their lives can be provided through support, protection and education. Early childhood education for sustainability (ECEfS) comes into picture in educating children to be informed citizens about the environmental issues and including them in the problem solving part of the issue. The aim of ECEfS is not to replace the present playing and learning activities for children like storytelling, singing, dancing, painting and building with blocks but it is to enrich these experiences by increasing children's knowledge, dispositions and their skills to make a difference in their lives in terms of sustainability matters (Davis, 2010).

In the sub-sections of this study, the importance of playing in nature in the development of children and in the possibility of a sustainable future and a deeper explanation of early childhood education for sustainability have been presented.

### 2.3.1. Playing in Nature

In the past, humans and nature were intertwined, so the concept of controlling it or its being separate from humans was out of context. However, today nature is observed as either the wilderness which is untouched, remote and uncontrolled, anything that is not made by humans, natural physical world like plants and animals, or ecosystems of planet supporting life. Although the description of nature can vary due to different experiences of every soul with nature, it is evident that it is always defined as something other than ourselves. Elliot (2010) believes that the future lies in the understanding of humans *in* nature and not humans *against* nature.

Nature as the critical element on children's health, wellbeing and development, outdoor play for children is mainly the topic that is the focus of the studies. Playing for children is accepted as the predominant vehicle for learning; however, between 1981 and 1997 the free playtime of children has dropped approximately 25% due to the structured activities prepared by adults in order to prepare the children for the competitive world and due to the perception of playing as a waste of time. With this reduction of playtime, time that children spend outdoors also reduces. Because of the urban design that consists of car-friendly instead of child-friendly streets and a priority of buildings instead of outdoor play spaces, even a child has time to play, the safety concerns of parents diminish the access of children to the outdoors. This point of view misses the point that risk is actually a healthy aspect of play which helps children learn how to cope with it (Elliot, 2010).

While before children could find playing opportunities outdoors taking advantage of a pile of builder's sand, the refuge of an hollow tree or the secrecy of bushes, in order to keep children from streets, structured and built playgrounds have been presented to them. Having no adventure and excitement opportunities, children get bored of the manmade play spaces with plastic equipments. In order to provide a play space for children that would create meaning, develop a sense of place, connect with nature and feel encouraged to live healthy and sustainable lives, landscapes that offer natural play spaces that children can safely reach a variety of play opportunities can be offered (Elliot, 2010).

Having experiences in nature leads to an affective knowing of the natural world and affective knowing and direct experiences in nature can build a sense of sustainable living and a deeper understanding of the bigger picture for children. Having real life experiences in nature through play, the children can be encouraged to trust their abilities and ideas on how to change the way people live with nature for a more sustainable future (Elliot, 2010). The possible ways for encouragement have been proposed in the following sub-section.

### 2.3.2. Early Childhood Education for Sustainability

Pratt (2010) mentions three central elements with equal importance of ECEfS that are the physical environment, the curriculum/program and the philosophy/culture. He

points out that the physical environment, consisting of both built and natural elements, should promote sustainability through buildings' engagement with sustainable elements like water tanks, solar energy, insulation and grey water treatment and through keeping outdoor play spaces as natural as possible so that the children can connect with the richness of nature. He explains that the curriculum/program should integrate with sustainable living objectives for children to connect with nature and learn about the environment and human impacts on it and develop skills and conscience to act towards conserving and protecting the environment. He also explains the importance of building a philosophy/culture that encourages active citizenship and appreciates the efforts of all members of the community, especially of children, for a society with ecological, economic, social and political awareness. The values of the philosophy and culture should include equity between generations, humans and between humans and non human beings on earth.

In order to teach sustainable living, early childhood educators may cover five topics that are mentioned below.

**A. Waste and Resource Management**

The disposal and the use of resources play a major role in the environmental issues. Sustainable ways of waste and resource management practices in the daily life in an early childhood education center both saves money, reduces the ecological footprint of the center and provide children with valuable information about the impacts of humans on the environment. While doing so, it is important to include children and their families in the discussions, actions and investigations about waste management. (Pratt, 2010) Some of the many actions to be taken in cooperation with children may be listed as,

- Adopting the philosophy of Rethink, Reduce, Reuse, Recycle,
- Purchasing the products with minimal packaging,
- Buying natural products and reducing plastic,
- Benefiting from discarded materials like pots, containers and pipes as play equipment,

- Implementing a low waste lunch program,
- Using both sides of paper for printing if it is necessary,
- Making sure that recycled materials are used as office consumables,
- Papermaking with scrap paper,
- Using recycling bins in the classrooms, offices and in the kitchen,
- Feeding animals with leftover meals,
- Visiting a waste-processing facility,
- Explaining the waste issues to children and having discussions on finding solutions,
- Sharing strategies with families (Pratt, 2010).

**B. Connecting with Nature**

The importance of connecting with nature for children have been discussed in detail in section 2.3.1. and the actions that could be taken towards this goal may be listed as;

- Planting native plants in the playgrounds,
- Joining community projects on habitat regeneration,
- Keeping animals,
- Planting and maintaining a vegetable garden,
- Installing compost bins,
- Placing feeding boxes in the grounds for animals,
- Investigating wildlife in the local area (Pratt, 2010).

**C. Efficient Use of Natural Resources**

Considering the unsustainable ways of using resources in our time, it is important to educate children on energy and water conservation. Education through action as the core of ECEfS, the actions to be taken for energy and water conservation in a child care facility may be listed as follows;

- Buying green energy from the companies that can supply it,
- Using passive design features for the buildings in the facility like building orientation, insulation and skylights,

- Planting trees to benefit from their shades for the cooling of buildings and play spaces,
- Using energy efficient light-bulbs,
- Using energy efficient appliances,
- Making it a habit to turn off the lights when not necessary,
- Making use of natural ventilation during summer,
- Using solar or gas water heating systems,
- Investigating alternative energies and brainstorming with children about the topic,
- Encouraging sustainable transports by implementing bike racks and supporting carpooling,
- Conducting water audit in cooperation with children to introduce the concept of water conservation and for them to understand in which ways the water is used unnecessarily or the amount of water used in every action,
- Installing a water tank, with a gauge for children to access, that is connected to toilets, washing machine and irrigation,
- Using a grey water treatment system,
- Using water saving fittings on taps,
- Using dual flush toilets,
- Using water efficient appliances,
- Encouraging children to pour clean waste water like excess drinking water into the garden,
- Planting native plants for water retention,
- Using drip irrigation,
- Discussing scientific investigations like where the water comes from (Pratt, 2010).

**D. Wise Chemical Use and Green Cleaning**

In our age, dangerous chemicals are used in everyday life of each person in cleaning, food production and manufacturing. Besides the harmful effects of chemicals on environment, awareness on the harmful effects of chemical on human health is rising. An action plan with children against the wiser use of chemicals can consist of the following recommendations;

- Starting a research project of green-cleaning practices and collecting evidence to support them,
- Communicating with the service providers in the local area to find out their choice of products and practices,
- Making changes in baby steps for the use of green cleaning products by getting rid of the worst first,
- Avoiding the use of antibacterial soaps or gels since it removes all the bacteria on a child's hand killing the useful bacteria with it, leading to reduction of the chances of the child's immune system to grow strong,
- Conducting a chemical audit with children.
- Discussing green cleaning practices with children,
- Using warm soapy water for cleaning bearing the philosophy of removing is better than killing germs (Pratt, 2010).

**E. Sustaining Sustainability**

In order to sustain the taken sustainability measures that have been covered the below mentioned guidelines may present a route:

- Establishing a sustainable committee including parents, children and staff to coordinate education for sustainability initiatives and strategic planning,
- Developing a sustainability action plan,
- Preparing sustainability checklists in each topic of study and letting in guide the actions,
- Calculating the ecological or carbon footprint of the center,
- Updating service policies taking into account the sustainability measures,
- Starting with small steps, aiming for one goal at a time,
- Establishing networks with other similar organizations, services or individuals,
- Organizing site visits to early childhood services that implement sustainable practices (Pratt, 2010).

# CHAPTER 3

# MATERIAL AND METHOD

In this chapter the materials and methodology of this study have been explained in detail. The material section includes the features of eco-villages to be integrated into children's villages and the methodology section is consisted of the steps of this study.

## 3.1. Material of the Study

The materials of this study are the information gathered from a thorough literature review and from the case studies. There are three main features of eco-villages determined from the literature review, used to evaluate the case studies and in presenting a model of ecological children's villages that are;

1. Ecological Sustainability

    i. Green Buildings

        a. Materials Used

        b. Energy Efficiency

        c. Water Efficiency

    ii. Organic and Local Agriculture

2. Social Sustainability

3. Economic Sustainability

Based on these features of eco-villages, five eco-villages have been selected as case studies, which are Findhorn in Scotland, Tamera in Portugal, Sieben Linden in Germany, Dyssekilde in Denmark, and Damanhur in Italy. The information and photographs regarding the applications of the determined features of these eco-villages have been gathered mostly from their official websites. In addition to this information, informal interview data and photographs have been attained from the site visit to Damanhur Eco-Village in Italy in October 2014.

Information about Children's Villages have been gathered through a literature review and the three selected case studies which are SOS Children's Village in Imst (Austria), SOS Children's Village in KKTC (Northern Cyprus) and Bolluca Children's Village in Istanbul, Turkey. While the information of the applications in the former two have been gathered from their official websites, most of the information and all of the photographs used of Bolluca have been obtained from the site visit and through an informal interview in February 2016.

Lastly, information about sustainable living for children topic have been gathered through a literature review and by the help of the three selected case studies, which are, Hazlewood Eco Center, Sustainable Schools Project and Eco-Healthy Child Care Program®. The information used in this study for these case studies have been gathered mostly from their official websites and online publications.

### 3.2. Method

A detailed literature review has been conducted to understand the features of eco-villages, children's villages and the requirements to present sustainable living for children.

Forming the list of features of an eco-village, five case studies that present taken measures in ecological, economic and social design for sustainability has been selected. It was given importance that these villages are located in Europe to be similar to Turkey in terms of their climate and socio-culture. A site visit to

Damanhur Eco-Village located in Italy has been conducted in October 2014, to better understand the life style of these villagers. This site visit allowed a small chance of informal interview since it was a guided tour only for one day, focused on mostly the Temples of Humankind that has been being built in the borders of the village; hence, most of the information used in this study has been gathered from the official website of Damanhur. By the help of the research on these case studies, the applications of the eco-village features have been described.

In order to understand how the children's village operates and what kind of a built environment needed for these children, three case studies have been selected one of which is the first SOS Children's Village in the world in Imst, Austria. However, no English source in detail could be found about this village; hence, the website of the village that is in German, have been translated by the help of online translation applications. The second selected village is the SOS Children's Village in Northern Cyprus due to its serving to the people with the same language and culture of Turkey. Lastly the only children's village in Turkey, Bolluca Children's Village, has been studied and a site visit has been conducted in February 2016 to understand the possibilities of adapting eco-village features into it. With this site visit, informal interviews have been held with the institution manager, Hatip Uzun, and the social service specialist, Emre Esen who also gave a tour around the village and one of the family houses when children were off to school, in order to give an idea about the interior design of the houses.

For sustainable living for children topic, three case studies have been selected to understand the projects, activities, and interventions directed to children for their healthy and sustainable living.

Finally, the information collected from the literature review and the case studies have been used for a meta-analysis. Sustainability features used in each selected eco-village have been determined and a model has been proposed, considering sustainable living for children, to act as a guideline towards an ecological children's village. Based on these features a checklist for ecological children's villages has been compiled. Finally, proposals for the integration of these features into Bolluca Children's Village have been presented.

The resources used for this study have been presented in the Reference list, and a list of resources that could help one reach more information about the topics covered in this study have been presented in the Bibliography.

# CHAPTER 4

# CASE STUDIES

## 4.1. Eco-Villages

As mentioned in Section 2.1, for a village to be counted as an eco-village, it needs to meet three main sustainability factors that are ecological, social and economic sustainability. For this reason, while selecting the case studies, it was important to select villages that embody these three factors. Another determinant for the selection has been the region of the village, and for it to be similar to the climate and socio-culture of Turkey; hence, villages from Africa or Asia have been ignored and only those in Europe have been investigated. For the selection of the villages, the official website of the Global Eco-village Network has been used, which is a worldwide alliance gathering the eco-villages together to share the knowledge and experiences with people and communities who are dedicated to develop sustainability principles and practices. The registered villages of this network are either the ones that could act like showcases or the ones in process to be supported.

### 4.1.1. Findhorn Eco-Village

The history of Findhorn Community in Scotland has started with six people, Peter and Eileen Caddy and their three sons, and Dorothy Maclean, in 1962 when Peter and Eileen's employment in a hotel in Scotland was terminated. They decided to move to the seaside village of Findhorn where they started to follow an ecological life style by living in a caravan growing herbs, flowers, plants and vegetables (Findhorn, 2015).

In 1972 their community grew quite large they established the Findhorn Foundation which was registered as a Scottish Charity. The Foundation bought the property and called it the Findhorn Bay Caravan Park, in 1982 (Findhorn, 2015).

Until 1980s the caravan park grew to be home to approximately 300 people, most of whom lived in caravans and some in Cedarwood bungalows, gathered by the "spiritual paths" they followed. At the end of 1980s with a wind generator producing energy and the first eco-friendly building, the Eco-village Project was begun. They have been and still are building ecologically healthy buildings in order to gradually reduce the number of caravans that are not very energy efficient. The village today is a part of the Global Eco-village Network as its founder member; this network links eco-village projects worldwide (Findhorn, 2015).

**Figure 4.2.** General view of the buildings in Findhorn (https://www.findhorn.org/aboutus/ecovillage/ecovillage-at-findhorn/)

## A. Ecological Design

In Findhorn Eco-village all aspects of ecological sustainability have been given importance through ecological houses, the use of building materials, recycling of water, use of renewable energy resources and organic and local agriculture. These aspects of the eco-village have been explained in greater detail in the following sub-sections.

**(i) Green Buildings**

Until now 61 ecological buildings have been built in the village and there are ongoing plans to increase this number and reduce the amount of caravans which are not energy efficient. The ecological features that are used in the buildings can be listed as follows;

- Passive design features through orientation and window layout
- Solar panels for domestic water heating
- District heating system using a gas condensing boiler for fuel efficiency
- Efficient insulation with U-values of 0.2 watts/$m^2$C in roofs, walls and floors
- Use of low energy light bulbs
- Use of triple glazing with U values of 1.65 watts/$m^2$C
- Use of recycled paper as cellulose insulation
- Use of organic paints and wood preservatives
- Boarding manufactured without the use of toxic glues or resins
- Use of timber that is locally grown and harvested from managed forests
- Use of local stone for skirting, patios and pathways
- Use of natural clay tiles on roofs
- Use of 'breathing wall' (a timber frame walling system with cellulose fibre insulation and an external wood wool insulant underlay that is bonded with mangasite, a naturally occurring mineral for breaking the cold bridge) construction for a controlled air and vapour exchange; hence, elimination of the need for a conventional vapour barrier
- Use of suspended timber floor for air circulation beneath the floor to avoid build up of radon gas.
- Isolation of electrical circuits to reduce electromagnetic field stress
- Precautions for water conservation like low flush toilets and self closing taps
- Recycling and collection of rainwater for irrigation
- Use of shared facilities, that are laundry, kitchens and lounges, to avoid excessive unnecessary consumption
- Use of simple timber frame construction and details that are suitable for self

building (Findhorn, 2015).

The features that have been covered in Findhorn have been studied under three topics; Materials Used, Water Efficiency and Energy Efficiency.

**(ii) Materials Used**

Building materials in Findhorn are carefully and locally chosen considering their carbon emissions and ingredients to avoid toxic materials. Consequently the chosen materials are mostly wood that comes from their own managed forest, straw bales, recycled car tires, 'warmcell' insulation, insulation with recycled papers or newspapers (Findhorn, 2015).

The structures of the buildings are mostly of timber, or timber with steel frame. In the Nature Sanctuary building, the structure is of cavity wall covered with stone facing.

**Figure 4.2.** Nature Sanctuary
(http://www.ecovillagefindhorn.com/ecohomes/specification.php)

The materials chosen for external wall finishes are mostly stained wood claddings of Larch, Douglas fur, or local cedar, or untreated French larch except for the nature sanctuary where stone cladding has been used. The roof coverings of the buildings in the village are slate, zinc, or copper and for the nature sanctuary earth and plant - green roof. Solar panels have been installed on the roofs for hot-water.
As insulation materials, instead of conventional insulation, the buildings are covered mostly with 'warmcell' which is cellulose fiber insulation, paper, pulverized newspaper or rockwool. Hence it can be interpreted that mostly cellulose based insulation is preferred in Findhorn

**(iii) Water Efficiency**

Precautions are taken for the showers, low flush toilets and self closing taps have been installed to avoid the unnecessary consumption of water (Findhorn, 2015).
Rainwater is collected and recycled for garden use in order to benefit from the rain and therefore reduce the amount of necessary clean water for irrigation (Findhorn, 2015).

One of the innovative approach for water efficiency that is used in Findhorn is the **Living Machine®.** It is a system that purifies waste water enough to be discharged into the sea or to be recycled and is seen as a solution to the urban water pollution and aquatic habitat degradation problems (Findhorn, 2015).

The first Living Machine® in Europe was installed in Findhorn Eco-village in 1995 by Jonathan Porritt. Designed for up to 500 people in the village, this ecological sewage treatment plant has become a research and educational facility that promotes ecological water treatment technology on the global scale. This system works based on a 'whole systems' approach by utilizing a set of sequenced, complete ecologies through biomimicry. In the system, sewage arrives in a greenhouse with series of tanks containing a variety of habitats of bacteria, algae, micro-organisms, variety of plant species, trees, snails and fish that interact as whole ecologies. This procedure copies the processes occurring in nature in a much more intensive way and at the end of the procedure the sewage water is purified enough to be discharged directly into

the sea and/or to be recycled (Findhorn, 2015).

**(iv) Energy Efficiency**

In Findhorn, there are guidelines for architects and builders on energy conservation. Architects are encouraged to consider energy efficiency in every building with passive design features, like minimal wall openings on walls facing north and placing south facing windows and conservatories, to benefit from solar radiation to reduce the energy needed for heating. The guidelines also encourage the use of high level insulation and double or triple glazing for windows with low-emission window coatings. For the light bulbs energy efficient compact fluorescent bulbs are preferred in most of the buildings to reduce the unnecessary consumption of electricity. Taking these precautions in the newly built houses it was acknowledged that the energy requirements of the newer houses are many times less than the requirements of the old caravans (Findhorn, 2015).

For heating, sustainably harvested wood is used for wood stoves with gas boiler in both old and new houses (Findhorn, 2015).

Solar panels, which are supplied by a community company, are used in numerous buildings to heat water for domestic usage (Findhorn, 2015).

The village started their wind energy project in 1989 with the first wind turbine of 75kW. When the only wind turbine covered 20% of the electricity needs of the whole village and the initial investment was repaid in approximately five years, the project was seen to be successful. Following this success, the village has erected three additional second hand turbines with 225kW capacity leading the village to own a wind park with 750kW capacity. By the help of the additional wind turbines the village became an exporter of electricity, using 50% on site by their own electricity grid and distributing the surplus to the main grid (Findhorn, 2015).

Today the wind park produces 100% of the electricity requirement of the village. The electricity produced is sent to a substation acting like a switching station where the flow is metered and the transmission voltages are altered. In case there is no wind to produce electricity from, the village imports it from the grid. Thanks to the wind park, energy efficient buildings, use of solar panels and use of wood for heating, the

village receives 28% of its total energy from renewable sources and the community plans to increase this percentage (Findhorn, 2015).

**(v) Organic and Local Agriculture**

In order to obtain locally and organically produced food, Earthshare, a community supported agriculture scheme, was established in 1994. The scheme is based on organic and biodynamic farming methods and has expanded from 5 to 25 acres in cooperation with the Findhorn Foundation's market garden. It currently provides most of the community's temperate vegetables needs and supplies organic produce to 140 households. EarthShare also supports the actions taken in raising public awareness on the dangers of genetically modified (GM) foods.

The nearby Wester Lawrenceton farm, which is spread out on 95 acre of land, provides organic cheese, eggs and meat for the community. This farm helps the village to obtain their food locally, hence it reduces food miles and combines traditional methods with 21st century technology (Findhorn, 2015).

**B. Social Design**

In order to gather the diverse organizations and people who are associated with the community within a 50 mile radius, the New Findhorn Association was created. There is an elected voluntary council of the association; however, the affairs of the association are controlled by the members through various democratic processes.

To welcome new members, support organizations and businesses, encourage the engaged citizens to take new initiatives, facilitate communication between the members of the community and to take the pulse of the community, the association employs two Listener Conveners. These two Listener Conveners and the voluntary council are elected by the 360 individual and 32 organization members of the association and the association organizes community meetings monthly for decision making upon community wide issues (Findhorn, 2015).

**C. Economic design**

Findhorn Eco-village has a live local economy with over 60 different businesses and initiatives. Some of the community businesses are listed below:

- Findhorn Foundation: an international center of education conducting programs for approximately 3000 residential guests each year
- Phoenix Community Stores : for promoting trade with ethical suppliers, initiating buying policies to support local products
- Ekopia: a Development Trust providing community based ethical investments
- Build One: for building ecological houses
- Findhorn Bay Housing Company: for providing infrastructure management
- Duneland Limited: a landholding company working with conservation, regeneration and ecological human settlement
- Eco-village International: for designing and delivering village-scale sustainability programmes
- Gaia Education: for developing curricula for sustainable community design worldwide
- Phoenix Bakery: organic bakers
- Findhorn College: for offering further and higher education sustainability programmes
- Moray Arts Center: for encouraging the study of the visual arts locally
- Findhorn Bay Holiday Park: offers holiday accommodation
- Findhorn Pottery
- Findhorn Flower Essences: for producing floral remedies
- Posthouse Printing: graphic design and printing services
- Moray Steiner School: providing Waldorf Education for children from age 3 to 16
- Newbold House: retreat and workshop center
- Ecologia Trust: for promoting exchange programmes with Russia
- Erraid Community: an associate community in the west of Scotland
- Trees for Life: an award winning Scottish ecological restoration project (Findhorn, 2015).

**Table 4.1.** Characteristics of the buildings at Findhorn Eco-village

| BUILDINGS OF FINDHORN | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **BUILDING** | **FLOOR AREA** | **COMPLETION** | **APP. COST** | **DESIGN FEATURES** | **STRUCTURE** | **EXTERNAL WALL FINISHINGS** | **ROOF** | **INSULATION** | **HEATING SYSTEM** | **DEFICIENCIES** |
| **ALAN WATSON** | 128,00 m2 | 2005 | £200.000,00 | Ecological materials<br>Passive solar heat gain<br>South glazing | Timber | Untreated larch cladding | Slate | Warm cell | Solar Panels<br>Wood stove with gas boiler | HEATING-DESIGN RELATION |
| **GILLIAN PASCHKA BELL** | 140,00 m2 | 2002 | £150.000,00 | Shared use<br>Central kitchen<br>Rounded rooftop<br>Pantry<br>Built-in garden shed | Timber | Douglas fur | | Warm cell | Gas<br>Wood stove | SOUND PROOFING<br>THIN INSULATION |
| **MARY INGLIS & GEORGE GOUDSMITH** | 142,00 m2 | 2001 | £115.000,00 | Incorporated office<br>Workshop room | Timber | Timber | Slate<br>Solar Panel | Pulverised newspaper | Solar Panels<br>LPG | AGEING RAPIDLY |
| **WILL RUSSEL (408)** | 110,00 m2 | 2006 | £110.000,00 | Wood pallet boiler<br>District heating system<br>Solar Thermal Panels | Timber | Larch Cladding | | Warm cell | Solar Panels<br>Wood stove | SOUND PROOFING |
| **MICHAEL WHITE (407A)** | 105,00 m2 | 2006 | | | | | | | | |
| **MICHAEL SHARP (407)** | 85,00 m2 | 2009 | | | | | | | | |
| **HENRIETTA ROSE** | 175,00 m2 | 2005 | £250.000,00 | Octagonal House | Wood with steel frame | Timber | Zinc | Paper | Wood stove<br>Unused gas boiler | CORNER SINK<br>SOUND PROOFING |
| **CRAIG GIBSONE (BARREL HOUSE)** | 180,00 m2 | 2005 | £130.000,00 | Recycled whisky vats<br>Passive solar heating<br>Wood stove heating | Timber<br>Concrete | Local Cedar Cladding | Copper | Rock wool | Passive solar heating<br>Wood stove<br>Electricity | WINDOW INSULATION<br>OLD RECYCLED DOORS |
| **DAVID MCEWAN** | 149,00 m2 | 2006 | £300.000,00 | South facing conservatory<br>Bamboo floors<br>Central vacuum | Post and beam | Untreated French larch | Natural Slate | Warm cell | Water powered under floor heating by LPG boiler<br>Wood sotve | SOUND PROOFING BETWEEN FLOORS |
| **ROGER DOUDA (BARREL HOUSE)** | 32,00 m2 | 1986 | £10.000,00 | Converted<br>Recycled whisky vat<br>Night storage heat from wind power | Timber | Wood Stain | Copper | | Night storage | ONLY FOR 1 PERSON |
| **NATURE SANCTUARY** | 20,00 m2 | 1987 | £1.500,00 | Circular chamber<br>Built of recycled materials | Cavity wall | Stone | Earth & Plant | Rock wool | Night storage | |

### 4.1.2. Tamera Eco-Village

Tamera Eco-village is actually called The Healing Biotope I Tamera and it is a peace research project. A Healing Biotope is basically about building a regional model of a future society of peace, where all the global problems leading to war are solved or being solved, before it can be applied on a larger scale. Hence, it could be stated that the aim of the Healing Biotopes is to seek for remedy against the global problems, that is available for everyone in pursuit and applicable for everyone all around the world, so that the solutions can be integrated with each other and make the overall solution visible. The overall solution is divided into three different aspects; the material basis of life, the social basis of life and the mental-spiritual basis of life because it is believed that for a non-violent future, new responses need to be given to humankind in all these three areas (Tamera, 2015).

**Figure 4.3.** General View of Tamera (http://www.tamera.org/what-is-tamera/about-us/)

**The material basis of life** is referenced to the global lack of water, food and energy and their insufficient distribution. The solution is accepted as creating sustainable centers that are decentralized, regionally self sufficient and water rich being home to several thousand people by using new technologies compatible with the laws of life

and nature, by permaculture, peace gardens and water retention landscapes. This way, the nature's ecosystems and living beings are healed and the contradiction between conservation of nature and economic growth is overcome.

**The social basis of life** is referenced to the idea that mistrust, alienation and fear led people to lose their ability to live together in peace. The project aims to show that by creating new living environments, cooperation and trust can be built permanently amongst human beings.

**The mental-spiritual basis of life** is referenced to the fight against spirituality leading to religious wars, domination and subordination, depression and blocked anger ending up in self destruction. The aim of the project in this area is to present a new worldview and to study a theory of primal trust for people to develop a strong humane core by opening their hearts so that they become incorruptible (Tamera, 2015).

The idea of the Healing Biotopes project has risen in Germany in 1978 and put into practice in Southern Portugal in 1995 with the foundation of Tamera (Tamera, 2015). While at first the aim was to create a resilient community, Tamera has been home to many projects in time including ecological projects, leading the village to be counted as a successful eco-village (Tamera, 2015). With the population of 170 today, the community is focused on below mentioned research topics in search of a world where people from all cultures and religions can live together in peace;

- Development of communities based on trust, mutual support and responsible participation
- Resurfacing the healing of love by creating balance and peace between genders
- Creating a way of living without hatred or competition between one another
- Cooperation with nature and living in peace with it
- Creating a material basis of life without destruction of nature, exploitation or the exhaustion of natural resources.

- Regional food autonomy and ecological subsistence.
- Water and landscape healing through Water Retention Landscapes.
- Developing autonomous energy systems in order to get free from oil-based economy
- Creating healing life circumstances
- Integrating man-made systems with the higher systems of creation (Tamera, 2015).

As mentioned before, the community has been involved in many project and studies; however, this study is mainly focused on the ecological, social and economic design aspects that have been covered.

**A. Ecological Design**

Tamera, being a research center in the first place, has many test fields and innovative projects in search of viable ecological solutions and alternatives to survive against climate change, widespread hunger and the destruction of the ecosystems (Tamera, 2015). The fields of interests regarding the focus of this study are explained in detail in the following sub-sections.

**(i) Green Buildings**

Tamera has taken initiatives in the built environment, using local, ecological and low cost materials, building water retention landscapes to practice correct treatment of water and energy production. These initiatives have been covered in detail in three topics; Materials Used, Water Efficiency and Energy Efficiency.

**(ii) Materials Used**

Tamera's approach to the choice of building materials is using low-cost alternatives presented by the surrounding environment. The one building that was possible to investigate in terms of the materials used is the auditorium building 'The Aula'.

The auditorium building has capacity for 400 people and it is the largest straw bale adobe building in the Iberian Peninsula. The walls are eight meters high providing a spacious and impressive interior that makes visitors resemble it to a cathedral. The building has a green roof where grass and herbs can grow. The construction is of wood and straw bales are used for the walls. Clay is used as plaster inside and out, and for protection from the rain and outdoor conditions, the clay is mixed with lime on the outer walls. Combining old knowledge with new techniques, building with wood, clay and straw saves money and labor and presents a warm living space indoors (Tamera, 2015).

**(iii) Water Efficiency**

One of the main focuses of Tamera is using water efficiently and finding ways to treat it correctly. The measures and initiatives taken are explained below;

In most of the houses compost toilets are used which makes the water consumption way lower than regular houses (Tamera, 2015).

Wastewater is purified in wetlands and discharged into meadows and beds (Tamera, 2015).

Clean water that is used for drinking and washing machines comes from their own springs and wells, enriched by the help of the Water Retention Landscapes. The water is filtered and pumped into the lines mostly by the help of solar energy (Tamera, 2015).

Tamera's currently working on their goal to supply water from a ring duct which consists of two containers. The first container is to be located at a high altitude made of burnt clay and shaped as an egg releasing high quality well water to all the houses. The water not used is to reach the second container to be pumped back to the first one, providing clean drinking water to all the taps connected to the ring duct (Tamera, 2015).

Bernd Walter Müller, explains how desertification results from the incorrect management of water. He points out that even the regions that are considered arid encounter heavy rain falls that could supply enough clean water for a year; however,

the water is washed away leading destructive flooding that damages the infrastructure, people, animals and nature. He identifies these disasters as man-made disasters instead of natural disasters (Müller, 2011).

Müller points out that the actual state of water corresponds ‘the half water cycle’ as described by Viktor Schauberger, in which water evaporates, forms clouds and turn into rain falling onto the ground that cannot absorb water any longer. However, previously the earth was richly vegetated forming valuable humus that absorbs water like a sponge. Now, due to the destruction of diverse vegetation and forests, misuse of grasslands by over or under grazing and covering of the ground by urban developments, the ground warms up and when the rainwater is cooler than the ground temperature, rainwater cannot be absorbed (Müller, 2011).

Tamera has found an answer to this problem, with the help of Sepp Holzer, that is called ‘Water Retention Landscape’. Müller describes it as ‘a landscape with no rainwater run-off’. A natural Water Retention Landscape is a healthy mixed forest with shaded humus-rich earth that absorbs the rainwater. Recharging ground water, the rainwater reaches deeper ground layers, mineralizing and maturing itself and then returns the surface as spring water. In order to revive the water holding capacity of soil and create Water Retention Landscapes, the following measures are to be taken:

- Reforestation and the planting for mixed-culture ground cover vegetation.
- Holistic grazing management
- Keyline design, a system that speeds up the process of natural carbon cycle to create fertile soil by firstly, blending the subsoil and topsoil with a chisel plow creating deep cuts into the soil for a more balanced distribution of minerals, nutrients, air and water, then adjusting the level of air and moisture to speed up the decomposition of the organic material in the soil and by designating the lines of water flow for water infiltration
- Terracing
- Swales
- The construction of water retention spaces in the form of decentralized lakes and ponds

Tamera began creating a Water Retention Landscape in 2007 and have focused on reforestation, terracing and they have a variety of lakes and ponds surrounded by shoreline terraces leading the citizens attain all the drinking water they need from the wells. They created Lake-1 as seen in Figure 4.1**.** which led to a new spring that feeds a small stream flowing to the neighbouring land all year (Tamera, 2015).


**Figure 4.4.** Tamera Lake in 2007 (http://www.tamera.org/project-groups/autonomy-ecology/water/)


**Figure 4.5.** Tamera Lake in 2011(http://www.tamera.org/project-groups/autonomy-ecology/water/)

**(iv) Energy Efficiency**

50% of the energy required to heat water for washing, showering or bathing is covered by solar in combination with gas heaters (Tamera, 2015).

Tamera built its own 'Grid Connected Island System' and owns a 20kW photovoltaic plant supplying electric power during the day of which the surplus is stored in two battery banks. The plant can cover 80% of the electricity requirement in summer and 40% in winter reaching an average of 60% during the year. Rest of the energy requirement is imported from the national grid (Tamera, 2015).

Based on the awareness of the importance of energy autonomy, Tamera created a test field 'The Testfield 1-Solar Village'. In the test field, the solar technology inventions of Jürgen Kleinwächter are tested and integrated into daily life in cooperation with elements like Scheffler mirrors, biogas digesters and solar dryers. As mechanical power, low-temperature Stirling motors are used. The Stirling motor, invented in 1815, turns temperature difference into mechanical energy; this principle is able to use the energy of the sun. The hot side of the motor is heated by the sun and the only gas used for the motor is normal air, which creates mechanical energy ecologically without harming any other third party (Tamera, 2015).

The Solar Village hosts Energy Power Greenhouse and SunPulse Electric system. This integrated system offers a solution for many aspects of life like energy, food, protection from weather, protection from excessive sun for people and plants, water recovery for cultivation and separation of light frequencies for plant growth support. In the Energy Power Greenhouse, there is a closed circuit in which vegetable oil is circulated and stored in a tank. The oil is heated by the help of the Fresnel lenses that are placed on the ceiling of the greenhouse and focus the sun's radiation. The greenhouse is covered with UV transparent sheeting and excessive heat taken away by the help of the closed circuit filled with oil, water requirement of the plants decrease and quality organic food is produced. The resulting heated vegetable oil can be used to power a kitchen for 50 people and to drive a low-temperature Stirling motor, as it is called in Tamera, 'SunPulse Electric'. Storing the heated oil, electrical current power of 1.5 kW can be produced day and night providing power for

refrigeration, lighting, computers, hospitals and schools, or mechanical energy can be obtained for a grain mill or saw. The SunPulse Electric can be used with hot water collectors where water at 5 bar can be heated to above 150° Celsius. This is the optimal temperature for SunPulse Electric and in combination with a storage tank, it becomes a Stand Alone System (Tamera, 2015).

The sun energy is also used for solar water pump; The SunPulse Water; which works also with low-temperature Stirling motor. The SunPulse Water is able to pump water from 100m deep and it can be manufactured locally.

**Figure 4.6.** Water Pump (SunPulse Water) in Tamera (https://www.tamera.org/project-groups/autonomy-technology/sunpulse-water/)

As an alternative to solar cookers, Tamera uses Scheffler mirror which is a fixed focus solar reflector. The mirror stays in front of the house and it reflects sun light to the baking oven, inside the house, allowing one to cook from inside which is advantageous during hot or cold seasons (Tamera, 2015).

**Figure 4.7.** Baking oven heated by the Scheffler Mirror in Tamera (http://www.tamera.org/project-groups/autonomy-technology/scheffler-reflector/)

**Figure 4.8.** Scheffler Mirror (reflector on the right) in Tamera (http://www.tamera.org/project-groups/autonomy-technology/scheffler-reflector/)

In 2010 a biogas system was started to be built in the Testfield 1, and in 2011 a second system was built to be connected to the first. The system is essential at the times the solar energy is not enough to keep the kitchen remain in service. The two digesters with 6,000 and 3,000 liters of capacity, are fed by ground kitchen or garden scraps and can process 90 liters of biomass slurry daily which corresponds to 10kg of kitchen waste. The kitchen can produce this waste daily and the biogas obtained can be used for cooking on a small flame for 18 hours and 9 hours on a large flame daily (Tamera, 2015).

**(v) Organic and Local Agriculture**

Tamera's working on a model to show how people can provide for themselves. The basic ideas that shape the direction of this model are as follows;

- Regional (decentralized) food that comes from their own gardens or from the regional network of their neighbors or when in need from Portugal. They do not engage in the international fair trade market unless there is a special case.

- Seasonal food, to adapt to nature and its rhythms with the gifts and fruits given by it in their respective seasons.

- Complicity-free (long term) dealing with plants. The way to cultivate and harvest plants, the way to treat animals and earth is to be enriching and healing instead of harmful. With systems that cooperate with the cycles of life there are only winners where nature thanks human beings with stable, high yields, healthy food and abundance.

- Preferably vegan diet until they find an answer to animal husbandry,

- High quality food production that nourishes and lead people be alive and healthy.

In order to follow these basic ideas Tamera work in different areas that combines in a complete system. The working areas are;

**Permaculture,** following the principles of Sepp Holzer's Permaculture and harvest a variety of fruits and vegetables, edible and medicinal herbs, spices, olives and almonds.

**Seed Saving,** in alliance with Permaculture where seeds are collected from the lands of Tamera that are adapted to the conditions of the region and hybrid-free and a seed garden and a seed bank were created.

**Regional Networking,** by cooperating with neighboring farmers and beekeepers. Besides fruits and vegetables they produce rice, grains, chickpeas, beans, honey, olive oil, eggs, cheese, bread and etc. They learn from the local farmers and their experiences and share the knowledge of permaculture and water retention landscapes. With this cooperation they aim to lead the residents of the region to participate in the new food cycles.

**Shopping and Coordination,** by coordinating the supply, purchasing, operation of various cuisines and the establishment of the regional network.

**Processing Kitchen,** providing necessary preservation and finishing steps where the production, preservation and storing of the herbs, teas, jams, dried fruit, vinegar, olive oil, canned tomatoes, spices, sauerkraut, chutney, soaps and shampoo take place. During the processing, solar energy is used by the help of Scheffler mirrors, solar dryers and cooking boxes, the resulting kitchen waste is used for biogas production (Tamera, 2016).

**B. Social Design**

Tamera aims to achieve social sustainability through community and creating peace in all aspects amongst the community. Being a research center in the first place, that focuses on various kinds of study, it is expected for the people who live and work there to commit to ongoing study and to participate intensively in community life and inner peace work. Community is accepted as a whole with animals and plants, bringing out the concept 'in cooperation with nature'. The pillars of community concept of Tamera are;

- Living truthfully with each other,

- Mutual support and compassion,

- Different generations living together,

- Knowledge about conflict resolution,

- Understanding of individuality and community,

- Peace amongst genders without jealousy and fear (study on free love) (Tamera, 2016).

**C. Economic design**

As every other aspect in Tamera, its economic design is also based on trust, transparency, mutual support and responsible participation. The decisions are made in the councils that are open to all community members, and all the members are informed of all the cash flow, economic projects and investments. The lands of Tamera belongs to the community with all the buildings and purchases (Tamera, 2015).

Since there is no elaborate legal form that covers the complex structure of a legal community, Tamera developed a structure comprised of the form of companies and associations. There are two associations that are the equal shareholders of the company 'Ilos', the owner of Tamera's property and infrastructure. These associations are called 'G.R.A.C.E' and 'Associação para um Mundo Humanitario (AMH)' the active members of which are the community members (Tamera, 2015).

G.R.A.C.E. is the association responsible from the field of peace education consisted of Global Campus, the youth school for global education, Place of the Children, internal education and global peace actions. The association provides opportunities to sponsor students and a special training and scholarship fund addressed to student peace workers from more destitute countries (Tamera, 2015).

The Associação para um Mundo Humanitario (AMH) is the association responsible from all the research projects, environmental and technological, that are the Solar Village Test Field, the Water Retention Landscape, ecological landscape healing, the

reforestation project, building alimentary biotopes and projects for establishing the regional network (Tamera, 2015).

The structure is based on a business that both makes profit and run as a charitable non-profit sector. There are three monetary circuits in the structure; Basic Household, Loan Budget and Investment Budget (Tamera, 2015).

**The basic household budget** covers the basic costs of the place and people with all the costs of services, repairs, maintenance, and supply and it is funded by the income from seminars, guests, the book shop, the support circle, donations and by the community. Within the community there are no wages or labor costs, since every member works for food and accommodation receiving only a small monthly payment. However, they are also required to work outside of Tamera to earn money to compensate any shortage in the basic household (Tamera, 2015).

**The loan budget** covers the loans that was taken in order to finance the purchase of the land of Tamera and the initial investment. For political reasons they decided not to get loans for investments and they plan to repay the loans by the help of interest-free exchange loans (Tamera, 2015).

**The investment budget** covers the funds donated for the individual project groups. These donations are used for building projects, the Solar Village Test Field, the Water Retention Landscape projects, food autonomy, landscaping, the international school 'Escola da Esperança', political actions and networking journeys. The extra costs that occur with these investments like operating costs, maintenance costs, infrastructure costs, cooperation and project planning costs, structurally belongs to the basic household budget. For this reason, these costs are set at 30% of the incoming donations and redirected to the basic household (Tamera, 2015).

### 4.1.3. Sieben Linden Eco-Village

Sieben Linden Eco-village was founded in 1997 as a model settlement that is an autonomous unit outside of the village Poppau, Germany. The village was initially planned for 300 people and for now it is home to 140 residents (GEN, 2015).

The main notion of Sieben Linden is to develop and test solutions to the current issues like climate change, economic crisis, exploitation of resources and the living. The community shares no religion or ideology; hence, they benefit from the advantages of diversity that reflects the basic issues of life. The common ground; however, that connects the community is the understanding and prospect of a life in harmony with earth and all its residents (S. Linden, 2016).

The village follows the idea that it is possible to enrich and to populate spaces at the same time. The initially arable and pine monocultures have been turned into a diverse ecosystem with many species, plants and animals. The village mostly follows permaculture principles and grows organically (S. Linden, 2016).

**Figure 4.9.** General View of Sieben Linden
(http://www.siebenlinden.de/index.php?id=25&L=2)

### A. Ecological Design

The aim of Sieben Linden is to reduce their ecological footprint in all aspects and the current ecological footprint per person is 2,500 kg $CO^2$-equivalents which is one third of German average (S. Linden, 2016). The ecological features that are used have been explained in greater detail in the following sub-sections.

#### (i) Green Buildings

In Sieben Linden buildings are being built using solar energy systems, local water supply and natural and local building materials (S. Linden, 2016). These systems

have been covered under three topics; Materials Used, Water Efficiency and Energy Efficiency.

**(ii) Materials Used**

In Sieben Linden, the main material chosen for the buildings is straw bale. Due to this reason, Sieben Linden is accepted as the village owning the highest density of straw-bale buildings in Europe. With every new building, it is possible for them to do further research and development on the building technique with straw-bale and to pass on the information they gathered with seminars. The straw bales that are used are obtained locally from organic farmers, and the timber used for construction is mostly obtained from the village's own forest. As plaster, clay is used and; even though it is not always possible, it is obtained from their ground (S. Linden, 2016).

**(iii) Water Efficiency**

The precipitation of the land of Sieben Linden is 400 mm per year and the summers are arid with little or no rain. For this reason, reduction of water requirement gains importance. In order to reduce the water requirement, compost toilets are used and the compost that is collected is used for planting trees. The village is not connected to the local municipality's sewage system, owning a closed water cycle, instead they built a reed bed system filtering the waste water and the naturally filtered water is used for irrigation (Permaculture Global, 2016).

They obtain fresh water from their own well and from the local supplier, and again the resulting water is transferred to the reed bed system. Due to these precautions, water consumption corresponds to half of the German average (S. Linden, 2016).

**(iv) Energy Efficiency**

In Sieben Linden, photovoltaic panels are used to generate electric power and currently they cover around 65% of the yearly requirement (S. Linden, 2016). The surplus of the production is transferred to the national grid since there is no storage unit (Permaculture Global, 2016).

Buildings are heated by water that is heated by solar panels in cooperation with wood burning stoves. Half of the wood needed is obtained from their own forest and the rest is obtained from outside giving importance that it is grown and harvested ecologically (Permaculture Global, 2016). Thanks to these precautions and the good insulated passive houses, the energy required for heating in Sieben Linden is one third of the German average (S. Linden, 2016).

There is no biogas plant in the village yet, so they use natural gas for cooking while some groups cook with wooden stoves that also help heating the room. They also use solar parabolic cooker to heat water for dishwashing during summer when the solar panels are not available (Permaculture Global, 2016). As a result of not using electricity for cooking and heating, and the economical domestic usage, the consumption of electric power per person in the village corresponds to one fourth of the German average (S. Linden, 2016).

**(v) Organic and Local Agriculture**

Sieben Linden aims to be totally self-sufficient in food. They own approximately 3 ha land that consists of organically managed vegetable and herb gardens where 75% of the vegetable, fruit and herb needs of the village is produced (Permaculture Global, 2016). The rest is provided from local organic farms and an organic wholesaler leading the village attain their food locally and seasonally. Cultivation of arable crops, grain and pulses in their arable land is still on planning process (S. Linden, 2016).

The soil is treated with green manure and compost made of grass. However, due to the fact that there is not enough land to grow compost material and there are only six horses whose manure is used to fertilize their meadows, they import manure from nearby farmers. The compost obtained from the compost toilets is used for planting hedges and fruit trees (Permaculture Global, 2016).

Sieben Linden owns 22 ha of arable land which is rented to a local organic farmer to treat and convert it to organic until it is possible to have efficient labor and infrastructure to treat it (Permaculture Global, 2016).

**B. Social Design**

The aim of Sieben Linden in living together is to integrate individual needs in the communal life everyday through;

- Transparency and trust among people
- Correct and attentive communication
- Mutual appreciation
- Communal decision making (S. Linden, 2016).

Currently there are 140 people living in Sieben Linden in different households that have their own infrastructure. The communal buildings offer space for communal activities like shared meals, celebrations, meetings, dancing, movie screening, talking rounds, mediations etc. On the philosophical aspect, there is no single religion, ideology, philosophy or lifestyle. In the village diversity is appreciated and it is accepted as an educational aspect where it is possible to learn from each other and help personal development of oneself. The Sieben Linden community consists of different communities with different philosophies where people sharing a common ideology can also form their own neighborhood or shared living units. The common philosophy of one shared unit can be observed in the building methods, economical and dietary values, in their family situation and even in the need for quietness. For children there is a forest kindergarten to visit and they can attend the local and free state schools. The village presents many learning and experience opportunities for teens, trainees and alumni of voluntary services (S. Linden, 2016).

Being aware of the need to be transparent and understanding amongst people for a successful community, they use the communication techniques like forums, nonviolent communication and mediation besides face to face approach to get to know each other and solve conflicts (S. Linden, 2016).

The decision making on buildings, social affairs, finances, administration, education and food, is the responsibility of five elected councils and working groups. The desires and needs of the residents are heard in the General Assembly, which is carried out monthly, to bring the ideas together and reach a possible way of acting.

For a decision to be made, two third of the majority is required where the possibility and right for veto is protected (S. Linden, 2016).

**C. Economic design**

The land and infrastructure of Sieben Linden, a communal project that is a legal entity, belong to the residents who are the shareholders of a co-operative. The responsibility of the domestic budgets belongs to the residents and it is supported for everyone to find their own place in the whole that would lead to new professions and occupational challenges derived from the personal inclinations (S. Linden, 2016).

The co-operative is called The SiGe and as a member of the SiGe, each resident finances the area of the village of 81,5 ha and the infrastructure with their share of 13.000 Euro. For the daily costs of the village every resident pays 100 Euro in average per month (S. Linden, 2016).

The housing co-operative WoGe, is responsible to provide a part of the legal and financial frame of the building projects. The future residents give their share and a determined amount of working hours in WoGe and the capital contributions are covered by WoGe with loans taken from banks or individuals or by extra shares from the residents. After accommodation a certain amount of rent is paid that is determined according to the residents' financial or work input (S. Linden, 2016).

While it is possible to work as a freelancer inside and outside the village, Sieben Linden offers many job opportunities inside the village with the employers;

- SiGe; for forest and gardens,
- WoGe; for administration
- Freundeskreis Ökodorf e.V.; for seminar center,
- Naturwaren e.V.; for food co-operative,
- Einfach Gut Leben e.V.; for eurotopia book, which consists of intentional communities, eco-villages, co-housing projects, introductions of community networks and useful addresses in Europe and beyond (S. Linden, 2016).

It is expected from the residents to work voluntarily for the construction and development of the eco-village, with approximately one hour of cleaning duties and

approximately 5 hours of work in different working groups and committees per week. While in modern life, appreciation of work is associated with money, in Sieben Linden voluntary work is appreciated by personal gratitude in thanking rounds for instance (S. Linden, 2016).

Sieben Linden provides the supply of food and household goods for every resident and everyone can take out their need from the communal storage for an equal daily fee, while children are supported by the community and don't have to pay for food (S. Linden, 2016).

### 4.1.4. Dyssekilde Eco-Village

Inspired by the teachings of the Danish spiritual philosopher Martinus, the idea of an eco-village was firstly born in Denmark in 1982 by five people. The core elements that this vision of a community based on were primarily; spirituality, vegetarianism, self-sufficiency, leaving a positive impact on the environment, conscious use of resources, local jobs and a variety of social activities. These core elements shaped below mentioned principles that the village has lived by from the beginning;

- Working in cooperation with nature instead of against it,
- Creating systems that produce energy more than they consume,
- Working for the regeneration of earth,
- Enabling local circulation of matter,
- Co-operating through interdisciplinary networking (Dyssekilde, 2016).

The first physical step towards this idea of a community was taken in 1987 by the foundation of Økologisk Landsbysamfunds Kommanditselskab (ØLK) meaning Ecological Village Society Limited Partnership in English. After a year of the foundation of ØLK, it bought the farm Dyssekildegård with additional buildings and 13 hectares of land, and the first residents, 10 adults and 5 children, moved in to the farm houses. In 1990, on the former potato field, the first houses were built and after a year the first people moved into these houses while the adults started a private kindergarten. This kindergarten named Torup, became a public institution in 1992 and moved to one of the farm buildings which still facilitates 25 children, most of whom are from the village. With the new buildings being built and rented along the

way, the village grew to house 71 adults and 35 children until 1999 in which ØKL becomes Økosamfundet Dyssekilde (Eco Community Dyssekilde) and now the Dyssekilde Eco-village is home to more than 170 people (Dyssekilde, 2016).

The core ideas has changed since the day they were first born and now the community's main focuses are ecology, sustainability and respect and tolerance. These aspects have been explained under Ecological, Social and Economic design topics (Dyssekilde, 2016).

**B. Ecological Design**

The major focuses of ecology and sustainability are taken into consideration in every action taken, depending on the work and the people involved. Having no rules and regulations, everyone is expected to act towards the core principles in the best way possible. Besides personal attention, there are also communal initiatives to ensure a high level of sustainability like; the use of a windmill, joint laundry, shared geothermal heating system, joint vegetable gardens and shared waste management. These initiative have been covered in greater detail in the following sub-sections (Dyssekilde, 2016).

**(i) Green Buildings**

Since the beginning, sustainable way of building through the materials used, the building process, the use of energy and resources, has been a major concern; however, since the knowledge increases by time, the first houses that have been built are considered as experimental instead of sustainable.

**(ii) Materials Used**

As there are no strict rules on the materials or the building techniques and everyone is the owner of his/her own house, there are a variety of building materials and architecture styles to be observed, rendering the village a showcase in that matter. There are both buildings that were built with new materials and with expensive heating solutions, and buildings that were built with recycled materials with a small budget. However, most of the houses were built with sustainable and natural materials like;

- Larch and Douglas fir, having a natural oil content that makes it weather resistant,
- Unfired bricks, energy efficient to obtain, possible to be produced locally and a good heat absorber,
- Straw bales for either construction or as insulation,
- Flax as an easy to work alternative to mineral wool,
- Paper insulation,
- Mussel shells,
- Recycled bricks and tiles,
- Eco paint and white wash (Dyssekilde, 2016).

**(iii) Water Efficiency**

Being aware of the importance of water conservation, in Dyssekilde the consumption of water is kept between 60-65% of Danish average. In order to reduce the consumption, compost toilets are used in some houses, rainwater is used for toilet flush, in private washing machines, in the communal laundry and for irrigation as much as possible. The rainwater collected from the roofs are stored in tanks in most of the houses and if the stored water is more than needed, the surplus is discharged to the pond in the middle of the village (Dyssekilde, 2016).

The village also uses willow wastewater cleaning system as an ecological wastewater management by treating wastewater by the help of a willow bed where the circulated water is directed to several tanks for the particles to settle and reaches the flushing tank to be directed back to the buildings as shown in figure 4.10.

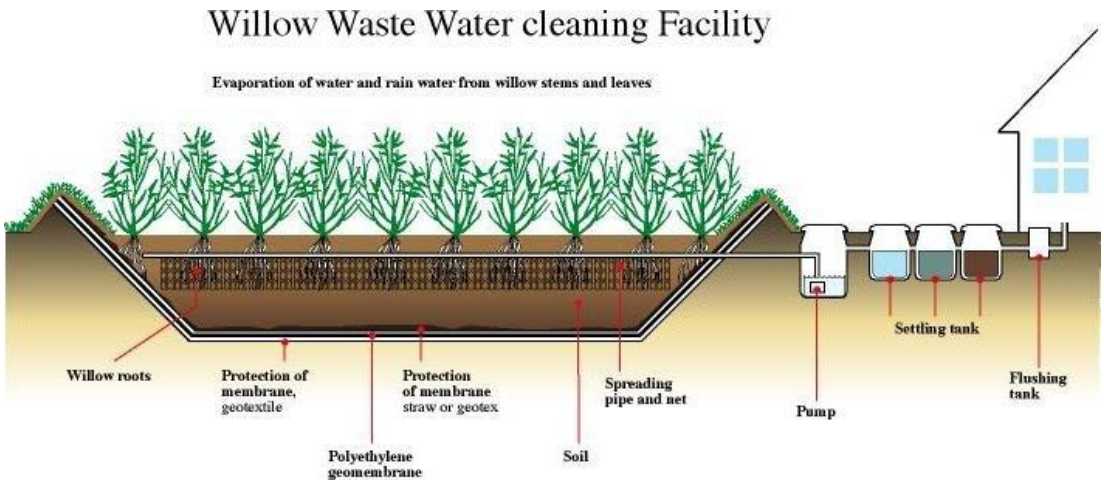


**Figure 4.10.** Depiction of Willow Waste Water Treatment System (http://www.pilerensning.dk/english/index.php?option=com_content&view=article&id=53&Itemid=56&lang=en)

### (iv) Energy Efficiency

In the 1990s the first windmill was built, and now there are 6 of them in the area. The one windmill the village uses produces 450kW of electricity which is supposed to cover 2,5 times the need of the houses (Dyssekilde, 2016).

In order to reduce energy consumption for heating, almost all houses in the village have a greenhouse on the south facade. The passive solar heating especially works best in the houses with brick walls or other high mass walls with high capacity of heat absorption, leading to shorten the active heating season a month in autumn and spring (Dyssekilde, 2016).

To heat water during summer, many houses use sun catchers on their roof, and few of the houses have solar panels to produce electricity (Dyssekilde, 2016).

The first house to be heated with geothermal energy is the communal house. The system has been expanded to 7 houses that are connected to it. In this system water filled tubes travel under the ground, approximately one meter below the earth. Water absorbs the heat from the ground and its temperature then is raised to 30-40 degrees and used for floor heating, radiators and hot tap water. The downside of the system is

that it uses electricity to raise the temperature afterwards; however, the electricity used is $CO^2$ neutral produced from a windmill so it could be accepted as a sustainable source of heat (Dyssekilde, 2016).

In the initial phase of the village, wood was the primary choice for heating due to its affordability, availability and the fact that it is considered $CO_2$ neutral. However, the focus on particle pollution gained force and residents started choosing other heating systems. The houses that are heated by wood have mass ovens that are made of heavy bricks or stone in the middle of the houses and it is fired only once a day. The heat absorbed by the mass is slowly released during the day keeping the house warm, and these ovens are also used for baking bread or cooking. The building that contains the bakery, shop and café is heated by the heat released from the baking oven that runs on rapeseed oil (Dyssekilde, 2016).

**(v) Organic and Local Agriculture**

The 12 hectares of land the village owns is unbuilt on, and the bigger part is unused giving space to wildlife and children play. In this land, a small forest has been planted and 1 hectare of it is used as the communal vegetable garden. Every resident can obtain organic vegetables from this garden with the condition of 40 hours of labor work and a couple of hundred Danish crowns a year. Some residents also have their own little plot where they can grow their own vegetables. There is also a meditation garden providing herbs and there are fruit trees scattered through the village enabling people to have access to fruit each autumn (Dyssekilde, 2016).

Although in the early years the villagers owned goats and sheep and produced goat cheese, now chickens are the most useful in terms of attaining fresh eggs and meat (Dyssekilde, 2016).

**B. Social Design**

In Dyssekilde, the highest authority is accepted to be the member meetings that are held once in every three months. In these meetings, both practical and theoretical agendas are discussed and decided like parceling, budget and ideas and principles of the present and future of the village. Each member has a right to influence the agenda

of the day and all the decisions. Members over 18 has a vote and the decisions are made according to the majority (Dyssekilde, 2016).

There is an executive committee whose duty is to stay in contact with the working groups and make sure the decisions taken in the member meetings are being carried out. The members of this committee, five to seven people, are elected during the members meeting that is held in April in every two years, and the committee members do not get paid for their responsibility just like any other working group. The aim is to have a representative from each housing group in the committee and the notes of the meetings of the committee are announced weekly through the newsletter (Dyssekilde, 2016).

**C. Economic design**

To become a member of Dyssekilde, everyone has to pay a deposit of 8.900 Danish crowns (app. 1.200 €) and a yearly due of 3,000 Danish crowns (app. 400 €). From the beginning, thanks to the income from the sale of the building plots, it was possible to finance the building processes of the common facilities; however, due to the fact that almost all plots are sold, the village needs to change their economic structure into a lower budget economy, focusing on the maintenance of the existing buildings (Dyssekilde, 2016).

### 4.1.5. Damanhur Eco-Village

The Damanhur Eco village was visited in October 2014 and information regarding its history, philosophy and way of life was obtained from the guided tour of the premises; and photographs of interesting features were also taken. Damanhur, a Federation of spiritual communities, was founded in 1975 in the alpine foothills north of Piedmont, Italy, between Turin and Aosta by Falco Tarassaco (original name; Oberto Airaudi) and his companions. (Damanhur, 2014).

In 1977 the first community project was started when there were only a few dozen citizens but the population increased slowly and in 1983 Tarasacco who was their spiritual leader aslso, initiated ‘The Game of Life’ and ‘The Viaggio’ (a travel journey). With these initiatives, the population and accordingly the number of

residential community houses quickly increased. At the end of 1980s other communities were formed in addition to the first ones that led to the birth of Damanhur Federation of Communities (Damanhur, 2015). This foundation is based on solidarity, sharing, reciprocal love and respect for the environment (Damanhur, 2015). And a temple called the 'Temples of Humankind' was built to replicate the dream temple of their leader, which was a guarded secret at first but later was opened to public due to political pressure. This was instrumental in making Damanhur known internationally and people from from all over the world came to settle here as "citizens"; today there are 26 nucleo communities spreading over a radius of 12 miles in the Canavese area (Damanhur, 2015).

### A. Ecological Design

Ecological design features of Damanhur have been explained in detail in the following sub-sections.

#### (i) Green Buildings

The buildings in Damanhur are constructed with ecological building materials and they use renewable energy resources like solar and photovoltaic panels, geothermal and biomass heating. In order to be able to live in healthy homes with low impact on environment, continuous research has been held and with the help of practical experiences it was made possible to experiment with earth friendly techniques, materials and innovative living solutions (Damanhur, 2015).

**Figure 4.11.** One of the Community Houses in Damanhur

**(ii) Materials Used**

The Green Building concept in Damanhur begins with reusing materials and energy conservation and they call it ‘bioclimatic building’. Architects of Damanhur only use new materials when it is not possible to reuse the existing ones, and the new materials are always chosen to be eco friendly like clay, wood and natural lime. The old and abandoned buildings are renovated and hence reclaimed by the community. They claim to have some houses that have Zero Carbon Footprint depending on being built with straw and clay harvested from less than 10km away or directly from the land of the construction site (Damanhur, 2015).

**Figure 4.12.** Wall Paintings of Real People That Lived in Damanhur

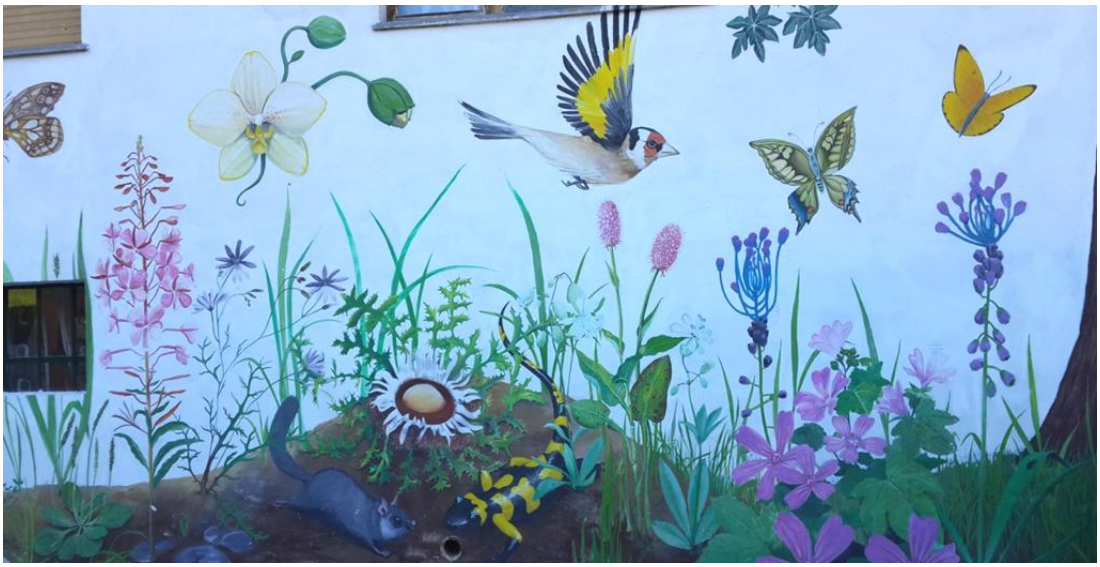

**Figure 4.13.** Wall Paintings in Damanhur

**Figure 4.14.** Wall Paintings in Damanhur

**(iii) Water Efficiency**

Damanhurians use organic septic systems and wetland systems for black and grey water treatment. They collect rainwater and clean stream water for household use, crop irrigation and fire fighting, use organic detergents, compost food waste to use as fertilizer in agriculture, give high importance and care in recycling and they succeed these by the help of technology instead of ignoring it (Damanhur, 2015).

**(iv) Energy Efficiency**

In order to reduce the energy requirements, high thermal insulation and solar panel installations are applied. There are three companies that work on design, green building and renewable energy that are; Inauge, EdilArca and Solerà respectively. The experiences that made these companies possible were gained from constructing houses in Damanhur and all three companies work throughout northern Italy today. Following this system, two communities in Damanhur received Green Flag award by FEE Italy (Damanhur, 2015).

**Figure 4.15.** Solar Panels on the Roof of a Community House in Damanhur

**Figure 4.16.** PV Panel in Damanhur

### (v) Organic and Local Agriculture

In Damanhur people are active in agriculture and livestock breeding. They cultivate and harvest seasonal organic vegetables, fruits and grains and they raise bees, chickens, rabbits, cows, ducks and turkeys (Damanhur, 2015). 50% of the required amount of food for 600 citizens can be fulfilled by the organic agriculture today (Damanhur, 2015). Damanhur acknowledges that for a food production chain to be good quality, it needs to be short, traceable, in harmony with the resources of the land and consumed locally and hence they created many complete production chains and exchange of products within the communities of the federation (Damanhur, 2015). Punto Verde, a large agricultural cooperative, was created to be responsible from extensive crops, horticulture and livestock breeding for the entire community. In the various communities, smaller initiatives also exist like orchards, vegetable gardens, vineyards and beehives and raising pigs, chickens, fish etc. (Damanhur, 2015).

Damanhurians initiated a project call Seed Bank, the aim of which is conservation of plant biodiversity and self-sufficiency with the production of seeds. They recognize that in order to conserve plant biodiversity and prevent the extinction of many species, wild plants as well as the ones cultivated for food are of great importance (Damanhur, 2015).

## B. Social Design

The social design of Damanhur is based on four pillars which are: the School of Meditation, the Social Pillar, the Game of Life and Tecnarcato.

### (i) The School of Meditation

The School of Meditation is not actually a place for teaching meditation but a concept of being aware of each moment of a day everyday and bringing meaning to it. Damanhurians believe that ‘Meditation is 24 hours a day’ even when one devotes him/herself to work, to others or to the environment and that spirituality means "giving meaning to things" and to be aware that every being is a reflection of the universe. While this school of meditation aims to reawaken the divine spark within

every individual, it also develops values on spirituality, positive thinking, taking action and esoteric knowledge (Damanhur, 2015). This philosophy is reflected in the life style of the people and their surroundings; one can see colorful stones that form the "meditation" paths on the grass in different patterns like spirals or labyrinths while each pattern is said to have a specific kind of effect on the act of meditation.

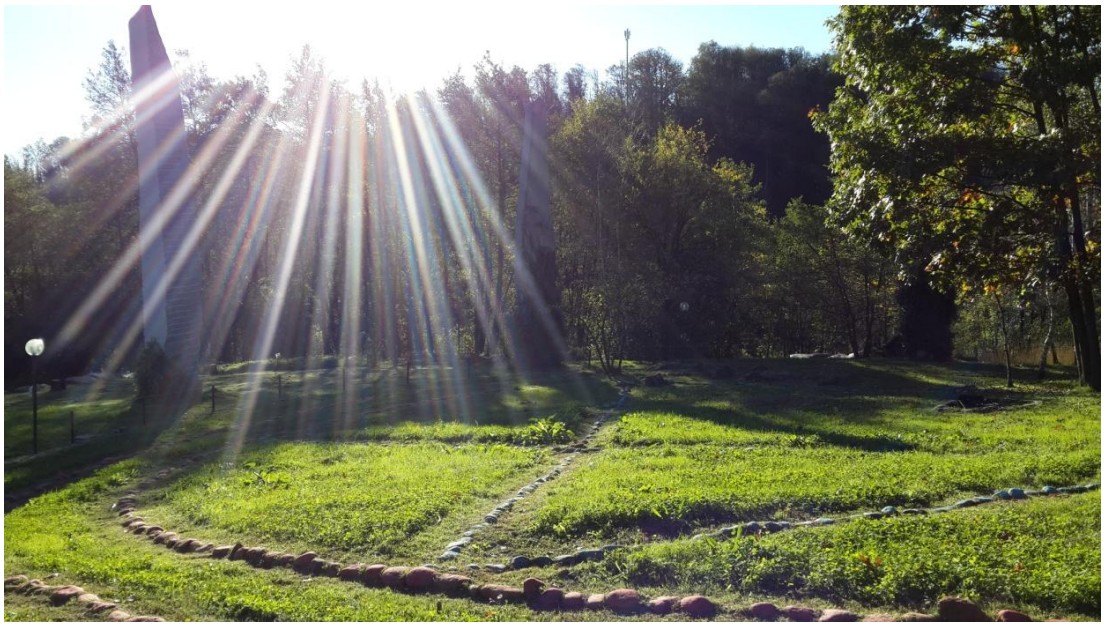

**Figure 4.17.** Meditation Pathways in Damanhur

**Figure 4.18.** Statues and Meditation Pathways in Damanhur

**(ii) Social Pillar**

As Damanhurians acknowledge the need of change since people change every second and so do their needs, the social structure and political system of Damanhur has changed many times to respond these needs. Damanhur has its own Constitution that has been updated many times, and regulatory changes are made according to this Constitution. All citizens have say in the decision making process through the elected bodies (Damanhur, 2015). The Constitution was first written in 1981 with 130 articles and its philosophical vision is 'to create a community that can sustain itself with ever-increasing individual awareness, with less and less need for laws and regulations'. Hence the Constitution has evolved in time and today there are only 15 articles that are the fundamental life principles of the federation. The principles include thinking positively about others and always giving another chance, solidarity, continuous inner transformation, caring about the environment and all life forms and respect for all citizens. The actions that harm themselves and others like smoking and drug use are banned by the constitution and the visitors are expected to abide by these rules (Damanhur, 2015).

Damanhur accepts citizens from all over the world. The primary language is Italian and there are Italian courses that take places frequently. In the meetings there usually are translators in a couple of languages for the international citizens and visitors (Damanhur, 2015).

There are many kinds of citizenships depending on the commitment one prefers to make. The first citizenship that is called 'A citizenship' is for the people who want to live in the community full time and the other ones are for the people who don't want to live in the community, but take part in their projects and stay connected. The people who choose full citizenship stay in large houses, that are called 'nucleos', with a group of 15-25 people, sharing the house works and responsibilities. There may be married couples with children, elder people or single people in the same house with their personal spaces and common areas. Each citizen is free to choose where and with whom s/he will live. Damanhurians appreciate the importance of humor and being able to communicate deeply and play together in a community and hence living together, they create opportunities to share moments. Though the children live with their parents, every citizen feels responsibility on their care and economic support. For the elderly people living in these communities, the spaces they live in are suitable for their needs and taking care of them and valuing the long life experiences they have are an important part of the social system (Damanhur, 2015).

Today, there is a Youth Community in Damanhur, in which teenagers between the ages of 15-23 live together without adults to be independent. This community was formed in 2007 by a group of teenagers and is called Milte nucleo community or Casa Ragazzi. In this community children learn to take responsibilities, manage their daily lives from cooking to budgeting and support each other independent of their parents. For the children under the age of 18 who want to join this community, family consent is required. After the middle school, the children of Damanhur starts attending public schools out of Damanhur so the first year of their high school is a great change for them. For this reason joining the Casa Ragazzi is only possible after a child completes the first year of the high school and is required to be successful in the classes. Otherwise, the child returns to the community in which his/her parents live in (Damanhur, 2015).

When it comes to education, there is one school that gives education until the end of middle school. However, this school is not an official one so the children need to attend exams in public schools of Italy to be able to get their degrees (Damanhur, 2014).

The Damanhur school was founded by a group of parents who wanted to take active role in guiding their children in 1985 and the Damanhur Education organization created the school covering the curriculum of the Italian educational ministry. Besides the Italian curriculum, the students are given opportunities for self expression through practical experimentation and contacting nature. They attend trips with their teachers to the historic sites to have an idea about the world and what they learn to gain practical knowledge and they actively involve in social awareness campaigns (Damanhur, 2015).

Besides the rituals, the citizens gather in weekly meetings for decision making and developing projects and for support and personal feedbacks. They take active roles on handling daily expenses and the 'A Citizens' elect the head of community that is called **Nucleo Leader or Regent** for one year who represents the nucleo community (Damanhur, 2015). The Regent is responsible from coordination of social relationships, organization and various community projects. The highest office in Damanhur politics is the **King Guides** who are responsible for the development and coordination of the activities of the federation. The King Guides are elected in every six months by the citizens. The second highest office is the **College of Justice** which is elected in yearly periods. They are responsible from solving disagreements between citizens, from ensuring the Constitution principles are respected and from the verification of the various institutions' works. In Damanhur, since it constitutes a large area, every distinct area is consisted of several nucleo communities grouped together that is called a region and each region chooses a **Captain** every year. There are leaders of the three pillars; The School of Meditation, The Game of Life and Tecnarcato and these leaders are selected by the **Sages**. The Sages are the three people selected by Falco Tarassaco before he passed away in order to continue Falco's mission of overseeing the general direction of Damanhur and continue the dream (Damanhur, 2015).

**(iii) The Game of Life**

For personal and community life at Damanhur, change, creativity and sense of humor are valued deeply and the Game of Life is the representative of the value given to these aspects. When Damanhur was first founded, the citizens' focus was mainly on collective management of space and resources and with the creation of The Game of Life in 1983 the community started their transformation into being flexible and open to new ideas to be able to evolve and to become integrated with new citizens. With this initiation, all citizens decided to take part in the transformation process of Damanhur along with their own inner transformation. An aspect of The Game of Life is the Viaggio which means a travel journey. In order to share experiences and have mutual discoveries, some citizens of Damanhur can come together and determine a route for their trip (Damanhur, 2015).

**Figure 4.19.** Open Air Temple in Damanhur

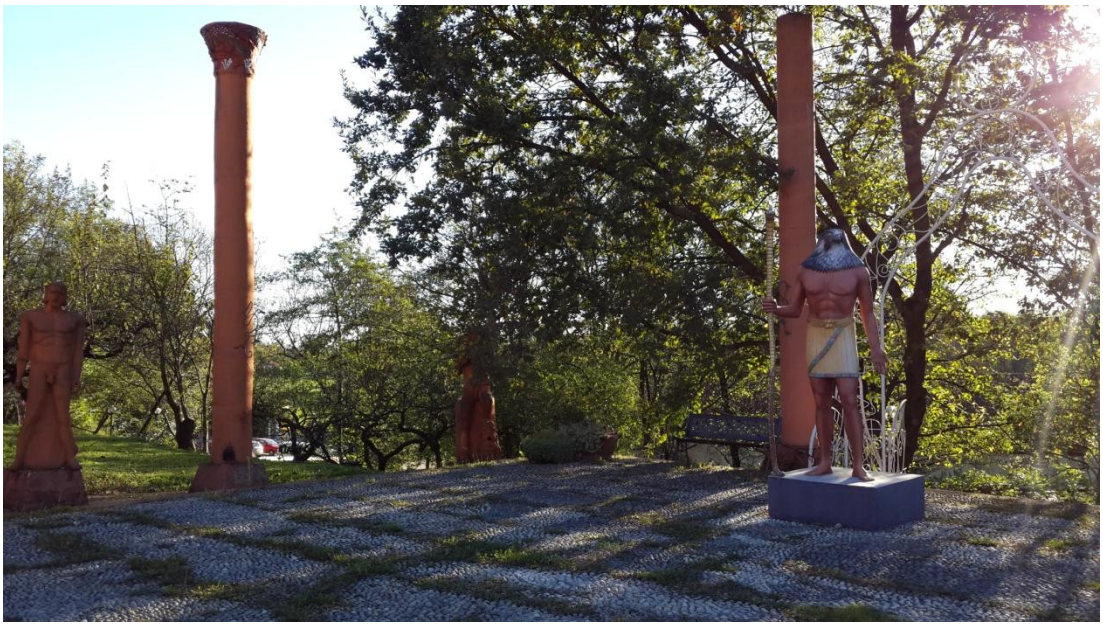

**Figure 4.20.** Statues and Columns that are Spread Around the Landscape in Damanhur-1

**Figure 4.21.** Statues and Columns that are Spread Around the Landscape in Damanhur-2 and 3

**Figure 4.22.** Statues and Columns that are Spread Around the Landscape in Damanhur-4

**(iv) Tecnarcato**

While communities are assumed to be collectivist societies, Falco Tarassaco defined Damanhur to be a community of individualists. As understood, community life is very important on ideal and practical levels, but the most precious element of every collective group in Damanhur is the individual. There are many techniques and tools to help enhance individual renewal and the collection of these is called The Tecnarcato. The transformation of every individual is only designed by themselves and in every three months they constitute a program of practical objectives and ethical values. Everyone chooses one person as a mirror to talk to during the process and to take feedbacks from. In this stage having an 'Individual Law', which is a personal rule, is important and this rule is decided by the individual with the verification of the chosen 'mirror'. The goal is to concentrate on their character so

that it doesn't hold the person back from his/her self development and individual goals by the help of this chosen person (Damanhur, 2015).

**C. Economic design**

The citizens of Damanhur are expected to be economically independent individuals. They may choose to work for and in the community or work outside of Damanhur and all of them have to pay a fixed amount every month to the federation. The ones that earn much more than the others are expected to pay more within a ratio in addition to the fixed amount. They have their own currency system which is called The Credito. Entering Damanhur, one can change Euro into Credito in the Welcome Office and change it back into Euro when leaving. At first the value of Credito was different from Euro but it wasn't well taken by the Italian government to have a separate currency with a different value in the country, so the value of Credito was changed to be equal to the one of Euro today (Damanhur, 2014).

The philosophy behind having Credito as their currency system is to return to the original purpose of money which is to be used 'as a means to facilitate exchange, based on an agreement between those involved' instead of seeing it as the goal. By naming their currency as Credito, they remind themselves that money is a tool to grant trust (Damanhur, 2015).

The economic system in the past 40 years has changed many times. In the first 10 years every citizen chose to share their individual income, putting it into a common fund to purchase land and houses. Thanks to this fund the basis of the community development could be created and the work on the Temples of Humankind could start. After this period people chose to change the system to be able to manage their own income and discover their own potential and today instead of sharing their income, they participate in the management of Damanhur which is a collective property. In order to have collective ownership of all the Federation's property assets, a housing association called Atalji, that owns the land and houses in the communities, was founded. Over time Atalji has started to acquire new land and renovate old house which helped growing of the economic legacy. In this association, every citizen is a shareholder and can withdraw when they want to leave

the citizenship or when they are in need. In the economic system of Damanhur, each community is acknowledged as a family, in which the ones that work cover the costs for the ones in need (Damanhur, 2015).

In Damanhur Crea center which was renovated from an old factory, many businesses and services in many fields exist from arts and crafts to medical clinic (Damanhur, 2015).

### 4.2. Children's Villages

Three case studies have been selected from the Children's Villages in the world. One of them is SOS Children's Village in Imst/Tyrol, being the first children's village and the one led the foundation of the SOS Children's Village organization. It is selected to benefit from the experiences of the village from the time it was built. The second village that is chosen is SOS Children's Villages in KKTC because of its common culture, religion and language with Turkey. The last case study on the children's villages is the one in Turkey, Bolluca Children's Village which was firstly founded by the SOS Children's Villages organization; however, due to legal constraints the ties with the organization was cut and the Koruncuk foundation in Turkey took charge of the village. A site visit was carried out to the Bolluca Children's Village for this study.

#### 4.2.1. SOS Children's Village Imst/Tyrol

The SOS Children's Village in Imst/Tyrol was founded in 1949 by Hermann Gmeiner in Austria as the first village of the organization. Children with no parents or children whose parents cannot care for them live in the village with their SOS mothers, biological and SOS siblings gaining stable and reliable relationships and a family based care on the way to their adulthood (Imst, 2016).

Currently the village houses 9 SOS families with 32 children most of which arrived the village as babies (Imst, 2016). The village also provides support for the families of the children in case there is an opportunity for the children to stay with their biological parents or the young people that are yet to become adults in the crisis

group homes or the therapeutic youth residential until they are ready for the independent life (Imst, 2016). Even after the children that grew up in the SOS Village become adults, they are supervised and assisted if necessary by the aftercare and intervention agency located in SOS Tirol (Imst, 2016). The different homes and facilities caring for children and youth and their responsibilities have been explained in the topics below.

**(i) Children Group Homes**

In the village there are 4 children group homes which are like family homes in the sense that children in these homes receive a long term family based care as well. The difference is that they are accompanied by a team of family assistants and social workers. The children in the care group can find several caregivers to build a stable relationship with in the protected environment. The key factor for these children is the contact with their biological parents which helps make it easier to work on children's traumatic experiences and build a bright future for them. Currently 22 children live in these group homes all of which have a viable relationship with their parents (Imst, 2016).

**(ii) The Kindergarten**

The village houses a Kindergarten which is open to the children in the neighborhood as well. Welcoming children outside of the village helps for the children in the village to communicate with the community that the village is a part of. Currently, half of the children attending the kindergarten are from the neighborhood and the number of children attending it from the SOS village is 22 (Imst, 2016).

**(iii) Crisis Group Home**

A crisis group home is located in the village currently housing 8 children who are yet to be decided to either go home to their biological parents or to a further form of home care. These children may also be transferred to a children group home or to an SOS family in the village depending on what is best for their well-being. This difficult time for children is managed in cooperation with the youth welfare and with the members of the village. The responsibility of the youth welfare in this period is to

investigate the opportunities for children to return to their family and to work with their parents and prepare them, and if this case is not possible, to find a good place for their long term accommodation (Imst, 2016).

**(iv) The Biwak Hall**

The Biwak hall is a residential community currently housing up to 15 children refugees who could escape without their parents. They come with traumatic experiences in need of a shelter so it is important to support and care for them in a way that is appropriate for their ages. The children in this condition are supported to become independent adults and to adapt to Austrian life and language. It is a prerequisite for them to learn German and they are tried to be given job opportunities inside or outside the village if their ages are appropriate. After this process if their stay in Austria is secured, they move out to live independently when ready, if not the children either return to their home country or sent to another country to find shelter with the experiences they gained in the village (Imst, 2016).

**(v) The Therapeutic Youth Residence**

The therapeutic youth residential building was opened in 2012 for the youth that are pedagogically supervised with a maximum of 8 young people above the age 14. For the youth with high psychological stress, it is observed with experience that classic social education is not sufficient; hence, these youth are given more resources of individual care and relationship formation and provided with therapeutic services and social counseling in the context of youth welfare measures. The goal is to achieve their physical, mental and social stabilization and decide what is best for them afterwards which could be returning to their family or transition to alternative care settings (Imst, 2016).

**(vi) Assisted Living House**

This house is for up to 8 young women between the ages 15 and 18 to help them prepare for the independent life in a protected way. The young women live in their own small apartments autonomously with guidance from social and educational staff.

The main goal in the end is to help these women become totally independent (Imst, 2016).

### 4.2.2. SOS Children's Village KKTC

KKTC SOS Children's Village Association was founded in 1991 in Lefkoşa (Nicosia) and started its activities in 1993with the family based care of 6 children. In 1994 the village was accepted as a member of the Global SOS Children's Villages Association gaining the same status of all the SOS Children's Villages in the world. In 1996 family based care was started to be given to youth in an apartment house in the city until the youth home in Girne (Kyrenia) was founded in 1998 (KKTC, 2016).

The aim of the SOS Children's Village in KKTC is to provide children have ever lasting relationships in a family with the four main principles of the SOS organization that every child needs a mother and every child grows up with brothers and sisters in a home within a supportive village environment in the most natural way. In this village, every child is respected in terms of their culture and religion and they are supported to shape their own future as active members of society. They are educated and given opportunities to gain occupational skills and to figure out and express their personal skills, abilities and curiosities (KKTC, 2016). The family based care in the village has 4 phases.

**(i) Children's Village in Lefkoşa (Nicosia)**

In the village, family based care is provided for children between the ages 0 and 16. In each house, that is a part of the village, approximately 6 children who live as brothers and sisters are cared for by the help of professionally educated SOS mothers and SOS aunts. As a normal house ought to be, every child has his/her own room and each family has its own harmony and order. It is given importance that the children attend a variety of activities and different schools to stay connected to the community (KKTC, 2016).

**(ii) Youth House in Girne (Kyrenia)**

Children who reach the age of 15 in the village are transferred to the youth house that is located in Girne. They are provided with support on life skills, emotional stability,

education and with occupation and life coaching by their youth leader in these houses. Some of the youth start working after completing their education, getting prepared for the half independent life program, while the rest of the youth still continue their education (KKTC, 2016).

**(iii) Semi- Independent Life**

The youth that start working or start their university education are transferred to the half independent life program in which maximum 3 people share an apartment and gradually start providing for themselves. With gradual increase in responsibilities, youth are supported to adapt to independent life both mentally and financially. The half independent life program is a process that lasts for 3 years for the youth that have a job and 4 to 5 years for the youth that continue their education (KKTC, 2016).

**(iv) Independent Life**

The last phase of the family based care is the independent life. The adults who grew up in the SOS village with a family, spent their youth in the youth houses and prepared for the independent life in the half independent life program, finally move on with their life as independent individuals with all the experiences and knowledge they gained. The moral support with the family and the village is kept for a life time (KKTC, 2016).

The village currently houses 11 family houses, an aunt house, a guest house, 3 staff houses, an administrative building, an open air theatre, a multipurpose hall, a playground and a kindergarten with a capacity of 100 children (KKTC, 2016).

### 4.2.3. Bolluca Children's Village in Istanbul

A site visit has been conducted in February 2016 to Bolluca Children's Village that is located in Istanbul and information has been gathered from the held interview with the institution manager and the social service specialist of the village. The photographs presented in this study have been taken during this site visit.

**Figure 4.23.** The location of the Bolluca Children's Village from Google Earth

Bolluca Children's Village was founded in 1992 in cooperation of SOS Children's Villages organization and the charitable foundation Koruncuk in Turkey. However, the existence of a foreign organization in charge of children in need was not welcome by Turkish government since these children, whose custody do not belong to their parents, are legally the children of the Turkish state/government. For this reason the SOS Children's Villages organization was taken out of picture and the government and the Koruncuk foundation signed a protocol in 1996 and the child admission process started to be maintained by the government (Bolluca-II, 2016).

According to the protocol, the expenses of the village are shared between the foundation and government. As government is responsible for all children in the child care institutions, electricity, water and natural gas expenses of the facilities, health expenses of children and school clothes, school books of children once in every year are covered by the government. While the government also provides a school bus and a certain amount of allowance for each child, all other costs like the household budgets, maintenance of the buildings, expenses for the activities are covered by the donations directed to the foundation. There are currently 60 co-workers in the village and 7 of them are government workers while the rest of them are employed by the foundation. The families in the village do not pay for meat and

dry food since the village owns a cold storage and all the donations during the Sacrifice Feast are kept in this storage and distributed to families (Bolluca-II, 2016).


**Figure 4.24.** The entrance to the Children's Village in Bolluca, Istanbul

**Figure 4.25.** The Administrative Building in Bolluca

The children in the village are provided with a variety of activities and programs like golfing, chess, scouting, music, folk dances, photography, painting, children's rights studies, intelligent games, gymnastics, swimming, basketball and religion courses. There is a convention center in the village containing a mathematics room, survey classes, a library, a music room with a variety of instruments, a computer room, two nursery classes, a gym with variety of sports implements and a multipurpose hall with a capacity of 200 people. On the billboard of the center, there are announcements for the clubs and children are expected to sign for whichever club they want to attend to. The clubs that were presented during the site visit was the red crescent club, the green crescent club, visual arts club, informatics and internet club, library club, civil defense club, tourism club, environmental protection club, chess club, health club, music club, sports club, traffic safety and first aid club, science and technology club, mathematics club, press and communication club and scouting club. For the activities that the facilities cannot house, the children are taken to the relevant facilities safely. Besides the organized activities of the village, the government services or other foundations organize activities in the village like tree planting activities or a theatre about the importance of water (Bolluca-II, 2016).

**Figure 4.26 .** Music Room in Bolluca

**Figure 4.27.** View of the Buildings in Bolluca

**Figure 4.28 .** The Convention Center in Bolluca

**Figure 4.29.** The Playground in Bolluca

There are not many animals in the village since the children are not very well educated on how to behave them and they may tend to harm them unintentionally. There are a few of cats and dogs and some chickens. Some of the families can grow vegetables in their small gardens but it is up to the mother or the children living in the house to do so and not a general application (Bolluca-II, 2016).

The living stages in the village can be explained in 5 sections.

**(i) Child Admission Process**

As mentioned in the previous section, the child admission process is controlled by the government. The children who are transferred to the village are the children who can no longer live with their families either due to substance addiction or violence or abuse tendency of parents. As the social service specialist of the village dictated, the reason of a child to be taken away from his/her parents due to monetary conditions is

out of question, in such cases the government is responsible to take any measures to support the family to keep their child. Even after their transfer to the village, children have a legal right to visit their biological families for 70 days a year. In order to check the conditions of the houses of biological parents, the social worker specialist arranges unannounced visits and evaluates the convenience for the children's visit (Bolluca-II, 2016).

**(ii) Family Homes**

The family homes are consisted of a mother, an aunt and approximately 6 children between the ages 0-13 living as brothers and sisters with biological siblings staying in the same house. The mother, educated on child development, and the aunt work in 3 - 4 days shifts covering for each other, while one of them stays for 3 or 4 days with the children, the other one is on leave and vice versa. The family homes are two storey standard buildings. In the entrance floor, there is the living room, the kitchen, the mother's room, the aunt's room and one child room while in the second floor, there are four child rooms and the bathroom. The sinks in the bathroom are in appropriate height for children while the toilet is standard. The furniture designs of each house has been carried out due to the choices of the mother of each house so they show diversity. There are currently 12 family homes in the village (Bolluca-II, 2016).

**Figure 4.30 .** The Living Room of a Standard Family House in Bolluca

**Figure 4.31 .** The Kitchen of a Standard Family House in Bolluca

**(iii) Youth Homes**

After the age of 13, children are transferred to the youth houses of which the population is 13. There are currently two youth homes for girls and boys (Bolluca-II, 2016). The aim of the youth homes is to prepare the youth for the awaiting life conditions by supporting them to take responsibilities under the guidance of the youth leaders. In these houses youth are grouped in 6 and for every 6 young person one youth leader is assigned with a university graduation and pedagogical formation. The youth leaders are responsible from guiding youth in their problems, helping them in the household management, their schoolwork and in organizing their free time. The youth can stay in these houses until they complete their education and are ready for their occupation (Bolluca, 2016).

**(iv) Semi- Independent Life**

The youth who have a job and started earning money, rent houses in groups of 2 or 3 and they are supported by the village to adapt to full independent life (Bolluca, 2016).

**Figure 4.32.** General Perspective of the Buildings in Bolluca

### (v). Fully Independent Life

The youth who are ready to take the full responsibility of their lives move on with the independent life where the only tie connecting them to the village is a moral one and where they start taking their decisions totally on their own. The village is still a home where they can turn to and the moral support continues. The village continues to support them during their military service, in their wedding process and activities like the asking the girl's hand in the marriage, the henna night and weddings are performed according to the Turkish culture (Bolluca, 2016).

## 4.3. Sustainable Living for Children

Three case studies for sustainable living for children have been chosen to for this study. The first one is Hazlewood Eco Center which is a project focused on the importance of children's outdoor play and presents guidelines in doing so. The second case study is Sustainable Schools Project the aim of which is to educate children on sustainability for them to become responsible adults who take action for their own future. The last case study chosen is Eco-Healthy Child Care Program® as the applications give a broad sense on how the built environment should be in a child care facility for the well-being of children's physical health.

### 4.3.1. Hazlewood Eco Center - Outdoor Education

Hazlewood is the first eco center of the Every Child Outdoors-Tennessee coalition which has more than a hundred supporting organizations. Founded because of the concerns on youth getting detached from nature, the coalition adopted The Tennessee Children's Outdoor Bill of Rights that is a list of experiences which children in Tennessee should engage in before they start their high school education for their health, academic success, social skills, self image and for a life more fulfilled. The list indicates that every child should have the opportunity to, (EE in Tennessee, 2016)

- Walk in the woods; Explore nature; Watch wildlife
- Play outside; Fly a kite; Climb a tree,
- Camp under the stars; Visit a farm; Grow a garden;
- Splash in the water; Learn to swim; Go fishing,

Based on these rights and driven by the fact that children spend much less time outdoors in unstructured play leading health problems like obesity, diabetes, vitamin D deficiencies and attention deficit disorders, Hazlewood Eco Center was founded in 2009 in Henry County, Tennessee, USA with the purpose of increasing children's connection with nature by providing opportunities for children and adults to gain outdoor recreation knowledge and skills. In order to be a national demonstration and training site for ECO (every child outdoor) facilities and programs, to create opportunities for children to engage with nature and experience it, to increase the awareness on the importance of outdoor play for children, to teach sustainable life styles and to increase tourism in Henry County, the center holds 4 objectives that are;

1. Training the trainers so that they can teach outdoor recreation knowledge and skills to children and their parents,
2. Teaching outdoor recreation knowledge and skills to children and their parents directly so that they are capable of participating activities on their own,
3. Integrating healthy living behaviors to the outdoor recreation education program to educate children and their parents on the issue,
4. Providing land and facilities specifically designed for outdoor recreation education.

With the help of this program children are expected to have fun, an outdoor place that has a special meaning, growing relationships with family and friends, special memories of their outdoor experiences, improvement in their social interaction skills, improvement in their self confidence and in their physical and mental health, growth in their spiritual awareness, better knowledge and understanding of nature and our relationship with it, skills to become good stewards of nature and an increased academic performance. In order to be able to receive these benefits the program offers many activities that differ for young children between the ages of 3 and 7 and older children between the ages of 8 and 16 ("Developing a Master Plan," 2010).

For children between the ages of 3-7 some of the activities and teachings consist unstructured play in nature, nature play, outdoor awareness, appreciating nature, and fishing. Some of the activities and teachings for children between the ages of 8-16 consist outdoor awareness, way-finding, survival, primitive skills, appreciating nature, camping, fishing, hunting, gardening, backpacking, mountain biking, rock climbing swimming and water sports like kayaking, canoeing, rowing, sailing, motor boating and boating safety ("Developing a Master Plan," 2010).

The facilities and natural resources the center houses or has access to for the daily needs and activities are;

- Dining hall and restroom

- Meeting room and an attached staff lodging,

- 3 camping areas with tent platforms,

- A small pavilion, and a large separate pavilion,

- Beach, Play fields, and 2 tennis courts,

- A manager's house,

- Hardwood; Cedar and Pine forest,

- 2 small streams for riparian activities and the Kentucky lake ("Developing a Master Plan," 2010).

### 4.3.2. Sustainable Schools Project

The sustainable schools project is a program of Shelburne Farms that is located in Shelburne, Vermont that work with schools all around the world, integrating sustainability in their curricula to generate informed and responsible generations who engage in building sustainable communities. Creating a sustainable school, each aspect of it, its campus and the community it belongs to is turned into an extension of the classroom and each aspect of these extensions like the origin of food, the energy usage, and the decision making processes present learning opportunities. In such a

school children are encouraged to take action on the things they learn to improve their school and community (SSP, 2016).

The project has four strategies which are;

1. Curriculum development, integrating sustainability concepts and ideas into curricular topics,

2. Campus practices and culture, helping schools practice sustainability concepts in their school and schoolyard leading to creative thinking,

3. Community partnership, developing and maintaining community partnerships for the connection of the curriculum to real world issues,

4. Collaboration, helping schools to collaborate with their own community for the creation of sustainable communities (SSP, 2016).

With education for sustainability, children in early years with their innate sense of wonder and curiosity are engaged with a curriculum that is designed to make connections with relevant issues and experiences for children to gain content knowledge and to understand **the big ideas of sustainability**. As these children grow, the strong foundation of connection that was built turns into a sense of stewardship and by the help of community participation and service learning they develop a deep sense of responsibility leading them to develop caring and action habits (SSP, 2016).

To be able to address students about sustainability, the program developed a list they call **'The Big Ideas of Sustainability'** which contains the important concepts and ideas of sustainability. This list works as a guideline to frame curriculum, projects and build student understanding. These big ideas of sustainability and their integration in the curriculum are explained as follows (SSP, 2016);

1. **Ability to make a difference**, the concept that each person has the power to change, affect or impact a system, is started to be integrated in the curriculum of kindergarten students until the end of their K12 education,

2. **Change over time**, the concept that each organism, place and system changes constantly, is started to be integrated in the curriculum of 5/6th graders until the end of their K12 education,
3. **Community**, the concept that the interconnections of the economic, environmental and social systems of a community should be understood to present sustainable solutions, is started to be integrated in the curriculum of kindergarten students until the end of their K12 education,
4. **Cycles**, the concept that each organism and system goes through different stages, is started to be integrated in the curriculum of 1st/2nd graders until the end of their K12 education,
5. **Diversity**, the concept that variety is what makes the systems and places work, is started to be integrated in the curriculum of 3rd/4th graders until the end of their K12 education,
6. **Equilibrium**, the idea of a state of balance, is integrated in the curriculum in a broad sense,
7. **Equity/Fairness**, the concept that resources must be shared in a way that they meet the needs of every living thing, everywhere and in every generation, is started to be integrated in the curriculum of 9/10th graders until the end of their K12 education,
8. **Interdependence**, the concept that each living soul is connected to the other and depends on one another, is started to be integrated in the curriculum of 7/8th graders until the end of their K12 education,
9. **Limits**, the concept that each system has a bearing capacity, is started to be integrated in the curriculum of 9/10th graders until the end of their K12 education,
10. **Long-term effects**, the concept that each action has an effect beyond the initial reaction, is started to be integrated in the curriculum of 11/12th graders until the end of their K12 education,
11. **Place**, the concept that one's place is made up by the natural and human communities and that each place has its own needs and capacity, is started to be integrated in the curriculum of kindergarten students until the end of their K12 education,

12. **Systems**, the concept that each element affecting each other is connected through a larger pattern, is started to be integrated in the curriculum of 3rd/4th graders until the end of their K12 education (SSP, 2016) (SSP, 2016).

### 4.3.3. Eco-Healthy Child Care Program®

The Eco-Healthy Child Care Program® was launched in 2005 by the Oregon Environmental Council to raise the environmental health profile of children and it was decided to focus on day care centers in order to reach more children. Currently there are more than 1400 certified day care centers abiding by the provisions of the council (Silverman, 2010).

The program promotes the creation of child care settings as environmentally healthy as possible for parents to choose these facilities due to their safety and healthy environment. For a child care center to be certified as Eco-Healthy, there is a checklist of 30 steps that are easy, free or low cost steps of which minimum of 24 must be followed (EHCC, 2016).

One of the steps in the checklist is about **pesticides and pest prevention** which includes the usage of non-toxic techniques for prevention and if necessary the application of the least toxic and effective product and disabling children's exposure to the affected area for at least 12 hours. In order to prevent the exposure to pesticides, fruits and vegetables should be washed thoroughly and children should be educated about the importance in doing so (EHCC Checklist, 2016).

In order to avoid excessive moisture that could cause the growth of mold and mildew and to keep humidity between 30-50%, proper ventilation with either suitable fans or open screened windows should be provided. It must be strictly prohibited to smoke on the premises especially in sight of children and the cars and other vehicles should be prohibited to idle in the parking areas while candles or manufactured air fresheners should never be used for a good **air quality** (EHCC Checklist, 2016).

As cleaning products, biodegradable and non-toxic products should be selected and stored where children do not have access to, chlorine bleach should only be used if required or recommended by local authorities with prudent use, aerosol sprays of any

kind should not be used and low-VOC households paints should be preferred for painting when children are not present (EHCC Checklist, 2016).

In order to avoid lead exposure from water lines, only cold water should be used for drinking, cooking and in the making of baby formula and if there was any lead based paint used in the facility, it should be removed by lead safe practices. Imported, handmade or old pottery should not be used for cooking, storage or to serve foods or drinks and in order to make sure that toys do not contain lead, lead testing kits should be purchased (EHCC Checklist, 2016).

Thermometers and thermostats containing mercury should be avoided and digital options should be preferred instead, and it should be given importance that all the used batteries and fluorescent and compact fluorescent light bulbs are stored and recycled safely (EHCC Checklist, 2016).

In order to avoid the exposure to flame retardants, the furniture, stuffed animals, matting, pillows and other items containing foam should be in good condition and it should be given attention that none of their stuffing is exposed. Furniture should be of solid wood, area rugs should be vacuumed daily and cleaned with biodegradable cleaners at least twice a year and there should not be any wall to wall carpets in the areas where children are present (EHCC Checklist, 2016).

Art supplies should be of non-toxic materials and toys should be labeled PVC-free. During the usage of microwaves, children's food should never be heated in plastic containers and baby bottles made of hard clear plastic should be avoided and bottles made of glass or opaque plastic should be used instead. The playground equipment should not be made of treated wood and if there are, they should be sealed with paint or a polyurethane coating twice a year (EHCC Checklist, 2016).

The facility should be checked for radon by using a radon testing kit. The garbage should be covered to avoid pests and odors and it is important that the facility engages in recycling paper, cardboard, glass, aluminum and plastic (EHCC Checklist, 2016).

The last but not the least step of the checklist is to create opportunities to educate the families in eco-healthy practices so that the children can continue the healthy habits they gained in their houses as well (EHCC Checklist, 2016).

# CHAPTER 5

# RESULTS AND DISCUSSION

With this chapter, sustainable design features have been determined through the literature review and the case studies and explained in detail, a model has been proposed for the integration of these features into children's villages, and a checklist for ecological children's villages has been presented. The application of the proposed model to Bolluca Children's Village in Istanbul has also been investigated.

## 5.1. Sustainable Design Features

In this study, eco-villages have been studied under their ecologic, social and economic design features for the reason that for a community to be self sufficient and sustainable it has to be sustainable in all these three areas. The determined features are explained in detail in the following sub-sections.

### 5.1.1 Ecological design

The ecological design features of the case studies have been studied under green buildings, consisting of materials used, water efficiency and energy efficiency, and under organic and local agriculture. In Table 5.1, the approach of each selected eco-village to these topics are summarized and evaluated in terms of their applicability to children's villages.

**Table 5.1.** Ecological design Features found in the case studies and their applicability to Children's Villages

| *ECOLOGIC DESIGN FEATURES* | | | FINDHORN | TAMERA | SIEBEN LINDEN | DYSSEKILDE | DAMANHUR | APPLICABILITY TO CHILDREN'S VILLAGES |
|---|---|---|---|---|---|---|---|---|
| MATERIALS USED | LOCAL | STRAWBALE | ✓ | ✓ | ✓ | ✓ | ✓ | *DP* |
| | | TIMBER | ✓ | ✓ | ✓ | ✓ | ✓ | A |
| | | ADOBE | *NI* | ✓ | *NI* | *NI* | *NI* | A |
| | | CLAY | ✓ | ✓ | ✓ | *NI* | ✓ | A |
| | | STONE | ✓ | *NI* | *NI* | *NI* | *NI* | *DP* |
| | RECYCLED OR REUSED | USED TIRES | ✓ | *NI* | *NI* | ✓ | *NI* | A |
| | | INSULATION WITH USED PAPER | ✓ | *NI* | *NI* | ✓ | *NI* | A |
| | | INSULATION WITH FLAX | *NI* | *NI* | *NI* | ✓ | *NI* | A |
| | | INSULATION WITH CLOTH | *NI* | *NI* | *NI* | *NI* | *NI* | A |
| WATER EFFICIENCY | WATER CONSERVATION | CONSIDERATE INDOOR FIXTURE | ✓ | *NI* | *NI* | *NI* | *NI* | A |
| | | COMPOST TOILETS | *NI* | ✓ | ✓ | ✓ | *NI* | A |
| | | ECO-LABELED EQUIPMENT | *NI* | *NI* | *NI* | *NI* | *NI* | A |
| | RECYCLING WATER | WATER TREATMENT | ✓ | ✓ | ✓ | ✓ | ✓ | A |
| | RAINWATER COLLECTION | THE USE OF RAINWATER FOR TOILETS, WASHING MACHINES AND IRRIGATION | ✓ | ✓ | ✓ | ✓ | ✓ | A |
| ENERGY EFFICIENCY | ENERGY CONSERVATIOIN | PASSIVE MEASURES | ✓ | *NI* | ✓ | ✓ | *NI* | A |
| | | LOW-E LIGHT BULBS | ✓ | *NI* | *NI* | *NI* | *NI* | A |
| | | LOW-E APPLIANCES | *NI* | *NI* | *NI* | *NI* | *NI* | A |
| | | ALTERNATIVE TECHNOLOGIES | *NI* | ✓ | ✓ | *NI* | *NI* | A |
| | USE GREEN RESOURCES | SUN | ✓ | ✓ | ✓ | ✓ | ✓ | *DP* |
| | | WIND | ✓ | *NI* | *NI* | ✓ | *NI* | *DP* |
| | | WATER | *NI* | *NI* | *NI* | *NI* | *NI* | *DP* |
| | | BIOFUEL (INCLUDING WOOD BURNING STOVES) | ✓ | ✓ | ✓ | ✓ | ✓ | *DP* |
| | | GEOTHERMAL | *NI* | *NI* | *NI* | ✓ | ✓ | *DP* |
| ORGANIC AND LOCAL AGRICULTURE | | | ✓ | ✓ | ✓ | ✓ | ✓ | A |

✓: EXISTS
*NI* : NO INFORMATION FOUND
A: APPLICABLE
NA: NOT APPLICABLE
DP: DEPENDS ON THE REGION

**A Materials Used**

In Table 5.1. only the materials used in the selected eco-villages have been listed and grouped under local materials and recycled or reused materials.

Local materials used in these villages are mostly strawbale, timber, adobe, clay and stone. While the extent of usage differs, all the selected villages make use of strawbale as a local, healthy and sustainable material for the construction of their buildings. Timber is the main material as the structure of the buildings indicating the importance of their being obtained from local and managed forests. The use of adobe has been observed only in Tamera Eco-village and the use of stone in Findhorn Eco-village while clay, being used as plaster, has been observed in all selected villages except for Dyssekilde Eco-village.

Recycled or reused materials used in the selected villages are mostly used tires, cellulose insulation with used paper and insulation with flax. While Findhorn and

Dyssekilde Eco-villages assert the usage of used tires and cellulose insulation with used paper, no specific information could be found in the other selected villages. In Dyssekilde Eco-village, they also use flax as insulation material and although insulation with cloth was not encountered in any of these villages, it was added to the table as a proposal.

**B. Water Efficiency**

In the table 5.1. water efficiency measures that have been taken in the selected eco-villages have been grouped under water conservation, recycling water and rainwater collection.

For considerate use of indoor fixtures like, shower taps, dual and low flush toilets, and self closing taps are used in Findhorn Eco-village and in order not to use water for flushing, compost toilets are used in Tamera, Sieben Linden and Dyssekilde Eco-villages while no specific information could be found for other villages in terms of considerate fixture uses and compost toilets. Eco labeled washing machines have been added to the list considering the importance of it but again, no specific information about the usage of them in any of the eco-villages could be found.

Sustainable water treatment systems are used in each selected village with different solutions by either using the purified water for irrigation and flushing water or directing it to the rivers or seas while some of the villages do both. Also all of the villages collect rainwater to be used for irrigation or for toilets and washing machines, taking advantage of the rain.

**C. Energy Efficiency**

In the Table 5.1. energy efficiency features have been grouped in energy conservation and the use of green energy resources.

While Findhorn, Sieben Linden and Dyssekilde Eco-villages indicate the taken passive measures like the orientation of the buildings, the building envelope, sunshades or natural ventilation, no specific information could be found in the other selected eco-villages. The information of the use of low-e light bulbs to reduce the consumption of electricity was found only in Findhorn and no information could be obtained for low-e appliances like fridges, freezers, washing machines or driers in any of the selected villages but it was added to the list to be proposed to children's villages. The use of alternative technologies like solar water pumps, cookers heated by mirrors reflecting sunlight or solar cookers take place in Tamera and Sieben Linden Eco-villages while Tamera is way ahead with their continuous tests and their given attention.

Between the green resources, sun is the resource that is taken advantage of by all selected eco-villages. The ones that don't use sun to produce electric, uses it at least to heat water. Findhorn and Dyssekilde Eco-villages use wind power to produce electricity while none of the case studies make use of water for electricity production. Geothermal energy is made use of for heating in Dyssekilde and Damanhur Eco-villages and wood burning stoves for which wood obtained from local and managed forests is used in every selected village as a relatively renewable and ecological solution compared to fossil fuels due to its CO2 emission being equal to its CO2 absorption in it lifespan.

All the eco-villages selected as case studies, practice organic and local agriculture and obtain their vegetables and in some cases their meet locally and organically.

### 5.1.2. Social Design

Examining the case studies, the common ground of each eco-village in terms of their social design is the involvement of each resident to the decision making processes. There are elected individuals representing groups, either a household group or a community in the village, and meetings are held to inform every citizen of all the decisions taken. In these meetings they all have the opportunity to speak up their minds as well and contribute to the community.

Respect and transparency is a common key factor in the social design of selected eco-villages. Motivated from a spiritual level, even the starting point of these villages in every aspect is based on peace, solidarity and understanding.

Communal activities are crucial for these villages, in order for citizens to connect and act as a community and diversity is respected and appreciated and accepted as a chance to learn from each other.

### 5.1.3. Economic Design

One of the common grounds of the selected eco-villages is that every individual is responsible from their own income, except for children, and each of them has to pay a certain amount of contribution to the village. The children do not pay for anything and accepted as the children of the community, the children of all.

Another aspect of the economic design of the selected eco-villages is that each resident is a shareholder and one of the owners of the village. Everyone is involved in the budget management and is informed about the process.

An important aspect of eco-villages is offering job opportunities inside the village either by establishing companies or by offering jobs for the communal services.

## 5.2. Proposed Model

Based on the information gathered from eco-villages and sustainable living for children as well as guidelines used for their establishment a model for integrating sustainable principles in children's villages has been formulated, which is presented in Figure 5.1 below. The measures proposed have been summarized in the following sections.

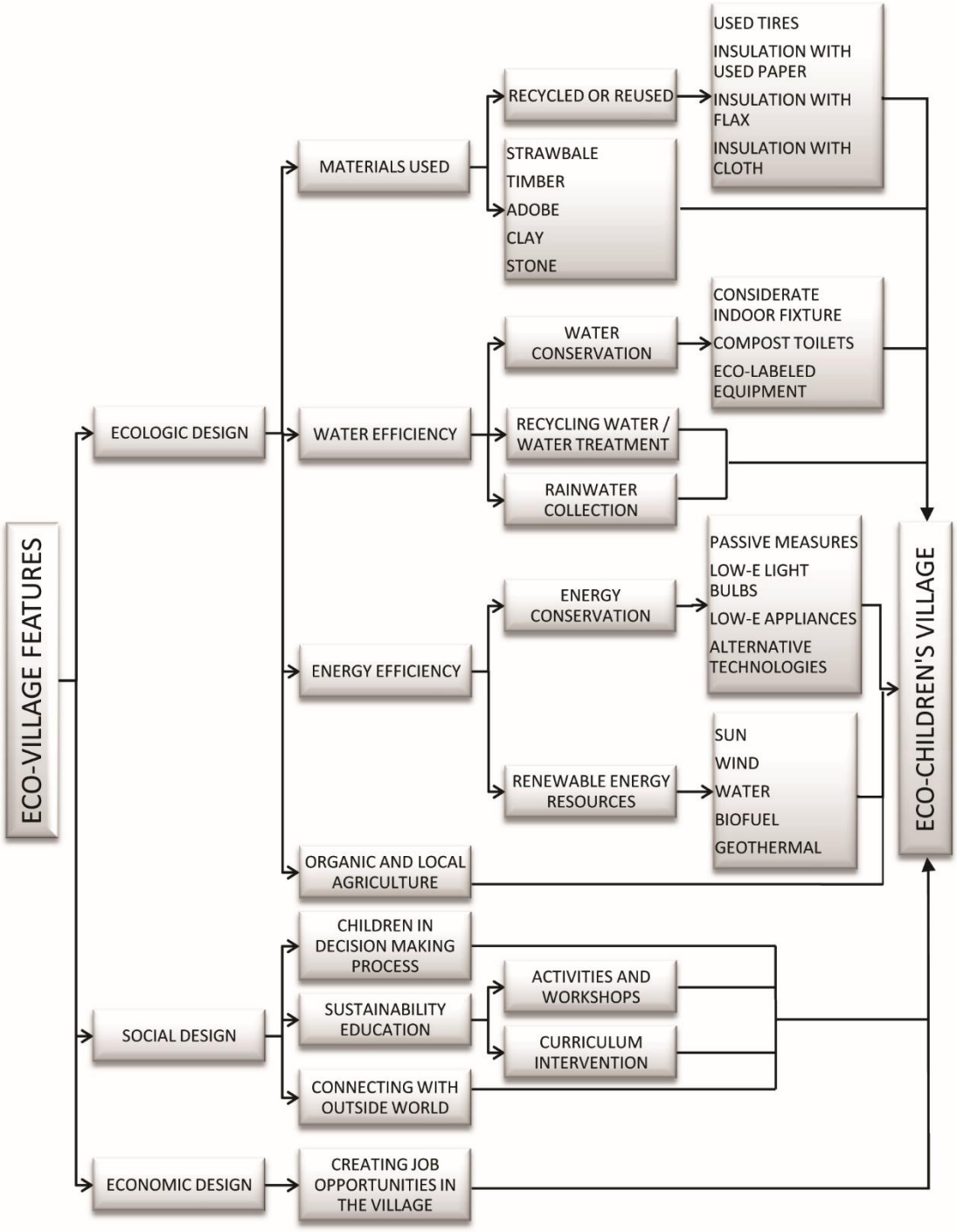


**Figure 5.1.** Model For Integrating Sustainable Principles In Children's Villages

### 5.2.1. Proposal of Material Usage for Ecological Children's Villages

In an ecological children's village, all of the materials mentioned in section 5.1.1. can be used for healthier buildings. Depending on the availability of the region, for the buildings to be built anew, sustainable and local materials like, strawbale, timber, adobe and stone should be used with clay plaster. The use of classic building techniques with concrete should be avoided. The paint to be used should be organic and low-VOC and should not be lead based. As insulation, used paper, flax or cloth should be used and used tires may be preferred as a foundation element of the buildings, as an element of barrier walls for elevation differences in the landscape, as hung over flowerpots or as any other creative method that could be found in cooperation with children.

It could be beneficial to include children in the making processes of the buildings, like teaching them how to make adobe blocks as hands on activities while younger kindergarten students play with mud, plastering walls with clay, collecting used paper or old clothes that cannot be worn any longer with the knowledge that they will be used as insulation, brainstorming for the creative methods or materials that could be used for the required buildings. The purpose of these activities should only be to teach while having fun and careful attention should be paid that the activities do not turn into a child labor opportunity.

### 5.2.2. Proposal of Water Efficiency Measures for Ecological Children's Villages

In an ecological children's village, all the water efficiency measures covered in the selected eco-villages can be applied. Indoor fixtures of each building should be considerate, toilets, if not compost, should have dual or low flush, showerheads should be water saver, and for the communal buildings the water taps should have sensors to close themselves when not used. The washing machines, with the highest rate of consumption after toilet flushes, should be eco labeled machines that operate with less water. The use of compost toilets should be considered since it works without water, acts as a natural water treatment system and the compost obtained can be used as manure.

Waste water treatment systems should be implemented, treatment with willow trees is a good option as a natural treatment system while giving children their shadows to rest under and play.

Rainwater should be collected and used for irrigation and toilet flush and if possible for washing machines. Water retention landscapes should be created as in Tamera Eco-village, which could help ground water to be filled and could also act like a sedimentation pond for the earth and dust mixed with rainwater to move towards the bottom, providing clean water on top to be either used or stored. Water retention landscapes can also provide a lovely environment for children with ponds and/or lakes where they can enjoy.

While implementing aforementioned features, it is important to educate children with and about them. The use and the importance of considerate fixtures should be taught and workshops with the agenda of water could be held, where the importance of water and the problems in the current treatment of water are explained and children are encouraged to think of solutions. While the workshops could be presented to different age groups separately, the agenda could be included in the curriculum of kindergarten students as well.

### 5.2.3. Proposal of Energy Efficiency Measures for Ecological Children's Villages

In an ecological children's village that is yet to be built, passive design features should be given utmost importance in the design process due to its affective contribution in energy savings. Low-e light bulbs and appliances should be used to avoid unnecessary consumption of electricity.

Wood burning stoves, as used in selected eco-villages, should not be used in children's villages due to the possible particle pollution as mentioned in section 4.1.4. and the smoke released. Depending on the region of the relevant village, the best solution or solutions could be selected between sun, wind, water, biofuel or geothermal regarding the required studies. If efficient electricity production is possible, the surplus, if not stored, could be exported to the national grid and provide an income to the village.

The use of alternative technologies in a children's village would be very affective in learning and creating alternative solutions to current problems. While they are used daily in the village children would learn by seeing and even using them, workshops could be held for children to create alternative solutions for different agendas in each workshop, developing their creative thinking habits and having them gain the knowledge and conscious that there is never one solution to a problem especially if it means hurting something or someone.

### 5.2.4. Proposal of Organic and Local Agriculture Practices in Ecological Children's Villages

A children's village should practice organic and local agriculture presenting healthy and fresh food for children which could also provide the opportunity of learning gardening skills for children.

Activities of gardening should take place and cooking classes or activities could be provided for children to help them gain important life skills and even an occupancy if preferred.

Different type of local trees should be planted to create a mixed-culture ground cover, increasing the water holding capacity of earth; hence, reducing the risk of flooding. A forest like area could give play areas for children where they can have adventures, new explorations and minimized and important risks.

### 5.2.5. Proposal of Social Measures in an Ecological Children's Village

Social design features of eco-villages may not be totally applicable for children's villages that already have a sustainable social design and the necessity of it is questionable. The decision making process in eco-villages which includes every resident though, should be a key factor in children's villages including children in the first place which is already accepted as a standard in children's villages.

Besides all sorts of ongoing activities for life skills, hobbies, sports and entertainment, educational but fun activities regarding sustainability should also be provided. Since children's villages house a kindergarten, sustainability features could be integrated with their curriculum and play times.

Though an ecological village requires self sufficiency in every possible way including education, children's villages are accepted as a place where children are prepared for the outside world and hence it is important for them to communicate with the surrounding community instead of living in isolation like the people who chose the life style of an eco-village. It is important to remember that these children haven't made a choice as such and should see outside world and decide for themselves. For this reason children should keep attending state or private schools depending on their tendencies and abilities. Since the village will not have an effect on the curriculum of these schools, sustainability education could be given to the children with aforementioned activities and with the measures taken in the village as a life style.

### 5.2.6. Proposal of Economic Measures in an Ecological Children's Village

Funded by donations and the government, economic design of children's villages is not very compatible with eco-villages. Although it is possible to create income opportunities with the addition of sustainable features.

Since after children leave their youth houses and are transferred to half independent life or when they need an half time job while continuing their university education, job opportunities inside the village could be proposed like gardening, teaching younger children sustainability features, working in the making of solar cookers, dryers and such, working with adobe, strawbales and other sustainable building materials, investigating and working in the development of green energy resources or any kind of occupation the eco-children's village could propose. Organic agriculture could also provide an income for the village if enough production is possible.

## 5.3. Ecological Children's Village Checklist

While formulating the proposal foran ecological children's village,it became important to propose a checklist that could be helpful in establishing sustainable children’s villages incorporating the appropriate features of an eco-village. This checklist is being presented in Table 5.2.

**Table 5.2.** Ecological Children's Village Checklist

| *ECOLOGICAL CHILDREN'S VILLAGE CHECKLIST* | | | | REQUIRED | YES | NO | APPLICABLE | N/A |
|---|---|---|---|---|---|---|---|---|
| ECOLOGIC DESIGN | MATERIALS USED | 1 | Recycled or reused materials are used in the village like used tires, insulation with paper, flax or cloth. | | | | | |
| | | 2 | Local materials are used for the built environment like strawbale, timber, adobe, clay or stone. | ✓ | | | | |
| | | 3 | Children are educated about the ecological materials through including them in the building process, workshops or curriculum intervention in kindergarten. | ✓ | | | | |
| | WATER EFFICIENCY | 1 | Water conservation features are applied through the use of considerate indoor fixtures (shower taps, dual and low flush toilets, self closing taps), eco-labeled equipment or compost toilets (the use of compost toilets is not required). | ✓ | | | | |
| | | 2 | Waste water is treated through ecological systems. | | | | | |
| | | 3 | Rainwater is collected to be used for irrigation, toilet flush and/or washing machines. | ✓ | | | | |
| | | 4 | Water retention landscapes are built to store water, increase the water holding capacity of earth and to make use of surface water instead of consuming ground water. | | | | | |
| | | 5 | Children are educated about the importance of water and water efficiency measures through workshops, activities and curriculum intervention in kindergarten. | ✓ | | | | |
| | ENERGY EFFICIENCY | 1 | Energy conservation measures are taken through passive design features, the use of low-e light bulbs and/or low-e appliances. | ✓ | | | | |
| | | 2 | Alternative technologies are investigated and used daily. | ✓ | | | | |
| | | 3 | Renewable energy resources are used that are compatible with the region of the village (sun, wind, water, biofuel, geothermal). | ✓ | | | | |
| | | 4 | Children are educated about the importance of energy resources and energy efficiency measures through workshops, activities and curriculum intervention in kindergarten. | ✓ | | | | |
| | ORGANIC AND LOCAL AGRICULTURE | 1 | The village performs organic and local agriculture, producing healthy and fresh food for children. | ✓ | | | | |
| | | 2 | A mixed culture ground cover is created through planting different kinds of local trees and the water holding capacity of earth is increased. | | | | | |
| | | 3 | Children are educated about the importance of organic and local agriculture and activities and workshops regarding gardening and cooking are provided for them. | ✓ | | | | |
| SOCIAL DESIGN | | 1 | Children are included in every step of decision making processes. | ✓ | | | | |
| | | 2 | Fun educational activities regarding sustainability are provided in addition to the ones for life skills, hobbies, sports and entertainment. | ✓ | | | | |
| | | 3 | Sustainability features are integrated in the curriculum of the kindergarten in the village. | ✓ | | | | |
| | | 4 | Children go to community schools that the village is a part of, to connect with the outside world. | ✓ | | | | |
| ECONOMIC DESIGN | | 1 | Job opportunities are provided inside the village for the youth. | ✓ | | | | |

### 5.4. Application of Proposed Model for Bolluca Children's Village

In this section, the ecological features have been studied in terms of their adaptability to Bolluca Children's Village; and the following paragraphs describe the specific measures that may be integrated into the existing village.

**A. Ecological Measure:** Considering the use of proposed building materials in Bolluca Children's Village, materials proposed for the construction cannot be applied, however, clay may be used if there rises the need for plaster and insulation materials made of used paper, flax or cloth may be applied if there is the need. As the Koruncuk foundation that supports the village accept donations, used clothes that are too old and worn out to be donated can also be accepted to be used as insulation materials for the buildings.

All water efficiency measures that have been proposed can be implemented in Bolluca Children's Village, with some infrastructure challenges the easiest implementations being the change in indoor fixtures and washing machines.

As an energy efficiency measure, passive design features, in Bolluca Children's Village is not possible to be implemented in a large scale due to the already built environment; however, building extensions could be implemented as greenhouses or sunshade could be attached if necessary. Low-e light bulbs and low-e appliances could be easily changed with the existing ones and alternative technologies could be implemented and worked on in cooperation with children. For the use of green energy resources, further engineering study is required to be able to be sure of the efficiency they will provide.

In Bolluca Children's Village, the implementation of organic and local agriculture could be challenging due to the area the village owns. In Bolluca Children's Village's property there is an empty grass area where they can have picnics and open air activities but it is kind of small for performing agriculture. Instead, as some of the families already do, the use of their small gardens to grow vegetables could be encouraged. After teaching children a few skills in gardening by workshops or different activities, these small gardens could be the test fields of children.

**B. Social and Economic Measure:** The social and economic design features proposed for children's villages in general can be applied to Bolluca Children's Village as well.

In Figure 5.2., proposed locations for some of the sustainable solutions has been depicted on the google earth view of the village and these proposals are integrated into the photographs taken from the village and presented with the following figures.


**Figure 5.2.** Proposed Locations for Integrating Sustainable Solutions in Bolluca Children's Village

**Figure 5.3.** Proposed Location for Integrating Alternative Technologies in Bolluca Children's Village_Solar Water Pump (SunPulse Water in Tamera)

**Figure 5.4.** Proposed Location for Integrating Alternative Technologies in Bolluca Children's Village_Solar Cooker

**Figure 5.5.** Proposed Location for Incorporating Photovoltaic Panels in Bolluca Children's Village

**Figure 5.6.** Proposed Location for Incorporating Solar Panels in Bolluca Children's Village

# CHAPTER 6

# CONCLUSION

Urbanization is one of the main reasons of the environmental problems we are dealing with today. Our world is full of resources of food, energy, materials for shelter and such, however, every piece of land has its own limit of them. When a piece of land is over populated, the resources that it provides does not suffice the resources that is needed by the residents. Hence, neither the land nor the people on that land can be self-sufficient which means the resources are consumed faster than they can regenerate and waste is produced faster than they can be assimilated naturally.

Considering urbanization as a problem, encouraging ruralization can be seen as a solution. This study takes eco-village model in hand as a method encouraging ruralization and proposing a guideline. The aim of eco-villages is to have a village self-sufficient economically, socially and ecologically so that the villagers don't need to leave their village and move into the urban areas where the ecological footprint is way larger than the land available.

All around the world, there are children's villages for the children in need. The aim of these villages are to provide home and most importantly family to these children. They grow up with a family in a community, where they come to know that there is a family and a whole community that is there for them for the rest of their lives if they prefer. Though this concept is not very well-known nor applied in Turkey, there is one running village called 'Bolluca Çocuk Köyü' and one on its way İzmir/Urla Çocuk Köyü.

Childhood is the most important period of a human life in which the character is formed, and the adult life of one is shaped. Children are more adaptable and open to new ideas than most adults and they learn from their environment. They interpret the actions of people by observing their interactions with other people, animals, environment etc... It is really important what message they are given and how clear that message is. Hence the idea of having a children's village that embraces the indicators of the eco-village model promises a healthy environment to the children where they can grow up learning and respecting the nature as a life style.

An ecological children's village presents many messages and advantages to the future adults. First of all, according to the psychologists living in touch with nature helps the cognitive development of children. They learn nature in the natural way, by seeing, touching, smelling, tasting and hearing.

The advantage most relevant to this study's motive is that children will surely gain an idea on how to live in harmony with nature without harming it. They will learn to live with appropriate technologies which gives the message of seeking or inventing other solutions when the formula to a dilemma seems to be harming the nature in some way. Children will learn that the nature provides the resources that keep us alive, so it needs to be well taken care of since they will be living in an environment that produces its own food, using passive systems to reduce the resource usage and inventing new ideas on how to use the resources efficiently.

Another character building lesson might be that, since an eco-village means a self-sufficient village in every way, children in an ecological children's village will grow up learning the ways of living self-sufficiently as a life style.

# REFERENCES

## Publications


Battle, G., McCarthy, C., (2001). Sustainable Ecosystems: and the Built Environment, Wiley-AcademWiley-Academy, London.

Broadbent, G., Brebbia, C., (2008). Eco-architecture II : Harmonisation between Architecture and Nature, WIT Press, Southampton and Boston.

Broome, J., (2008). The Green Self-Build Book: How to Design and Build Your Own Eco-Home, Green Books, Totnes.

Cooke, S. (2010). Healthy and Sustainable Environments for Children and Communities. In Davis, J. M. (Ed.), *Young Children and the Environment: Early Education for Sustainability* (pp. 242-268). New York: Cambridge University Press

Davis, J. M. (2010). What is Early Childhood Education for Sustainability. In Davis, J. M. (Ed.), *Young Children and the Environment: Early Education for Sustainability* (pp. 22-42). New York: Cambridge University Press

Elliott, S. (2010). Children in the Natural World. In Davis, J. M. (Ed.), *Young Children and the Environment: Early Education for Sustainability* (pp. 43-70). New York: Cambridge University Press

Hattam, C., El-Hage Scialabba, N., (2002). Organic Agriculture, Environment and Food Security, Food and Agriculture Organization of the United Nations, Rome

Kats, G., (2010). Greening our Built World: Costs, Benefits, and Strategies, Island Press, Washington, DC.

Lánczi, D., (2009). “Practice of Sustainability in an Eco Village: Ecological Footprint of Krishna Valley in Hungary”, Eötvös Lóránd University, Faculty of Science, Department of Environment and Land Geography, Thesis, Budapest.

Lucena, J., Schneider, J., Leydens, J., (2010). Engineering and Sustainable Community Development, Morgan & Claypool Publishers, San Rafael

Pearson, D., (2005). In Search of Natural Architecture, Gaia Books, London.

Pratt, R. (2010). Practical Possibilities and Pedagogical Approaches for Early Childhood Education for Sustainability. In Davis, J. M. (Ed.), *Young Children and the Environment: Early Education for Sustainability* (pp. 105-153). New York: Cambridge University Press

Sassi, P., (2006). Strategies for Sustainable Architecture, Taylor and Francis, USA and Canada

Sev, A., (2009). Sürdürülebilir Mimarlık, YEM Yayın, İstanbul.

Smith, P., (2007). Sustainability at the Cutting Edge: Emerging Technologies for Low Energy Buildings, Elsevier Science & Technology Books, San Diego.

Thill, M., (2011). “Sustainable development and natural resource management through community participation in Maharashtra, India: the case of Ralegan Siddhi”, Berlin Institute of Technology, Department of Landscape Economics, Diploma Thesis, Berlin

Timberlake, L., Thomas, L., (1990). When the Bough Breaks…: Our Children, Our Environment, Earthscan, London

**Websites**

Anonymous, (2011). Available:

http://planetaryrenewal.org/ipr/economics.html#LETS [Accessed 27.12.2011]

Anonymous, (2015). Available: http://www.religioustolerance.org/damanhur.htm [Accessed 11.01.2015]

Bener, O., Babaoğul, M., (2008). "Sürdürülebilir Tüketim Davranışı ve Çevre Bilinci Oluşturmada Bir Araç Olarak Tüketici Eğitimi", Hacettepe Üniversitesi Sosyolojik Araştırmalar e-dergisi. Available: http://www.sdergi.hacettepe.edu.tr/surdurulebilirtuketimdavranisi.pdf [Accessed 17.12.2011]

Bolluca, (2016). Available: http://www.koruncuk.org/cocukkoylerimiz/bakimmodelimiz [Accessed 02 03 2016].

Bolluca-II, (2016). Informal Interview in 29.02.2016

Damanhur, (2014). Informal Interview in 23.10.2014

Damanhur, (2015). Available: http://www.damanhur.org/en/ [Accessed 11.01.2015]

Dawson, J., (2006). "How Eco-villages Can Grow Sustainable Local Economies". Available: http://gen.eco-village.org/iservices/publications/articles/cmag133_dawson_economies.pdf [Accessed 25.12.2011]

Developing a Master Plan for Tennessee's First ECO-Center. (2010). Available: http://web.utk.edu/~markfly/documents/ECO-Center%204_26_10.pdf [Accessed 09 11. 2015].

Dyssekilde, (2016). Available: http://www.dyssekilde.dk/uk/node/131 [Accessed 12 02 2016].

EE in Tennessee, (2016). Available: http://eeintennessee.org/net/org/info.aspx?s=98786.0.114.37935 [Accessed 29 02 2016].

EHCC, (2016). Available: http://www.cehn.org/our-work/eco-healthy-child-care/ [Accessed 01 03 2016].

EHCC Checklist, (2016). Available: http://www.imagineeducation.com.au/files/CHC30113/CEHN_20Eco_20Healthy_20Child_20Care_20Checklist.pdf [Accessed 01 03 2016].

Findhorn, (2015). Available: https://www.findhorn.org/ [Accessed 19 10 2015]

GEN, (2011). Community Sustainability Assessment. Available: http://genoa.eco-village.org/dev/images/cra.pdf [Accessed 06.12.2011]

GEN, (2015). Available: http://gen.eco-village.org/en/sieben-linden-eco-village [Accessed 10 12 2015].

Imst, (2016). Available: http://www.sos-kinderdorf.at/ [Accessed 25 02 2016].

KKTC, (2016). Available: https://www.soscocukkoyu.org/tr/ [Accessed 29 02 2016].

Manual for the SOS Children's Village Organisation. (2004). National Associations, the General Secretiat and the Hermann Gmeiner Academy. Available: http://www.sos-ds.ba/doc/1364388921.pdf [Accessed 29.04.2014].

Müller, B. W., (2011). Free Speech: *The Secret of Water as a Basis for the New Earth: Healing the Water Cycle through the Creation of Water Retention Landscapes*. Available: https://www.tamera.org/fileadmin/PDF/2.2_The_Secret_of_Water.pdf [Accessed 19 02 2015].

Permaculture Global, (2016). Available: https://permacultureglobal.org/projects/801-sieben-linden-eco-village [Accessed 10 02 2016].

Silverman, J. (2010). Fostering Eco-Healthy Day Care: Oregon Environmental Council uses Checklist to Assess Centers. 1st ed. Portland Tribune.

S.Linden, (2016). Available: http://www.siebenlinden.de/index.php?id=25&L=2 [Accessed 10 02 2016].

SOS Children’s Villages, (2014). Available: http://www.soschildrensvillages.ca/turkey [Accessed 29.05.2014]

SOS Children's Village Programme Policy, (2009). Available: http://www.sos-childrensvillages.org/getmedia/ 4321dda1-1db7-4275-a511-d21d3fcdf9cb/Programme-Policy-en-small.pdf?ext=.pdf [Accessed 29.04.2014]

SSP, (2016). Available: http://sustainableschoolsproject.org/about [Accessed 29 02 2016].

Tamera, (2015). Available: http://www.tamera.org/ [Accessed 19 10 2015].

Tamera, (2016). Available: https://www.tamera.org/ [Accessed 28 01 2016].

Who We Are; SOS Children's Villages, a Loving Home for Every Child. Available: http://www.sos-childrensvillages.ge/ResourceFiles/PagePdfs/Who%20We%20Are%20-%20Mission%20Statement%20-%20PDF.pdf [Accessed 20.02.2016]

Willow Wastewater Cleaning Facility with zero discharge, (2015). Available: http://www.pilerensning.dk/english/index.php?option=com_content&view=article&id=53&Itemid=56&lang=en [Accessed 10 03 2016].

# BIBLIOGRAPHY


Anink, D., Boonstra, V., Mak, J., (1996) The Handbook of Sustainable Building: Ecological Choice of Materials in Construction and Renovation, James and James (Science Puplications), London.

Anink, D., Boonstra, V., Mak, J., (2001). Handbook of Sustainable Building: An Environmental Preference for Selection of Materials for Use in Construction and Refurbishment, Earthscan Publications Ltd., UK.

Balisacan, A., Chakravorty, U., Ravago, M. (ed.), (2014). Sustainable Economic Development, Elsevier Science, San Diego, USA.

Barnett, D.L., Browning, W.D., (2004). A Primer on Sustainable Building, Rocky Mountain Institute, Green Development Services, Colorado.

Bartelmus, P., (2013). Sustainability Economics: an Introduction, Routledge, New York, USA.

Behling, S., Behling, S., (1996). Sol Power: The Evolution of Solar Architecture, Prestel, Münih

Binder, C., R., Feola, G., (2013). Normative, Systemic and Procedural Aspects: a Review of Indicator-Based Sustainability Assessments in Agriculture, Springer, New York and Heidelberg.

Bowers, J., K., (1997). Sustainability and Environmental Economics: an Alternative Text, Addison Wesley Longman, Harloe, Essex, England.

Bragança, L., Pinheiro, M., Jalali, S., Mateus, R., Amoéda, R., Guedes, M.C., (Eds.) (2007). Sustainable Construction: Materials and Practices, Challange fort he New Millenium, iiSBE, CIB, UNEP, Portugal SC07, Portekiz.

Dickson, M.H., Fanelli, M. (1995). Geothermal Energy, John Wiley&Sons, West Sussex.

Dujon, V., Dillard, J., Brennan, E., M., (2013). Social Sustainability: a Multilevel Approach to Social Inclusion, Routledge, New York, USA.

Edwards, B., Hyett, P.R., (2001). Guide to Sustainability, RIBA Companies Ltd., London.

European Consultative Forum on the Environment and Sustainable Development, (1998). Agriculture and sustainability: principles and recommendations from the European Consultative Forum on the Environment and Sustainable Development, Office for Official Publications of the European Communities, Luxembourg.FEE, (2002). Environmental Economics and Natural Resource Policy Analysis, Training Manual for the Forum for Economics and Environment (FEE), Module 2: The Environment and Sustainable Development, FEE Secreteriat Office, Pretoria, S. Afrrica.

Freeman, H. A., (2008). Designing Improved NRM Interventions in Agriculture for Poverty Reduction and Environmental Sustainability in Developing Countries. In Kochendorfer-Lucius, G., Pleskovic, B. (Eds.), *Agriculture and Development* (pp. 57-70). World Bank, Washington, D.C.

Gepts, P., (2012), Biodiversity in Agriculture: Domestication, Evolution, and Sustainability, Cambridge University Press, Cambridge.

Giovani, B., (1974). Man, Climate and Architecture, Van Nostrand, NY.

Godish, T., (1986). Inddor Air Pollution Control, Lewis Puplishers, Chelsea, Mich.

Goldin, I., Winters, L.A. (Ed.), (1995). The Economics of Sustainable Development, Cambridge University Press, Cambridge, UK.

Gonzalez-Perez, M., A., Leonard, L. (Ed.), (2013). Advances in Sustainability and Environmental Justice, Emerald Book Serials and Monographs, Bingley, UK.

Halliday, S., (2008). Sustainable Construction, Butterworth-Heinemann Architecture, Armsterdam.

Hawken, P., (1993). The Ecology of Commerce, Harper Collins, New York.

Hawkes, D., Forster, W., (2002)., Energy Efficient Buildings: Architecture, Engineering and Environment, W.W. Norton & Company, New York.

Heal, G. (ed.), (2010). Is Economic Growth Sustainable?, Palgrave Macmillan, Hampshire, UK.

Herzog, T. (Ed.), (1996). Solar Energy in Architecture and Urban Planning, Prestel, Münih

Hester, R.E., Harrison, R.M., (2005). Sustainability in Agriculture, RSC Pub., Cambridge.

Higgins, K., L., (2015). Economic Growth and Sustainability: Systems Thinking for a Complex World, Elsevier Academic Press, San Diego, CA, USA.

IPPC, (2000). Special Reports on Emission Scenarios, A Special Report of Woeking Group III of the Intergovernmental Panel on Climate Change (IPCC), Cambridge University Press, Cambridge.

Jha, R., Murthy, K. V. B., (2006). Environmental Sustainability: a Consumption Approach, Routledge, London; New York.

Jones, D.L., (1998). Architecture and the Environment: Bioclimatic Building Design, Laurence King Publishing, London.

Jones, P., Selby, P., Sterling, S. (Eds.), (2010). Sustainability Education: Perspectives and Practice Across Higher Education, Earthscan, London; Sterling, VA.

Jorgenson, D., W., Landefeld, J., S., Schreyer, P., (2014). Measuring Economic Sustainability and Progress, University of Chicago Press.Jucker, R., Mathar, R.

(Eds.), (2015). Schooling for Sustainable Development in Europe: Concepts, Policies and Educational Experiences at the end of the UN Decade of Education for Sustainable Development, Springer International Publishing.

Kant, S., Berry, R., A., (2005). Economics, Sustainability, and Natural Resources: Economics of Sustainable Forest Management, Springer, Dordrecht.

Keenan, A., Georges, D., (Ed.)., (2002). Green Building: Project Planning and Cost Estimating, R S Means, Construction Publishers & Consultants, Kingston.

Kibert, C., J., Sendzimir, J., Guy, G.B., (2002). Construction Ecology: Nature as Basis for Green Buildings, Spon Press, London

Kibert, C , (2008). Sustainable Building Construction: Green Building Design and Delivery, 2nd ed. John Wiley & Sons, Inc., USA

Kleppel G., S., (2014). The Emergent Agriculture: Farming, Sustainability and the Return of the Local Economy, New Society Publishers, Gabriola, BC.

Knox, P., L., Mayer, H., (2009). Small Town Sustainability: Economic, Social, and Environmental Innovation, Birkhıauser, Basel; Boston.

Kumar, S., Managi, S., (2009). The Economics of Sustainable Development: The Case of India, Springer-Verlag New York.

Lawson , B., (1996). Building Materials, Energy and Environment: Towards Ecologically Sustainable Development. RAIA, Canberra.

Madhavan, G., Oakley, B., Green, D., Koon, D., Low, P. (Eds.), (2013). Practicing Sustainability, Springer New York, New York, USA.

McDonald, T. (Ed.), (2011). Social Responsibility and Sustainability, Stylus Publishing, Sterling, Virginia.

Nobbs, C., L., (2013). Economics, Sustainability, and Democracy: Economics in the Era of Climate Change, Routledge, Abingdon, Oxon, UK.

Norton, B. G., (2005). Sustainability: A Philosphy of Adaptive Ecosystem Management, University of Chicago Press, Chicago.

OECD. (2003), Organic Agriculture: Sustainability, Markets and Policies, OECD Publishing, Paris.

OECD. (2004), Biomass and Agriculture: Sustainability, Markets and Policies, OECD Publishing, Paris.

OECD. (2006), Water and Agriculture: Sustainability, Markets and Policies, OECD Publishing, Paris.

Oliver, M. A., Bishop, T. F. A., Marchant, B. P., (2013). Precision Agriculture for Sustainability and Environmental Protection, Routledge, Abingdon, Oxon.

Oliver, P. (Ed), (1997). Encyclopedia of Vernacular Architecture of the World, Cambridge University Press, Cambridge.

Papakostas, N. (Ed.), (2015). An Agenda for the Western Balkans: from Elite Politics to Social Sustainability, Ibidem-Verl., Stuttgart.

Pearce, D.W., Turner, R. K., (1990). Economics of Nature Resources and the Enviroment, Harvester Wheatsheaf, New York.

Pearce, D., (2006). " Is the Construction Sector Sustainable: Definitions ans Reflections", Building Research and Information, V. 34, No. 3, s. 201-207.

Prasad, S., Snow, M. (Ed.), (2005). Designing with Solar Power, Images Publishing, Hong Kong.

Retolaza, J. L., San-Jose, L., Ruiz-Roqueni, M., (2015). Social Accounting for Sustainability: Monetizing the Social Value, Springer International Publishing, Bilbao, Spain.

Seyfang, G., (2008). The New Economics of Sustainable Consumption: Seeds of Change, Palgrave Macmillan, Hampshire, UK.

Shastri, V., Banerjee, P. M., (2010). Social Responsibility and Environmental Sustainability in Business: How Organisations Handle Profits and Social Duties, SAGE Publications India Pvt., Ltd., New Delhi, India.

Shmelev,S., E., (2012). Ecological Economics: Sustainability in Practice, Springer Netherlands, Dordrecht.

Singh, S., (2010). Globalisation and Sustainability Issues in Agriculture in Asia: A Case of India, Taylor and Francis, Routledge, London; New York.

Sitarz, D. (Ed.) (1994). Agenda 21, The Earth Summit Strategy to Save Our Planet, The Earth Press, Boulder, Colorado.

Sleesor, C., (1997). Eco-Tech Architecture: Sustainable Architecture and High Technology, Thames and Hudson Ltd., London

Söderbaum, P., (2008). Understanding Sustainability Economics: Towards Pluralism in Economics, Earthscan, London, Sterling, VA.

Stang, A., Hawthorne, C., (2005). The Green House: New Directions in Sustainable Architecture, Princeton Architectural Press, New York.

Steele, J., (2005). Ecological Architecture: A Critical History, Thames and Hudson, London.

Thompson, P. B., (2010). The Agrarian Vision: Sustainability and Environmental Ethics, University Press of Kentucky, Lexington, Ky.

WCED, (1987). Our Common Future, The World Commission on Environment and Development Report, Oxford University Press, Oxford

Wilhelm, K., (2013). Return on Sustainability: How Business can Increase Profitability and Address Climate Change in an Uncertain Economy, FT Press, Upper Saddle River, NJ.

Williamson, T., Radford, A., Bennetts, H., (2003). Understanding Sustainable Architecture, Spon Press, London.

Wojtkowski, P., A., (2008). Agroecological Economics: Sustainability and Biodiversity, Academic Press, Amsterdam; Boston; London.

Yeang, K., (1995). Designing with Nature: The Ecological Basis for Architecture Design, McGraw-Hill Inc., New York.

Yeang, K., (2006). Ecodesign: A Manual for Ecological Design, Academy Press, New York.