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Erasmus+ Programme  
of the European Union

**‘Training the next generation of  
professional beekeepers’**



**MODULE 1 - Unit 1**

# **BEES & ENVIRONMENTAL SUSTAINABILITY – Introduction to bees and environmental sustainability**

**Developed by IDEC SA**

Project No: 2019-1-UK01-KA204-062075



**Spey Valley Bees**



# MODULE 1 – Unit 1 – Introduction to bees and environmental sustainability

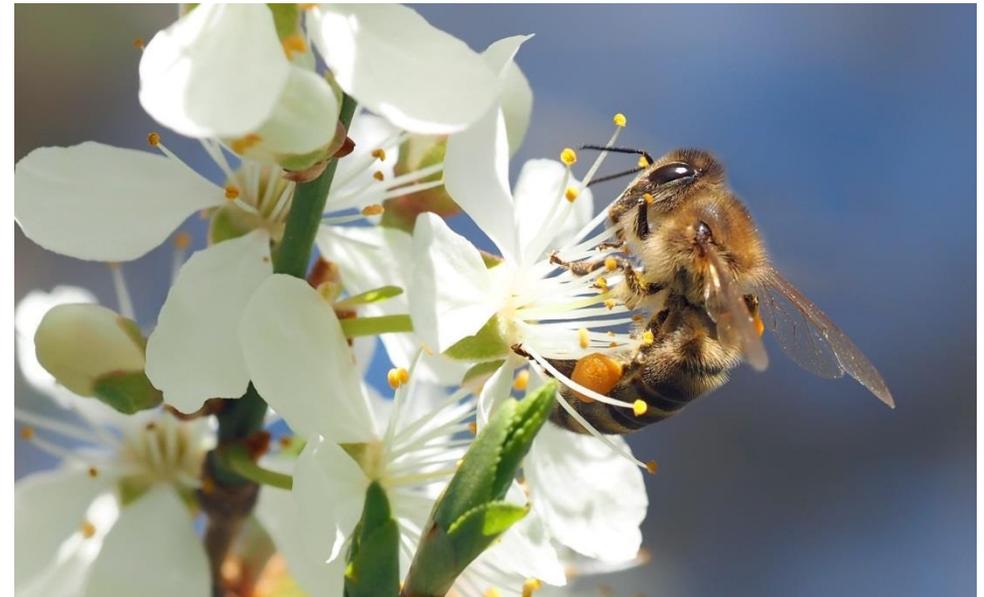


## Introduction

This unit talks about the evolution of beekeeping and how it can become sustainable. Moreover, it makes a connection to the sustainable environment

It provides answers to the questions:

- What does it mean and what actually is sustainable beekeeping?
- What is the relationship between bees and sustainable environment?



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(unit duration 1 hour)

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## Description

Beekeeping has been a sustainable activity for humans since ancient times. With human evolution and changes in the relationship between humans and the environment, this relationship changed with unpleasant results.



In this section, we will try to describe this process, and also define what sustainable beekeeping is.



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## List of Topics

- Topic 1** The historical evolution of beekeeping, and its relationship with the humans
- Topic 2** Human perception of nature through time
- Topic 3** The role of the bee
- Topic 4** The evolution of the beekeeper
- Topic 5** The characteristics of beekeeping
- Topic 6** The concept of sustainability and sustainable beekeeping
- Topic 7** The bees – sustainable environment relationship, and their future



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## Learning Outcomes - Knowledge



At the end of this unit, the beekeeper will:

- Know about the historical evolution of beekeeping, and its relationship with agriculture.
- Know about the role of the bee in nature.



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## Learning Outcomes – Competences and skills



At the end of this unit, the beekeeper will be able to:

- Understand the concept of sustainability in general and how bees contribute to it.
- Be aware on how to approach beekeeping, so that it becomes sustainable during the following years.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- Beekeeping is an activity that has been closely tied with humans for thousands of years.
- There is evidence of beekeeping activity in Greece since 3400 BC and specifically in Crete.
- According to mythology, Melissa (the word for bee in Greek) and Amalthea, who were nymphs and daughters of king Melissea of Crete, were feeding Zeus with honey and milk when he was an infant. This is why one of his names is Melitteus Zeus.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- The relationship is also evident all over the world through art or other objects that indicate the admiration and interaction between bees and humans.
- For example, in one of Sandro Botticelli's paintings, *The Birth of Venus*, we will notice bees flying around her.
- Likewise, there are tiny bees on the gold wreath of King Philip II (father of Alexander the Great) found in his tomb in Vergina near Thessaloniki.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- A characteristic of bees is that they are hard working insects, highly respected and mentioned by every religion in their books.
- Bees specifically, are closely tied with human activities that are related with food search as a means of survival.
- Moreover, bees are role models to the whole world because of their work style.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- Humans in the beginning of their existence, were living a nomadic life and their survival was dependent on food located free in nature or wild preys they tried to catch.
- Bees at the time were living in nature as wild bees, in mainly inaccessible places and humans harvested honey directly from the nest much like bears do now.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- One of the very first observations that people made, was that whenever they destroyed the honeycomb in order to extract honey, bees would construct a new one in the same place and continue harvesting it.
- This is how the idea of creating hives looking like a tree hollow or a rock cavity was born in the human mind.



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## 1. The historical evolution of beekeeping, and its relationship with humans

- As a result of this discovery, humans could harvest honey in a relatively easy way, keeping just a few traditional beehives.
- At the same time, humans started cultivating pieces of land and therefore they could produce food on a regular basis.
- Anthropologists consider this time as the turning point when life changes from nomadic to settled life.



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## 1. The historical evolution of beekeeping, and its relationship with humans

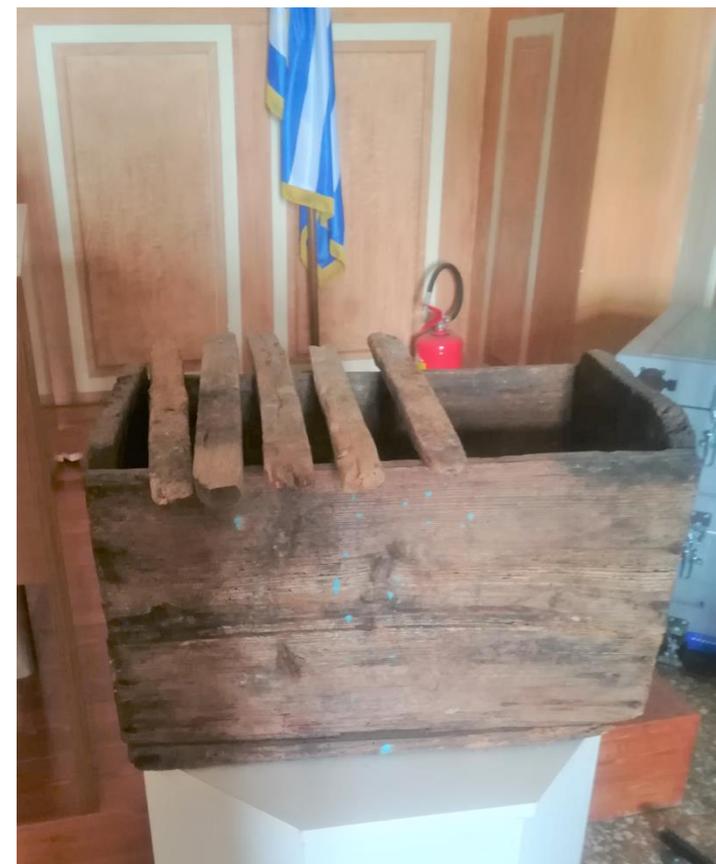
- Either by researching historical information or by visiting old beekeepers, we can come across some old-style types of beehives.
- In areas such as Africa or central America exists a considerable number of beekeepers who continue honey production using exactly these beehives.
- In the rest of the world old type of equipment like beehives, honey harvesting equipment, bee smokers, amongst others, can be found mainly in public as well as privately owned museums.



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## 1. The historical evolution of beekeeping, and its relationship with humans

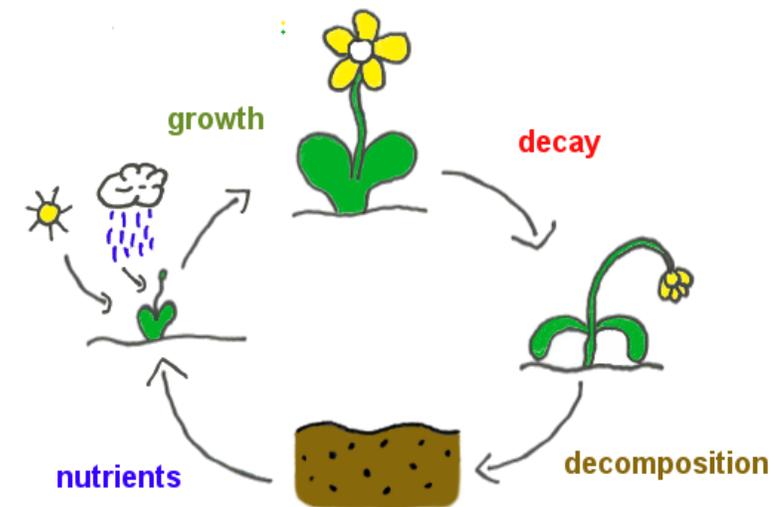
- Beekeeping, during most of its history, had stayed stable. On one hand, humans were using similar beehives and equipment all around the world, and on the other hand bees behaved in the same way as we nowadays know.
- Possibly the oldest reference about bees is the “Stories about animals” of Aristotle (“Περί τῶν ζῴων ἱστορίαι”).
- The earliest form and predecessor of the modern movable frames beehives comes probably from Greece and is the “adonaki” which was found in the island of Kythera.



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## 2.a. Human perception of nature through time

- Humans, with their coexistence with nature, had succeeded in finding the natural processes that would allow them to produce food without destroying the environment.
- Agriculture was a very mild activity.
- In all human activities at the time they had the cyclical process concept in mind and that of reuse of materials. For example, they would use the organic matter from the plant decomposition as food back to the plants.



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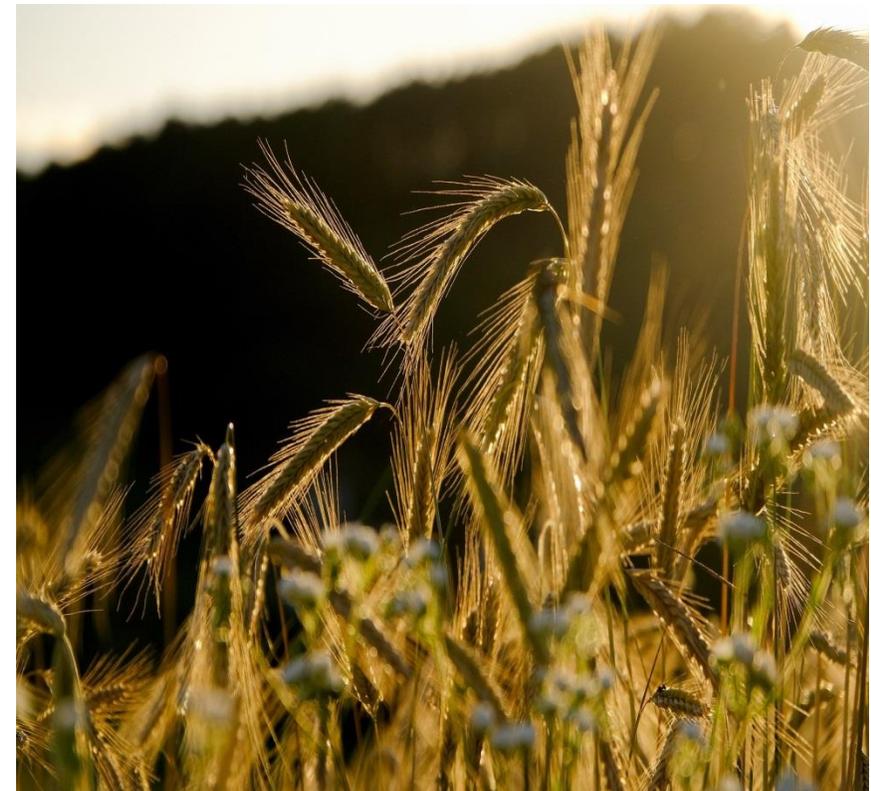


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## 2.a. Human perception of nature through time

- Their aim was primarily to cover their nutritional needs and not to make any profit of it. Crops were of family size and movement of goods was limited.
- Therefore, with farming small areas and keeping farm animals and/or bees, they were self-sufficient. It is worth noting that production was of significantly smaller size compared to today and it required more manpower.



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## 2.b. The change of human perception of the environment

- Until the 18th century farmers were using indirect cultivation methods (e.g. crop rotation), or some mild plant protection substances (e.g. sulfur, copper) in order to protect their crops from enemies and diseases.
- It was after the development of agrochemicals and fertilizers in the 19th century, that the agricultural area grew larger and so did production, and therefore one farmer could provide food for more people.



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## 2.b. The change of human perception of the environment

- This caused the use of land to change. Larger and larger natural areas are being destroyed either due to urbanisation or deforestation in order to cultivate the land.
- As a result, the natural habitats of the bees but also of other pollinators are being either decreased or degraded.



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## 2.c. The outcome of this change

- Although initially the extended use of agrochemicals helped a lot to increase the quantity of products and consequently the nutrition of more people, on the other hand various environmental issues begun to arise that are directly troubling us even today.
- Bee is a pollinator of croplands and lives there too. This means that any intervention to the croplands has a direct effect on the bees.



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## 2.c. The outcome of this change

- Furthermore, bees are a sensitive environmental pollution indicator. For instance, there have been reports about areas where bees have disappeared, and crop cultivation is difficult. As a result, farmers must pollinate crops with other less effective means.
- Humans think of themselves as sovereigns and not as part of nature, destroying the natural ecosystems.
- Mass food production does not take into account the consequences on the environment.



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## 3. The bee's role in nature

- Bees are an integral part of the natural ecosystems. It is generally acknowledged that they help in preserving and improving biodiversity.
- Moreover, quality products such as honey, bee pollen, royal jelly and other, are being produced from the bee colony management.
- It is worth noting that honey was one of the few sweetening substances that existed up until the 18th century. After sugar was extracted from sugar beets following a chemical method, the use of honey was limited.



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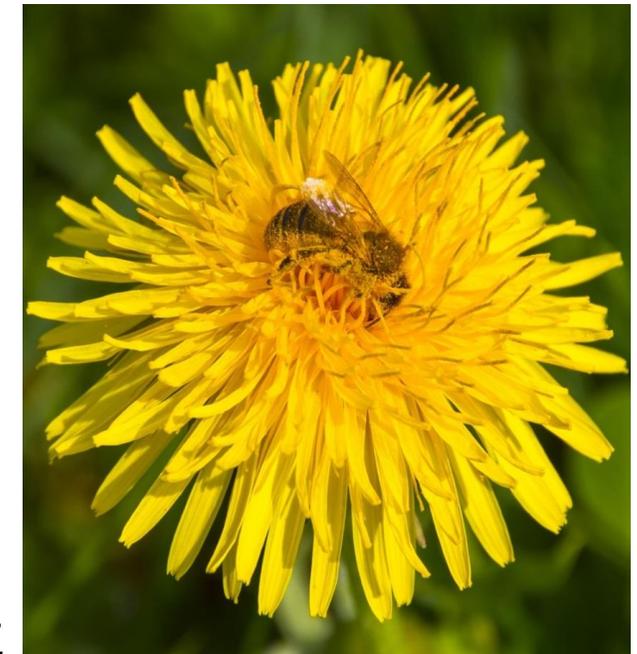


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## 3. The bee's role in nature



- However, the main contribution of the bees is not the products they produce inside the beehives, but the pollination either of the cultivated plants or the native plants.
- Pollination is the transfer of pollen grains from one flower to another of the same species of plant, which results in fertilisation and the production of seeds. If the transfer is done by insects, then we speak about insect pollinated flowers and if the transfer is done by the wind we speak about wind pollinated flowers. Other insects, which are regarded as wild pollinators (wild bee species, butterflies etc.) take part in this process too.



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## 3. The bee's role in nature

- A characteristic of the honeybee's behavior is the so-called total bee dependence on one flower species (monolecty), which means that a honeybee would go to only one flower species during a flight.
- This knowledge is being used by beekeepers and farmers in order to increase production and the improvement of the crop quality.
- In some cases, such as in almond trees cultivation, it has been reported that quantities are decreased by up to 90% without the presence of managed honeybees.



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## 4. The beekeeper's evolution

- In older times, a beekeeper was a producer that had relatively a few old style beehives (skeps, bee gums etc.). The materials used to build these were whatever the area had to offer such as wood, or stone, or reeds.
- Production was smaller and honey extraction depended on the flowering of each area. Basically, a beekeeper waited once or twice a year to harvest honey. And at the same time, they would leave enough honey inside the beehives for the bees themselves.
- This type of beekeeping was not sustainable as the bees were often killed over a pit of Sulphur for the honey to be harvested. It was only with the invention of the moveable frame hive that it became sustainable and the bees could survive year on year



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## 4. The beekeeper's evolution

- Beekeeping was predominantly a static activity and would not be regarded as a profession itself. The old-style beehives were not suitable to be transferred over long distances and of course the appropriate vehicles for that did not exist.
- Over the years, the modern beekeeper gained the characteristics of a professional farmer. Beekeeping became for several, their main profession and the flower-chasing journey began.



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## 4. The beekeeper's evolution

- This means more beehives in order to have bigger production and consequently bigger profit. So, in specific areas the number of beehives is by far increased and there is competition between the bee colonies and sometimes between the beekeepers too.
- Beekeeping in some parts of the world is becoming predominantly nomadic from static, and this is a basic requirement for it to become a viable activity. This is done either to cover the nutritional needs of the bees either to get bigger production.



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## 4. The beekeeper's evolution

- Although during most of the time, beekeeping depended mainly on native plants, nowadays cultivated plants form their primary food source. During spring for instance, beehives (mainly in USA) are being transferred to almond trees, citrus fruit etc., whereas in the wintertime they are transferred to meadows, where there are vegetables, cotton, herbs etc.
- The relationship between beekeepers and farmers is getting more direct and both parts depend on each other to become more productive.



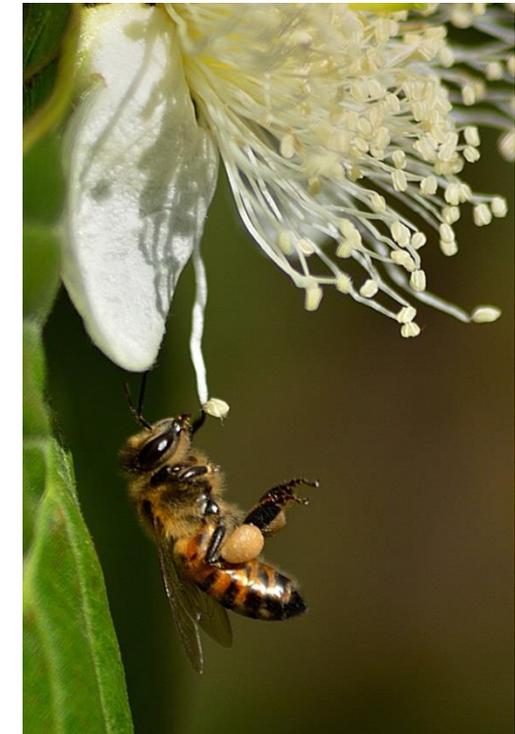
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## 5. General characteristics of beekeeping

- Beekeeping is possibly the only agricultural activity that is 100% environmentally friendly. Bees contribute towards the improvement of biodiversity through pollination, as well as the creation of more stable ecosystems.
- A bee produces naturally pure products, starting from the bees' wax which is the foundation of its hive, and where a bee stores its products in it.
- Therefore, any problem inside a hive is either due to poor intervention by the beekeeper or due to contamination from an external source.



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## 6.a. Sustainability concept

- Sustainability is a concept that was developed during the last few decades. When it was first used as a term, sustainability referred to the exploitation of forest timber, without destroying the environment.
- When we refer to a forest, sustainability means exploiting its timber and the rest of its products up to the point that the next generations will be able to do the same, and at the same time this will be continuously a financially viable activity.

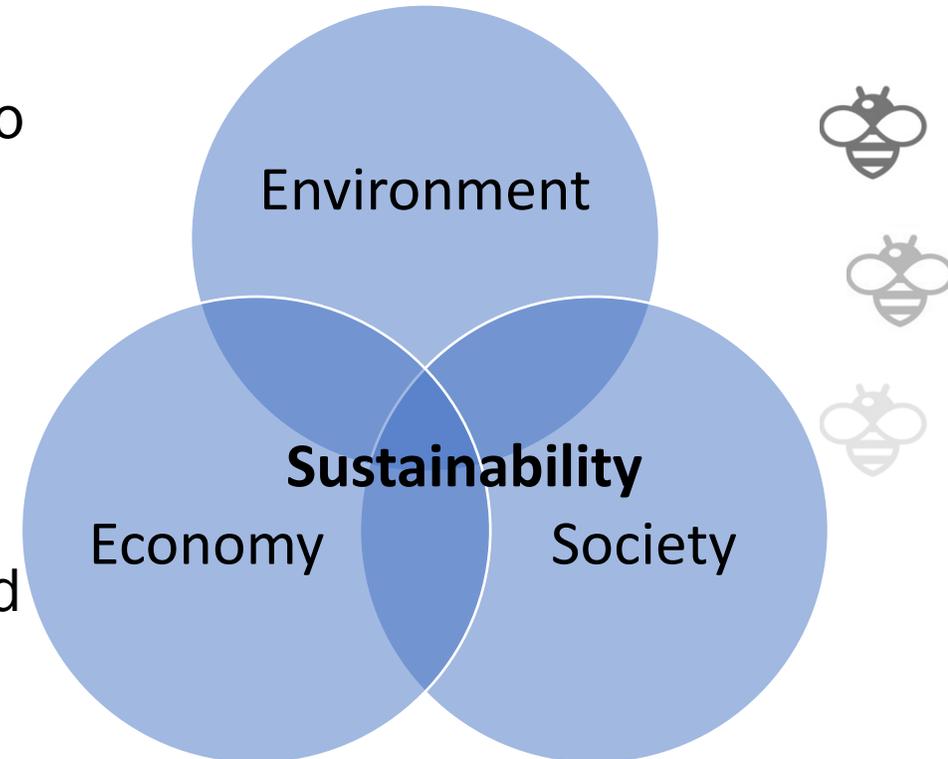


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## 6.a. Sustainability concept

- As a general definition, we can say that it is the management of an object or a situation, that takes into account the protection of the environment, the social needs and at the same time is financially viable. It is a concept that we use more and more often in whatever we do, and in fact it is a basic ingredient that official bodies consider when making decisions.
- In order though to be applied, this should be translated to specific actions and practices adopted by most people.



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## 6.b. Sustainable beekeeping

- Sustainable beekeeping is the management of bee colonies in such a way that beekeepers can keep producing bee products without putting in risk their bees in the long term, using commonly accepted techniques, and this continues to be a financially viable activity.
- This is accomplished through good beekeeping practices and constant update of information and knowledge on the subject. To succeed there definitely must be balance among the three pillars: society, environment and economy.



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## 6.b. Sustainable beekeeping

- Due to the nature of beekeeping, it is being used as a means for sustainable development in some developing countries. Specifically, there are organisations that have been set up by teams of experts with the aim to approach local people and educate them on modern beekeeping. At the same time, they provide the necessary equipment (e.g. modern beehives) in order to increase their return.
- The benefit from this activity is that on one hand quality products are being produced, and on the other hand, people can earn money that will help them cover basic needs like clothing, food, expenses for their kids' education etc.



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## 6.c. Sustainable beekeeping, relationship with the environment



- Bees are perfectly harmonised with their natural environment. However, when bad beekeeping practices are applied, then problems arise. For instance, a beekeeper should not leave behind any plastic, rubber from beehive bases, or even old beehives. Moreover, they should not use substances inside the hives that negatively affect the bees' development.
- Just as bees improve the environment they live in, so too beekeepers should behave in a similar way, and allow bees to function according to their own rules.



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## 6.d. Sustainable beekeeping, relationship with the society

- People know bees and beekeeping mainly because of the quality products bees produce, and less because of their indirect contribution through pollination.
- However, most of the people are scared when they see a beehive, because they see bees as a dangerous insect that will attack and sting them. On the contrary, this will happen indeed only if you bother their hive in the wrong way.
- it is observed that when somebody gets to know better the way bees' function, then they instantly become their admirers.



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## 6.d. Sustainable beekeeping, relationship with the society



- Nowadays, informed citizens want to know the production method for each product they consume and the same applies to bee products. Bee management, concerning their living conditions, the intensive or extensive bee exploitation, the use of chemical products inside the hives, the areas where they are placed, these all have a bigger and bigger impact on society.
- In the context of healthy eating, it is required by society, that all food is safe, produced in adequate quantities and at the same time in affordable prices.



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## 6.e. Sustainable beekeeping, relationship with the economy

- Beekeeping as an agricultural activity, can be divided in various categories, depending on the number of bee colonies and on whether or to what extent it is someone's main occupation.
- In the 1st category belong many beekeepers that keep just a few beehives and aim to get quality products that will cover their personal needs. In this case, the production cost is usually larger than the purchase cost of the products.



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## 6.e. Sustainable beekeeping, relationship with the economy

- In the 2nd category belong beekeepers that keep several beehives (50-100 beehives) and aim to cover their costs and gain an extra income. Therefore, in this case we are talking about those whose second job is beekeeping.
- In the 3rd category belong the beekeepers that keep over 100-150 beehives, who can have a financially viable business and cover their costs and make a profit if they manage it efficiently.



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## 6.e. Sustainable beekeeping, relationship with the economy

- For the beekeeping activity to be financially viable, it needs to belong in the 3rd group. Then, if the number of beehives is increased further, the way they are managed changes too.
- Moreover, the beekeeper should deal with most of bee products and their derivatives. At the same time, he should “train” the consumers so he/she can expand his/her business.
- Though the true relation between bees and economy is their indirect offer through pollination. The value of the products produced is many hundred of times that of honey’s, wax’s and other derivatives’ price altogether.



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## 7.a. Sustainable environment

- As sustainable environment or sustainable product management, we define the management, in such a way that we meet our present needs without undermining the needs of future generations.
- Natural environment is made so it can cover all its needs while taking care of its perpetuation. Its processes are cyclical, and it builds useful ecosystems that interact with each other.



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## 7.a. Sustainable environment

- The organic matter for instance that decomposes in the soil, helps plants absorb better nutrition, and consequently the production of better-quality crop plants.
- At the same time, bees that visit those flowers, feed themselves with better quality nectar and pollen that will ensure the survival of their offspring.
- On the contrary, man through his activities, such as pesticide use, extensive use of chemical fertilizers, water pollution, the destruction of virgin ecosystems etc. resulted on the obstruction of processes that nature built through time.

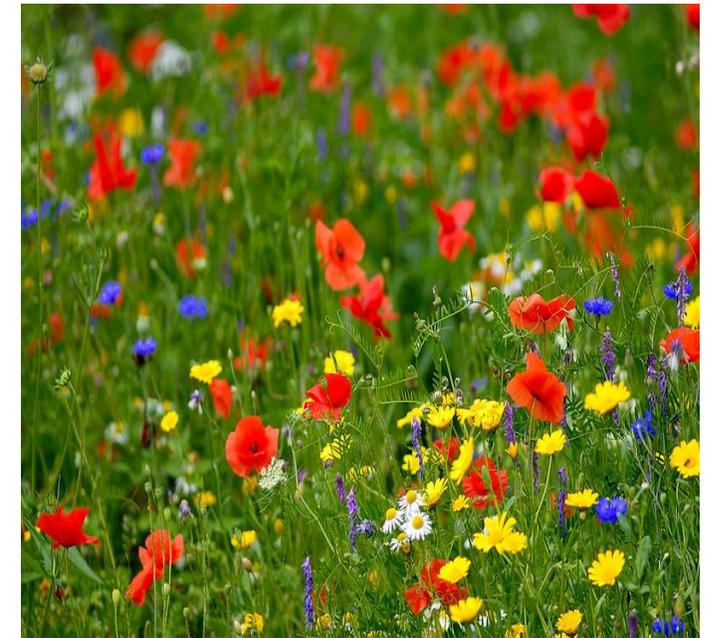


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## 7.b. Relationship between bees and the sustainable environment

- Bees help to preserve and improve a sustainable environment, and in turn a sustainable environment helps bees to survive.
- Bees, through pollination support the conservation and improvement of biodiversity, which in turn means a wider variety of genetic materials.
- Biodiversity is a result of millions of years of evolution and it is a treasure through which we can gain access to raw materials, to food and medicine.
- The meaning of it is a synonym for a stable ecosystem. Its decline means that nature becomes more sensitive and therefore could collapse more easily.



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## 7.b. Relationship between bees and the sustainable environment

- The conservation of a sustainable environment by humans, means that bees will be able to find food for themselves and keep producing the same results.
- Man especially after the industrialisation of agriculture learned to destroy natural ecosystems fast, to use chemicals for the complete extermination of insects-enemies of crops, to degrade soils with the result of producing lower quality food and likewise nectar and pollen for the bees.



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## 7.b. Relationship between bees and the sustainable environment

- The relationship that existed between bees and the environment for so many years was shaken after the aggressive human intervention. The goal for the next years is for this relationship to be re-evaluated and to build new foundation for it.
- What needs to be understood by most people is that bees are part of the natural ecosystems.
- Therefore, bees need to exist in our forests to improve them, in our croplands so we get increased production, but also in our cities so people can get to know them better.



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## 7.c. Connection to the present, and the future of agriculture - beekeeping

- Humans, since the very first years of their evolution, as hunter-gatherers and up until today as producers, saw their position in the environment from different points of view.
- During the first years, humans co-existed with nature and exploited whatever nature had to offer, whereas nowadays many humans try to produce maximum quantities driven by profit, without considering the effects on the environment.
- During the last decades, the concept of sustainability is mentioned in every field, which is not something theoretical but has specific practices.



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## 7.c. Connection to the present, and the future of agriculture - beekeeping

- Contemporary agriculture from the conventional form it used to have, tends to acquire a form of integrated management. Practically, this means reduced use of pesticides, chemical fertilisers, preservation of natural ecosystems and lower environmental burden.
- Changes in the way agriculture takes place and changes in the perception of the bee's role by producers and society alike, will result in better conditions for beekeeping.



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## 7.c. Connection to the present, and the future of agriculture - beekeeping

- Challenges related to colony management are bigger than in the past. The instability of climatic conditions is now more obvious, poor nutrition happens more often and diseases are a permanent factor.
- For beekeeping to become sustainable, beekeepers need to work in the same way as a bee builds cell by cell its honeycomb. Beekeepers need to gain step by step better knowledge, give time to the bees and constantly learn from them, and last but not least, show respect to everything the bee, this amazing insect, offers us.



# Congratulations!

## You have completed Module 1 – Unit 1

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