

Extinction is for good

What is extinction?

Extinction is an evolutive process that leads to the disappearance of a species or a population. When a species becomes extinct, its entire genetic heritage is lost for good. With evolution, a species can become another in order to adapt to the small environmental changes or due to casual changes in its genetic heritage. This process is known as speciation, in other words the birth of a new species. Speciation and extinction are both part of the natural evolutive process of living beings. Therefore, the natural extinction of a species in itself must not be interpreted as a negative event (nor, obviously, as a positive event), but it must be considered simply for what it is, in other words, an expression of biological evolution. The great extinctions in history, in fact, were accompanied by the formation of new species that have given continuity and vigour to the diversities of life.

Normally two types of extinction may be classified. There is the background extinction that is the slow and, for us, imperceptible trend of the living creatures to transform constantly. And then there is the episodic extinction, with massive and concomitant deaths of species, triggered by rapid changes in the environment.

In general, the extinctions that contributed most to the drastic changes in the flora and fauna in the earth's history, were of the second type. Some extreme events took place on a vast scale during the course of the geological eras, like climate changes or the impact of our planet with comets and asteroids, which translated into environmental perturbations that were so radical that there were not many possibilities of escape for a multitude of organisms. At various times of the Earth's history, these phenomena have been very severe limiting factors for the survival of the species, and at times these have drastically cut biodiversity in entire geographic regions, causing the so-called mass extinctions. Palaeontology experts have discovered five great mass extinctions in the last 500 million years. From the famous one that led to the extinction of all the dinosaurs on the Earth. During these great extinctions it is believed that 75 per cent to 95 per cent of the number of extinct species is believed to have gone lost.

However, today the extinction rate is not considered natural, but the main cause of it all appears to be mankind, that, according to some scientists will cause a sixth mass extinction. In fact approximately 23 per cent of the Mammals and 12 per cent of the Birds are considered to be endangered by IUCN (the International Union for Conservation of Nature).

There seem to be a number of causes that lead to this rapid mass extinction, however they are all caused by humans:

- constant growth of human population with a non-sustainable life-style
- increase in urban areas
- increase in the production of waste and polluting substances
- increase in alien, non autochthonous species
- climate changes
- international conflicts

The extinct marsupial wolf

The thylacine, also known as the Tasmanian wolf or Tasmanian tiger, was the largest known carnivorous marsupial. Thylacines were widespread all over Australia and New Guinea, but these were confined in historical times in Tasmania, where now they have become extinct. The thylacine looked like a dog with stripes, but could sit on its hind legs and on its tail like a kangaroo and jump forward 2-3 metres with great agility. At the time of European colonization, the thylacine lived in Tasmania and was widespread specially in the areas near the forests. Probably it hunted at night in the grasslands while during the day it rested, hidden in the forests. The extinction of this curious animal seems to be due to

different causes among which the consequence of competition that arose with the dingo, but not only this. Since the times of European colonization the marsupial wolf got the unhappy reputation of being a “predator of sheep”. From 1830, rewards were promised to those who killed this animal, up to 1850. In 1888 the Government of Tasmania again began offering rewards to wipe them out, and in only a few years 2268 were killed. This criterion fell into disuse in time, and in the end it was thought that an epidemic had definitively made the thylacines extinct. The last thylacine was captured in 1933 in West Tasmania and died in the zoo in Hobart in 1936. Since then many researches have been made to find traces of survival of the thylacine, with no results. No one will see a live thylacine again!

The roots of the problem

In purely ecological terms, what provokes the extinction of a species is the destruction of its habitat and the impossibility to find another one. When the environments change, many of the physical and chemical characteristics change with excessive speed compared to the time for biological adaptation: the organisms that live there die, unless they are able to migrate. The five great biological extinctions of the past were provoked by ecological dynamics that did not depend on human impact (also because the appearance of Homo sapiens was remarkably later) that had these characteristics. For example, biologists believe that the two extinctions of the late Ordovician era and the late Devonian era were the result of a violent change in the conditions of the climate; while the interpretation of the extinction of the late Cretaceous era was due to the effect of the collision of our planet with one or perhaps two large meteorites. It is known that these collisions had such repercussions on the global biological balance, that they led to the disappearance of the dinosaurs and many other organisms. At present, however, the planet is experiencing a condition that had never occurred in the past, at least in the amount that we can see today: the rapid disappearance of species due in particular to human beings. Scientists believe that the speed of erosion of biodiversity today is similar to what characterized the great extinction events of the past, with the sole difference that this time the cause is to be found in the anthropic activities. Diversely from what has been stated about the five historical extinctions, then in this case we must deal with a process that, besides having obvious ecological implications, it also has an ethical and cultural value that must not be neglected. In fact we wonder if it is right that man should dilapidate the biological richness of the planet, without thinking of his responsibilities with regard to the survival of nature and of the future generations of human beings. Many authors believe that the “ecology crisis” that we are going through may have negative consequences on the quality of our life in a very short time, and it is obvious that this worry leads to reflections and discussions that are not only scientific.

Humans and other species

There are different ways in which humans have become responsible for the disappearance of other species. From this point of view a fundamental responsibility is the impact of agriculture on the world ecology. The conversion to agriculture of the land, that has taken away considerable areas from the forests, the grasslands and the humid environments, has deeply simplified the ancient structure of biomes and ecosystems. Naturally these alterations have had differential results in terms of extinctions in the tropical and subtropical areas where biodiversity reaches its peak, the results of the agricultural conversion of the territory have been much greater than in the higher latitudes. But also industrialization and urbanization have played a key role in the extinction of the species. In particular, in the last three-four centuries, the human population has registered a rate of growth that had never been noted in the past, and anthropization of the natural environments that derived from this and all its consequences in terms of cementing, industrialization and deterioration of the territory, has deeply modified the features, and the ecological quality of the habitats. Another crucial factor in the present loss of biodiversity is to be found in the anthropogenic climate change. The accumulation of greenhouse gas emissions produced by human beings in the atmosphere in fact has produced an increase in the global temperature, that in many regions of the planet is already pointing out severe biological alterations and documented extinction phenomena. The origin of the extinctions that are being recorded all over the world however, is not very recent. Due (directly or indirectly) to man, many hundreds of animal and vegetable species have become extinct starting 400 years ago. Furthermore it must be taken into consideration that many other species today can survive only because they are bred in captivity or are under the protection of conservation programmes. The IUCN (International Union for Conservation of Nature and Natural Resources) organization cyclically issues a “red list” of the organisms that are threatened by

extinction. At present the list includes 12,500 species subdivided into the categories “in critical danger”, “in danger” and “vulnerable”. For example, out of the almost 10,000 species of birds, over 1,000 are classified in one of the three categories indicated above. Which means that more than 10% of the avifauna in the world, has a significant risk of extinction. However the problem may be even more severe. In fact if on one hand many “vulnerable” organisms can be monitored quite easily nowadays, and therefore effective measures can be carried out in order to protect them, on the other hand there is an entire universe of organisms that cannot be controlled easily that, due to their microscopic size, their habits or for the simple fact that they still have not been discovered, escape any form of assessment of their state of conservation. A precise definition is important because most of the biomass of the planet is probably concentrated in these organisms, which in turn play an indispensable role in the balance of the ecosystems.

Human weight on nature

In order to visualize the weight that our species has on the global ecosystem, consider that the entire area of the Earth, is about 51 billion hectares. The surface area above sea level, accounts for little more than 14 billion hectares, which, according to the calculations made by FAO (Food and Agriculture Organization), are in turn subdivided as follows:

- 2 billion hectares of cultivated and built-up areas ;
- 3,4 billion hectares of permanent meadows and grasslands ;
- 3,8 billion hectares of forests and wooded land;
- 5 billion hectares of frozen land, tundra, deserts and humid environments.

Therefore it is evident that for the production of food, in order to exploit and extract the resources, and in order to dispose of human waste, it is necessary to make use of the surface that is still available. This is a compulsory step, because the surface of the planet is suited, and its productive capacity is great, but it is not infinite. It has been calculated that humanity, at the present population pressure has about 2.3 hectares of bioproductive territory per head (the average amount of earth that is available to obtain food), and the calculation includes the fraction of dry land for agriculture and breeding livestock, and also the fraction of ocean surface that is necessary for fishing. It has been noted however that the estimated 2.3 hectares only bear in mind the requirements of our species, neglecting the needs of all the others. Taking into consideration also these requirements, and taking the projections of the United Nations, according to which in 2050 the human population will reach a total of nine to ten billion people, to be correct, it has been noted that the bioproductive territory per head is destined to fall below one hectare. The question at this point is: will this surface per head be sufficient to guarantee the survival of mankind without further jeopardizing biodiversity of the planet?

From extinction to conservation

The risk of jeopardizing the biodiversity of the Earth at this stage is quite evident, and it is equally evident that the answer cannot be found only on a scientific scale, but must also be discussed on a cultural scale. In fact if we think of the role of the biological heritage for the survival of human beings, it is possible to see how important the action of biological conservation that now involves the institutions and agencies all over the world is. The most important step made up to date to formally confirm the need to save the natural heritage, is the international treaty known as the Convention on Biodiversity (CBD). The agreement was signed in 1992 by 156 countries (including the European Union), during the course of a Conference on Environment and Development organized in Rio de Janeiro by the UNO (United Nations Organization) and it established the principle that biodiversity is a heritage that belongs to the entire humanity, and as such must be used according to ecological sustainability criteria and social equity among all the populations worldwide. The concept of conservation as a topic that is worthy of international attention, is however older than the CBD. In the last century, the first efforts to understand this problem thoroughly and to manage it rationally, led to the foundation of very prestigious organizations such as the WWF (World Wildlife Fund) (World Wide Fund for Nature) and others. In these organizations, highly qualified experts on the environmental, social and economic topics are employed. Therefore

conservation has become much more than an exclusively scientific matter, it has become a matter that needs to be solved with adequate measures that range from economy to law, from social science to natural science, from philosophy to biomedicine and so on. Experts have noticed that extinction and all the other forms of erosion of biodiversity can be faced only with the instruments made available by different fields of knowledge. As a matter of fact, what seems increasingly necessary is a different way of dealing with the relation between man and nature: a challenge that cannot be faced with only one form of knowledge.