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ECOLOGICAL FOOTPRINT AS AN ELEMENT OF ENVIRONMENTAL MANAGEMENT

Abstract: Consumer approach of people caused that the high use of many natural resources exceeded the possibilities of reconstruction of our planet. These resources are first used in manufacturing companies to produce goods and services, which will later be sold to customers to meet their requirements. That is why the ecological education of people in this regard is so important. The purpose of this article was to define the ecological footprint and to show the size of this index in the world and Europe. Examples of actions that every company can make in its operation, to influence the improvement of this index, were also presented.

Key words: environmental management, ecological footprint, environmental protection

1. Introduction

In recent decades needs and demands of the people were growing due to the consumer approach. An increase in production, the emergence of new products, improvement of already known and produced products are related with this phenomenon. It should be remembered that in order to produce all of these products, which must constantly meet the growing needs and requirements of the people, there is more and more need of materials and other natural resources of the earth. It is not taken into account the fact that many of these resources are non-renewable resources. It should be also noted the fact that the high use of many of these resources exceeded the possibilities of reconstruction of our planet. It is estimated that in order to fulfill all the needs of the people, there is a need of a regeneration potential of not one, but 1.5 planet earth (*Living Planet. Report 2014*; BOND S. 2002).

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It should be remembered that any production depends mainly on the availability of resources that in this production are needed. Therefore, from the point of view of all companies the ecological footprint and the ecological education of people are so important (*Climate change: Europe must take adaptation measures to lessen impacts of current and future warming*).

Lack of respect for the surrounding nature, a large consumption of resources, generation of huge amounts of trash and waste, air emissions have already led to massive changes in the natural environment. Some results are already being experienced across the world (*Review of the state of world marine fishery resources; Water Conflicts in Tana River District, Kenya; Fast Melting Glaciers from Rising Temperatures Expose Millions in Himalaya to Devastating Floods and Water Shortages*):

- Europe has already warmed by almost 1°C over the past century, faster than the global average. The heatwave in summer 2003 caused an estimated 70,000 premature deaths in the EU.
- More than 70% of fisheries are either overfished or are fished at their maximum capacity.
- Conflicts are already occurring between pastoralists and farmers in Africa.
- Himalayan glaciers are disappearing – these glaciers supply over a billion people with fresh water during the dry season.
- Deforestation rates of around 13 million hectares per year far outweigh a planting rate of four million hectares. The deforestation that occurs is often in the areas of the planet that are richest in species, whereas planting often takes the form of monocrop plantations, resulting in species-poor areas.

To make people aware of need to care about the natural environment, it is important to show them that they have huge impact on it. For this purpose the ecological footprint, which is an index that allows to estimate the needs of humanity in comparison with the productivity of our planet, should be used. Ecological Footprint Analysis tracks the regenerative capacity of an ecosystem in terms of historical flows of natural resources.

A “flow” corresponds to an amount per time unit, for instance, the number of tones of round wood grown in a given area over a one-year period (*Ecological footprint atlas 2010*).

The purpose of this article was to define the ecological footprint and to show the size of this index in the world and Europe. Examples of actions that every company can make in its operation, to influence the improvement of this index, were also presented.

2. Definition of the ecological footprint

To understand the need for determining the carbon footprint, at the beginning it should be defined. There are many definitions of this term in the literature. The easiest definition says that the ecological footprint is a kind of an index (WACKERNAGEL M., MONFREDA CH., MORAN D., WERMER P., GOLDFINGER S., DEUMLING D., MURRAY M. 2005), it is one of the relatively new meters that allow for the assessment of human pressure on the environment by the volume of consumption of goods and services.

The Ecological Footprint is defined as "the area of productive land and water ecosystems required to produce the resources that the population consumes and assimilate the wastes that the population produces, wherever on Earth the land and water is located" (WACKERNAGEL M., REES W. 1996).

More precisely, it measures the amount of biologically productive land and water area required to produce all the resources an individual, population, or activity consumes, and to absorb the waste they generate, given prevailing technology and resource management practices. This area can then be compared with biological capacity (bio capacity), the amount of productive area that is available to generate these resources and to absorb the waste (WACKERNAGEL M., MONFREDA CH., MORAN D., WERMER P., GOLDFINGER S., DEUMLING D., MURRAY M. 2005).

The definition of ecological footprint can be represented in a graphical way. In Figure 5.1 human activity and utilization of land by

humans, which have the greatest impact on the formation of the ecological footprint, were shown. Such presentation of the ecological footprint has more influence on the imagination of people than any number.



Fig. 1. Graphical interpretation of the ecological footprint.

Source: <http://www.zujiwangluo.org/overview/>

Ecological footprint can be calculated at any scale: for business, people, community, city, region, nation and humanity as a whole. City, due to the concentration of the population, have a large ecological footprint and become the most important point of its reduction.

3. Ecological footprint in the world

Human activity has caused a lot of damage to the natural environment. The consumer approach caused that the environment is not able to reproduce. This is particularly true in case of the earth's natural resources which are used by people.

In a business-as-usual scenario, global extraction of natural resources could further grow by more than 50% by 2030 compared to today's situation (LUTZ C., GILJUM S. 2009), and humanity's demand on ecological assets (in Ecological Footprint terms) could equal two Earths worth of resources slightly after 2030 (Moore et al., this issue). Up to two-thirds of the world population could experience water scarcity over the next few decades (ALCAMO J., HENRICH T., RÖSCH T. 2002; VÖRÖSMARTY C.J., GREEN P., SALISBURY J., LAMMERS R.B. 2000) and approximately one billion people could face absolute water scarcity (less than 500 m³ capita⁻¹ year⁻¹) by 2025 (ROSEGRANT M.W., CAI X., CLINE S.A. 2002).

In Figure 2 the top 10 countries with the biggest ecological footprint per capita was presented. It is noteworthy that among these ten countries, there are only three really big countries: the USA, Australia and Canada, while countries such as Russia and China do not appear on the list, even if they are known for bad environmental politic.



Fig. 2. Top 10 countries with the biggest ecological footprint per capita.
Source: <http://www.see-change.org.au/ecological-footprint/>

It is very interesting that the greatest ecological footing was observed in the case of Luxembourg, very small country.

Fortunately, Poland does not belong of the leading countries in Europe in terms of the ecological footprint. According to the Figure 3 is only ranked as 22nd with a value of 3.8 gha/pers. In Figure 4 per-person ecological footprint and biocapacity in Poland since 1961 were presented.

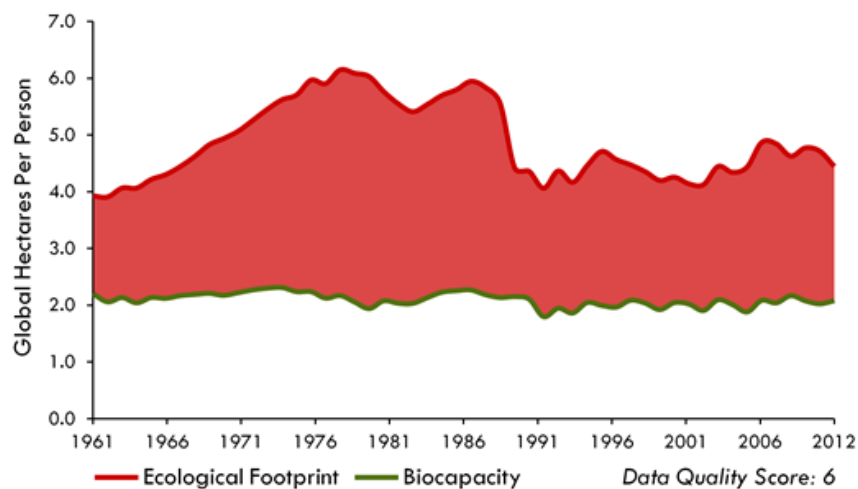


Fig. 4. Ecological footprint and biocapacity in Poland since 1961.

Source: <http://www.footprintnetwork.org/en/index.php/GFN/page/trends/poland/>

Biocapacity per person varies each year with ecosystem management, agricultural practices (such as fertilizer use and irrigation), ecosystem degradation, weather, and population size. Footprint per person varies with consumption amounts and production efficiency.

4. How to reduce ecological footprint in the company

It should be remembered that our daily life has large influence on the size of our ecological footprint. Each of us, if implemented even minor

changes, is able to have a positive impact on improving the environment, and thus affect the reduction of the ecological footprint.

With the environmental management, managers look for opportunities for maximum use of materials, reduction of the material consumption, reduction of the waste generation, replacement of hazardous materials by those less dangerous, reduction of emissions to air. An important element is also the recycling of used materials or products after their utilization.

During the activities in the field of environmental management in the company, the managers should remember about the most important factor of production, which are the employees. It was they who could help management in reducing the impact on the environment. The managers and the employees should keep in mind a few simple rules (<http://simplife.pl/2015/03/23/slad-ekologiczny-minimalizm-a-ekologia/>; <http://angicafe.blogspot.com/2013/10/slad-ekologiczny-sposoby-jego.html>):

- Try to send documents, information via email if possible. Do not print them if not necessary.
- Perhaps we are able to change supplier of our energy on this one, which produces energy from renewable sources. We can also install solar panels that will be used, for example, to heat water during sunny days.
- When we are not in an office or we leave it for longer, we should turn off the lights, computers and other equipment. Replacing incandescent light bulbs for energy-saving bulbs will also be a good idea. This will save energy, and thus the energy resources of the earth.
- If we need to purchase new equipment, it is wise to choose energy-efficient appliances. They are marked with symbols from A to A ++. We can also search for TCO Certification on the product which means we can buy office equipment based on user friendliness, safety, and products' eco-friendliness.

- Making orders we should carefully look at the needs of the company, not to buy things that will be in stock for very long and will get older, and as a result in future will be discarded.
- Making orders we should also pay attention on the packaging. We should check if the packaging is environmentally-friendly and what will happen with it after consumption of the product.
- Also the choice of means of transport may affect the reduction of the ecological footprint. A good idea is a common trip to work, which can further reduce traffic. We should also chose good mean of transport in case of the work trip.
- Things that we do not use anymore, we should not throw away. The question is whether we will need it in the future. Perhaps big part of them can be reused in the future by us or other people in the company.
- When printing certain documents, especially those less important, we can use recycled paper, already printed from one side.
- It is also worth thinking about segregation of garbage. Especially that during utilization of separated waste, less energy is used. Additionally sorted trash such as glass, paper, plastics, metals can be recycled and used again in the production process.

These simple things, if they become habit, will be performed by them also in private life. Perhaps this approach also infect other members of our families, and in effect will save the natural environment.

5. Conclusion

The ecological footprint is an index that provides information on how much impact we have on the planet earth and the environment. It shows how quickly the earth resources are used, and compares it with the capabilities of its regeneration. Unfortunately, there are still many people who are not aware that the earth's resources are consumed 1.5 faster than their potential reconstruction.

Poland is among the countries in Europe which have low ecological footprint calculated per person. It should be noted, however, that its value in the seventies and eighties was much higher.

We do not realize that changing the habits, as people or companies, has a positive impact on the level of this index and the same time on the natural environment. Appropriate environmental education can help in such changes and explain why it is so important.

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