EVALUATION OF THE ECO LIFESTYLE FOOTPRINT IN ROMANIA

Valentina-Mariana Manoiu
University of Bucharest, Romania, Faculty of Geography
Alexandru-Codrut Miroiu
EDCENTRIC NGO, Bucharest, Romania
Alexandru-Ioan Craciun
Technical Bureau, Bucharest Regional Division,
Romanian Railway Company

Abstract

The sustainable eco-lifestyle is progresingly becoming part of the mainstream thinking. This paper evaluates the ecological footprint of a specific type of vegan eco-lifestyle adopted by one of the authors, and compares it to that of a typical Bucharest citizen. Although the activities of the eco lifestyle are reflected by individual actions and choices, its effects are substantial when adopted on a large scale. If the entire population would pick up on the lifestyle of the eco-citizen, human needs would only require the resources of 0.78 planets; however, should mankind choose to adopt the other respondent's lifestyle, 1.96 planets would be needed. According to the conclusions presented in the study, the adoption of these environment-friendlier vegan and vegetarian lifestyles by the majority of the population can be an effective way to diminish the burden directed onto the ecosystems that our planet is depending on. The summarized version of this extensive study has been presented at the Global Conference on Environmental Studies, April 2014, Rome, Italy.

Keywords: Eco-lifestyle, ecological footprint, sustainability, vegan, eco-citizen

Introduction

For many, the term "eco" is often used as a synonym for sustainable. The United Nations, in a report (UNEP Report, 2010) on the projects developed by the Taskforce on Sustainable Lifestyles, demonstrates that "sustainable lifestyle is not a niche concept, discussed by a minority of people in specialized fields. It is something that people from around the world are considering and it is increasingly becoming part of mainstream

thinking". In the report, this lifestyle is defined as "being aware of your surroundings. Aware of the consequences of the choices made and therefore make the choices that do the least harm. It involves more than just care for the environment – it also involves thinking about people and community. It involves thinking about health and well-being, educational development, rather than just money and possessions."

Although the eco-lifestyle has been part of all civilizations, it began to strongly develop during and especially after the industrial revolution. Basically, a parallel can be drawn between the three major transitions undergone by mankind (agricultural revolution, industrial revolution, communication revolution) and the development and spread of the eco lifestyle in response to the severe problems that the transitions have created in everyday life at a global scale.

This paper aims to assess the eco lifestyle ecological footprint of one of the authors' specific type of vegan lifestyle and compare it to that of an ordinary citizen of Bucharest. It is important to mention that the authors are either vegan or vegetarian, and all of them are making a conscious effort to reduce their ecological footprints.

Overview of eco-lifestyles and ecological footprints

Eco-lifestyle

It involves all activities and choices made by individuals concerned with diminishing their environmental impact, having at hand a wide aray of options to pick from. Therefore, although the core of an eco-lifestyle is to decrease one's environmental impact, the possible individual choices and actions are numerous, depending on motivation and awareness, cultural background, degree of adaptability to change, etc.

In the present-day sense, eco-living is guided by the 4 R principle:

- Refuse: not using a resource when it is not necessary. This is the most environmentally friendly choice one can make; for instance, refusing complementary plastic and paper bags when shopping, replacing bottled water with tap water, etc.
- Reduce: it refers to reducing one's environmental impact by cutting down as much as possible on the resources one uses. For example, an eco-friendly individual will choose to use the same phone even if a better model is launched shortly after the initial purchase; this "R" also applies to food - reducing meat, but also water and energy consumption.
- Reuse: it refers to the reuse of resources in their current state, but not necessarily with the same destinations. For instance, reusing a jam jar as a vase, pencil holder or as a recipient for storing various food scraps in the refrigerator; this R also includes the repair and refurbishment of electronic equipment instead of purchasing new ones.

- Recycle: the last step in addressing the 4 R principle is the reintroduction of resources in the industrial circuit, thus reducing the need for new raw materials in production processes.

The 4 R's are listed according to their importance. This main principle is supplemented by other actions and choices, such as those related to supporting local businesses by buying their products - especially food, switching to a vegetarian/vegan lifestyle, using the least polluting transportation options etc.

Ecological footprint (EF)

This concept was first presented in 1990 by Mathis Wackernagel and William Rees, both assigned at the time at the University of British Columbia. Today, the EF is used on a wide scale as an indicator and computation model by various scientists and institutions keeping track of ecological resource use and sustainable development.

The EF is a synthetic indicator that determines the human pressure on the biosphere by matching consumption patterns and the Earth's regeneration capacity, or biocapacity. This evaluation is based on estimating the optimal area needed to produce the resources demanded by the population, as well as those sustaining the infrastructure and the forests needed to assimilate the extra carbon which can no longer be absorbed by oceans (Wackernagel et al., 2005; Kitzes et al., 2007; Galli et al., 2011).

In more detail, the assessment of the EF is designed to answer a key question: what percentage of the planet's biocapacity is required by a certain human activity or population? The EF provides the answer by measuring the areas of biologically productive land and water bodies used by an individual, a city, a country, a region or the entirety of mankind, in the production process of necessary resources and also in the absorption of carbon dioxide emissions generated by current technologies and resource management practices. Resource requirements directed to the biosphere can be compared with the biocapacity, which is measured in global hectares of biologically productive land and water bodies available for human use in one year. Biologically productive land includes arable land, forests and fisheries and excludes deserts, glaciers and oceans (Global Footprint Network, 2011).

The evaluation of the EF takes into account all of the planet's biologically productive land and water bodies and as some areas are more productive than others, the final result will be presented in global hectares, which is the average global annual productivity value of all types of biologically productive elements. The conversion to global hectares involves the use of certain equivalency factors, partly based on a series of analyses of different types of land and their distinct features.

When assessing the EF of an individual, an inventory comprising all biological materials used in one year is needed, as well as an assessment of all carbon dioxide emissions produced throughout the same year. Just as important is the acknowledgment of the fact that the existence of those materials and the absorbtion of the emissions cannot occur without the presence and use of ecologically productive areas. The values derived from this inventory are subsequently transposed into an equivalent number of global hectares by dividing the amount of biological material consumed by that person (tonnes per year) to specific yield values (annual tons per hectare) used in the production of materials or waste absorption; the resulting number is converted into global hectares using equivalence and yield factors.

For certain groups, as well as for cities and countries, the EF is in fact the collective EF of all the group's members or, in the case of cities and countries, the total number of residents. Moreover, one can calculate the EF of a city or country's production by rounding up the EF of all extracted resources and carbon dioxide emissions produced within the boundaries of that city or country.

Regarding the production of goods (e.g. a laptop) and services, the EF of all materials and carbon dioxide emissions must be summed up.

Methodology

The eco-lifestyle EF in Romania was calculated using data that can be classified into three main categories:

• Statistical data on the national and global EF;

• Statistical data obtained from investigating the 6 months eco-lifestyle (July 2012 – January 2013) of one of the paper's authors (referred to as "eco-citizen");

• Statistical data obtained from monitoring the 6 months eco-lifestyle (July 2012 – January 2013) of a Bucharest resident (referred to as "ordinary citizen"). (Manoiu, Miroiu, Craciun, conference communication, April 11, 2014)

Statistical data on the national and global EFs were found both in studies conducted by the Global Footprint Network organization and through the subsequent researches done in collaboration with its partners.

The statistical data obtained from keeping track of the eco-citizen's lifestyle featured water and electricity consumption, the general consumption pattern and waste management and transportation; these results have been constantly compared to the national average figures provided by Eurostat, the World Bank, the Organisation for Economic Cooperation and Development (OECD), the European Fresh Produce Association and the Romanian Portal for Foreign Trade.

In turn, the statistical data recorded from monitoring an ordinary citizen's lifestyle, covering water and energy consumption and waste management, were compared to the national average values as well as to the information obtained from monitoring the eco-citizen.

The data were analyzed using Word 2013 and Excel 2013, software components of the Office 2013 software suite, marketed by Microsoft.

Measuring the water consumption included the recording, interpretation and graphic processing of the monthly consumption of hot and cold water (expressed in cubic meters) for the two house water sources - kitchen and bathroom.

Monitoring the electricity consumption included the recording and interpretation of the monthly electricity consumption, expressed in kilowatts, the graphic processing of consumption and energy sources, grouped according to the type of fuel they operated on (coal, hydrocarbon, nuclear, hydro and wind).

Checking the general consumption pattern of the eco-lifestyle included an inventory of all the products bought monthly and the interpretation of results according to the group the products were assigned to. The parameters were: type of product, quantity in grams or milligrams, category, country of origin, continent, whether the product was organic or not, packaging biodegradability and recyclability, the presence or absence of recycled materials in the composition of packaging, product biodegradability and recyclability and the presence or absence of recycled materials in the product.

In order to determine the quantities for each of the purchased items, official data displayed on the product packaging were used.

Listing the typical transportation habits of an eco-lifestyle included monthly mileage recordings and interpretation according to the type of means of transport (bicycle, tram, trolley, subway, bus, train, car and plane).

The monitoring of eco waste management included registering the quantities of recyclable and unrecyclable materials and biodegradable waste generated per month; wasted food and WEEE were also considered and, in the case of the ordinary citizen, WEEE and recyclable materials generated per month were recorded as well.

The determination of these quantities was performed manually, using a Zelmer 34Z050 electronic balance.

The assessment of the EF of eco-living in Romania

In a planetary context, Romania recorded in 2008 an average EF per capita of 2.84 global hectares and a Biocapacity of 2.33 global hectares per capita (Global Footprint Network, 2011).

Starting with the 1960s, Romania recorded an increase of EF figures (Fig.1), followed by a relative stabilization between the late 1970s and the late 1980s, which was succeeded by a dramatic decrease in the following years, with the lowest value recorded in the early 2000s; the ascending trend was reestablished in 2008.

In a scenario which would feature the entire world population adopting the “Romanian consumption pattern”, the natural resource needs could only be met by 1.6 planets.

While the 2010 EF per capita in Romania was of 2.71 global hectares and the Biocapacity of 1.95 global hectares per capita (Global Footprint Network, 2011), the former rose to 2.84 in 2012 and the latter to 2.33; Romania ranked number 53 worldwide in 2012, having stepped down 7 places from the 2010 position.

The evaluation of the eco-lifestyle’s EF in Romania zoomed in on two major issues:

- Using the Center for Sustainable Economy survey (Ecological Footprint Quiz):
    - It uses a "Footprint 2.0" standard, which was retouched to meet our country’s needs; the data are filled in the online form available on the organization’s website (Ecological Footprint Quiz, http://www.myfootprint.org/) and the number of global hectares and the optimal number of planets for supporting the resulting consumption pattern are automatically shown after a brief analysis; although the EF assessment of the "Footprint 2.0" standard methodology is reasonably accurate, it is notable that the standard is not up to date, as the information corresponds to 2005;
    - The "Footprint 2.0" standard is based on average national consumption values and its inquiries, while unable to take all possible circumstances and lifestyles into account, provide a reasonable assessment of the EF;
    - Footprint values derive from the average per capita values generated by the global footprint processor, hosted on Redefining Progress (RP) servers, which in turn uses the data international agencies such as FAO, the UN and the World Bank publish. The per capita value methodology is fully described in "Refining the Ecological Footprint", a paper co-signed by Jason Venetoulis and John Talberth (Venetoulis & Talberth, 2008); the values the questionnaire generates follow in the lines of scientific research published by governments, NGOs and academic institutions.
- Using the data collected from the registering of different parameters of the eco-citizen’s rather strict lifestyle and that of an ordinary resident of Bucharest.

The questionnaire used to assess the EF starts with the average per capita carbon, food, housing and goods and services footprints, which are based on average values estimated for Romania, and then operates a series of additions and substractions based on the respondents' choices. The questionnaire inquiries can be found on the http://www.myfootprint.org/ website.

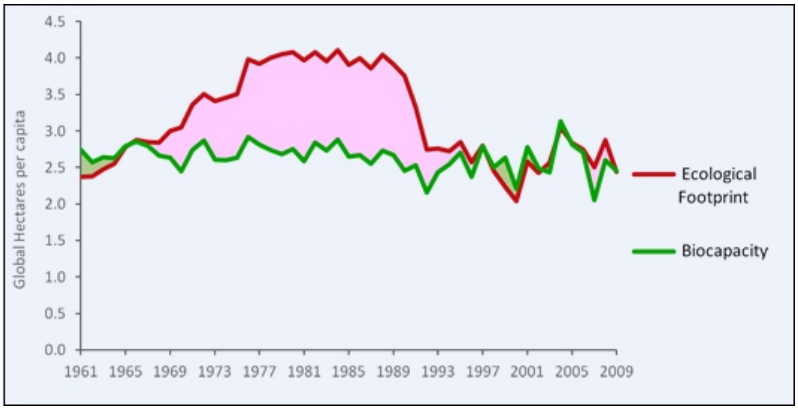

Figure 1. Romania's Ecological Footprint and Biocapacity between 1961 and 2009 (Source: Global Footprint Network, 2011)

Results and conclusion

The data gathered from monitoring the lifestyle of the eco-citizen and that of the ordinary citizen led to the following important observations (Manoiu et al, conference communication, April 11, 2014):

- The eco lifestyle leads to a reduction of our impact on the environment but, similarly to the EF, certain aspects are harder or even impossible to control, as they are imposed by living conditions; for example, the eco actions and choices of a certain person can be exemplary when it comes to nutrition (going on vegetarian or vegan diets), waste management (decreasing the generated quantity and recycling all the resulting waste materials) or energy consumption (switching to an energy-efficient household), but a certain variable part of the final result of these choices can be somewhat annulled by the line of work the person is in (travelling many kilometers on the job each year using highly polluting means of transportation). Still, it is important to highlight that even though the final result can be indirectly negatively influenced to a certain extent – just as it was explained in the example presented above – this influence only targets certain parts of a whole, acting differently and on a fluctuating scale: adopting a vegetarian or vegan diet ensures a reduced impact on ecosystems that are affected by animal breeding; diminishing waste generation and recycling leads to an uneventul impact on the ecosystems susceptible to this type of damage; we have to mention that

the goal of an eco-lifestyle is not the complete exclusion of the human negative effects brought upon the environment – which is impossible –, but to lower as many of these effects as possible;

- The eco-lifestyle importance can be truly noticed only when it is embraced on a large scale; as the effects are cumulative, the pressure brought upon the biosphere decreases significantly once the number of people choosing this lifestyle grows;
- The adoption of the eco lifestyle leads to an indirect transfer through the power of public example and individual choice from the initiators to the people they come in contact with, giving rise to an educational effect of awareness or lifestyle change.

After processing all the data, the conclusion was that, compared to national average per capita values, the eco-lifestyle generates lower EF numbers.

In the case of electricity, reducing the number and types of equipment, the use of energy-efficient devices and the replacement of all light sources with compact fluorescent bulbs lead to a general reduction of the household energy consumption (Fig.2). In 2009, while the average monthly per capita energy consumption in the European Union (EU-27) was of 452,79 KWh, Romanians were only up to 145,9 KWh (Eurostat yearbook, 2009).

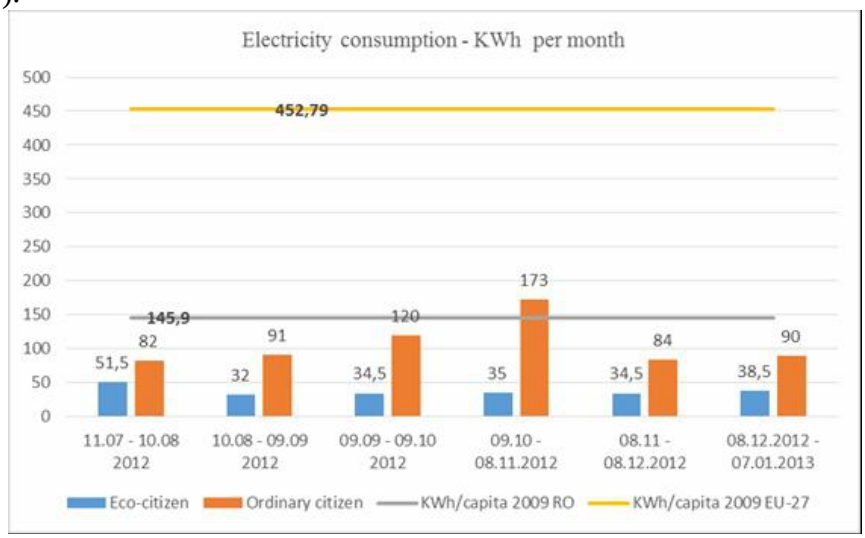

Figure 2. Electricity consumption - KWh per month (Source: EU-27 and Romania - Eurostat, 2009)

Regarding the water consumption, the use of low flow systems, reducing the time and flow for all activities and taking up some water-saving habits lead to an important reduction of the household water consumption (Fig. 3, 4, 5).

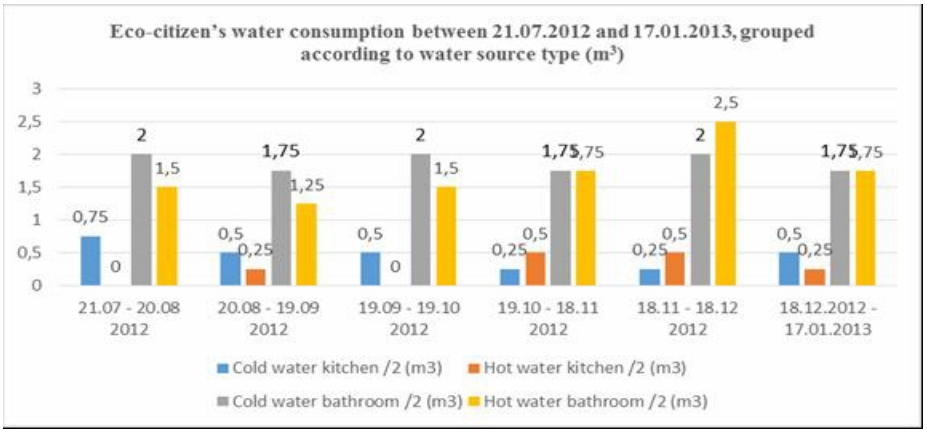

Figure 3. Eco-citizen's water consumption between 21.07.2012 and 17.01.2013, grouped according to water source type (mc)

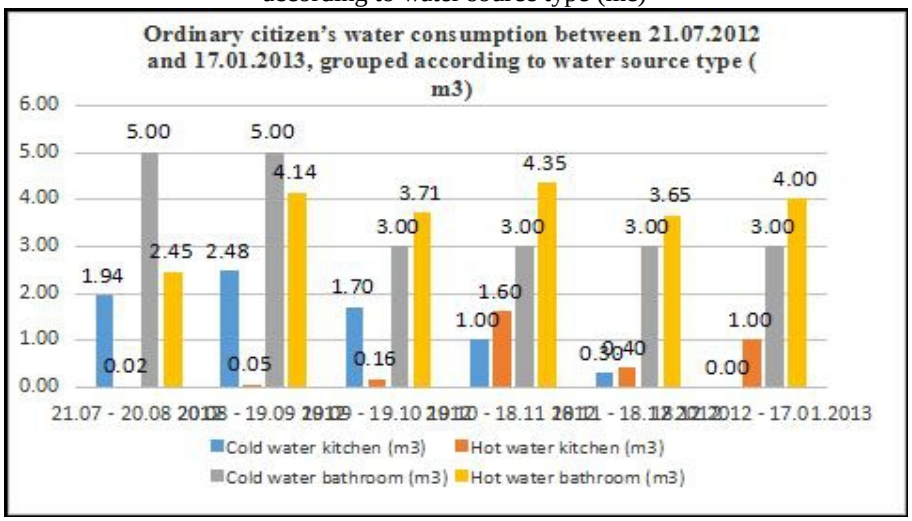

Figure 4. Ordinary citizen's water consumption between 21.07.2012 and 17.01.2013, grouped according to water source type (mc)

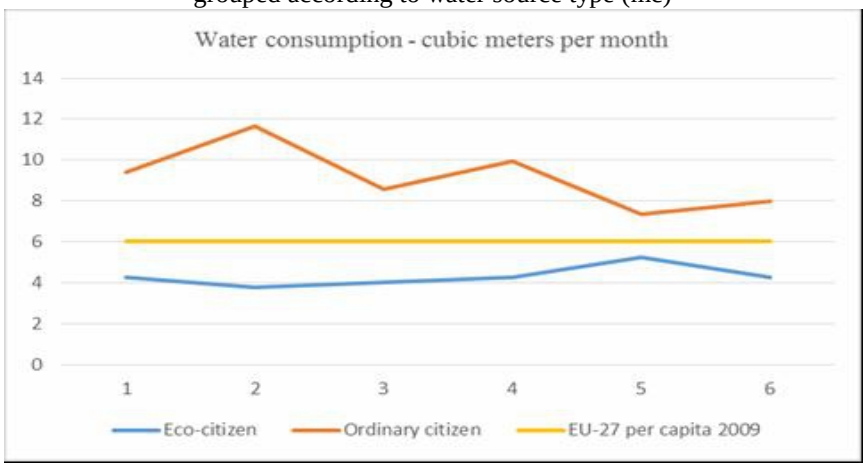

Figure 5. Water consumption - cubic meters per month (Source: EU-27 - Eurostat, 2009)

In terms of product use and eating habits, buying most of the products and goods made/grown locally, with very little or no packaging, biodegradable and non-toxic products, lead to the diminishment of the environmental impact and consequently to that of the EF.

When it comes to nutrition, a vegetarian or vegan diet represents a fast way to reduce the EF. According to a report released by the UN (UNEP Report, 2010), animal breeding (including fish) places this activity amongst the worst polluters worldwide; the report also states that:

- More than half of the world's crops are grown for animal feeding, instead of direct human use;
- In general, dairy products and meat use up more resources and release notably larger quantities of greenhouse effect gasses than their green equivalents.

According to Dr. Samuel Soret, from the Loma Linda University in California, "vegan greenhouse gas emissions are 41,7% smaller than those of non-vegetarians, those of ovo-lacto-vegetarians are 27,8% smaller, those of pesco-vegetarians - 23,8% smaller and those of semi-vegetarians - 20% smaller; combined, the greenhouse gas emissions of vegans and vegetarians are 30% smaller than those produced by the people who eat meat" (Soret S., congress communication, February 2013). The data were processed using the SimaPro7 software, which assesses the cycle of life.

For waste management, the eco-lifestyle leads to a reduction of generated waste, as its residue is generally biodegradable (Fig. 6, 7, 8, 9, 10, 11).

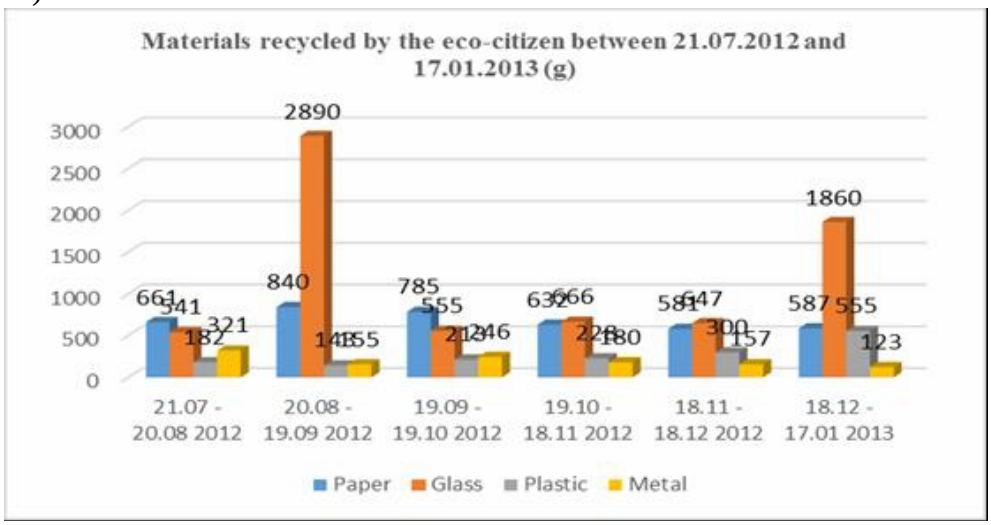

Figure 6. Materials recycled by the eco-citizen between 21.07.2012 and 17.01.2013

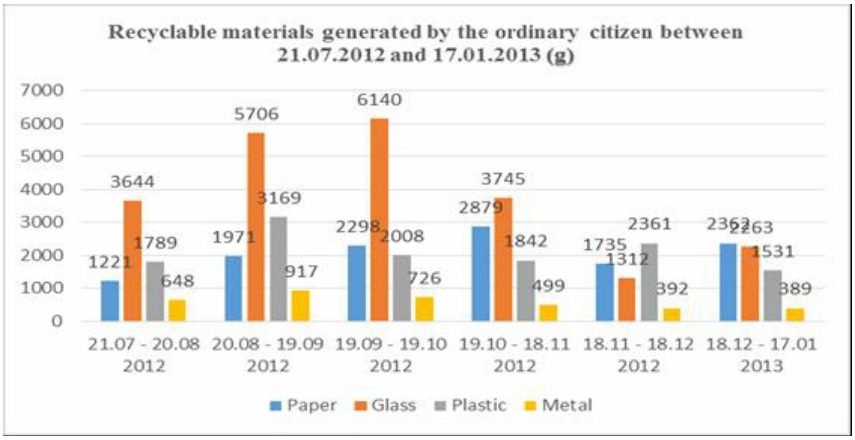

Figure 7. Recyclable materials generated by the ordinary citizen between 21.07.2012 and 17.01.2013

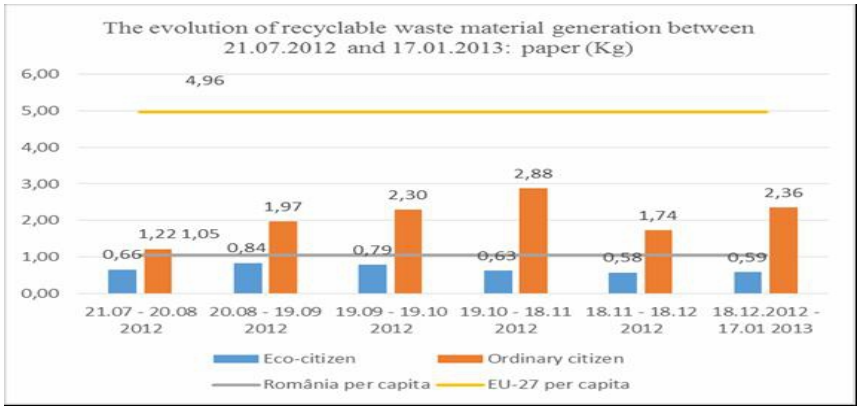

Figure 8. The evolution of recyclable waste material generation between 21.07.2012 and 17.01.2013: paper (Kg) (Source: monthly per capita data for Romania and EU-27: Eurostat 2009)

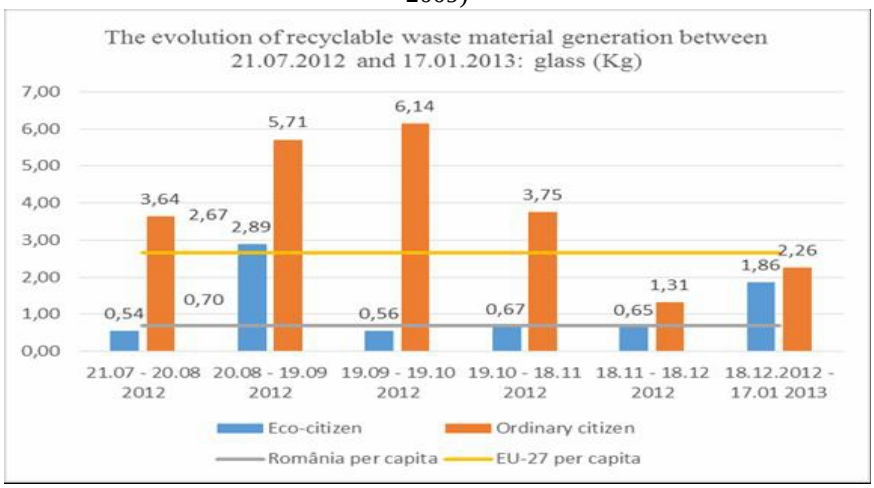

Figure 9. The evolution of recyclable waste material generation between 21.07.2012 and 17.01.2013: glass (Kg) (Source: monthly per capita data for Romania and EU-27: Eurostat 2009)

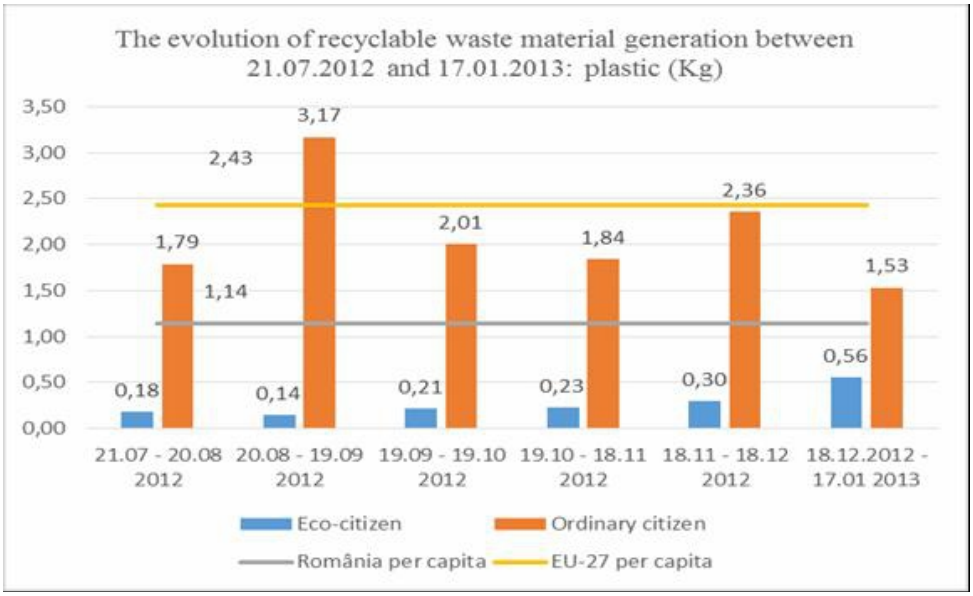

Figure 10. The evolution of recyclable waste material generation between 21.07.2012 and 17.01.2013: plastic (Kg) (Source: monthly per capita data for Romania and EU-27: Eurostat 2009)

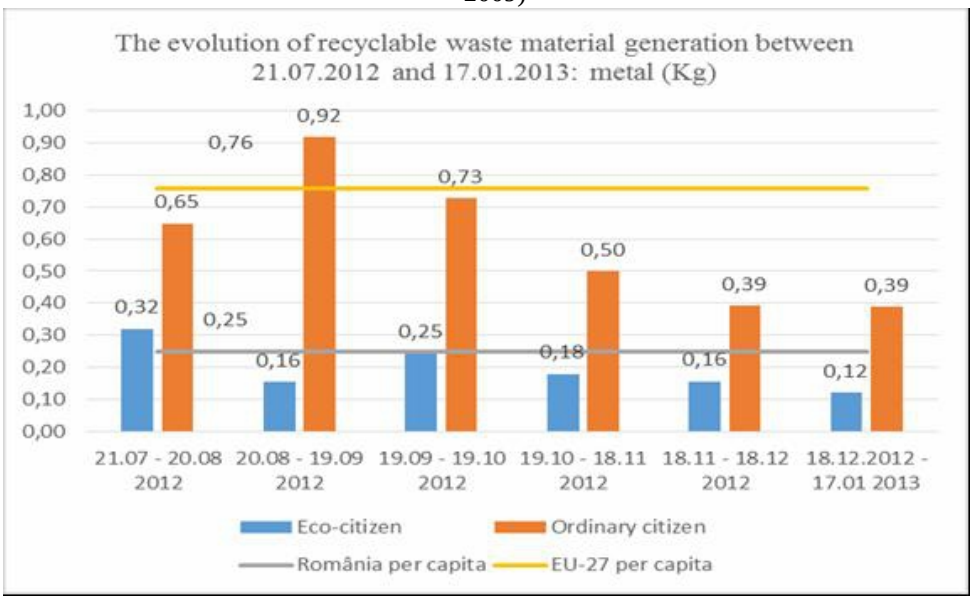

Figure 11. The evolution of recyclable waste material generation between 21.07.2012 and 17.01.2013: metal (Kg) (Source: monthly per capita data for Romania and EU-27: Eurostat 2009)

For transportation, the measures meant to reduce the EF are the use of less polluting means of transportation, such as bikes, public transport instead of personal vehicles, avoiding flights to a maximum.

Overall, as a result of the EF assessment of the eco-citizen's and ordinary citizen's lifestyles, the following conclusions were reached (Manoiu et al, conference communication, April 11, 2014):

- If everyone adopted a lifestyle similar to the eco-citizens', the needs of humanity would only demand 0,78 planets; in other words, even though the values of the EF can still be lowered (through the continuous improvement of people's eco-lifestyles), humanity would live within its means and would not surpass the limits of planetary regeneration;
- If everyone endulged in a lifestyle similar to that of the other respondents', the needs of humanity would demand the resources of 1,96 planets.

General conclusion

The rate at which we consume the planet's resources would make an outside observer reach the conclusion that humanity has not one, but surely several planets under its control.

Presently, the globe's population uses up 50% more resources than the planet can regenerate every year; in Romania's case, the percentage goes up to 140%, according to the study presented in this paper. If humanity continues on the same pattern until 2030, EF values will surely rise even more. Therefore, adopting an eco-lifestyle represents one of the key-ways of reducing the pressure brought upon ecosystems.

The people adopting an eco-lifestyle are aware of the effects of their actions, with the most important conclusion being that their efforts aimed at the protection of the environment pay off, which leads to a cumulative and synergic effect. Moreover, beyond the aforementioned effects, the educational aspect is also extremely important, as all citizens and especially policy and decision makers need to be conscious of this problem that demands immediate action.

Acknowledgements

All authors have equally contributed to this study.

References:

Ecological Footprint Quiz. [Online] Available from: http://www. myfootprint.org/ [Accessed 4th September 2013].

Europe in figures, *Eurostat yearbook 2009*, Available from: http://epp.eurostat.ec.europa.eu/portal/page/portal/publications/recently_published [Accessed 25th January 2014]

Galli, A., Wiedmann, T., Ercin, E., Knoblauch, D., Ewing, B., Giljum, S. (2011). Integrating Ecological, Carbon and Water Footprint: Defining the

"Footprint Family" and its Application in Tracking Human Pressure on the Planet. *OPEN:EU project deliverable.* [Online] Available from: http://www.oneplaneteconomynetwork.org/resources/programme-documents/WP8_Integrating_Ecological_Carbon_Water_Footprint.pdf [Accessed 23rd March 2014].

Global Footprint Network. *National Footprint Accounts, 2011 Edition*. [Online] Available from: www.footprintnetwork.org [Accessed 28th April 2014].

Kitzes, J., Galli, A., Wackernagel, M., Goldfinger, S., Bastianoni, S. (2007). A 'constant global hectare' method for representing ecological footprint time trends. [Online] Available from: http://www.brass.cf.ac.uk/uploads/fullpapers/Kitzes_M66.pdf [Accessed 20th January 2014].

Manoiu, V., Miroiu, A-C., Craciun A-I. (2014). Eco-living footprint assessment in Romania. *Global Conference on Environmental Studies, 10-12 April 2014*, Rome, Italy.

Soret, S. (2013). "Environmental footprint of vegan and vegetarian diets 30% lower than non-vegetarian diets". *6th International Congress on Vegetarian Nutrition, S.U.A.* Available from: http://www.foodnavigator-usa.com/R-D/Environmental-footprint-of-vegan-and-vegetarian-diets-30-lower-than-non-vegetarian-diets-say-researchers-We-have-to-drastically-cut-consumption-of-meat-and-dairy [Accessed 22nd January 2014].

UNEP, Taskforce on Sustainable Lifestyles. Ministry of Environment Sweden. (2010). Marrakech Task Force on Sustainable Lifestyles. *Futerra Sustinability Communications.* [Online] Available from: http://www.unep.fr/scp/marrakech/taskforces/pdf/SLT%20Report.pdf [Accessed 19th October 2013].

Venetoulis, J., Talberth, J. (2008). Refining the ecological footprint. *Environment, Development and Sustainability, 2008, 10 (4),* 441-469.

Wackernagel, M., Monfreda, C., Moran, D., Wermer, P., Goldfinger, S., Deumling, D., Murray, M. (2005). National Footprint and Biocapacity Accounts 2005: The underlying calculation method. *Oakland: Global Footprint Network.* [Online] Available from: www.footprintnetwork.org [Accessed 23rd November 2013].