

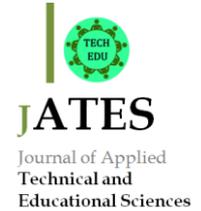


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Main environmental problems and how to deal with them in education – a review

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Abstract

Nowadays people begin to recognize that there are problems in our environment and they must do something about it. The purpose of this paper is to presents the most important environmental problems without a priority order. For example, we have to provide the required energy, drinking water and adequate food as well to ensure the livable environment for everyone. In order to solve these problems, it is important to understand that we have to examine them as a coherent system. Environmental education is a good opportunity to spread this mindset among students of all ages. In the second half of this study education methods are presented where environmental problems can be effectively addressed in pedagogical practice. The paper argues that environmental education is the first step to solve and to prevent aforementioned global environmental issues.

Keywords: environmental problems; sustainability; environmental education

1. Introduction

Climate change is the most popular and well-known environmental problem, that raised awareness of society, economy and politicians. On one hand this is good, as people start to do something, try to find solutions for the climate change, but on the other hand it takes away attention from other environmental problems. There are many environmental matters besides climate change that cause problems already or will cause in the near future, e.g. energy production, providing drinking water and food in the appropriate quantity and quality for everyone, or to preserve the nature. These are just the most important ones. The effects of climate change are the most obvious, but there other problems with more subtle effects. All these problems need to be addressed. To solve these environmental challenges it is necessary to have an environmentally conscious society. The way to such a society could be through environmental education. If people grew up aware of the interconnected nature of the environment, and felt responsible for global problems these could be solved or even be prevented easily.

2. Environmental Problems

Based on the Nobel Prize winner, Richard Smalley's work (2005), Szarka (2012) rethinks the most important problems that threaten humanity focusing on the environmental impacts. These are energy and raw materials (minerals), fresh water, soil (agriculture), and livable environment. These are the most basic conditions for the welfare of society. All these conditions are connected as a system; therefore they should be addressed together, as a whole.

2.1. Energy and raw materials

In the near future there is no need to fear about running out of raw materials (Schulz and Briskey, 2003; Szarka, 2008). However the availability of the rare earth elements might be a cause for concern since most of them are used in electrical devices and their consumption is increasing (Alonso et al., 2012; Koltun and Tharumarajaha, 2014). Modern man uses twelve times more energy than 100 years ago. Our energy supply is based on the cheap, easily available fossil resources (crude oil, coal, natural gas). The raw material reserves are limited and their mining, transport and manufacturing impact the environment (Sorrell et al, 2010). Nuclear energy has a huge impact on environment and it could be hazardous as well. Our energy requirements are not manageable by renewable energy alone. The biggest problem is not the type, but the amount of energy used. Decreasing energy consumption would be the best solution.

2.2. Fresh water

Although 70% of the Earth's surface is made of water, but only 3% of it is freshwater, and two-third of that is ice and snow. The biggest part of the freshwater supply is ground water that is hard to access. Freshwater supplies are limited and humanity simply consumes more than nature can provide. Surface waters are already contaminated and we started to get to ground water sources too. The distribution of drinking water is uneven, the poorest regions are lacking drinking water, while in contrast, advanced countries use drinking water in excess (Nield, 2005).

2.3. Soil resources

Soil is the source of life. The population is growing, so more and more fertilizer is used to ensure sufficient quantity and quality of food. The overuse of fertilizers is polluting the soil, the surrounding water reserves and the atmosphere. The agricultural soil erodes faster than it could be regenerated (Szarka, 2012). Our ability to increase food production is limited, it will not grow infinitely. The human impact on the surface of the Earth is larger than the natural processes (Crutzen, 2002). Overconsumption is the biggest concern in the case of soils, too.

2.4. Environment

Changes in our environment are most visible in the case of weather, climate and biodiversity. It is not known exactly how big of an effect we have on Earth's climate, but the effect and the change is undeniable. People won't necessarily be able to adapt to changes this quick. Extreme weather conditions cause problems both directly by affecting health and indirectly by making food production harder.

The general consensus between scientists is that climate is changing. Some researchers state that the weather is changing because of human factors and that this is a problem that should be dealt with immediately (Takács-Sánta, 2007, Bartholy et al., 2011, Gelencsér, 2017), while others say that these human factors are insignificant and that this takes attention away from more important problems (Smalley, 2005, Szarka, 2012, Harangi, 2017).

All throughout Earth's history species evolved and went extinct, but the rate of species formation was always greater than the rate of extinction over larger time periods which ensured biodiversity. Humanity increased the rate of extinction 100-1000 fold, which is unprecedented. Biodiversity is beneficial for both humans and the environment: soils with lower biodiversity have lower yields, balances get thrown off and ecosystems are destroyed (Vida, 2013).

Over the last one and half century humanity has altered the composition of the atmosphere considerably. Greenhouse gases (nitrous oxide (N₂O), carbon-dioxide (CO₂), methane (CH₄), sulfur-dioxide (SO₂)) and aerosols have increased in concentration, while stratospheric ozone reduced (Beaulieu et al., 2011, Gelencsér, 2017). Some scientists (Keeling, 1960, Dlugokencky et al., 1994) think that the increasing concentrations of these gases have a big effect on climate change and they have other serious associated health risks. "Eco-friendly" technologies and slowing down consumption could help reducing these effects.

A new ozone-depleting gas has been identified: N₂O besides being a greenhouse gas has an ozone-depleting effect as well. The biggest source of N₂O is agriculture and soil. In areas where farmers use fertilizers with high nitrogen content the emission is considerably greater (Ravishankara et al., 2009). This is a sensitive subject: people have to eat but also need an ozone layer to protect them against the sun.

More and more trash is generated and the wasted resources mean that we put a greater strain on natural resources than necessary even without taking waste management into account.

3. Solutions for global environmental problems

Jancsovszka says that (2016) global environmental problems are only solvable through international collaboration. The aim of this collaboration would be to ensure continuous

development while not endangering the needs of future generations. This was the topic of multiple international conferences in the last decade.

The Sustainable Development Goals is a system that includes global aims, targets and indicators that the UN members will have to take into account in the next 15 years during their political decision-making processes (<http://www.un.org/sustainabledevelopment/>, UN, 2015). This went into effect in January 2016. It includes 17 sustainable economical, environmental and societal goals (Jancsovszka, 2016).

It's not enough to sign an agreement like this, but to keep in line with its goals people need to make them part of their everyday lives. There are successful agreements but they are few and far between. People can't expect politicians to solve these issues through laws and policies, these issues need actions from the general public as well. Grass-root organizations can provide solutions and substantial gains, starting from individuals. This is where environmental education is really important.

4. Environmental problems and education

The goal of environmental education is to teach people to live in harmony with and to protect and preserve the natural, built and social environment. This is a process through which people get to learn about their environment and about living in a sustainable fashion (Havas, 1993, Malatinszky, 2009, Wals et al., 2017). Children are especially open to environmental education, because their habits are still malleable. As people get older, their habits and their way of life becomes more and more difficult to change, so education has to begin early. Environmental education is not a simple subject; it's more of a mindset and a practical method to create a globally conscious society. Most of the big environmental problems are already known, but we need to improve on transferring this knowledge, along with a system-conscious viewpoint to the next generation.

4.1. The role of schools and sustainable development

Varga et al. (2011) investigated the role of schools taking public action in the fight for sustainable development. School studies have to get closer to everyday life and students should take part in more projects that need cooperation between different social groups. The first objective should be to obtain the knowledge necessary for a sustainable development.

4.2. Development: the key to sustainability could be geosciences

Lampert (2011) developed a method and study matter based on one of the 12 issues of GEO-FIFIKA (published in 2008) books, because he thinks that the problem of sustainable

development will be solved by geoscientists. In his opinion all of the other well-edited and easy-to-understand issues could be used to teach any age group with the appropriate methods and additions. Based on this method study matter could be developed based on the other issues as well.

4.3. Developments: Soil, a less interesting subject

Halbritter (2011) didn't find enough teaching material about soil so he developed one of his own. He constructed a practical class (field work, collecting samples, empirical investigation, lab experiments and water-permeability tests) where students learn by experiencing what they would normally learn about by reading books.

There is more and more teaching material focusing on this kind of knowledge and if any field is lacking, Lampert and Halbritter are good examples that useful material can be developed for any field.

4.4. Computers and environmental education

Nowadays computers, tablets and smartphones are a part of everyday life. Halácsi (2011) says that internet use can improve the global viewpoint and systematic view of students, and that it's fundamentally important in getting to know global processes. Studies proved that a deeper understanding can be achieved if students talk about real-world problems and they actively participate in looking for solutions. A good example for this is BEAGLE (Biodiversity Education and Awareness to Grow a Living Environment) and Carbon-dioxide detective project.

Games are a key to how children learn. To connect games and environmental education with technologies we get environmental protection PC games (Szigeti and Horváth, 2012).

5. Conclusion

There are many environmental problems to solve: energy, drinking water, quality food for everyone, climate change and preserving nature just to name a few. These problems are just symptoms of our increasing consumption, so it is not practical to make them a priority; instead the root of the problem needs to be eliminated and we need to change the way people think. Environmental education could be a good solution to solve these problems. With an environmentally conscious society it is possible to solve or even to prevent the problems.

It is not a new idea; long ago this thought was natural, as this Chinese proverb says:

„If you are planning for a year, sow rice;

If you are planning for a decade, plant trees;

If you are planning for a lifetime, educate people.”

References

- Alonso, E., Sherman, A.M., Wallington, T.J., Everson, M.P., Field, F.R., Roth, R, Kirchain, R.E. (2012): Evaluating rare earth element availability: a case with revolutionary demand from clean technologies. *Environ. Sci. Technol.*, 46(6), pp. 3406-3414
- Bartholy J, Bozó L., Haszpra L. (ed.) (2011): *Climate Change – 2011, Climate scenarios for the Carpathian Basin*. MTA-ELTE Department of Meteorology, Budapest, pp. 281
- Beaulieu J.J. et al. (2011): Nitrous oxide emission from denitrification in stream and river networks, *PNAS*, 108(1), pp. 214-219
- Crutzen, P.J. (2002): The „anthropocene”. *J. Phys. IV France*, 12, Pr10-1
- Dlugokencky, E.J., Steele, L.P., Lang, P.M. And Masarie, K.A. (1994): The growth rate and distribution of atmospheric methane, *Journal of Geophysical Research*, 99, pp. 17021-17043
- Gelencsér A. (2017): *Climate Change and Human Activity*. *Magyar Tudomány*, 178(6), pp. 674-679
- Halácsi Á. (2011): Sustainability education with the help of internet. *Új Pedagógiai Szemle*, 2011/1-5, pp. 390-396
- Halbritter A. (2011): Make the difficult easy, how to present soil in ESD. *Új Pedagógiai Szemle*, 2011/1-5, pp. 422-430
- Harangi Sz. (2017): Climatic Effect of Volcanic Eruptions: Even the Small Ones Could Have a Role! *Magyar Tudomány*, 178(6), pp. 664-673
- Havas P. (ed.) (1993): *Environmental education of elementary students. Alapítvány a Magyarországi Környezeti Nevelésért – Réce-füzetek I.*, Budapest; 77 p
- Jancsovicska P. (2016): Sustainable development goals. *Tájökológiai Lapok*, 14(2), pp. 171-181.
- Keeling, C.D. (1960): The Concentration and Isotopic Abundances of Carbon Dioxide in the Atmosphere, *Tellus*, 12(2), pp. 200-203
- Koltun, P., Tharumarajaha, A. (2014): Life Cycle Impact of Rare Earth Elements. *ISRN Metallurgy*, vol. 2014, pp. 1-10
- Lampert B. (2011): Our Environment the Earth - Developing natural science competence through geosciences. *Új Pedagógiai Szemle*, 2011/1-5, pp. 372-389.
- Malatinszky Á. (2009): *Environmental education. Egyetemi jegyzet*. Szent István Egyetemi Kiadó, Gödöllő. 99 p
- Nield, T (ed.) (2005): *Groundwater - reservoir for a thirsty planet? Earth sciences for society*, (2) pp. 1-16. <http://yearofplanetearth.org/content/downloads/Groundwater.pdf>
- Ravishankara, A.R., Daniel, J.S., and Portmann, R.W. (2009): Nitrous Oxide (N₂O): The Dominant Ozone-Depleting Substance Emitted in the 21st Century, *Science*, 326, 123–125.
- Schulz, K. J., Briskey, J. A. (2003): The global mineral resource assessment project. U.S. Geological Survey, Fact Sheet FS-053-03, <http://pubs.usgs.gov/fs/fs053-03/>
- Smalley, R. E. (2005): Future Global Energy Prosperity: The Terawatt Challenge. *MRS BULLETIN*. 30(6), pp. 412–417.
- Sorrell, S., Speirs, J., Bentley, R., Brandt, A., Miller R. (2010): Global oil depletion: A review of the evidence. *Energy Policy*, 38(9), pp. 5290-5295
- Szarka L., (ed.) (2008): *Natural Resources and Raw Materials (“Towards Sustainable Use”)*, GEO-FIFIKA Földtudományi ismeretterjesztő füzet (6) http://www.foldev.ggki.hu/geofifika_fuzet_6.pdf, pp. 1-8
- Szarka L. (2012): Critical Remarks Addressed to Climate Fanatics and Climate Sceptics. *Periodica Oeconomica*, (5), pp. 133-143
- Szigeti C., Horváth B. (2012): Games of environmental protection. *Fenntarthatósági Füzetek* 10. http://iffegyesulet.hu/aas_szoveg/file/188_kornyezetvedelmi_jatekok.pdf, 1-57 pp.
- Takács-Sánta A. (2007): The global climate change. *Védegylet, Presentation*: http://www.vedegylet.hu/globfeszt2/anyag/%C9ghajlat_web.pdf, 1-9 pp.
- Varga A., Czippán K., Benedict, F. (2011): The social role of schools for sustainable development. *Új Pedagógiai Szemle*, 2011/1-5, pp.259-267
- Vida G. (2013): *Renewal of the National Biodiversity Strategy*. MTVSZ, Presentation: https://mtvsz.hu/dynamic/vida_nemzeti_biodiverzitasi_strategia_megujitasa.pdf
- Wals, A.E.J., Weakland, J, Corcoran (2017): Introduction. In: *Envisioning futures for environmental and sustainability education*, Wageningen Academic Publishers, pp.19-29
- UN, 2015: United Nations, General Assembly: Transforming our world: the 2030 Agenda for Sustainable Development, pp. 1-35. http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E
<http://www.un.org/sustainabledevelopment/>