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Water as theme in the Hungarian educational system

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Abstract

There is no life without water on the Earth. With the climate change the water cycle will also change. Some regions will be affected seriously. Although Hungary is a water rich country, we have to be aware of our water resources, as most of them is not renewable. Facing to the global warming we recognized the anomalies in the precipitation of the last decades. As, a geography teacher we have several themes during our course in which we can speak about water related problems. But we must prepare and sensitize our student regarding their water usage. Water will be more precious in the closer future. We examined how the water appears in the thematic lessons during the Hungarian geography courses from the elementary to university level. We found a lot of themes in which we can introduce them to become environmentally conscious. Regarding water related problem we found that water footprint is a good tool to involve our students into challenges. On its website www.waterfootprint.org, where is a lot of educational tool as well. Our pupils found it very interesting and useful.

Keywords: water, Hungarian education, geography, water footprint; Introduction

1. Introduction

Hungary is situated in Central Europe, in the Carpathian Basin. Due to its location and geological situation, our country is rich in water, not also in rivers and streams, but we have a lot of groundwater capacity as well. As the geothermal gradient is higher than the global average, in Hungary, the groundwater is often thermal water, as well. But, in the last decade some changes were observed in the precipitation regime, not only in its amount, but also in the seasonal distribution. So, as a consequence of climate change in the future, Hungary will face some challenge regarding water, for example: torrential rain, flashflood, drought, etc. Our purpose is to show some ways of adaptation to the changed circumstances.

1.1. The Hungarian educational system

In Hungary, the public education system is composed of primary school and, subsequently, secondary or vocational school. The general school mostly takes 8 years (grades 1-8), but a part

of the children can attend to general secondary school after 4 or, 6 years, as well. Secondary schools always request an entrance exam.

So, secondary school can be 8, 6 or 4 years long (i.e. mainly grades 9-12, but possibly also grades 5-12 or 7-12). Beside secondary schools, vocational schools also exist in our country, starting after the 8th grade. In these vocational schools pupils learn basic courses, like Hungarian literature, history and mathematics, together with the selected vocational courses and practices.

At the end of the 12th grade every student needs to pass a final exam called matriculation, or baccalaureate. It is obligatory in mathematics, literature and grammar, one chosen foreign language, history and a freely chosen course of science (e.g. geography, biology, chemistry etc.). In vocational school, some vocational courses are parts of the baccalaureate. The results of these exams are counted at the entrance points to any university and college.

Figure 1 comprehends the educational system in Hungary. It shows that besides the secondary general schools there are so called vocational secondary schools. These types give a more specific knowledge about a vocation chosen for example: forestry or water management. So the pupils in vocational secondary school have special courses regarding their future profession.

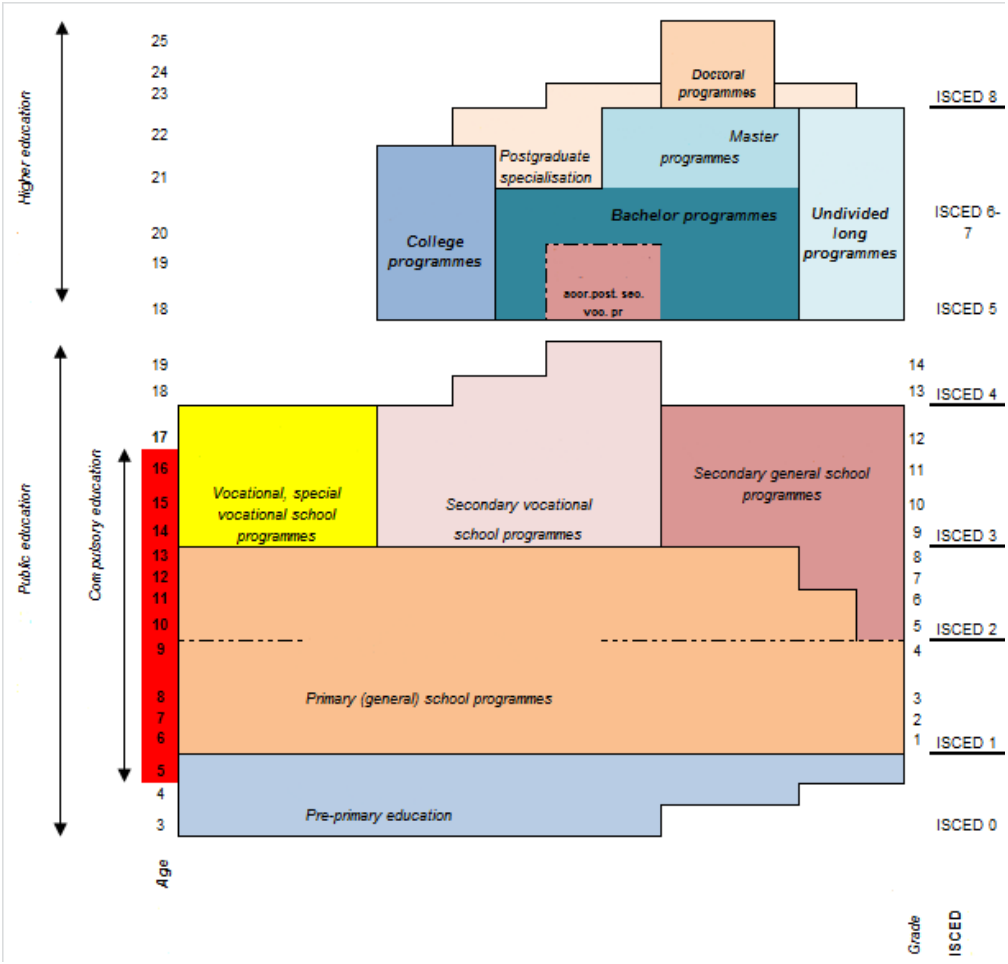

Figure 1. Structure of the Hungarian education system by age, grade and by ISCED-2011level (Csécsiné Máriás E. ed. 2015)

On figure 1 the International Standard Classification of Education (ISCED) can be seen also. According to UNESCO this is a framework used to compare statistics on education systems all around the world.

2. Water as theme in geography

2.1. Environmental studies

In the 1-4 grades, pupils do not have any course of geography, but they learn environmental studies. According to the National Core Curriculum (NCC 2012), the aim of this course is that the children get acquainted with the objects and phenomena happening in their narrow or wider environment. But, it is not an aim to describe them deeply, or to emphasize any scientific necessity. At the same time, it must insist that the complex issues seem to be interpreted using simple models, in line with the age specific characteristics of the pupils. It means that in this early age the pupils get to know the casual relationships. In the context of environmental knowledge, the aim is to develop related conceptual schemes and provide an emotional background for open observation and questing.

In the frame of this course pupils meet some water related topic such as shown in Figure 2.

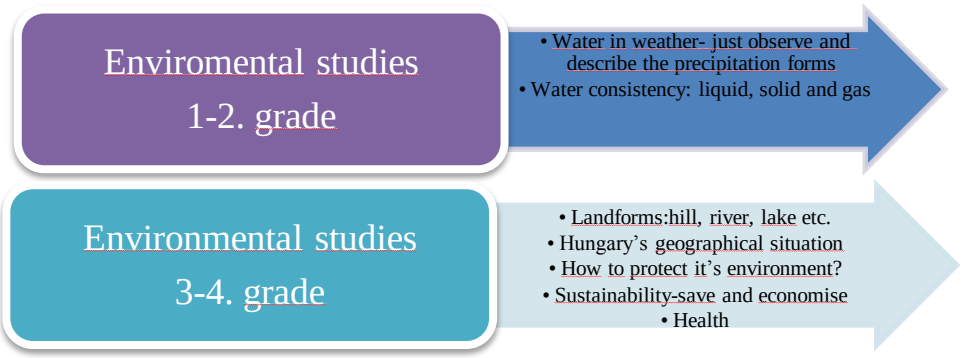

Figure 2. Water related topics in environmental studies during the 1-4 grade in Hungarian elementary schools

These topics are shown very basic level for our students. They learn to take some observation in their environment and also the water is obligatory for the life on Earth. But they do some project work also linked to World Water Day, or Birds' and Trees' Day. It could be a presentation or a poster about problems in environment.

2.2. Natural Sciences in grades 5-6.

In the next stage some new courses are introduced for elder students such as natural sciences, in which they have some introductory lessons from biology, geography, chemistry and physics. The aim of this course is to maintain students' interest in nature. Based on previously acquired

knowledge and skills, he develops the ability to observe the natural phenomena, highlights the need to explain the observed phenomena, prepares the methods of natural science cognition and establishes natural science subjects starting from the 7th grade: biology, physics and chemistry, as well as geography learning. The natural science subject, in keeping with the holistic worldview of 10-11 years old students, presents, as far, as possible, the phenomena, processes and interactions of the living and inanimate world. During the cognition, based on the elemental knowledge gained primarily through experiential learning, the students' natural sciences conceptual system gradually evolves and their abstraction knowledge is developed. The natural science subject plays an important role in the acquisition of cognitive methods, in the foundation of scientific thinking, in the formation of positive attitude towards nature. Figure 3 shows the most important topics related to water.

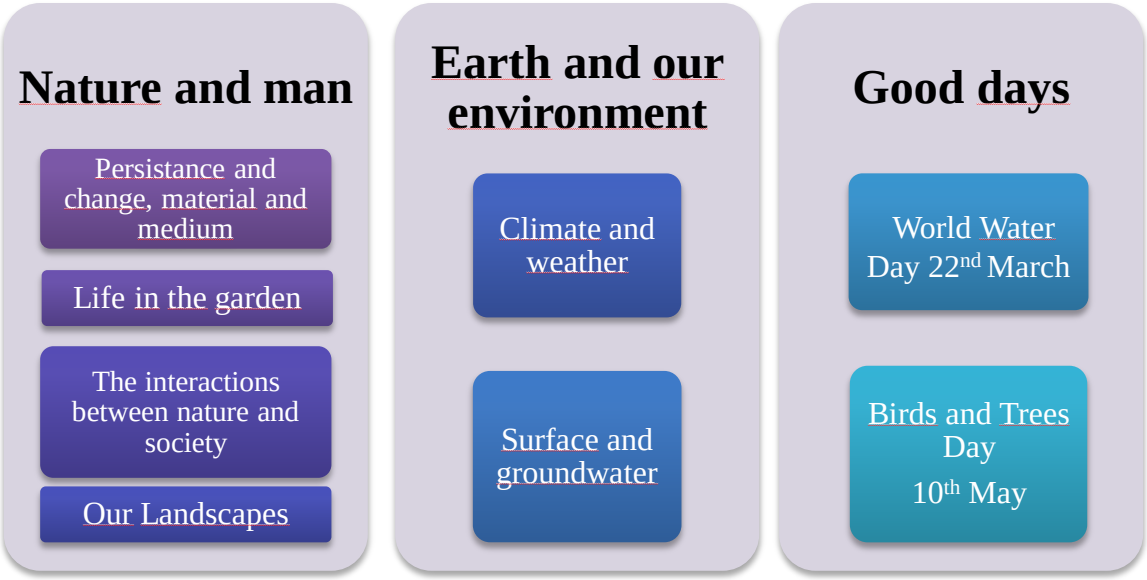

Figure 3. The water related topics in natural sciences

In the lessons of persistence and change, material and medium students learn about the evidence of the volume increase of water at freezing, its consequences in the environment (collecting examples, e.g. crushing rocks, freezing water pipes). They also deal why is water, air and soil indispensable for living beings? So the pupils meet the properties of soil, air and water and also their role in the life and in human's life (concrete examples).

Our students have lessons about the different type of water: surface and groundwater from which the humanity can get the drinking water supply. Some water related challenge is mentioned in these lessons, such as inland water on the crop fields, inundations, and how we can defend our home or cropland.

Regarding surface water they learn about the most standing waters and rivers of Hungary. They meet such concepts as catchment area, waterway, streams and rivers etc.

In this age, and course we teach them some environmental problems as well such as what it waters pollution, what are the signs of water contamination. What damage can floods and inland waterways cause? What threatens our drinking water supply in Hungary? What are the properties of healthy, good drinking water? How can we save drinking water at home and in school? In this way they can form own conceptual models about water and its environmental issues.

2.3. Geography in grades 7-9

In the last decades the weekly number of geography lessons decreased slowly. Nowadays a student of grades 7-9 has only 1 or 2 hours every week (Ütőné Visi, J. 2002). Geography teaches students the basic tools and methods that help them to understand natural, socio-economic and environmental characteristics, processes in the narrower and wider environment. Its focus is on the natural, socio-economic and environmental processes, phenomena, their interactions, and the economic and environmental events of today. The geography course, in addition to natural and social geography and regional science, represents a number of geosciences in public education, integrating geological, atmospheric, hydrological, soil and planetary knowledge. The subject of the subject is the lower level environmental knowledge, and 5-6. in the grades of science, so it is based on the requirements of which it implies. Continue with steps 5-6. integrated knowledge acquisition in the classroom and the development of a unified natural science approach. It looks at the apparent contradiction of constancy and change, the systems of systems, the relationships between structure and function, material, energy, and various forms of information in their regional appearance. It always links their socio-economic use to natural features, and adapts social and economic elements together, thereby rejecting the foundations of social science. In order to understand the natural, environmental, and socio-economic processes of our ever-changing and globalizing world, we need continuous information and information, and open thinking. Therefore, acquiring content is unimaginable without the learner's increasingly independent information management activity. Thus, in the teaching-learning process, emphasis is placed on the development of information acquisition and the processing of information, in particular the use of the opportunities offered by the experience and the digital world. Because geography is a task for students to become familiar with their local, regional, and global environments and reality is changing rapidly, students are forced to constantly update their knowledge (EMMI 2012a). Figure 4 shows the main topics in which children meet the theme of water, or water related challenges. It means the learn that there are several region of the world

where the water is abundant, but also meet the concept of desertification, and water shortage regions (Sahara and Sahel, Iran, and near East, some region of India).

Figure 4. Some topics of geography in the Hungarian education

During these lessons children have discussions about world disaster, tsunamis, floods, ocean world sea, main rivers, seas, etc. Hungary's natural and cultural values. In this last theme we say a few words about the water cyanid pollution of the Tisza river in 2002.

2.4. Water in grades 9-10.

According to EMMI (2012b), geographic content is processed by the students' geo-environmental thinking, local, regional and global perspective. They understand that nature is a unified whole, the Earth is a unified but ever-changing system in which one lives as a natural and social being, and that requires a sound management of resources. The field of art presents all phenomena and processes in spatial and temporal changes and continuous transformation, showing their causes and possible consequences. Consequently, the responsible behavior of students in a narrower and wider natural and social environment can gradually develop. By evaluating globalizing economic, social and environmental processes, it is possible for students to become familiar with the nature transformation of humanity across the globe and the resulting global natural and social problems, so that they can also provide useful points for the future directions of these problems for the coming decades. Figure 5. shows some main topic in which our students learn about water.

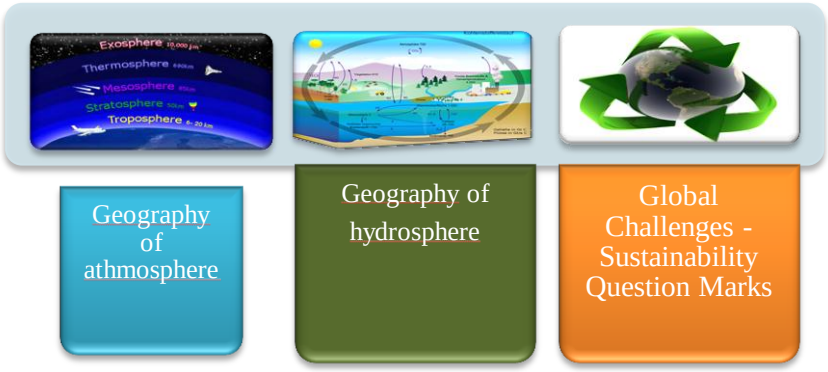

Figure 5. The 3 main topic at grade 9-10 in which student meet the water at geography courses (the source of photos ClipArt of Word)

Presentation of the effects of the atmosphere as system processes on the Earth as a whole. Creating a demand and capability for attractive, responsible environmental behavior by presenting the effects of human activity on atmospheric processes, identifying the need for personal responsibility and action.

Recognizing the socio-economic consequences of processes occurring in the water cycle. Developing thinking by changing changes in increasing production and consumption in the hydrosphere, seeing the other fate of humanity.

Understanding that preserving the balance between natural and socio-economic processes, the principles of eco-conscious production and consumption are essential for the future of our planet. The local process - in the sense of a global consequence principle - recognizes the responsibility of the individual and local communities. Creating a demand for continuous orientation on environmental issues, developing the need to know the environmentally friendly products, processes, and critical information about the topic in the media.

This gives us more connection point to global water crisis. At this age the pupils have already some self-thought about the humanity and environmental problems and also they are very critical about the steps did toward the sustainability. After this level the students have the possibility to take their baccalaureate exam.

2.5. University level

In our Institute, we have two basic formations: at BSc and MSc levels we train geographers and at master level we deal with geography teacher trainees, as well. In these two forms we have several courses about environment, sustainable development, ecosystem services and hydrology. For those who are interested in water and its role we offer a special course named water as resource and risk. In the frame of this course students have deep scientific lessons about floods

and inundations, the effect of dams, water as renewable energy, and also they have discussions about water crisis, sustainable development goals.

During this course, use of the water footprint concept is initiated. This concept was introduced by Hoekstra (2003). It works like the ecological footprint, which is used widespread. Water footprint can be calculated for a nation, a product, or an individual. During our courses we took the example of tea and coffee consumption of Netherlands as it is seen in Figure 6.

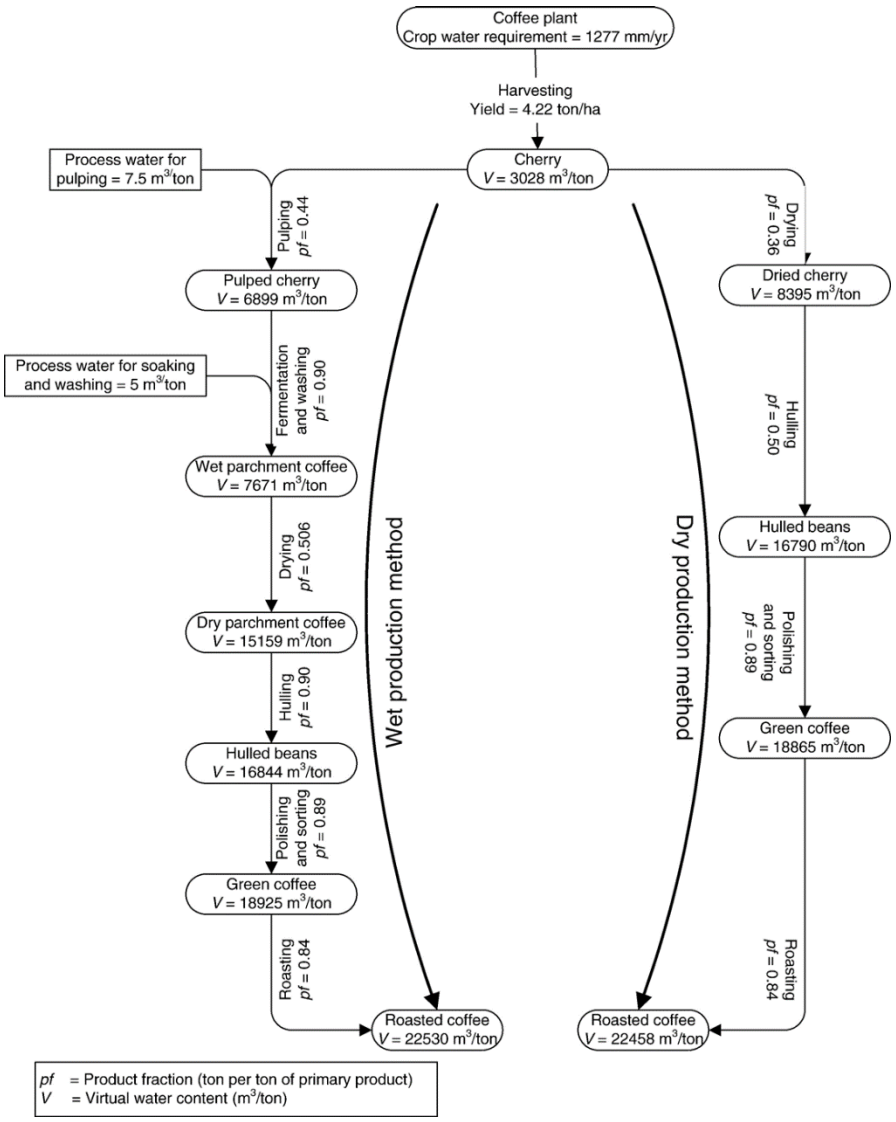

Figure 6. Steps in the calculation of the virtual water content of coffee under the different production methods. The numbers arefor Brazil.. (Chapagain, A.K., Hoekstra, A.Y(2007.))

Depending on the Fig.6. the virtual water was also introduced, and green, blue and grey water. This is the water amount, which was used for the transportation, or packaging of the product. We also use the webpage of water footprint. This page offers for teachers a lot of tools and examples for educational purpose.

For our students this concept was really new. They have never heart about water footprint. As we look after other datas in this topic on the webpage, we saw several ineteresting datas. It

shcoked our students and they started a discussion about how they can change their water using habit to decrease the received amount.

3. Consequences

Although, our educational system is a bit repetitive, our students do not have interested and responsible attitude towards the environment. It seems that the information learned in primary or secondary school, are not enough to create this attitude. The situation is better in the "ecological" schools, where there are several possibilities. During the school-year there are various programs and projects for environmental and nature protection.

As we can see, the water related lessons are on wide range, and it depends on the teacher what methodology, or tools are used during the class. But we see at the university that the students have not so big environmental awareness. They do not own the slogan: "Thinking globally, doing locally!". To make them more conscious water user, we forced them to calculate the water footprint to see how much water they use in average. The numbers were shocking for them and they tried to think and live their everyday life in a different way.

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Short professional biography

Lívia Kürti is working at Eszterházy Károly University, Department of Physical Geography. She is assistant lecturer, and she teaches courses from 2014: physical geography, karst morphology and also Water as resource and risk. Her PhD research topic is karst water, mainly karst sources and anthropogenic effect on karst hydrological system in the Bükk Mountain. She has MSc of geography and also teacher of geography degree. She is member of the Hungarian Society of Geography.