Sustainability and Geography Education

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Abstract

The balance between man and nature has been disturbed in many places on Earth. At some places, however, we can see how people have been able to organize their society in a more sustainable way. One of the important conditions for a more sustainable society is to have knowledge of the functioning of the different systems that feature both humans and nature on Earth. Geography is the discipline where this knowledge is available. In spite of many good ideas about modern geography education, geography education in many schools is of low quality or not existing at all. The central question of this contribution is what kind of geography education can be helpful for the citizens of today and tomorrow to learn in a sustainable way about sustainability and other key issues in our society. Young (2008) and others argue that we need “Powerful Knowledge”, which means that we need knowledge to critically think about the systems we are living in. Geospatial technologies can be very useful tools in the process of knowledge acquisition and presentation. Systematic and meaningful geographic learning can be sustainable and enables people to travel on planet Earth with a different view.

Keywords: Geography Education, Sustainability, Powerful Knowledge, Meaningful Learning, Charter, Geocraft

1. Introduction

One of the best things of my secondary school period almost 50 years ago was that my biology teacher gave me a book to read that had a great impact on my life. The book was “Silent Spring” written by Carson (1962). Rachel Carson, a marine biologist, wrote about the increased use of pesticides, especially DDT. Her point was that although pesticides kill insects, they also kill fish, birds, and other animals and are even dangerous for human beings. This book fascinated me. Carson asked good questions about the impact of chemical industry and new technology. Carson wrote about the relations between man and nature and about the systems on Earth taking in account borders between different regions and the limits of what man and nature can manage. “Silent Spring” opened my eyes for sustainability and human-environment interactions in the context of specific places and locations. Looking back, it was my take-off for geography and geography education.

In the next paragraphs, three issues will be presented about sustainability. Firstly, some aspects of sustainability in society will be presented, secondly the focus is on sustainability
in geography education and last but not least attention will be given to the sustainability of geography education. The three issues are related as will be made clear. Before the start of these paragraphs, it is good to give a definition of sustainable development. Many authors follow the definition of former Norwegian Prime Minister Brundtland, past chair of the UN World Commission on Environment and Development, who described in 1987 sustainable development as “the development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (De Wolf et al., 2012, p. 13). A useful definition because sustainable development is more than protecting plants and animals, it has also to do with the way we, rich and poor people, are living together on planet Earth. However, Wals (2015) argues that “sustainability remains a contested concept both normatively and scientifically although consensus about the rapidly declining state of planet earth seems to be growing”. Huckle and Wals (2015) advise us to be critical about sustainable development. Not everything what is advertised as green or sustainable really is green or sustainable. Be care of “green washing”, Huckle and Wals warn us, also in education for sustainable development. The title of their publication is not for nothing called “The UN Decade of Education for Sustainable Development: business as usual in the end”.

2. Sustainability in society

Ten years after “Silent Spring” Meadows et al. (1972) published “The limits to growth”. This report focuses on main global issues such as population growth, food scarcity, industrialisation, the use of resources and environmental problems. Although the foundation of the presented results was discussed in some reactions (Bardi, 2011), the report was the start for a worldwide discussion about economic growth and its effects.

An important question is “Where do we stand 50 years later?” Has sustainable development improved after all this years? The answer is not easy to give.

The answer is no if we look at all the media information about recent disasters which seem to be of the same category as the disasters described by Rachel Carson. If we look at air pollution in big cities such as Beijing, Jakarta and Mexico City or at the plastic soup in the great oceans on the globe, environmental problems do not seem to become smaller after 50 years but more global. The air pollution in Beijing has not only an impact on the people in the agglomeration of Beijing and in Northeast China but also on other continents. Researchers in the US say that part of the air pollution in San Francisco blows over from China (Ewing et al., 2010). In her book “Earth is our business” Higgins (2012, p. 3) says that “Ecocide is the extensive damage to, destruction of or loss of ecosystem(s) of a given territory, whether by human agency or by other causes, to such an extent that peaceful enjoyment by the inhabitants of that territory has been severely diminished”. Higgins argues that we need international laws to save the Earth. She adds that we have a Universal Declaration of Human Rights, but something like that does not exist for the Earth.

Although we have no laws yet to save the Earth, many people will argue that after 50 years we are heading in the right direction. We have made steps forward with the 2015 Paris Climate Agreement, with the growth of solar energy and the extension of wind farms. It seems doable to harvest solar and wind energy in areas where there is plenty of it. Nevertheless investments in sustainable development go slow. Only 5% of the 2014 energy consumption in the Netherlands was based on renewable resources such as wind and sun (Ministerie van Economisch Zaken, 2016). Other countries do better but there is still a world to win. Short term economic and political advantages and the interests of those who have the power often impede real change. And there is more than just solar and wind energy to work on. Hazard management, water management, waste management, a more fair distribution of food and work, are all issues that need more attention if we really want to realize more sustainable development. So there is still a lot to do in the field of sustainable development. Geographers have a unique position to take the lead. Dansero and De Luca (2014, p. 387) cite Vallega who wrote that:
Con la sua capacità di leggere ed interpretare in modo transcalare e connettivo le relazioni tra la società e l’ambiente, la geografia può contribuire alla riflessione sulla necessità di un’eco-ristrutturazione sociale, economica e politica che sappia coniugare innovazione tecnologica e sociale nel perseguire contemporaneamente i molteplici obiettivi della sostenibilità.

The message of this Italian text is that geography by its ability to relate society and environment can very well contribute to restructuring society bringing together modern technology and social renewal taking in account aims of sustainability.

3. Sustainability and geography education

As sustainable development requires knowledge and engagement, education can play an important role in sustainable development. Geography education is in an excellent position to offer this knowledge and involvement. The UN 2030 Agenda for Sustainable Development has 17 Sustainable Development Goals (https://sustainabledevelopment.un.org/sdgs).

Geography education can help to build bridges between different goals. “Quality Education” (goal number 4) and other goals like “No Poverty” (goal number 1), “Clean Water and Sanitation” (goal number 6) or “Sustainable Cities and Communities” (goal number 11) can be connected in geography education.

Another important document for geography educators is the 2016 IGU International Charter on Geographical Education, that states: “Geography is a vital subject and resource for 21st century skills living in a tightly interconnected world. It enables us to face questions of what it means to live sustainably in the world. Geographically educated individuals understand human relationships and their responsibilities to both the natural environment and to others. Geographical education helps people to learn how to exist harmoniously with all living species” (IGU-CGE, 2016). However, the same Charter also says “geography education is neglected in some parts of the world, and lacks structure and support in others” (IGU-CGE, 2016). In many countries schools focus on teaching mathematics, sciences, history and languages and do not give much attention to geography education. De Vecchis, Pasquinelli d’Allegra and Pesaresi (2011) described the position of geography education in Italy and how to improve geographic illiteracy.

One of the consequences of the weak position of geography in schools is that the time to learn about sustainable development is limited in many schools. That is strange. As we live in a time with big sustainability issues, a time in which the world is changing very fast, and a time in which a huge amount of information is coming to us, schools should help pupils to see the wood for the trees.

To get attention for the contribution of geography education to society and particularly to sustainable development it is better to start sustainable development projects in which geographical knowledge is indispensable than to complain about the marginalized position of geography education.

A good example of such a project is the 2016 “International Year of Global Understanding” (IYGU). This project is supported by several main organizations of scientist (ICSU, ICSS, AAG, and IGU) and will continue after 2016. It addresses sustainability in an increasingly globalized world. Societies determine the ways we live with and shape environments. IYGU wants us to realize what our daily actions mean for our local environment and for the world as a whole in order to overcome global challenges. IYGU focuses on essential daily activities such as eating, drinking, housing, working, travelling, and communicating (www.global-understanding.info). What we eat and how we handle our waste is important for the future of our local and global environment. Key messages are:

1. Everyday actions matter for global climate change.
2. Everyday decisions depend on lifestyle.
3. A global view reduces the risk of regional conflicts.
5. Sustainable change should emerge from the bottom.
Global understanding is based on joint social and natural research.
Research should address the logic of everyday life.

A second and related project is OURSUS (www.oursus.org) which stands for ‘our sustainable cities. This IGU project about global sustainable cities started in China and works with seven aspects of sustainability all represented by a different colour:

1. Red: Road and traffic
2. Orange: Land and buildings
3. Yellow: Energy and communications
4. Green: Nature and landscape
5. Blue: Water and climate
6. Indigo: Pollution and governance
7. Violet: Society and life

In many countries cities are growing fast and more and more people live in cities. The question is how we can develop living in cities in a more sustainable way. On the OURSUS website a whole range of inspiring initiatives can be found. Users of the website are challenged to upload additional information. The website also includes some examples of teaching modules about sustainable energy, and water and waste management in cities. The change from a linear to a more circular economy is an important issue in these materials. These modules aim at secondary education and include student assignments and teacher guides.

Although many curricula, schoolbooks and projects give attention to sustainability, this is no guarantee for what happens in classrooms. If we really want to know what happens regarding sustainability in education we have to go in the classroom and see what and how teachers teach about sustainability and more importantly what the students learn about it. It is a pity that research about students ideas about sustainability is scarce. We present here the results of two small Dutch research projects.

The first investigation is a 2016 survey at a secondary school in Amersfoort, the Netherlands. 94% of a group of 14 year old students (N=123) reported in a questionnaire that sustainability is an important issue for them. Asked to write down there associations with the concept of sustainability, most of these students associated sustainability with the use of energy, solar energy and wind energy. More than 40% of the students stated that they did enough for a sustainable world using their bike to go to school or being aware where to put their waste.

The second investigation is the “Atlas of the future” project organized in 2015 by the Royal Dutch Geography Society (Beek and Knuivers, 2015). This project challenged students between 12 and 15 years of age to draw maps of the Netherlands in 2040. Supporting questions for the students were: Where do people live? How do people live? Are there still traffic jams? How do cities look like? How do we react to climate change?

More than 90 atlases from groups of students in 42 schools were produced and more than
1000 additional questionnaires were collected. Figure 1 shows a collage of the main characteristics in the atlas maps. What is striking is the attention for green energy. We see solar plants and wind farms on an island in the North Sea and also hydropower plants in the rivers. The same trend can be seen in a comparable investigation five years earlier (Adang, Notté and van der Schee, 2010) and also in the small research project from the school in Amersfoort mentioned earlier. Secondary school students in this age group believe that technology can help to solve today’s problems. These ideas will be generated by what they learn in school and at home. Although the maps are quite nice to look at, further research is necessary to investigate what the contribution of school, media and family is in the development of students ideas about a sustainable society. From the results of the questionnaires in the second investigation we learn that most students are really involved in thinking about sustainability but also that their knowledge base is not very well elaborated. Today’s Facebook generation may have more information than the generation of 50 years ago, but the question is what kind of knowledge is involved.

4. Sustainability of geography education

A main question in education is which knowledge lasts. Teaching about sustainability is only useful if that what students learn endures. This is of course also true for other themes in geography education. Although geography education is often associated with learning place names, geography educators have a different idea about it. In September 2013 during the Congress of EUGEO in Rome, a joint Declaration on Geographical Education has been adopted. Representatives of the International Geographical Union (IGU), the Italian Association of Geography Education (AIIG), EUGEO and EUROGEO agreed on the content of an action plan for geography teaching (van der Schee, 2013). The joint declaration stresses the important role of geographical education in a changing world and expresses the growing concern of the international geographical community over the shrinking role of geography in secondary school curricula (Kolosov, 2014, p. 78). This 2013 Rome declaration was the take-off of a new International Charter on Geographical Education. The new 2016 International Charter states: “Geography is much more than learning many facts and concepts. Its focus is on the patterns and processes that help us to understand an ever-changing planet” (IGU-CGE, 2016).

However, if we look at what happens in geography classes we must conclude that the aims of geography educators are often not realized yet. Bijsterbosch (2016) analysed more than 1000 geography assignments in summative tests for 15-year-old students in vocational schools in the Netherlands. Geography teachers developed these assignments. Using the classification model of Anderson and Krathwohl (2001) Bijsterbosch concluded that the majority of the test items were low-level assignments testing remembering and understanding of facts, concepts and simple relations. In other studies, we see outcomes that are in line with these results. Favier (2011) wrote a PhD study about the introduction of Geographic Information Systems (GIS) in geography education. He discovered that after some training teachers and students are able to use the new digital technology but that they have difficulty to analyse geographical relations systematically. Geography is a complex subject but many geography lessons do not go beyond the level of education of facts and concepts and that is not very helpful for understanding of our complex life on planet Earth nor very good for engagement in learning geography.

Since some decades we see a tendency to try to solve this problem systematically. Meaningful learning and deep learning are slogans that are used to describe the new direction in education. Structure and feedback are important characteristics (Hattie, 2009). Powerful knowledge and powerful thinking are terms used by geography educators, especially in the United Kingdom. Young (2008, p. 14) argues: “Powerful knowledge provides more reliable explanations and new ways of thinking about the world and acquiring it and can provide learners with a language for engaging in political, moral, and other kinds of debates”.

De Wolf et al. (2012) offered a framework to
operationalize “powerful knowledge” for those who want to teach about sustainable development. Figure 2 shows the framework for lessons about food waste in the city. The framework has been developed to help teachers to structure their lessons about sustainable development. The authors argue that for all issues in which sustainability is at stake questions can be asked such as “What are the natural and human resources involved?” and “What are the causes and effects?”.

Figure 2. A framework for teaching about sustainable development.
Source: De Wolf et al., 2012, pp. 39 and 48.

Apart from knowledge also engagement is important as has been shown in interviews with Hong Kong primary school teachers (Ng Yee Cheng and Wing Mui So, 2015). Teachers need to have in-depth knowledge but should also have a drive to act as a role model for their students to motivate them to protect and preserve the environment.

A concrete example of powerful thinking and meaningful learning about sustainability can be found in the project “Regreening Africa” (Reij and Winterbottom, 2015). In this project farmers are successful in protecting and managing trees in the Sahel zone. Local knowledge and local initiatives are combined with international support in regenerating agriculture and forestry. The trees provide many benefits as they increase the area with shadow and doing so lower evaporation, but trees also provide nutrients, fruits and firewood. The trees and shrubs help to restore degraded lands and provide increased crop yields, recharging groundwater, providing fodder and storing carbon. More information can be found on the website http://www.wri.org/our-work/project/re-greening and in a Youtube film “Re-greening in Niger, a road trip with Chris Reij”. The result is 5 million hectare of new agroforestry land in countries as Mali, Niger and Ethiopia. Instead of clearcutting of agricultural land we see the numbers of trees growing. Research in this region shows that from villages where regreening is found significantly less young man emigrate to Europe than from villages without regreening.

This Regreening Africa project is a very inspiring project about sustainable development. It shows clearly how important thinking in geographical relations and geographical systems is. The system approach is a good way to integrate sustainable development into the teaching of geography (Danahar, 2016). Man and nature are interrelated and work out differently in different regions. Focusing on human and natural relations, processes and systems in different contexts is necessary to help students learn about scenarios for development in a lasting way. This Regreening Africa project can also be very useful in geography teaching as it helps students to get a different view of Africa.

Sustainable geography education challenges students to think systematically and critically about the mosaic of regions in the world, their characteristics, relations and possible futures.

Most students like to be involved in thinking about future scenarios and planning issues. Geospatial technologies enable students to do that in a modern way.

An example is Geocraft. Geocraft can be seen as digital LEGO and is a variant of Minecraft (Scholten et al., 2016). All kind of data can be visualized with Geocraft: houses, traffic, the use of energy in different areas or the regional level of air pollution. It offers the opportunity to build a virtual 3D world, see Figure 3. It is not only useful for planners but also for students to build, analyse and discuss different geospatial scenarios.
In 2016 the Dutch Ministry Infrastructure and Environment started to develop new islands in the Markermeer. On five small islands of all together 500 hectares the government wants to plan a nature reserve and space for recreation. In addition these islands can be used to generate sustainable energy. Students of a secondary school in the city of Lelystad, located near the Markermeer, used Geocraft to develop their vision on the future of these new island taking into account the different interest of different groups of actors and taking into account the characteristics of the area. They were invited to present their designs to the Minister of Infrastructure and Environment, who spoke highly about the results of the students. This is an example to show how modern technology can be used to help students think in a systematic and realistic way about different geospatial scenarios. This project also showed student how important systematic physical and human geographical knowledge is for deeper and meaningful learning about sustainable development and related issues. Other projects such as the Italian GIS4RISKS project (Pesaresi and Lombardi, 2014) have the same main characteristics. GIS4RISKS focuses on elaborating geophysics as well as social and economic parameters. Doing so it is giving input for geography education using GIS and raising the awareness of the population at risk.

5. Conclusions

Geography offers many perspectives for futures oriented education. In futures education sustainable development is one of the main topics to discuss (Pauw, 2015). For an optimal use of geography as discipline to help students think about sustainable development, geographers should be aware of the images of geography that people have and if necessary provide other images to show what modern geography has to offer. A condition sine qua non is that teachers have the powerful knowledge and the engagement to help students think in a systematic and critical way about sustainable development. Teachers have the key to give students a different view on what is happening around them and to help them to be well equipped for the future. Geography education is more than other subjects able to help students to think in relations, systems and scenarios and how they work out differently in different natural and cultural contexts. All this is not always easy in a time in which there is not much space for nuances and different perspectives, but it is worthwhile. Education should counter-balance to make students stronger and geography has important knowledge and good tools to do so (van der Schee, 2007).

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References


Figure 3. Screenshot from GEOCRAFT 2016. Source: https://geocraft.nl.


