

Summer Course on Sustainability, River Basin Management and Climate Change in the Baltic Sea Region

**Dealing with the challenge of climate change in the Baltic Sea Region:
promoting regional sustainable development**

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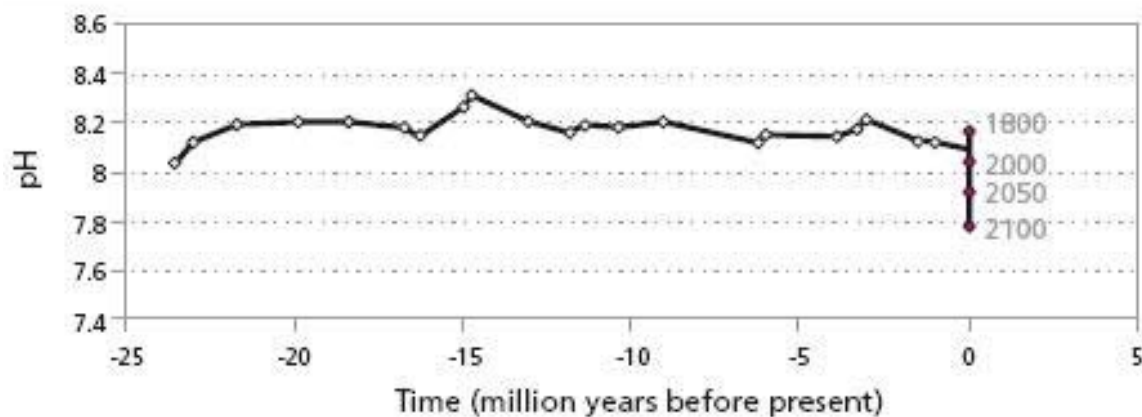
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Hamburg

Till the end of the 22nd century number of population will precipitously decrease because of growing streams of heat reaching up to 45 °C. People will be forced to move from dry areas, panic will be overwhelming and, in result, crime will reach its height. The average number of daily demises will amount to three thousands, but nobody will be surprised at the fact. This is only the beginning of a dramatic screenplay which nature can prepare for us if we do not change our lifestyle immediately.

One may ask, “What will be next?” Fires of forests will send massive amounts of carbon dioxide to the atmosphere. What’s more, the final nail in the coffin will be additional emission of carbon dioxide caused by commonly-used air conditioning supplied with energy by fuel burning. Lack of potable water for people and industry will become a great threat. Dry vegetation will go up in flames turning into a danger to nearby cities and villages. The authorities will decide to take drastic steps of choosing guards to water tanks and any sources of potable water. Humans will try to get more water than will be allotted to them by using a deceit. Panic and chaos will grow in the whole society.

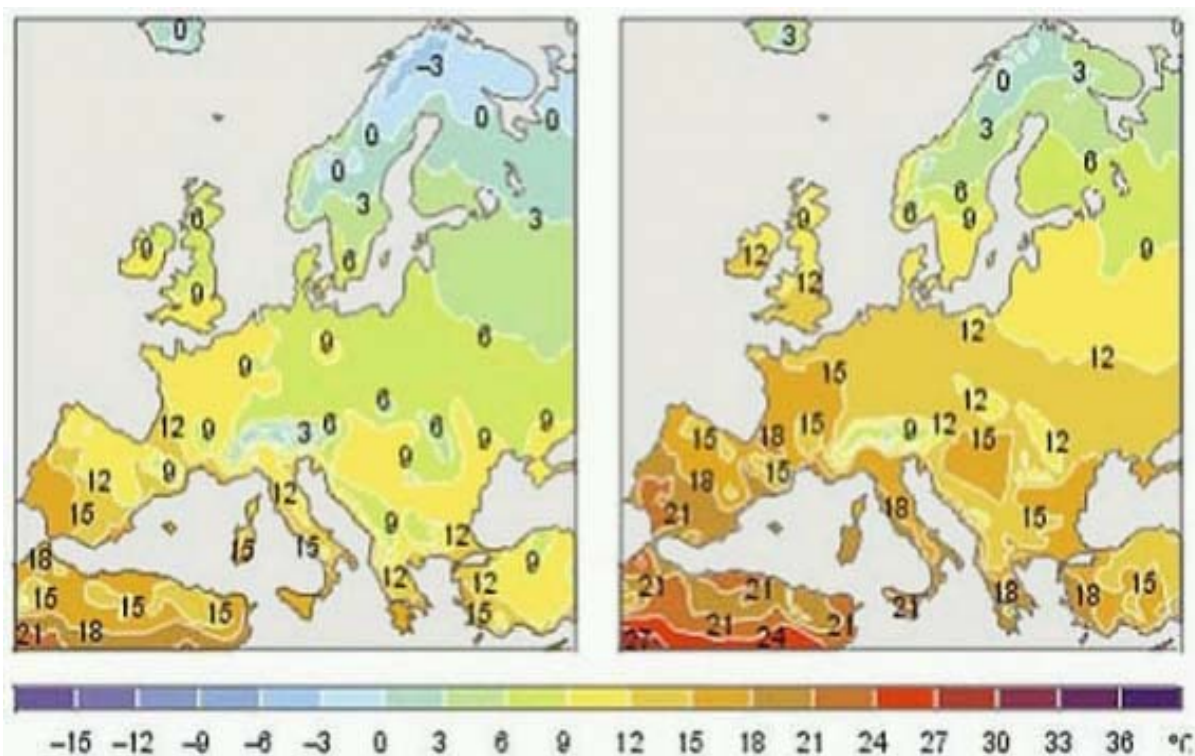
The sea level will rise four metres above his normal level drowning huge areas of earth including the biggest cities. Population will emigrate searching for any safer settlements, because they will not be able to rebuild and protect their former places. Following the track, it is essential to mention the time when winter should come. People will know the season only from old stories; in fact, only two seasons will really exist – the time of rain which will come in the time of calendar winter with temperatures above 0 °C, and summer time, extremely hot season during which people will pray for a little drop of rain. All of the mentioned dangers can be caused by excessive emission of carbon dioxide to the atmosphere. Excessive acidity can have a great influence on oceans and seas. The chart below presents acidity of the oceans (pH) within 25 million years as well as its prevision to the year 2100.



Source: <http://ziemianarozdrozu.pl/arttykul/451/aktualizacja-raportu-ipcc:-wszystko-dzieje-sie-szybciej-niz-nam-sie-zdawalo>

The lower pH value is, the higher acidity of the ocean occurs. As a result, it affects those species of water life which have calcareous skeletons, for example, crabs, mussels, corals, sea urchins, oysters and obviously sea plankton. Some of the creatures are only 0,05 millimetres small, but they have colossal meaning to the sea food chain. They are the ones which take part in removing sludge from the bottom of oceans and eliminating carbon dioxide. Unfortunately, when they die, their whole surrounding will suffer from their demise because of human thoughtlessness and carelessness. It could be much easier to protect the Earth if people cared more about the environment.

In spite of the fact that ecologists do not waste time and try hard to encourage people to change their lifestyles, and in spite of many projects prepared in order to protect the environment, it is still not enough. Ecologists warn that within the next 100 years the average annual temperature may rise up by 5 °C and it is quite a lot. The pictures below display the predicted changes of temperature which can ensue by the end of the century. On the left, average annual temperatures



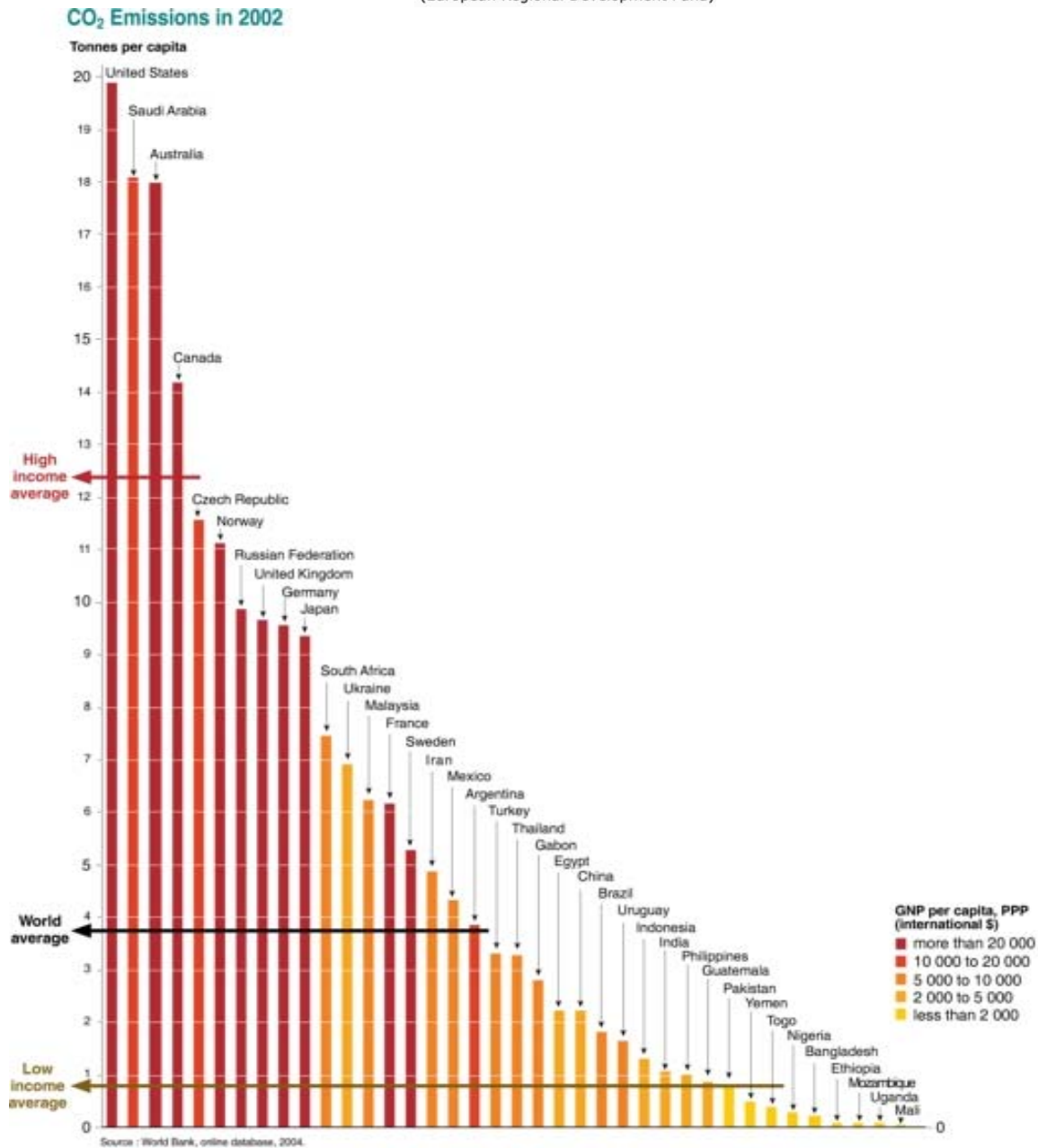
Source: <http://ziemianarozdrozu.pl/encyklopedia/107/wplyw-zmian-klimatu-na-polske>; date: 09.01.2009

are presented, on the right one can see the predicted changes. There are not enough people willing to save our globe actively.

The only one solution to the problem is immediate reduction of fumes emission. Nowadays, global warming is more and more visible. Instead of warm spring floods caused by melting snow, we have streams of heat, drought, violent storms or even floods brought about by excessive rainfalls. However, they seem to be insufficient proofs, maybe people wait for the greater number of casualties to realize how important the protection of the environment is.

It is commonly known that sewage, industrial pollutants, chemical fertilizers, pesticides, herbicides, detergents and all the pollutants coming from the littered environment flow to the Baltic Sea. What is more, all the pollutants from passenger ships and ferries can be added to the list of dangers. Instead of removing sewage according to the law in the port sewage treatment plant, they prefer to spill it directly into the sea, because it s cheaper and easier. Furthermore, there are a lot of sunbathers who leave behind enormous amounts of litter. To enlarge the list of dangers to the Baltic Sea ecosystem, it is also essential to mention pollutants caused by the oil leaking from old shipwrecks due to their corrosion, as well as litter that comes from the torn fishing nets.

The question arises again: How to find a solution to the problem? It should be obligatory to limit the burning of fossil fuels which is threatening the health of the seas and the diverse organisms living there. Gases already emitted to the atmosphere cannot be entirely removed from the air, but people can prevent sending out new dangerous matter. The below chart presents the CO₂ emission to the atmosphere in2002. It is clearly visible how different countries influence the atmosphere.



Source: http://www.ecologicalhope.org/wp-content/uploads/2007/03/web_national_carbon_dioxide_co2_emissions_per_capital.jpg, date:12.01.2010

It would be advisable to introduce new better technologies and change people's lifestyle. Instead of basking in luxury, the society should take into consideration the next generations and start to act more sensibly than before in order to protect our environment. The use of alternative sources of energy and environmentally friendly fuels can to a large extent contribute to reducing the emission of greenhouse gases. The mentioned alternative sources of energy can be water, wind or the sun. The curious claim that uranium beds can be a perfect economical alternative. It is true that one gram of uranium may deliver about twenty milliard joules of energy per day. The amount is equal to burning one and a half ton of coal. It can seem very impressive, but there is the other darker

side of the coin. Many scientific researches prove that the uranium beds would be enough only for 70 to 200 years. What is more, they exist in Russia, so the supply would be totally dependent on its owner and such situation is rarely advantageous. In addition, the problem of radioactive rainfalls appears. It may be concluded that it is better to invest straight in other sources of energy, meaning the already mentioned solar collectors, watermills or windmills. For example, if each house had such a collector, it would be repaid in three years' time.

Removing the CO₂ from the atmosphere can be helped by huge concerns which are able to detect and store it. One of the concerns is Statoil which since 1996 has forced about one million tons of CO₂ into the ground on its sandstone beds. The comes from CO₂ comes from the natural gas that lies about 1000 metres below the North Sea bottom. The area is called Sleipner. The underground store is separated from the surface with impervious layers of slates and mudstones which are perfect insulators. The company invented the idea after Norway raised taxes for the CO₂ emission. However, the end justifies the means. The system proves that it is possible to store CO₂ in deep isotropic aquifers. Furthermore, obvious ways of environmental protection are the prevention of cutting down woods and paying greater attention to agriculture, especially to its means of cultivation which should be environmentally friendly. The problem is scrutinized by the project "COHIBA" which controls the flow of dangerous substances to the Baltic Sea and creates new methods of the dangers' identification. Monitoring of the pollutants is possible thanks to the support of the European Regional Development Fund. According to Kaj Forsius, the manager of the project, "neither the government, nor the society have sufficient knowledge of how to control chemicals." The mentioned project is only one of many programmes aiming at improving the condition of the Baltic Sea. Scientists participating in different projects analyze dangerous chemical molecules in order to control the risk. Moreover, coming back to the sources of environmental pollution, great threats to the environment are rubbish tips which transform huge quantities of methane to the atmosphere. The idea of methane using is based on its detection and then taking use of it as fuel. Thanks to the idea, methane may be used as a source of heat as well as it may reduce greenhouse gas emission.

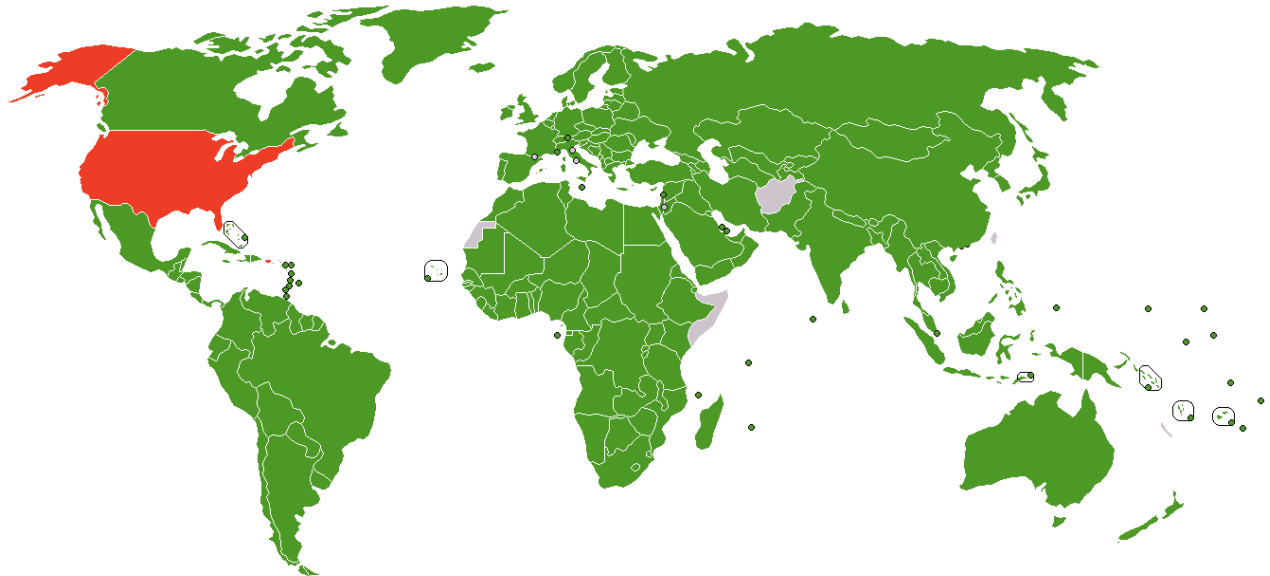
The European Union strategy for the Baltic Sea district establishes the idea that there are nine countries but one region. The bordering states have been cooperating for many years to improve the sea condition, however, it's getting worse and worse day by day. Therefore, the Commission have been working out a suitable strategy which is to guarantee a better future for the Baltic. The strategy aims at facing major challenges such as balanced development of environment, welfare maximization, as well as enhancement of the region and its safety. It is also essential to supervise the area in order to assure safety, protect fishery and prevent crime. Unfortunately, few people care about the Baltic area and fight against crime. Many people try to use the sea in a

iniquitous way. Fishery is also a very important issue as far as the Baltic protection is concerned. The condition of fishing resources has improved recently, however, it is still alarming. It is essential to control the excessive fishing. According to Christopher Beazley, a former Member of the European Parliament and a founder member of the Baltic States Inter Group, the greatest barriers to the realization of established goals will be education and culture. He meant such actions as teacher and student exchange programmes aiming at getting to know common heritage or carrying out mutual researches. On the other hand, for Cecilia *Malmstroem*, Sweden's EU commissioner, the greatest challenge will be the equalization of existing differences in the Baltic region.

A very interesting idea is the campaign called “The *International Clean Up Baltic.*” The members of the campaign are such countries as Poland, Germany, Denmark, Sweden, Finland, Estonia, Lithuania, Latvia and Russia. The campaign calls the whole society to take care of the Baltic area to keep the sea and the coastline clean. The project makes people aware of the dangers and the consequences that pollution can have on their lives. Their slogan is “Our sea is to be as clean as the smallest river or stream in the country.” The founders of the campaign underline that the Baltic Sea is the states’ joint treasure, and therefore they should look after it together.

At the end, it is significant to mention the ambitious protocol formed on the 11th of December, 1977, in Kyoto, Japan. The representatives of different states gathered and created a new document according to which they obliged to restrict the emission of six major gases: carbon dioxide (CO₂), methane (CH₄), nitrogen monoxide (N₂O), fluorocarbons (HFC), perfluorocarbons (PFC) and sulfur hexafluoride (SF₆). The chart below shows the CO₂ emission in different countries in years 1990 – 2025. The states obliged to reduce the emission of pollutants by 5,8% till 2008 – 2012. What is more, the European Union turned out to be more ambitious establishing that they would reduce the emission by 8%. In fact, the established goals were not fully accomplished. The reduction reached 3,3% in 2000, however, the emission started to increase again, especially in sports sector, what may be perceived as a failure in keeping promises. Therefore, actions should be taken up immediately. Fortunately, the project predicts many flexible solutions as far as economic arena is concerned. One of the mentioned solutions is the emission trading scheme that was set up in 2005. According to the scheme, a central authority sets a limit on the amount of a pollutant that can be emitted. Companies are issued emission permits and are required to hold an equivalent number of credits which represent the right to emit a specific amount. The total amount of credits cannot exceed the limit. For instance, a company emits 40 thousand tons of carbon dioxide to the air annually, the limit is 35 thousand tons. Then the company has to decide if they prefer to limit the emission by the use of ecological technologies, or if it is better to buy the 5 thousand credit from the other company which is not able to make use of their limit. The similar protocol was written between Spain and Poland, the

cost was 25 million Euros and the deal made each of the sides content. The only state that did not agree to sign the protocol was the United States of America. In spite of the fact that they are one of the most polluting countries, they refused. The following map presents the countries that joined the protocol.



Source: http://upload.wikimedia.org/wikipedia/commons/9/9d/Kyoto_Protocol_participation_map_2009.png, data: 12.01.2010

Taking everything into account, the reality seems to be very harsh. It is too late to restore the perfect condition of the environment, but it is never too late to improve it. The Baltic Sea is to a large extent exposed to pollution as it is almost completely surrounded by land. Pollution caused by sewage, refuse and emission gases from human settlements, transport, agriculture and industry has become one of the most dangerous threats to the sea and its surrounding areas. Many positive steps are being taken by the countries which border the sea, however, it is still threatened. Most people do not realize how much they need the Baltic. If the marine life dies out, there will be the end of fishing trade and tourism, the end of welfare and prosperity for the surrounding countries. What will happen to the endangered Baltic Sea in future one can only predict, but do we really want to wait for the worst?

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