Geography, geology, geomorphology, sedimentology;

Input Of Nutrients To The Baltic Sea From The Transboundary Rivers

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Excessive nutrient concentration, of phosphorus and nitrogen, lead to eutrophication of the water bodies. Eutrophication, especially in extreme cases, leads to algal blooms which are often followed by low oxygen levels when the algal material decays. Approximately 100,000 km^2 of the Baltic's seafloor (a quarter of its total area) is a variable dead zone. The more saline (and therefore denser) water remains on the bottom, isolating it from surface waters and the atmosphere. This leads to decreased oxygen concentrations within the zone. It is mainly bacteria that grow in it, digesting organic material and releasing hydrogen sulfide. Because of this large anaerobic zone, the seafloor ecology differs from that of the neighbouring Atlantic. Nutrient loads increase the amounts of algae in the sea. When algae dies and sinks to the bottom, bacteria decompose the dead algae and in the process consume oxygen. Because of the layered structure, decomposition can, in some places, use all the oxygen at the deeper layer. When there is no oxygen on the sea bottom, the phosphorus bound to the bottom is released and rapid eutrophication results. This process called inner loading. Harmful and toxic algal blooms have occurred annually in the Baltic Sea in recent years. A chlorophyll a threshold concentration of > 0.5 mg.m-3 constitutes as an algal bloom. It can be reached when water temperature > 160C, there is a daily radiation over 129 W•m-2 and wind < 6 m•s-1. Large phytoplankton blooms during springs and summer are a characteristic feature of the Baltic, where approximately 30 different species of phytoplankton could be harmful. There are 14 larger international river basins within the Baltic Sea Drainage Basin. These river basins vary in size, number of countries sharing the basins, environmental problems experienced and the way they are managed. But, they do have something in common. They are all international and they are all situated in the same geographical area, the Baltic Sea Region. The Baltic Sea Drainage Basin (BSDB) is a large heterogeneous region. The drainage basin covers an area of 1 739 000 km2, is shared by 14 countries (Belarus, Czech Republic, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia, Slovakia, Sweden and Ukraine) and home to about 84 million people. Within the BSDB there are 14 larger transboundary river basins, covering a total area of 1,050,000 km2. The following river basins have been included in the characterization: Klarelven-Trysilelva/Gota Alv, Indalsalven, Tome River, Kemijoki, Vuoksi/Lake Ladoga-Neva River, Narva River/Lake Peipsi, Gauja, Daugava, Lielupe, Venta, Nemunas, Vistula, Pregola and Oder. On November 15, 2007 in Krakow (Poland) HELCOM member countries (Finland? Sweden, Denmark, russia, Germany, Pland, Latvia,

Lithuania and Estonia adopted the Baltic Sea Action Plan (BSAP), wich is a long0term strategic dicument. It’s aim is to reduce marine pollution and to restore the safe ecological status of the Baltic Sea to the year 2021. BSAP provides for pollutant reduction of nitrogen and phosphorus compounds into the thr Baltic Sea to 135,000 t and 15,250 t respectively to the year 2016. The aim of this research is an attempt to find relationships between input of total phosphorus and total nitrogen to the Baltic Sea from 14 larger international rivers and some characteristics (area of basin, total number of inhabitants, population density, the areas of forests, shrubs, cultivated areas, areas of water bodies and total river runoff to the sea). Calculations have shown that the most informative characteristic are the population on a river basin and cultiveted areas.This may be of interest to water managers, stakeholders and other interested in international water management in the region. The study was supported by the Ministry of Education and Science of Russia, Project 14.B37.21.0651. Input of Nutrients to the Baltic Sea from the Transboundary Rivers G.T. Frumin Russian State Hydrometeorological University, Russia There are many reasons why the Baltic Sea is such unique aquatic ecosystem: (1) It is a large, (2) very shallow and (3) sheltered inland sea with (4) brackish water, (5) many coastal types, (6) in a cold climate; (7) the catchment area is heavily industrialized, with large population and an in intensive land use; (8) the Baltic Sea is also a most productive with an intensive fishing; it is (9) sensitive but with (10) great recreation potential; and (11) the present population constitutes a threat to the people, flora and fauna of all countries at its border. Excessive nutrient concentration, of phosphorus and nitrogen, lead to eutrophication of the water bodies. Eutrophication, especially in extreme cases, leads to algal blooms which are often followed by low oxygen levels when the algal material decays. Approximately 100,000 km² of the Baltic's sea floor (a quarter of its total area) is a variable dead zone. The more saline (and therefore denser) water remains on the bottom, isolating it from surface waters and the atmosphere. This leads to decreased oxygen concentrations within the zone. It is mainly bacteria that grow in it, digesting organic material and releasing hydrogen sulfide. Because of this large anaerobic zone, the sea floor ecology differs from that of the neighbouring Atlantic. Nutrient loads increase the amounts of algae in the sea. When algae dies and sinks to the bottom, bacteria decompose the dead algae and in the process consume oxygen. Because of the layered structure, decomposition can, in some places, use all the oxygen at the deeper layer. When there is no oxygen on the sea bottom, the phosphorus bound to the bottom is released and rapid eutrophication results. This process called inner loading. Harmful and toxic algal blooms have occurred annually in the Baltic Sea in recent years. A chlorophyll a threshold concentration of > 0.5 mg.m-3 constitutes as an algal bloom. It can be reached when water temperature > 160C, there is a daily radiation over 129 W•m-2 and wind < 6 m•s-1. Large phytoplankton blooms during springs and summer are a characteristic feature of the Baltic, where approximately 30 different species of phytoplankton could be harmful. There are 14 larger international river basins within the Baltic Sea Drainage Basin. These river basins vary in size, number of countries sharing the basins, environmental problems experienced and the way they are managed. But, they do have something in common. They are all international and they are all situated in the same geographical area, the Baltic Sea Region. The Baltic Sea Drainage Basin (BSDB) is a large heterogeneous region. The drainage basin covers an area of 1,739,000 km2, is shared by 14 countries (Belarus, Czech Republic, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russia, Slovakia, Sweden and Ukraine) and home to about 84 million people. Within the BSDB there are 14 larger transboundary river basins, covering a total area of 1,050,000 km2. The following river basins have been included in the characterization: Klarelven-Trysilelva/Gota Alv, Indalsalven, Tome River, Kemijoki, Vuoksi/Lake Ladoga-Neva River, Narva River/Lake Peipsi, Gauja, Daugava, Lielupe,

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