ARE INSTITUTIONAL CHANGE AND THE IMPLEMENTATION OF THE ECOSYSTEM APPROACH SUCH STRANGE BEDFELLOWS? A CASE STUDY OF HELCOM AND THE BALTIC SEA ACTION PLAN

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The Helsinki Commission (HELCOM), the governing body of the 1974 Convention for the protection of the Marine Environment of the Baltic Sea Area has expanded to include membership of the EU, Russia as a successor of the USSR and the newly independent Baltic States in 1992. HELCOM changed its structure and instruments to aid implementation efforts. The Baltic Sea Action Plan (BSAP) was adopted in 2007, with the aim of implementing the ecosystem approach (EA) to achieve good ecological status. BSAP acknowledges that the ecosystem approach is based on integrated management of human activities and the ecosystem.

Whilst HELCOM previously focused on sectoral governance, a clear shift was needed for this integrated approach. The structuring of BSAP around four strategic goals reflected the major environmental problems of the Baltic Sea but was this change accompanied by institutional changes within HELCOM? This question is pertinent as a review of the BSAP indicates that national implementation actions are lagging. This paper examines the institutional demands of ecosystem based management. It uses the Institutional analysis and development framework (IAD) to analyse the institutional changes of HELCOM to implement this new governance approach.

FOREST ECOSYSTEMS' IMPACT ON THE CARBON BALANCE

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The ability to deposit and store the atmospheric carbon in the organic matter determines the important role of the forest ecosystems in the carbon balance of the biosphere. Boreal forests, that occupies about 33 % of the land surface, contain 25 % of plant carbon and 60 % of soil carbon, which is about 50 % of the global carbon stocks contained in biomass and soil. Investigation the role of wood residues in the carbon cycle is a relatively new direction. Recently, they are considered not only as a source of atmospheric CO_2 formation, but also due to a long period of destruction in natural conditions, as a pool of long-term carbon storage, especially in boreal forests [1].

Keywords: forest, carbon stock, greenhouse gas absorption, dead organic matter, soils, biomass.

Plant biomass, including above-ground and below-ground parts, is the main conduit for CO_2 removal from the atmosphere. Large amounts of CO_2 are transferred between the atmosphere and terrestrial ecosystems, primarily through photosynthesis and respiration [2].

Greenhouse gas absorption is influenced by land use and management through a variety of anthropogenic actions such as deforestation, afforestation, fertilization, irrigation, harvest, and species choice. For example, tree harvesting reduces biomass stocks on the land [2]. Thus, some of the carbon removed from the ecosystem is rapidly emitted to the atmosphere while some carbon is transferred to other stocks in which the emissions are delayed. In non-forest ecosystems (i.e., Cropland, Grassland), biomass is predominantly nonwoody perennial and annual vegetation, which makes up a much smaller part of total ecosystem carbon stocks than in forest lands. The non-woody biomass turns over annually or within a few years and hence net biomass carbon stocks may remain roughly constant, although stocks may diminish over time if land degradation is occurring. Land managers may use fire as a management tool in grasslands and forests or wild fires may inadvertently burn through managed lands, particularly forest lands, leading to significant losses of biomass carbon. Fires not only return CO_2 to the atmosphere through combustion of biomass, but also emit other greenhouse gases, directly or indirectly, including CH_4, N_2O, NMVOC, NOx and CO [2].

The bulk of biomass production (NPP) contained in living plant material is eventually transferred to dead organic matter (DOM) pools (i.e., dead wood and litter). Some DOM decomposes quickly, returning carbon to the atmosphere, but a portion is retained for months to years to decades. Land use and management influence C stocks of dead organic matter by affecting the decomposition rates and input of fresh detritus. Losses due to burning dead organic matter include emissions of CO_2, N_2O, CH_4, NOx, NMVOC, and CO [2].

As dead organic matter is fragmented and decomposed, it is transformed into soil organic matter (SOM). Soil organic matter includes a wide variety of materials that differ greatly in their residence time in soil. Some of this material is composed of labile compounds that are easily decomposed by microbial organisms, returning carbon to the atmosphere. Some of the soil organic carbon, however, is converted into recalcitrant compounds (e.g., organic-mineral complexes) that are very slowly decomposed and thus can be retained in the soil for decades to centuries or more. Following fires, small amounts of so-called 'black carbon' are produced, which constitute a nearly inert carbon fraction with turnover times that may span millennia [2].

In the Republic of Belarus the lowest amount of carbon is contained in the extremely poor sod-podzolic sandy soils (22 tons/ha), on which the lichen, cowberry and heather types of forests are formed. With the increase in the mineral wealth of soils, the proportion of carbon also increases, reaching the maximum values (111 tons/ha) in humus-calcareous soils, on which some nettle and lamellar forest types are formed. The largest amount of carbons is contained in the peaty and peat-gley soils, where the anaerobic processes prevent the lime mineralization and the formation of peat. For comparison, the proportion of carbon in mineral soils varies from 0,4 in sand to 1,2 % in loamy soils, while the share of carbon in peat soil varies from 46,7 % in upland peat to 49.8 % in transitional peat. The maximum volume of carbon content (335 t/ha) with a high bulk density (0,133 g /cm^3) and a fraction of carbon (49,1 %) contains in the fen peat [3].

The carbon balance of forests is not stable over time, due to the dynamics of wood stocks and the amount of wood use. Reducing the increase in forest area, shifting the age structure of forests towards increasing the area of pruning and mature forests, increasing logging through main-use cuttings can actually change the carbon balance, direct the net carbon flow towards the atmosphere [4].

BIBLIOGRAPHY

1. *Zhdanovich, S. A.* Differential estimation of carbon store contained in the coarse woody debris pool in the Belarussian near natural pine forests / S. A. Zhdanovich, A. V. Pugachevskiy // Journal of the Belarusian State University. Ecology . – 2017. – № 3. – P. 101–108.

2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, IPCC, 2006. Prepared by the IPCC Program on National Greenhouse Gas Inventories, Iggleston HS / Buendia L., Miwa K., Ngara T. and Tanabe K, editors. Volume 4: Agriculture, forestry and other land uses. Part 1. IHEES, Japan.

3. National inventory report of anthropogenic emissions from sources and removals by sinks of greenhouse gases not controlled by the Montreal Protocol for the period of 1990 – 2017 RUE "Bel SRC" Ecology ". – Minsk, 2018. – 220 p.

4. *Shatravko, A. V.* Carbon flows in the forests of the Republic of Belarus / A. V. Shatravko, L. N. Rozhkov // Collection of scientific works of students of the Republic of Belarus "NIRS 2011". – Minsk, 2012. – P. 314–317.

RESPONSIBLE CHOICE OF LIGHT BULBS EQUALS HELP TO NATURE AND MEN

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This work is dedicated to analysis of advantages and disadvantages of four types of lightning lamps: incandescent, fluorescent, halogen and LED. The main criteria were economy and environmental friendliness.

Keywords: saving of electricity, light bulbs, LED, light bulbs disposal.

The aim of work: on the basis of analysis, determine the most economical and environmentally friendly kind of lamp for lighting.

Tasks:

1. to study the literature and Internet sources on this topic, identify the main types of lamps used today;
2. to conduct a comparative analysis of 4 types of light bulbs, first of all, according to the criteria of economy and environmental friendliness;
3. to make a conclusion based on the analysis about the most effective form of light bulbs;
4. to give advice to schoolchildren and their parents on the use of light bulbs at home.