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Belarusian mire and peat soils contribution to formation of sources and fluxes of CO_2 and CH_4

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The total peatlands area in Belarus before the beginning drainage and peat extraction made up 2,939,000 hectares, or 14.2% of the republic total territory. Widescal melioration and industrial peat extraction have lead to reduction of their virgin area more than 40% and to degradation of environment on a local level.

The quantity of annually transferred carbon from biogenic to geological recycling depends on conditions of water regime, plants mineral nutrition and the duration of biologically active temperature period. According to data obtained by conducting balance experiments, from 5 to 15% of biomass produced by mire vegetation annually converts to peat in Belarusian mires. This means that carbon removed from the atmosphere by mire vegetation through photosynthesis is not fully released into it.

One hectare of virgin peatland transfers from atmosphere through biogenic recycling to geological one about 150-500 kg of carbon, what makes up 550-1800 kg CO_2 per year.

Balance flux of carbon dioxide to 1676.5 thousands ha of virgin peatlands is estimated in 1388.6 thousand tons in a year.

According to their water-air modes, peatlands can remove carbon dioxide from the atmosphere as well as to be a source of its emission to the atmosphere. Meliorated, but not used now peat deposits have emission maximum (18-24.5 t/ ha per year), first of all – peatlands after peat excavation and drained peat soils under tilled crops (17.5-24.3 t/ha per year). Drained peat soils occupied by perennial grasses have emission

minimum (6.2-8.8 t/ha per year).

Emission of CO_2 to atmosphere from drained peat soils of Belarus makes up 10377.5 thousand tons. Emission of CO_2 to an atmosphere from peatlands, which are developing and after industrial exploitation, but not are handed to agriculture now is 4285.3 thousands tons. General annual emission of $CO_2$to an atmosphere from 1262.5 thousand hectares of the drained peat soils is 14662.8 thousand tons.

The annual emission of CH_4 to atmosphere from virgin peatlands makes up 40-90 kg/ha, and methane emissions from drained peat soils makes up 5-15 kg/ha. General annual emission of methane to an atmosphere from natural peatlands of Belarus is about 101.5 thousand tons.

Thus, the annual carbon dioxide emission from the drained peat soils is more than flux of CO_2 to natural mire ecosystems in ten times. Therefore the main principle of peatlands use is restoration their biosphere functions after peat excavation through their rehabilitation by secondary swamping.