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Mathematic simulation of soil-vegetation condition and land use structure applying basin approach

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cosystems anthropogenic transformation is basically connected to the changes of land use structure and human impact on soil fertility.
The Research objective is to simulate the stationary state of river basins ecosystems.
Materials and Methods. Basin approach has been applied in the research. Small rivers basins of the Klyazma river have been chosen as our research objects. They are situated in the central part of the Russian plain.
The analysis is carried out applying integrated characteristics of ecosystems functioning and mathematic simulation methods. To design mathematic simulator functional simulation methods and principles on the basis of regression, correlation and factor analysis have been applied in the research.
Results. Mathematic simulation resulted in defining possible permanent conditions of "phytocenosis-soil" system in coordinates of phytomass, phytoproductivity, humus percentage in soil. Ecosystem productivity is determined not only by vegetation photosynthesis activity but also by the area ratio of forest and meadow phytocenosis. Local maximums attached to certain phytomass areas and humus content in soil have been defined on the basin phytoproductivity distribution diagram. We explain the local maximum by synergetic effect. It appears with the definite ratio of forest and meadow phytocenosis. In this case, utmost values of phytomass for the whole area are higher than just a sum of utmost values of phytomass for the forest and meadow phytocenosis. Efficient correlation of natural forest and meadow phytocenosis has been defined for the Klyazma river.
Conclusion. Mathematic simulation methods assist in forecasting the ecosystem conditions under various changes of land use structure. Nowadays overgrowing of the abandoned agricultural lands is very actual for the Russian Federation. Simulation results demonstrate that natural ratio of forest and meadow phytocenosis for the area will restore during agricultural overgrowing.