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The function and economic value of soil conservation of ecosystems in Qinghai-Tibet Plateau

XIAO Yu, XIE Gao Di, AN Kai (The Institute of Geographical Science and Natural Resource Research, CAS, Beijing 100101,China)..

Soil conservation is one of the basic functions provided by terrestrial ecosystems. Its importance has been increasingly recognized in recent years. The development of quantitative estimation of soil erosion supports an effective way to study the contribution of soil conservation functions of ecosystems. In view of the increasing degradation of soil, this article examines the economic values and the soil conservation functions from ecosystems in Qinghai Tibet Plateau (QTP). The soil conservation functions analysed in QTP include: protection of soil fertility, reduction of soil disuse and decrease of soil deposit. The soil conservation of ecosystems is critical in QTP because it prevents soil erosion into the rivers, especially the heads of many main rivers of China, and protects farmlands. Soil erosion by water can result in the degradation of the quality of farmlands, which may lead to land disuse. Soil deposits from eroded soils can enter into water bodies and may decrease the capacities of water storage of lakes, rivers and reservoirs. Soil erosion may also result in a considerable loss of fertility in the surface soil. Ecosystems, such as forests, grasslands, farmlands and wetlands, can thus prevent those phenomena from occurring by controlling soil erosion. In order to characterize the impacts of internal heterogeneity of the ecosystems, Geographical Information System methods were used to determine the area of four classes and twenty seven subclasses of vegetation cover, and the spatial distribution of economic value of soil conservation by the different ecosystems in QTP. An integrated spatial database was initially established using a workstation based Arc/Info system. The data sets include the vegetation map at the scale of 1:1000000, the water systems map, and remote sensing landuse map at the scale of 1:1000000 precipitation from May to October of 137 weather stations in QTP from 1990 to 2000. All of the data sets and topography for QTP were organized at the scale of 1:4000000. The quantity of soil conservation (QSC) can be obtained from the difference between the quantity of actual and potential soil erosion. The quantity of actual and potential soil erosion was calculated by using the Universal Soil Loss Equation. The economic value of protection of soil fertility refers to the economic value of protection of soil fertility such as N, P and K, and can be estimated with QSC, the average content of soil nutrients (N, P and K) and the market price of N, P and K. The economic value of disused soil can be calculated with the quantity of soil conservation per hectare, the area of each type of ecosystems, the density of soil and the economic profit of area unit of each type of ecosystems. The economic value of decrease of soil deposits can be estimated with QSC , the cost of reservoir construction and 24 percent deposit rate (the ratio of the amount of soil deposit accounting for the total amount of soil erosion in the watersheds of most rivers in China). The results indicate that the quantity of soil conservation is 377 03 million t/a. The total economic value of soil conservation has been estimated to be 559 01 million yuan/a, accounting for 6 17% of the total output of plant production, forestry and animal husbandry in Tibet and Qinghai Province in 2000. The economic value of protection of soil fertility, reduction of land disuse and decrease of soil deposit are 368 06 million yuan/a, 26 48 million yuan/a and 200 47 yuan/a, respectively. All of these contribute considerably to human welfare in local area and cannot be replaced by man made ways. In addition, we analyzed the spatial distribution of the economic value of soil conservation by ecosystems of QTP. However, the soil conservation functions of ecosystems in QTP are only one contribution of the overall ecosystem services provided by them. The economic value of other ecosystem services together may be far higher. Therefore we are convinced, that the total economic value of ecosystem services must be a quite substantial contrib

【Key Words】：**Qinghai Tibet Plateau soil retention soil erosion the universal soil loss equation**

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