



Benefit evaluation and annual change of soil and water conservation after converting farmland to forest in Lanlingxi watershed

Zhilin Huang, Liang Ma, Tian Wang, and Lixiong Zeng

Research Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry, Beijing, China
(hzlin66@163.com)

As the population has grown and human activities have intensified (predominantly agriculture) in the Three Gorges Reservoir area (TGRA) since the 1980s, the substantial areas of arable land on the steep slopes are the main living and farming space for people. Chinese government implemented the Conversion of Cropland to Forest Program from 2001, because of increasing erosion hazard by excessive cultivation and over-felling. To investigate the efficiency of a range of widely recommended program for soil conservation, long-term monitoring in the Heigou watershed was initiated from 2009. Surface runoff, sediment and nutrient transport were measured at watershed. Monitoring has been done to collect sufficient baseline data about soil erosion rate, runoff rate and quantity of soil nutrients (the sum of nutrients in sediment and runoff) in the watershed. The results showed that the soil erosion modulus varied from 138.26 to 355.28 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$ among between 2016 and 2019, while average soil erosion modulus was 265.8 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$, lower than the allowable soil loss in this area. The average runoff coefficient, average loss load of total nitrogen and total phosphorus were 53.9%, 11.24 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$ and 0.19 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$. Runoff contributed more than 90% of nitrogen loss, and sediment contributed 82.7% of total phosphorus loss. The soil erosion modulus decreased significantly from 2054.06 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$ to 265.8 $\text{t}\cdot\text{km}^{-2}\cdot\text{a}^{-1}$ by returning farmland to forest, which was a severe erosion before. Loss load of soil nutrient diversion was high, and TN was excessive for surface water. The ratio of nitrogen to phosphorus would encourage algae growth and eutrophication in TGRA.