

Khongsy Vanhnasin 2012: Rainfall and Land Use Change on Potential Stream Flow of Upper Nam Ngum River Basin, Lao PDR. Master of Science (Watershed and Environmental Management), Major Field: Watershed and Environmental Management, Department of Conservation. Thesis Advisor: Associate Professor Wicha Niyom, Ph.D. 114 pages.

The purpose of this study was investigated the land use change. In particularly, the forest and agricultural land changed in the Upper Nam Ngum River Basin (Nam Ngum, Nam YothNgum, Nam Kho, Nam Lik, Nam YothLik and Nam Xong sub-basin). The situation of the land use change was determined by the percentage of forest and agricultural remaining areas and used the moving average such as 1, 3, 5, 10, 15 and 20 years to determine the variability of rainfall and stream flow volumes. The potential stream flow was applied the specific water yield formula. The simple linear regression and multiple linear regression were applied in determining the correlation of the annual stream flow, annual rainfall and land use area during 1987-2008.

The results indicate that i) During 1987-2008 the forest area in Nam Ngum, Nam YothNgum, Nam Kho, Nam Lik, Nam YothLik and Nam Xong sub-basin were clearly decreased in 33.01 % , 44.17%, 66.60%, 13.41%, 22.44% and 19.32%, respectively. The most of forest area changes was agricultural land. ii) The volume of average annual rainfall of sub-basins were 1,829.83, 1,448.31, 1,448.31, 2,346.61, 1,781.58 and 2,469.91 mm. The average annual stream flow of sub-basins were 4,315.7, 548.48, 504.76, 4,889.99, 525.08 and 2,354.47 million cubic meters. iii) The trend of rainfall and stream flow of the sub-basins were increased but they were not significant. It was only the Nam Yothlik sub-basin was found the trend decreased and it also was not significant, too. iv) The results of the potential stream flow with the annual volume of stream flow per unit area was 919,434.32, 804,322.74, 802,229.17, 984,852.69, 1,256,645.66 and 1,970,538.61 cubic meters/year/square kilometer. When representing the stream flow per rainfall was 50.25%, 54.04%, 53.90%, 41.97%, 71.17% and 80.13%, respectively

Regarding correlation of the annual stream flow and annual rainfall of sub-basins, the results indicated that annual stream flow had significant effected on annual rainfall in the same trend with the coefficient determination (R^2) were 0.617, 0.788, 0.848, 0.745, 0.919 and 0.954, respectively. For the correlation of the annual stream flow and land use area especially forest remaining area was found that insignificant. Thus, the flat forest changed to agricultural land was not influence significantly on the annual stream flow.

Student's signature

Thesis Advisor's signature