

Water Balance in the Forest Basins Essential for the Water Supply in Central America

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Abstract : The demand for water doubles every twenty years, at a rate which is twice as fast as the world's population growth. Despite its great importance, water is one of the most degraded natural resources in the world, mainly because of the reduction of natural vegetation coverage, population growth, contamination and changes in the soil use which reduces its capacity to collect water. This situation is especially serious in Central America, as reflected in the Human Development reports. The objective of this project is to assist in the improvement of water production and quality in Central America. In order to do these two watersheds in Costa Rica were selected as experiments: that of the Virilla-Durazno River, located in the extreme north east of the central valley which has an Atlantic influence; and that of the Jabillo River, which flows directly into the Pacific. The Virilla river watershed is located over andisols, and that of the Jabillo River is over alfisols, and both are of great importance for water supply to the Greater Metropolitan Area and the future tourist resorts respectively, as well as for the production of agriculture, livestock and hydroelectricity. The hydrological reaction in different soil-cover complexes, varying from the secondary forest to natural vegetation and degraded pasture, was analyzed according to the evaluation of the properties of the soil, infiltration, soil compaction, as well as the effects of the soil cover complex on erosion, calculated by the C factor of the Revised Universal Soil Loss Equation (RUSLE). A water balance was defined for each watershed, in which the volume of water that enters and leaves were estimated, as well as the evapotranspiration, runoff, and infiltration. Two future scenarios, representing the implementation of reforestation and deforestation plans, were proposed, and were analyzed for the effects of the soil cover complex on the water balance in each case. The results obtained show an increase of the ground water recharge in the humid forest areas, and an extension of the study of the dry areas is proposed since the ground water recharge here is diminishing. These results are of great significance for the planning, design of Payment Schemes for Environmental Services and the improvement of the existing water supply systems. In Central America spatial planning is a priority, as are the watersheds, in order to assess the water resource socially and economically, and securing its availability for the future.

Keywords : Costa Rica, infiltration, soil, water

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