

Watershed Technology Conference

Technical Tours

Thursday 25/02/2010

Hydrological Services (water partitioning, sediment control) in Turrialba (Costa Rica)

Turrialba is a small city in Costa Rica located at 600 meters above sea level. It lies on the slopes of the active the Turrialba volcano (3500 m) and is subjected to a tropical wet climate (≈ 3000 mm annual rainfall). The city is surrounded by large sugar cane, pasture and coffee fields.

The Reventazon River is formed by the confluence of the Turrialba, Pejibaye and AQUIARES rivers nearby the city. The electricity company of Costa Rica (ICE) operates a hydropower plant. This hydropower plant is the most powerful of Costa Rica. About 80% of electricity is from hydropower in this country. During the morning, a visit will be conducted to the lake, the dam and 3 turbines that yield 180 MW.

The problem of sedimentation will be seen, and presented as a national issue impeding the profitability and the development of hydropower. Payment of environmental services will be presented as an option to mitigate the erosion problem, with ICE as the potential purchaser of the service, and the land-users (particularly farmers) are the potential providers.

The second stop will be CATIE (Centro Agronomico Tropical de Investigacion y Ensenanza (www.catie.ac.cr)). A visit will be conducted to its facilities including its graduate school, library, botanical garden, and its laboratories. Lunch will be served at this location.

For the afternoon, the trip will head to AQUIARES, one of the largest coffee farms of the country, where the CoffeeFlux experiment is currently run by Cirad and CATIE. The aim of Coffee-Flux is to evaluate the water, sediment transport and carbon sequestration environmental services at the scale of an agro forestry Arabica coffee watershed (1 km^2). Experimental, modelling and remote-sensing techniques are combined. The watershed is instrumented with automatic flumes, pluviometers, soil moisture probes, piezometers, turbidimeters and an eddy-covariance tower (for H_2O and CO_2 gas fluxes). CoffeeFlux is monitoring the water balance partitioning (rainfall, interception, superficial runoff, infiltration, soil water balance, evapotranspiration, aquifer fluctuations and total streamflow), and the sediment yield from plot to watershed. Scientific assessment as a tool to help farming management towards the increase of environmental services will be presented.

Friday 26/02/2010

Field trip to the Sarapiquí River Basin

The Sarapiquí River Basin is a major basin of Costa Rica. It is located in the northern part of the country and drains an area of approximately 2020 km^2 . The drainage area is a sub-basin of the San Juan River Basin, which is the largest basin of Central America. The Sarapiquí River flows down from the Poás and Barva Volcanoes in a predominantly northern direction to the Santa Clara plains and to its mouth in the San Juan River. The mean annual precipitation in the upper part of the basin is approximately 4000 mm and in some areas the mean is over 7000 mm.

Land uses in the upper part of the basin are woodlands, cattle and crops like strawberries, flowers, ornamental plants and grass. Due to the land use and the annual precipitation volume, the annual runoff coefficient is over 70%. Despite the high annual runoff coefficient, the mean annual volume of sediment transported by the Sarapiquí River is 6650 ton.

In January 8, 2009 an earthquake hit the upper basin of the Sarapiquí River Basin, causing the destruction of the town of Cinchona and severely damaging the roads, houses and killing 30 persons. The earthquake also caused massive landslides and the loss of vegetation eliminating the land cover.

Because of the changes that the earthquake caused on the upper part of the Sarapiquí River Basin, it is expected that runoff patterns will change. The expected changes include an increase of the volume discharged and an increase of sediment production and transport. These changes will have an important impact on the river equilibrium, the plains and will also increment flooding risk downstream the lower Sarapiquí River Basin.

During the field trip a visit to areas affected by the landslides will be conducted. This will include a presentation in the power house of the Cariblanco hydroelectric plant of the events that occurred immediately after the earthquake, and the actions that the country is taking to monitor and manage the actual runoff pattern.