

Report of the first training course provided by the field research team to project's counterparts and target beneficiaries in Costa Rica.

Conrado Tobon and Arnoud Frumau

Project: Hydrological impacts of converting tropical montane cloud forest to pasture, with initial reference to northern Costa Rica.

Monteverde, August 10 – 14, 2003

As part of the dissemination strategy of the project and according to the objectives of the project and the programme of activities (activity 1.2 in the PMF), the field research team (Dr. Conrado Tobón Marin, MSc. Arnoud Frumau, MSc. Jorge Fallas) provided a field training course on the **“Theory and instrumentation for the development of forest hydrological research, with special emphasis on tropical montane cloud forest”**.

The course was attended by 10 Costa Ricans from various local institutions and universities (counterparts and target beneficiaries), as follows:

Dr. Julio Calvo Alvarado, Professor from the Technological Institute of Costa Rica (ITCR), Cartago; project participant.

Dr. Dagoberto Arias Aguilar, Professor from the Technological Institute of Costa Rica (ITCR).

MSc. Jorge Fallas Professor from the National University of Heredia, Heredia (UNA); project participant.

Dylana Vargas Navarro. Meteorologist from the Department of Meteorology of the Costa Rica Institute of Energy (ICE), San Jose.

Marco Sánchez Chinchilla. Topographer from the Department of Meteorology of Costa Rica Institute of Energy (ICE).

Ir. Hugo Herrera Soto Head of the Department of data communication at the National Institute of Meteorology (IMN), San Jose.

MSc. Jorge Cisneros Physicist from the Physical department of the University of Costa Rica, San Jose (UCR)

Oscar Arias Rodriguez Junior Researcher from the Tropical Studies Organization “OET”

Wagner Lopez Vargas Junior Researcher at the Tropical Science Center (TSC), Monteverde/San Jose.

Achim Haeger Participatory research project with the Tropical Science Center (TSC).

The course focused on providing the basic theory behind energy and water budget calculations for cloud forest and pasture, and the application of GPS in hydrological studies. The week-long course included two days of theory and three days of field training. Special emphasis was given to the training of the two participants from ITCR, since the project's equipment will be donated to this counterpart institute after the termination of the current measurements.

At the end of the course, some material and follow-up literature was provided to each participant, according to the specific focus of further interest of each participant.

Furthermore, initial discussions were held to prepare the ground for an agreement between the project / ITCR and the National Institute of Meteorology, with the objective of facilitating mutual data exchange, transfer of information and the FIESTA model (under development) from the project to the Institute (which is considered a target beneficiary). This agreement, similar to that signed between ITCR and ICE, will be further discussed and signed by Dr. Julio Calvo (on behalf of the project) and Dr. Hugo Herrera Soto (IMN).

The course programme (in Spanish) is listed below.

Proyecto: Impacto Hidrológico en la Conversión de los Bosques Nubosos del Tropico en pastos, con una referencia inicial en los bosques de Costa Rica.

Vrije Universiteit Amsterdam – DFID – RNNRS - ITCR

Objetivo

Proveer entrenamiento a delegados de Instituciones locales de Costa Rica relacionadas con la educación superior, aprovechamiento y manejo del Medio Ambiente y de los recursos hídricos, en la teoría y manejo de la instrumentación para el estudio de la Hidrología de Bosques, con énfasis en los bosques de Niebla.

Capacitar a científicos locales en el manejo del equipo meteorológico e hidrológico que donara DFID – RNNRS al Instituto Tecnológico de Cartago, con el fin de que se de continuidad a la presente investigación.

Introducción

The Energy Budget

- Evaporation concepts
- Energy budget components
- Radiation and ground heat flux
- Turbulence and direct flux measurements
- Characteristics of turbulence
- Statistical approach of turbulence
- Fluctuation in vertical wind speed
- General calculations rulers
- Derivation of practical methods for the determination of surface fluxes
- Similarity theories
- Turbulence closure problem
- Latent heat flux
- Sensible heat flux
- Flux profile methods
- Flux variance methods
- Combined methods (Penman-Monteith)
- Eddy correlation measurements (equipment)
- Sonic anemometer. Gathering and processing of data
- Measurements of water vapour
- Bowen Ratio – energy balance
- Variance energy balance method.

Balance Hídrico

- La intercepción de agua por la vegetación, epifitas y pastos y su evaporación desde superficies expuestas (Instrumentación).
- La precipitación neta y su papel en el transporte de nutrientes solubles hacia la superficie del suelo. (Instrumentación y arreglos de distribución espacial).
- El agua en el horizonte orgánico: Instrumentación
- La dinámica del agua en el suelo
- Propiedades físicas de los suelos relacionados con el movimiento del agua en el suelo: Medición y estimación
- Propiedades hidráulicas del suelo: Kh, pF (CRH), histéresis, parámetros VG
- Infiltración, principios e Instrumentación
- Drenaje superficial en condiciones de sobresaturación y en suelos no saturados
- Humedad del suelo y capacidad de almacenamiento. Principios e Instrumentación
- Los flujos del agua en el suelo (saturados y no saturados): Principios y aplicación de modelos
- Relaciones agua-suelo-vegetación
- Drenaje en cuencas hidrográficas (caudal)
- Balances hídricos detallados.
- Discusión: Criterios para la definición de usos potenciales del suelo cuando se pretende generar o controlar caudales de agua.

Uso y aplicación del GPS en estudios hidrológicos

- El sistema de posicionamiento global satelital
- Tipos de receptores
- Registro de datos
- Transferencia de datos instrumento-computadora