

THE LLANO BONITO EXPERIMENT

San Pablo de León Cortés, Tarrazú, Costa Rica

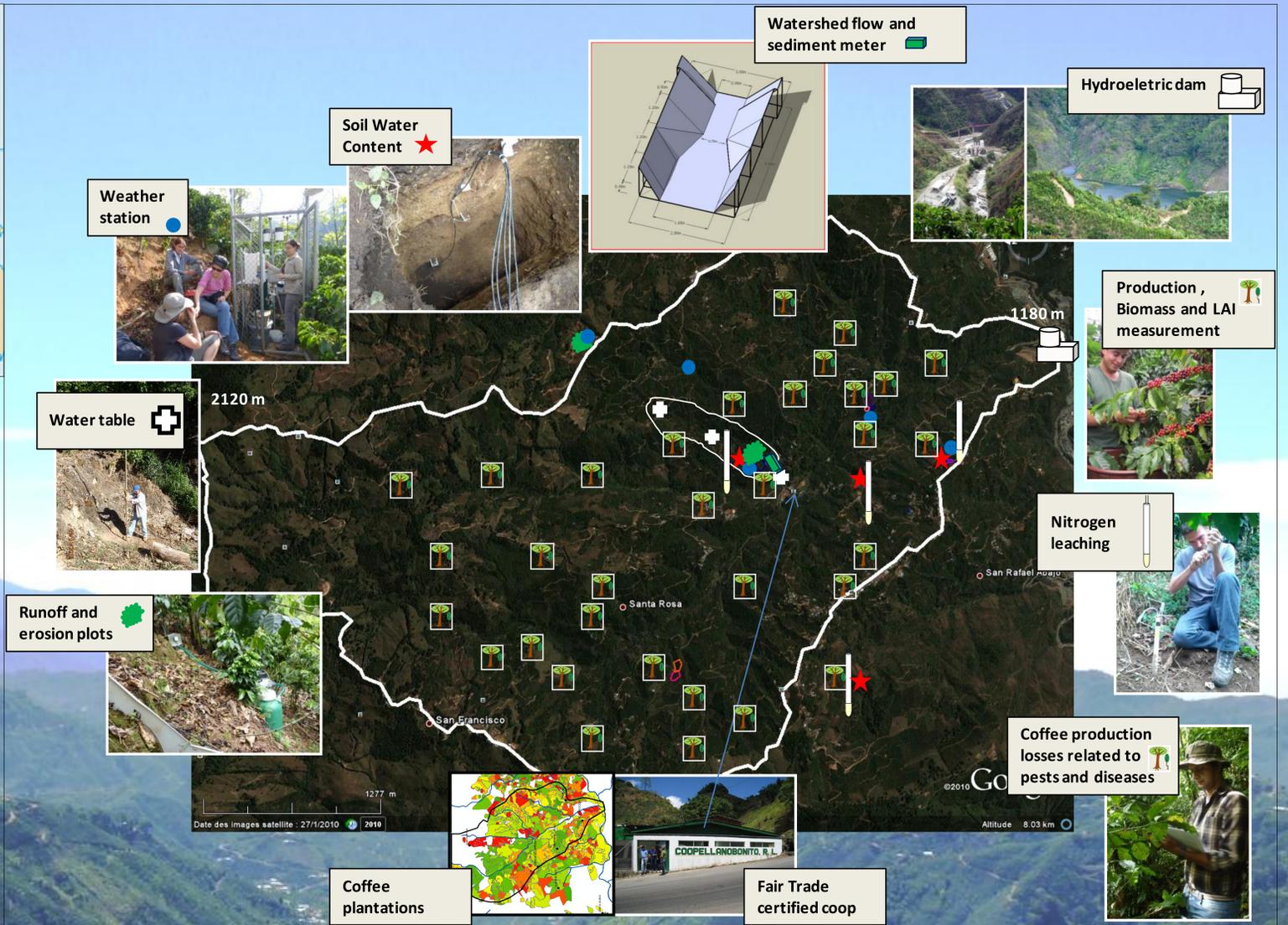
Investigating agricultural practices, environmental services and design of agroforestry systems in Costa Rica's Central mountains

A sustained provision of balanced Ecosystem Services (ES) is key to adaptation to future climate change and current climate variations. When measuring ES provision, the scale matters. We have set an experiment in Llano Bonito, to understand the scaling effects of ES provision and the possible negotiations between stakeholders for an optimized provision of ES at watershed scale. The Pirrís watershed is a productive coffee-growing region in Costa Rica, known for its favorable growing conditions and high quality coffee. It is also characterized by steep slopes and high precipitation levels during the rainy season.

Despite coffee being a perennial crop, plots that are intensively grown with little or no shade are susceptible to heavy soil losses in these conditions. Local farmers are regularly affected, and heavy sediment loads in the Pirrís river threaten the operation of a newly build hydroelectric dam downstream. The local electricity company, ICE, has recently issued a watershed management plan, in which they try and find coordinated measures, including incentives, coordination mechanisms, and environmental education to mitigate the environmental degradation of the watershed.



We try and develop a live experiment, by measuring the trade-offs in the concurrent production of high quality coffee beans and the provision of environmental services, particularly focused on the health of the river system. The Llano Bonito watershed is a micro-watershed, which extends over 18 km², at the distal part of the Pirrís watershed draining into the hydroelectric dam. This micro-watershed was earmarked as the most vulnerable to erosion, and consequently that most contributed to sediment transport to the dam.



In this watershed, we are researching on four complementary topics:

- Trade-offs in coffee agroforestry systems: we calibrated a coffee agroforestry model with measurements in the fields and used simulations to explore alternative ways of managing coffee plantations and ES tradeoffs between ES with farmers (Ph. D. Louise Meylan, 2009-2012, J. Ortiz)
- Hydrological services: we are measuring the effect of coffee farming practices on runoff and erosion at the plot scale since 2010 (Ph. D. M. Villatoro, 2011-2014, O. Castro, A. Bonilla);
- Sociology of the innovation process in agroforestry system: How do the Llano Bonito farmers take their decisions under environmentalist pressure (N. Sibelet, I. Gutiérrez, R. Laffourcade, S. Dhorne);
- Merging field and modelling work at the landscape scale for exploring alternative landscape designs to improve tradeoffs between four ES: coffee provision, Erosion control, Nitrogen lixiviation, Pest and diseases regulation (S. Bhattarai, EU AgTrain Ph. D. 2012-2015, C. Allinne, D. Warren Raffa, A. Garcia, JJ Araya).

ICE, CATIE, CoopellanoBonito and the PCP team are particularly interested in developing a PES scheme of second generation that would:

- ✓ focus on the consecution of measurable services;
- ✓ target agricultural activities;
- ✓ integrate different policy and social tools;
- ✓ take into account the interests of the producers, i.e. assess the trade-offs between coffee productivity and environmental services provision.

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