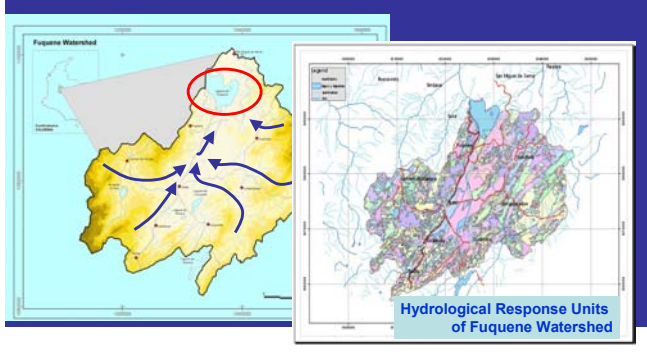
INTEGRATING ENVIRONMENTAL SERVICES TO AGRICULTURAL FINANCIAL MECHANISMS FOR PROMOTING RURAL DEVELOPMENT IN THE ANDES. The Case Study of Fuquene Watershed (Colombia).

CONDESAN · CIAT · DANSK INSTITUT FOR INTERNATIONALE STUDIER · CGIAR Challenge Program on WATER & FOOD · gtz

Goal: To alleviate poverty and enhance sustainability in upper catchments by increasing the flow of resources from governments and civil society to poor rural producers, reducing the negative impact of environmental externalities and strengthening the competitive capacity of the poor through greater food security, higher incomes, and better administrative and organizational skills.

Identifying externalities: location, magnitude and who is causing them?



Hydrological Response Units of Fuquene Watershed

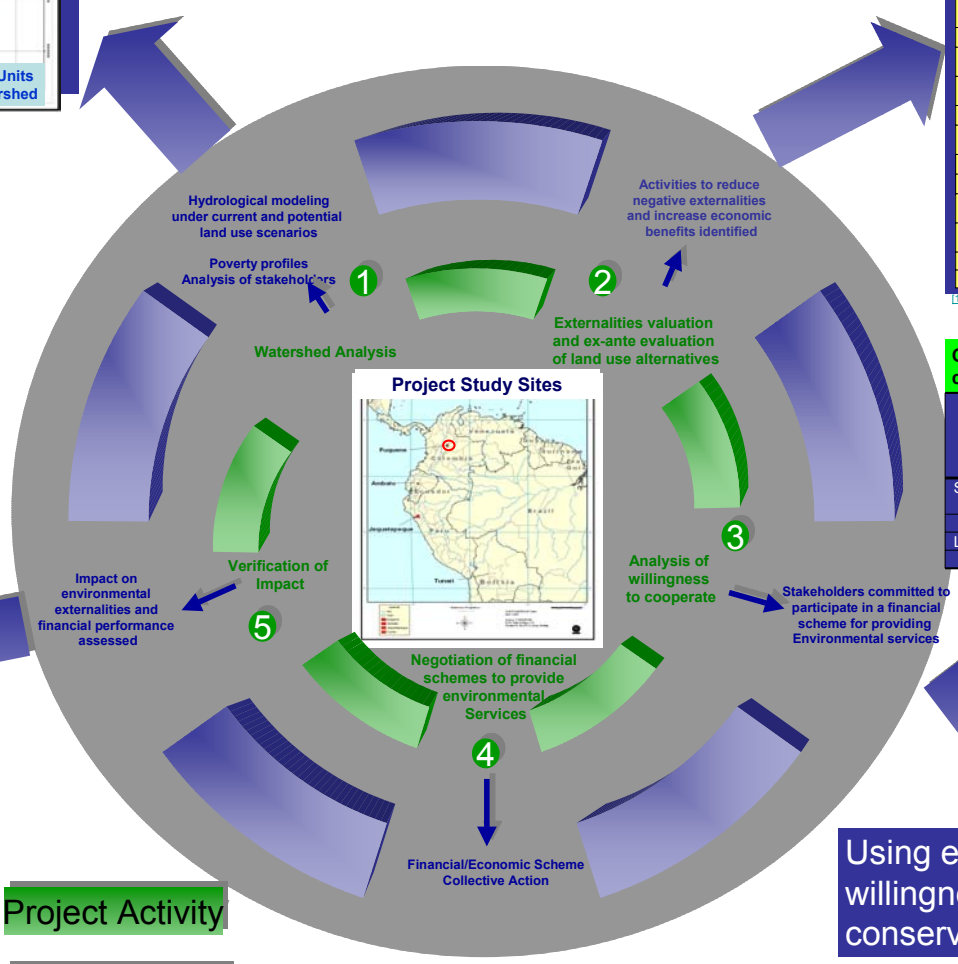
Fuquene Watershed Problematic

The Fuquene Lake located downstream provides water to 27 aqueducts. However, the lake is being affected by an accelerated process of eutrophication. This is being caused by high amounts of sediment discharges and N and P yields that come from agriculture (potato and cereals) in the upper watershed.

Optimization model for ex ante evaluation of land uses and management practices in

VARIABLES [1]	Rotations of crops (ha/ yr) with/without minimum tillage & green manures	Permanent forests (ha)	Permanent pastures with/without green manures	Feed concentrates for cattle production	No. cows	Farm incomes (sales of meat, milk, wood, harvest) (t/yr-sem.)	N and P pollution residual yields (t/yr or sem.)	Buys & sells labor according to job profiles	Bank loans
Net incomes (n yr) (objective function)	x	x	x	x	x	x	x	x	x
Capital	x	x	x	x	x				x
Cash flows (by sem. or yr)	x	x	x	x	x	x	x	x	
Land availability (upper, medium and downstream watershed) (ha)	x	x	x						
Erosion thresholds by land use (t/sem.)	x	x	x						
Hydrological balance, contribution to the superficial aquifer (m^3/ha/sem.)	x	x	x		x		x		
N contributed to water flows by land uses (t/ha/sem.)	x	x	x	x	x			x	
CO_2 fixation by vegetative cover (t/ha/sem.)	x	x	x						
Labor profiles by land uses (no. workdays/sem.)	x	x	x					x	
Wood production by planted forests (t/ha)		x							
Wood production by native forests (t/ha)		x							
Energy production for livestock (megacal./K/ha)	x		x	x	x				
Protein production for livestock (kg dry matter/ha)	x		x	x	x				
Dairy production (t/sem./individual)					x				
Meat production (t/sem./individual)					x	x			

[1] X indicates the presence of a relationship between an alternative and a variable.



Changes in net incomes and environmental externalities with conservation agriculture in prioritized Hydrological Response

Middle part	Potato and cereals cropping with conservation agriculture
Sediment yield (10 years)	-49%
Net Income	+1%
Labor employment	+62%
Social benefits	+111%

Upper part	Potato cropping with conservation agriculture
Sediment yield (10 years)	-39%
Net Income	+18%
Labor employment	-14%
Social benefits	+40%

Mechanism to verify the expected impact.

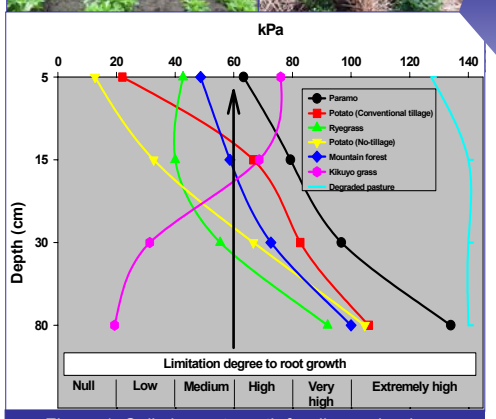


Figure 1. Soil shear strength for diverse land use systems on the upper Fuquene watershed (Colombia)

Project Activity

Output

Using economic games to explore the willingness of potato farmers to adopt conservation agriculture.

Individual decisions made by potato growers adopting conservation farming practices.

Communication means to the chance of negotiation between potato farmers and downstream water consumers for adopting conservation agriculture as an strategy to increase potato productivity while the quality of downstream water is improved.

Sanctions refers to penalties that were applied in the game to farmers that decided to continue with conventional agriculture

A pooled fund for providing soft credits to small and medium farmers and stimulate conservation farming adoption. About 700 Ha have been implemented under conservation agriculture in Fuquene.

Acknowledments

Programa Ambiental Colombia · Corporación Autonoma Regional de Cundinamarca

For providing technical assistance on conservation agriculture practices

FORD FOUNDATION

For providing part of the resources to create the fund for conservation agriculture credits.

Pontificia Universidad Javeriana

For conducting the analysis of willingness to cooperate through the application of experimental economics methods.

Contacts:

Coordinators:
Rubén Darío Estrada (CIAT-CONDESAN) r.estrada@cgiar.org
Alonso Moreno (GTZ). A.moreno@cgiar.org,

Research Team:
Marcela Quintero m.quintero@cgiar.org
Edgar Amézquita e.amezquita@cgiar.org
Helle Munk Ravnborg hmr@diis.dk
Natalia Uribe n.uribe@cgiar.org
Marco Rondon m.rondon@cgiar.org
Jorge Rubiano j.rubiano@cgiar.org
Olaf Westermann owe@diis.dk
Ximena Pernett, Ernesto Girón condesancuencas@cgiar.org

Conservation Agriculture Technical Assistants:
Wilson Otero (FUNDESOT- Colombia) waob@tutopia.com.co
Jhon Serrato (CAR) jhonserrato@yahoo.com.mx