

Relation between land use and soil degradation in the Cointzio basin, Michoacán, México

by Adriana Ramos



Studying the effects of land use on degradation

Soil degradation caused by human activities is one of the principal environmental problems of the 21st century. The Cointzio basin, in the Michoacán state of México, presents areas severely affected by land use change. The consequences are the loss of soil and nutrients, gully formations, decrease in soil fertility and productivity, plus contamination and reduced water availability.



C. Prat, IRD, 2002

Landscape of the Cointzio basin



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Land uses in Cointzio basin: growing maize, beef and dairy farming, and newly-planted avocado orchards

Characteristics of the soils

The main physical and chemical characteristics of soils of the Cointzio basin under different land uses (pine forest, pine and oak mixed forest, and various agricultural uses managed for more than 50 years) were studied. The degree of soil degradation was assessed using key indicators such as the depth of soil available for crops (A horizon), soil colour, size and structural stability of soil aggregates, organic matter content, bulk density, resistance to penetration and pH.

Results of the assessment

First results show that soils that are not degraded have a thick surface A Horizon, with high organic matter content, a good structure based on aggregates, and low bulk density. In contrast the agricultural soils have a shallow A horizon (<30 cm) with little organic matter content and a paler yellowish colour. There is high resistance to penetration (> 2 Mpa), and formation of plough pans below 30 cm depth, that are a product of agricultural cultivation and grazing of cattle.



Adriana Ramos, 2010



Andisol soils under a cover of (a) pine trees and (b) maize

Minimizing soil degradation

To reduce the effects of soil degradation, organic residues and rotation of crops may be used, plus conservation tillage with mulch to reduce the runoff, loss of soil, and loss of nutrients and to increase infiltration of water. But the most important thing is to convince farmers to reduce numbers of cattle which are the main cause of soil erosion in this area. Beef and dairy farming may be replaced by other sustainable agro-economic practices such as production of *Agave* for commercial uses.

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