



Soil Mapping

José Luis Ornelas de Anda
Natural Resources Director
General Division of Geography and Environment
November, 2018



INSTITUTO NACIONAL
DE ESTADÍSTICA Y GEOGRAFÍA

Aguascalientes, Ags.



- Background.
- Characteristics of the soil information.
- Uses of information.
- Soil erosion information.



BACKGROUND

- Soil is an essential resource and a fundamental part of the natural environment in which most of the world's food is produced.
- The soil provides vital space for human beings, as well as essential environmental services important for regulation and water supply, climate regulation, biodiversity conservation and cultural services.
- Soils are under pressure due to population growth, increased food demand and competition for land use.
- Approximately 33% of the world's soils are degraded.
- Its preservation is important for achieving the goals of sustainable development.



BACKGROUND

INEGI has among its responsibilities the preparation of the inventory of natural resources.

One of the inventories that the Statistical and Geographical Information Law establishes is the National Soil Inventory.



BACKGROUND

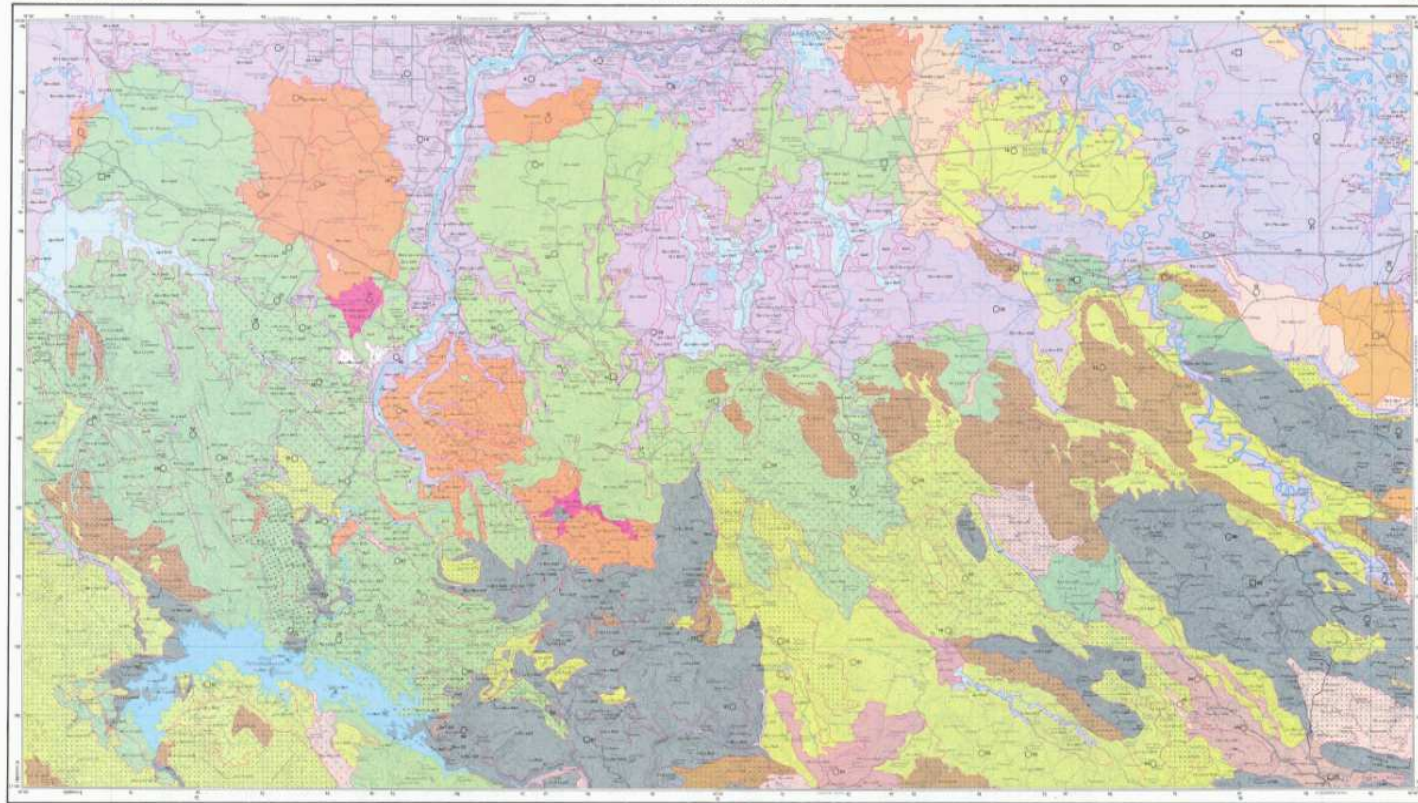
The inventory of the soils of Mexico was born in 1968, the year in which the bases for the research of this resource are consolidated, with the elaboration of the edaphological cartography scale 1:50 000.

Between 1981 and 1983 the inventory was carried out at a scale of 1:1000 000 series I.

In 1982 the national edaphological inventory 1: 250 000 was started, concluding at the end of 1998.

For the scales 1:50,000, 1: 1,000,000 and 1: 250,000 Series I, the Soil Classification FAO 1968, modified by DETENAL in 1970, was used.





UNIDADES DE SUELO

(Color)	ALCALICACLES
(Color)	ALCALIFERROS
(Color)	ALCALISOL
(Color)	ALFAQUELES
(Color)	ALFAQUELES ALCALICOS
(Color)	ALFAQUELES ALCALICOS SALINOS
(Color)	ALFAQUELES ALCALICOS SALINOS SALINOS
(Color)	ALFAQUELES ALCALICOS SALINOS SALINOS ALGEBRA
(Color)	ALFAQUELES ALCALICOS SALINOS SALINOS SALINOS ALGEBRA
(Color)	ALFAQUELES ALCALICOS SALINOS SALINOS SALINOS ALGEBRA
(Color)	ALFAQUELES ALCALICOS SALINOS SALINOS SALINOS ALGEBRA

FASES FISICAS

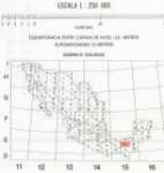
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES

FASES QUIMICAS

(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES
(Color)	ALFAQUELES

SIMBOLOGIA

(Symbol)	ALFAQUELES
(Symbol)	ALFAQUELES
(Symbol)	ALFAQUELES
(Symbol)	ALFAQUELES
(Symbol)	ALFAQUELES
(Symbol)	ALFAQUELES



INEGI
INSTITUTO NACIONAL DE ESTADISTICA
GEOGRAFICA E INFORMATICA

**CARTA TOPOGRAFICA
1:20 000**

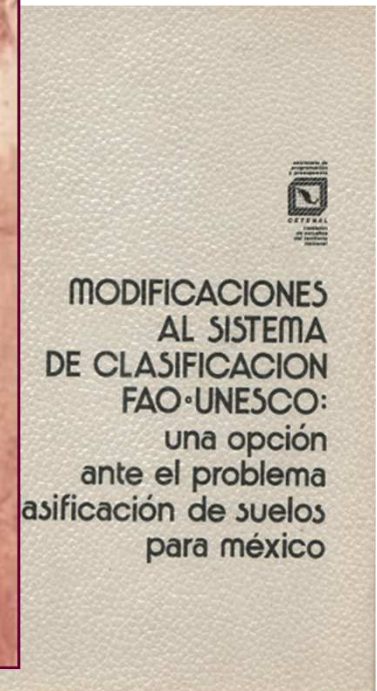
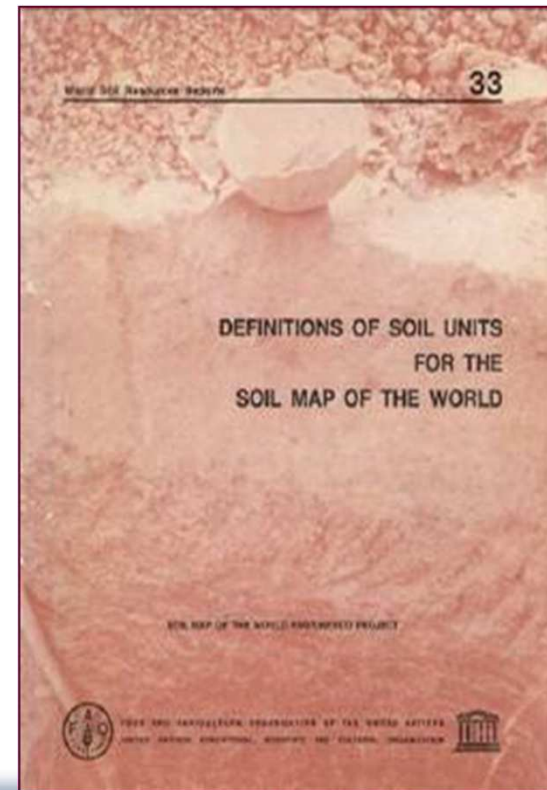
VILLAHERMOSA E15-8



BACKGROUND

Soil information is based on the
FAO classification system..

This information is based on a
classification system developed
under international standards.

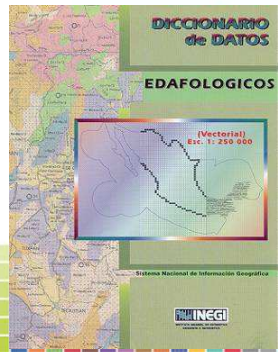


BACKGROUND

To date, there are two series of soil information.

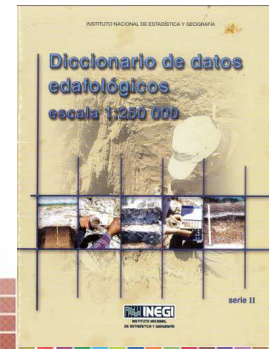
Series I: 1980-1998

FAO-UNESCO 1968
(Modificada por DETENAL 1970)



Series II: 2002-2007

WRB 1998
(Adecuada por INEGI 2000)



BACKGROUND

National Soils Data Set, series III

WRB 2014
classification system

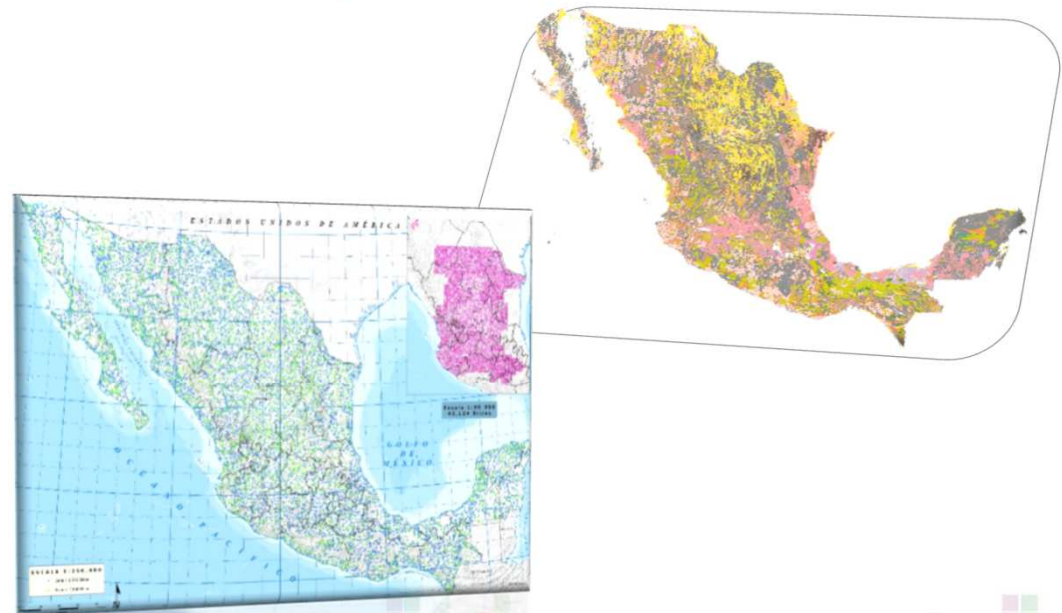
~ 30+ people
specialized in soils
through the INEGI's
offices



THE INFORMATION

The National Soils Data Set contains two layers:

- Polygon (soil type) layer.
- Soil profile layer.



THE INFORMATION

The Edaphological Information Series II was generated by visual interpretation of Landsat satellite images, Sensor Thematic Mapper (TM) 1993-1994, supported with **field work**.

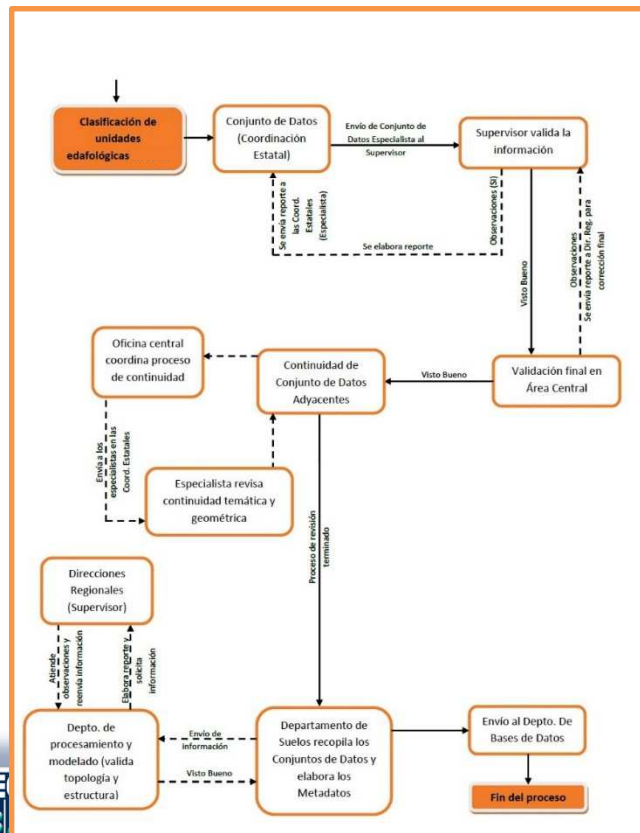
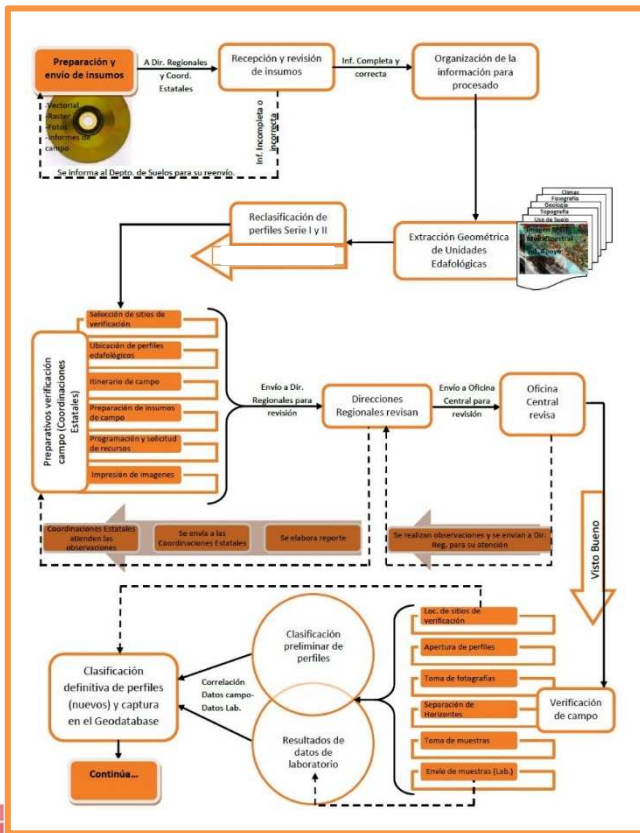
Contains 74,362 polygons.



Soils National Data Set



General Method



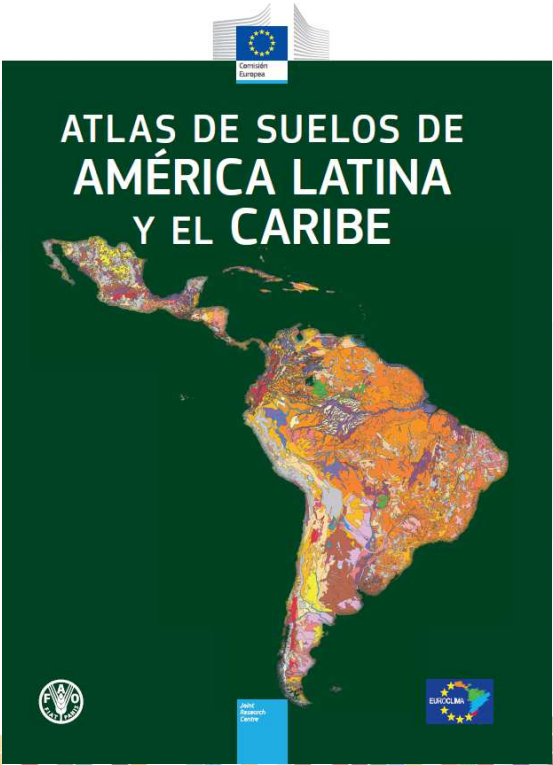
Soil data

The information presented in the polygon layer is as follows:

Name of soil group	Name of qualifiers of soil group	Soil texture	Surface phase of the soil
30 soil groups (WRB 1998).	Support the detailed characterization of the soil group.	Fine (Clay). Medium (Silt). Coarse (Sand).	Gravel. Stony.



USES OF INFORMATION



Realizado en el marco del programa EUROCLIMA.
Financiado por la Comisión Europea.

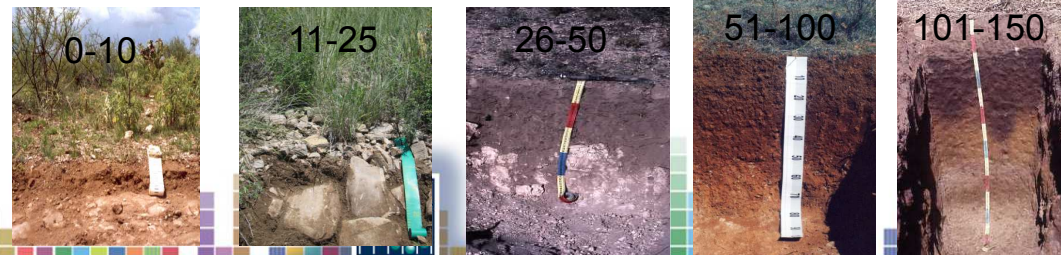
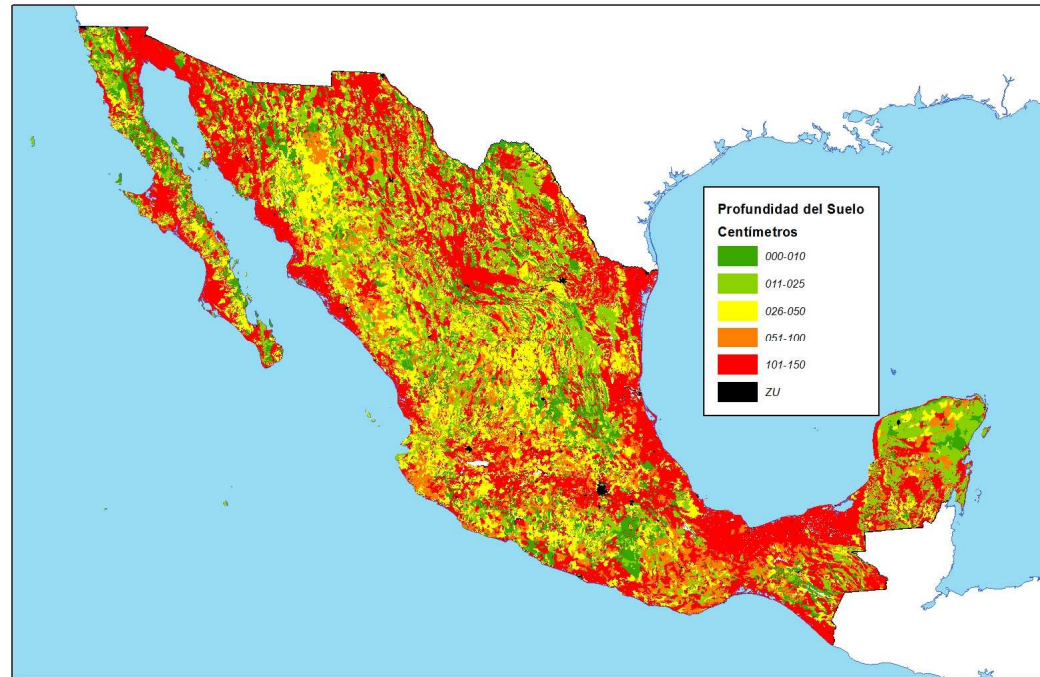


SOIL DEPTH MAP (Experimental)

It is estimated that 22% of the soils have a depth of less than 10 cm.

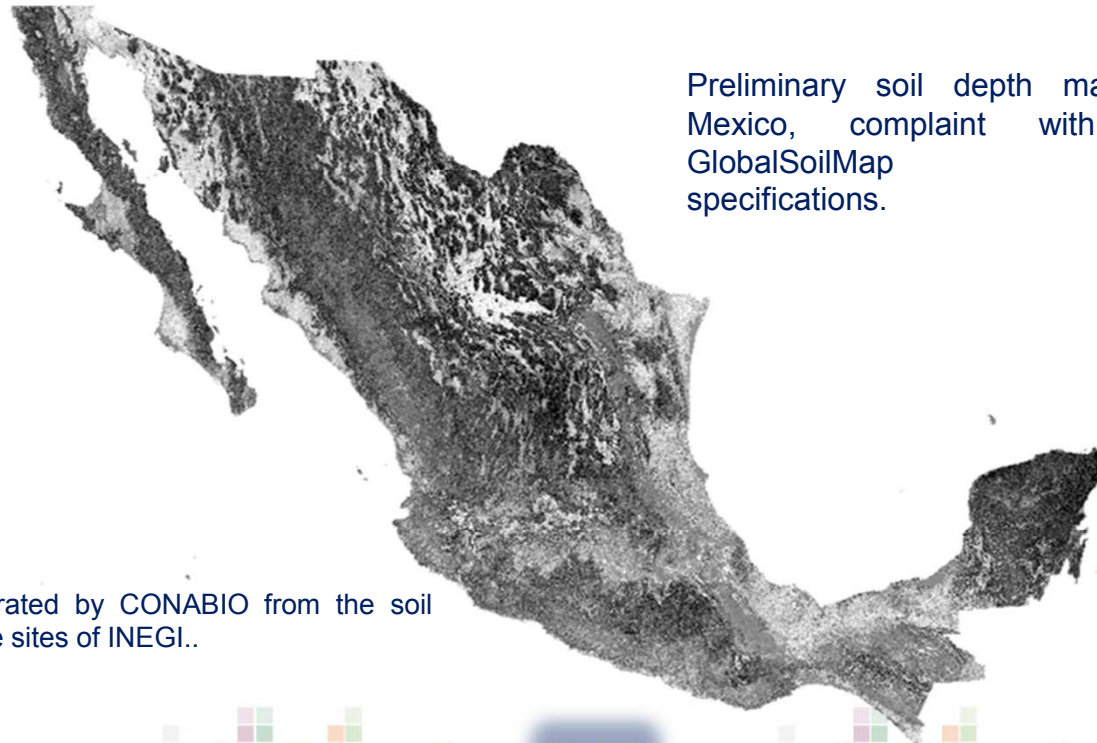
In 83% of the shallow soils the principal limitation is continuous hard rock and the other 17% the presence of a cemented horizon.

Fuente : INEGI (2007) Conjunto de Datos Vectorial Edafológico escala 1: 250 000 serie II (Conjunto Nacional).



INSTITUTO NACIONAL
DE ESTADÍSTICA Y GEOGRAFÍA

In the framework of the celebration of the GlobalSoilmap Conference 2013 in Orléans, INEGI and CONABIO presented a poster of digital mapping of soils in Mexico



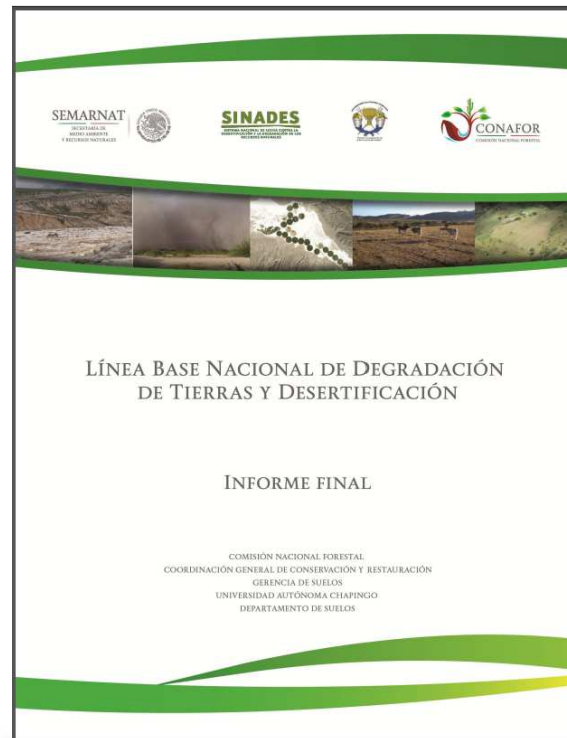
Preliminary soil depth map for Mexico, compliant with the GlobalSoilMap project specifications.

Generated by CONABIO from the soil profile sites of INEGI..



National Soil and Land Degradation Base Line

First national study that integrates indicators of land degradation and desertification, in accordance with national and international standards



INSTITUTO NACIONAL
DE ESTADÍSTICA Y GEOGRAFÍA

Diciembre 2013

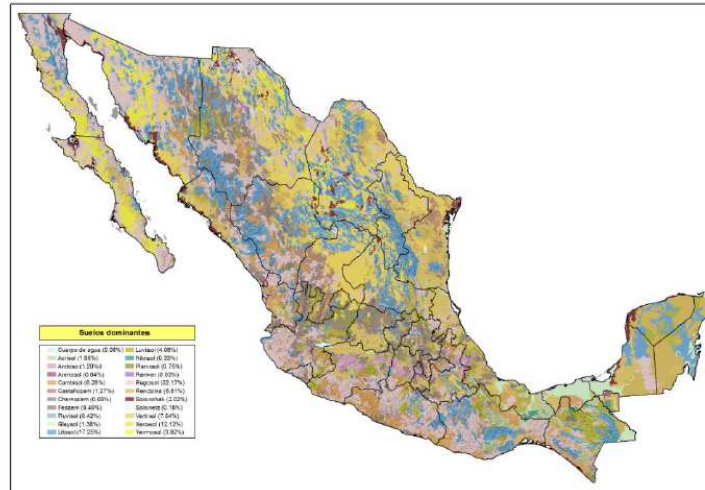


Figura 4.2 Distribución de las unidades de suelos dominantes en México.

Fuente: Edafología de la República Mexicana escala 1:250 000 (INEGI, 2004).

The SOIL RESOURCE INDICATOR considered the fragility of the soils according to their thickness and the loss of the soil by: 1) water erosion, 2) wind erosion, in addition to 3) physical degradation expressed mainly by compaction and 4) chemical degradation expressed fundamentally by the decline in fertility. The results show that the degraded soils are found in 111,472 million hectares, or 63.02% of the national total. The category of slight degradation represents 24.21% (47,433 million hectares), the moderate one 27.2% (53.291 million hectares), the severe 10.01% (19.612 million hectares) and the extreme degradation 1.59% (3.115 million hectares).



Carbono Orgánico



SOIL EROSION



SOIL EROSION MAP

Objectives:

To have an inventory on the spatial distribution of the areas affected by erosion.

To obtain information based on visual and quantifiable evidence on the sites with erosion in Mexico.



SOIL EROSION

Contains information on the different types, forms and degrees of soil erosion, which occur in Mexico, with emphasis on **runoff** erosion.

It shows the location and spatial distribution of the eroded areas, it has specific information that describes the sites verified during the field work.



Sitios de muestreo (erosión)



- Morphometry
- Apparent density
- Carbon contents
- Visible soil erosion assessment

Field work

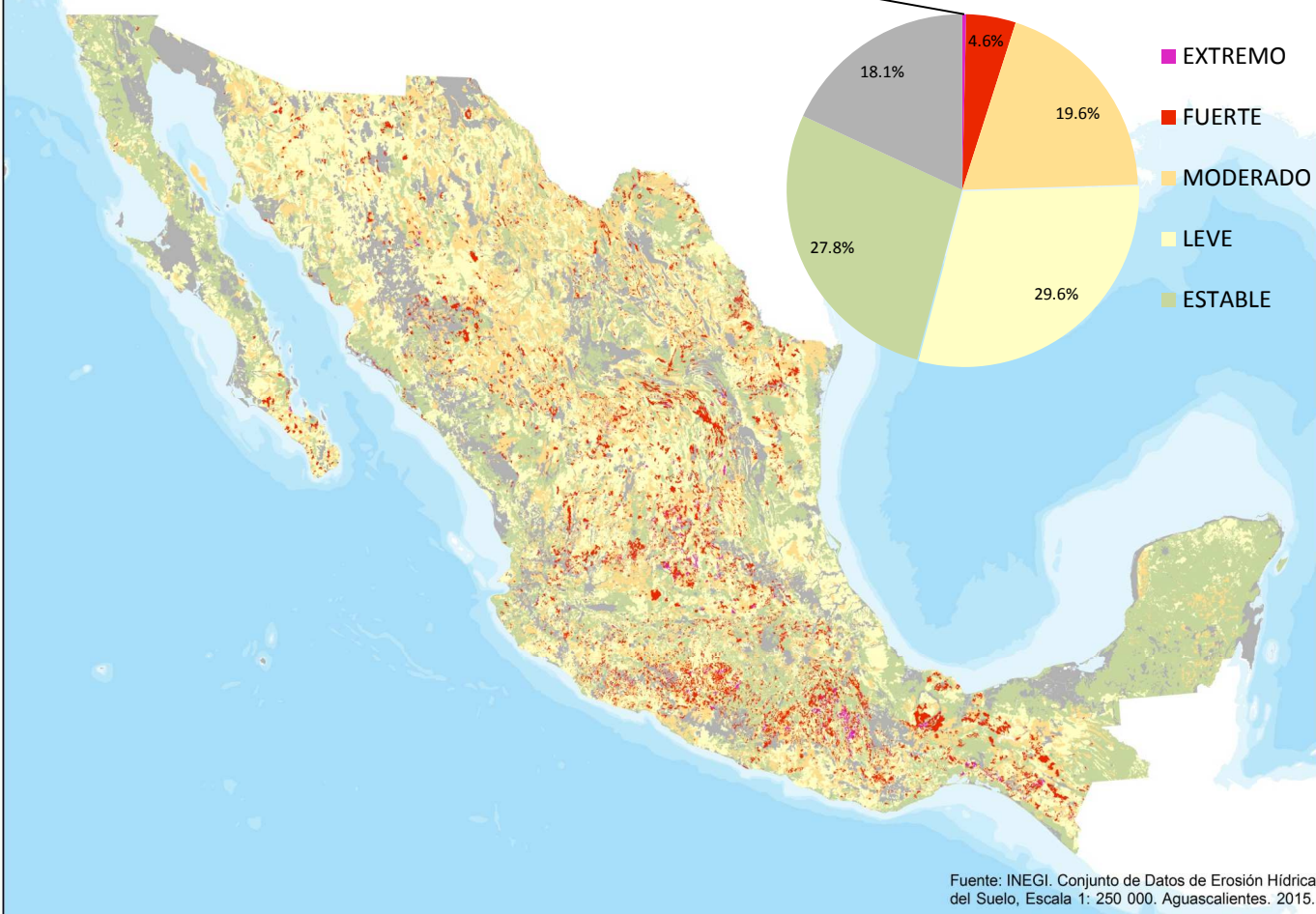
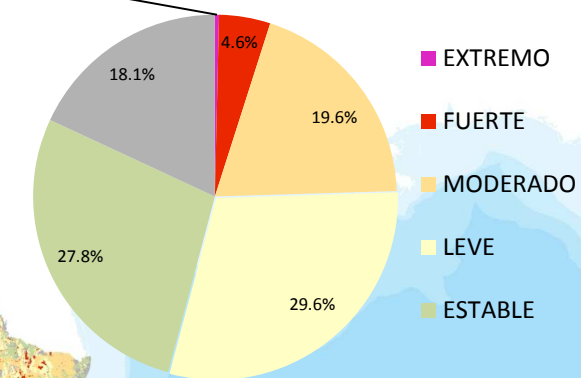
5,200 verification sites.
2009-2013

Fuente: INEGI. Conjunto de Datos de Erosión Hídrica del Suelo, Escala 1: 250 000, Aguascalientes. 2015.



EROSIÓN HÍDRICA DEL SUELO EN MÉXICO (Grado)

Distribución de la erosión hídrica del suelo en México
por grado (Porcentaje).



Fuente: INEGI. Conjunto de Datos de Erosión Hídrica del Suelo, Escala 1: 250 000. Aguascalientes. 2015.



Descriptores de la erosión hídrica del suelo

EROSIÓN HÍDRICA (H).

The main forms of water erosion are the gullies, furrows and sheets. The criteria for the identification of the form and degrees of water erosion are presented below.

Gullies (C). Its structure is in the form of a trench with steep walls of 50 cm or more both in depth and width in its most representative section. Generally it has slopes and abrupt breaks.

Extreme degree (4)



Strong degree (3).



Moderate degree (2)



Mild degree(1)



Descriptores de la erosión hídrica del suelo

•**Furows (S)**. Formation in channels with depth less than 50 cm and up to 50 cm wide.

Extreme degree(4)



Strong degree (3)



Modetate degree (2).



Mild degree(1).



Runoff soil erosion attributes

•**Sheet Erosion (L)**. It is the gradual and uniform removal of thin layers of soil, generally parallel to the surface. (Others: gully, rill)

Extreme degree (4)



Strong degree (3).



Moderate degree (2)



Mild degree (1)

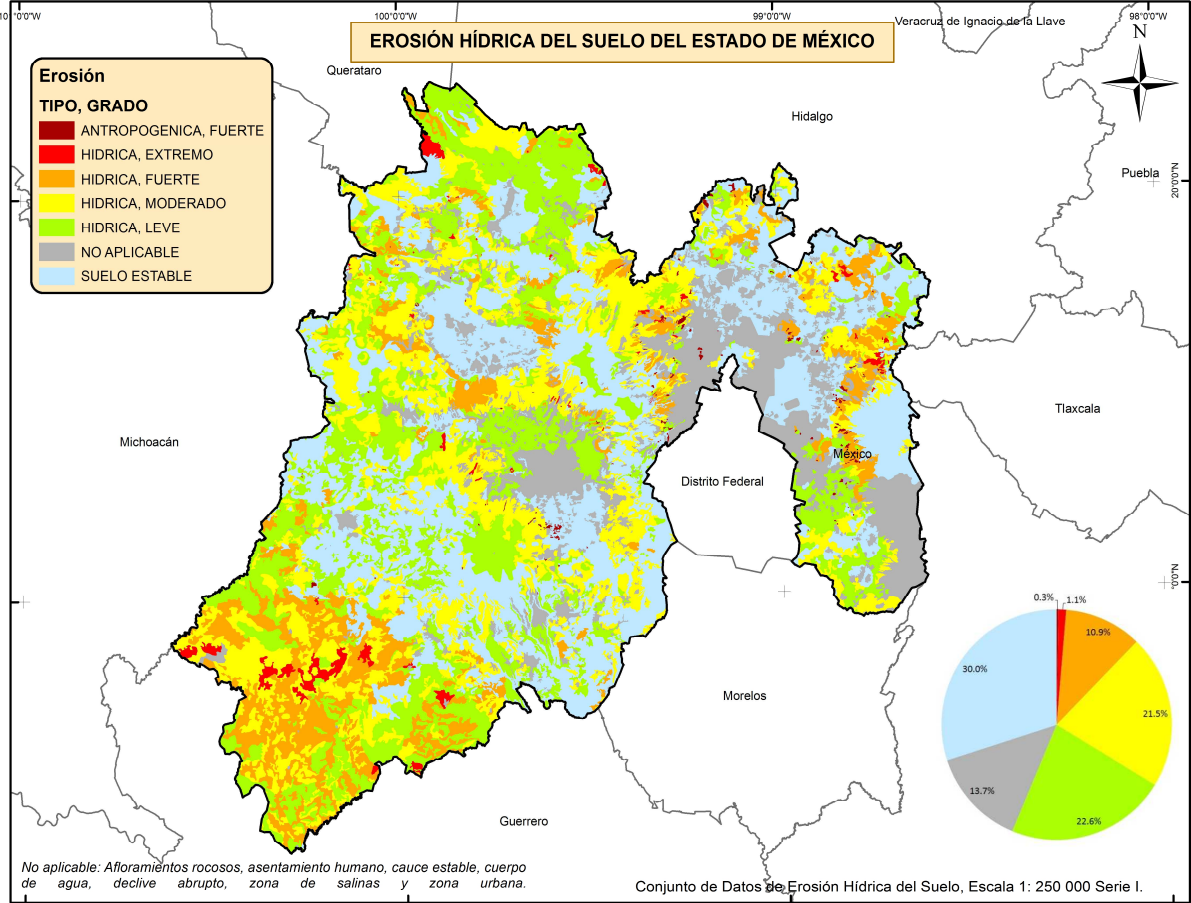


ANTHROPOGENIC EROSION (A).

The most obvious causal agent is man, by changing the natural landscape in an abrupt and irreversible way (construction of roads, dams, urban growth, extraction of materials, transmission lines or gas pipelines and arson) thus facilitating the direct action of the erosive agents.



USES OF INFORMATION



Prospective

- Going from soil type mapping to soil properties mapping.
- Make extensive use of field data and ancillary information (DEM, slope, climate, vegetation).
 - INEGI, CONAFOR data.
 - Continue field work – soil sampling
- Use of Big Data and M Learning





Conociendo México

01 800 111 46 34

www.inegi.org.mx

atencion.usuarios@inegi.org.mx

jose.ornelas@inegi.org.mx



@inegi_informa



INEGI Informa



INSTITUTO NACIONAL
DE ESTADÍSTICA Y GEOGRAFÍA

