

# **Key principles of the land classification in Mexico**

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System of  
Environmental  
Economic  
Accounting

**Forum of Experts in SEEA Experimental  
Ecosystem Accounting 2018**

# Content

**Introduction**

**Vegetation types and Ecosystems**

**Land Use and Vegetation Information:**

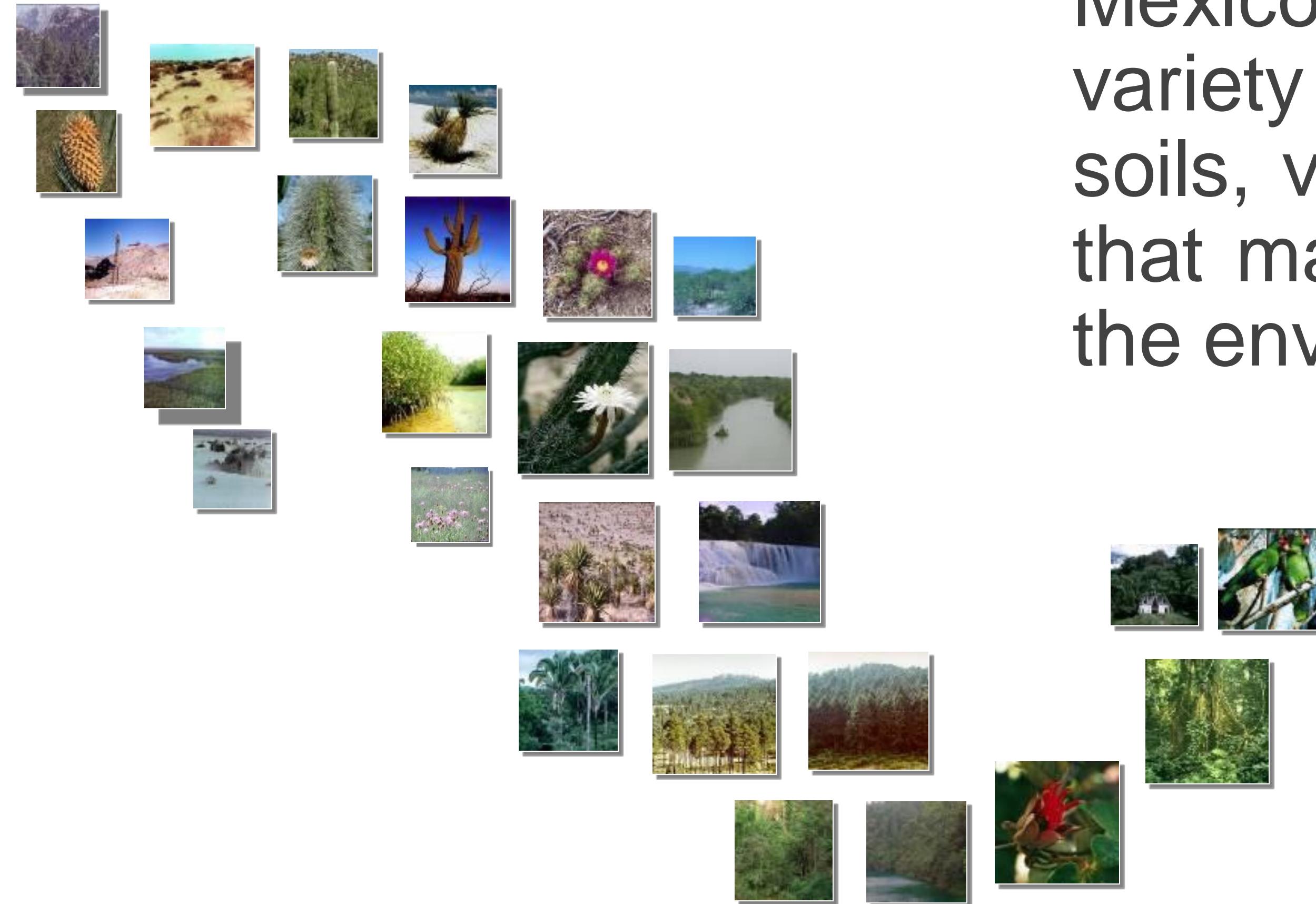
Classification System

Evolution of series

Botanical information

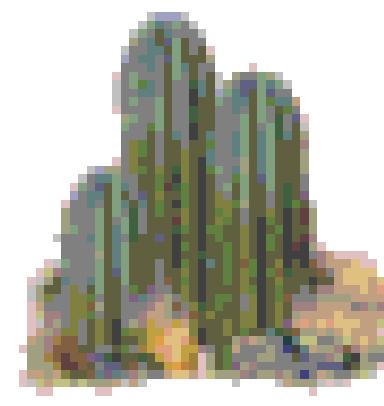
**Conclusion**

# Introduction



Mexico is a country with a great variety in relief, climates, rocks, soils, vegetation and other elements that make up natural resources and the environment.

**It is the 14<sup>th</sup> largest country with a territorial area of 1,964,375 km<sup>2</sup>.**



- In flora, Mexico ranks fourth worldwide with more than 25,000 registered plant species, of the 250,000 known.



- Fauna: first place in the world for the variety of reptile species (707; second by diversity of mammals (439); fourth by amphibian species (282) and, the 12<sup>th</sup> in birds, with more than 1,000.



# Vegetation types and Ecosystems

# **Vegetation type as an approximation to Ecosystem types**

The vegetation found in a given place is the result of the interaction of the environment: climate, relief, elevation, rock and soil type, as well as the plant and animal species and the ecological processes (succession, disturbances) that occur there.

As such, a vegetation type is a reflection and a synthesis of all those factors: climate, soil, plant composition, vegetation structure, and the ecological succession processes. So the vegetation is a good approximation to an Ecosystem.

# Land cover maps vs. Vegetation maps

Land cover classes and maps describe in a simplified way the dominant life form present in a given place (trees: forests, shrub: shrublands, etc):

Vegetation characterization goes beyond a description, involving **what** it is found and **why**: the environmental and ecological factors.

It also involves and interpretation of the ecological processes (**what is happening**), including the effect of human activities and disturbances.

# Land Use and Vegetation: Classification System

# Land Use and Vegetation Information

- The information is organized in three large groups:

Natural and induced vegetation



ADDITIONAL INFORMATION

(Nomadism, Water Bodies, Human Settlements)



AGRICULTURAL INFORMATION



## **Types of Natural and Induced Vegetation of Mexico**

The Natural and Induced Vegetation Classification System of the INEGI is based on ecological and/or floristic characteristics.

In a first level large groups of vegetation (formations or plant ecosystems): Coniferous Forest, Oak Forest, Cloud Mountain Forest, Tropical Evergreen Forest, Tropical Semideciduous Forest, Tropical Deciduous Forest, Tropical Thorny Deciduous Forest, Grassland, Xerophytic Scrub, Hydrophytic Vegetation and Other Vegetation types.

**Secondary vegetation.-** when an area with natural vegetation has been eliminated or severely altered by various human or natural factors, a secondary succession process occurs (secondary growth). The structure and plant composition may be very different to the original vegetation.

**Induced Vegetation.-** Refers to the vegetation that interrupts the natural process of plant succession due to human activities or special circumstances that favor its appearance;

# Natural and Induced Vegetation Classification System by INEGI

The country's vegetation cover is described considering 12 biomes and 58 types of vegetation, in addition to considering the current state of the vegetation in successional phases (Secondary growth in Tree, Shrubby and Herbaceous seral phases) in 219 combinations registered so far.

PLANT FORMATION
Coniferous forests
Oak Forest
Mountain Cloud Forest
Evergreen Tropical Forests
Semideciduous Tropical Forests
Deciduous Tropical Forests
Thorny Tropical Forests
Grasslands
Xerophytic Scrub
Hydrophytic Vegetation
Other Vegetation Types
Induced Vegetation *

\*Man induced groups

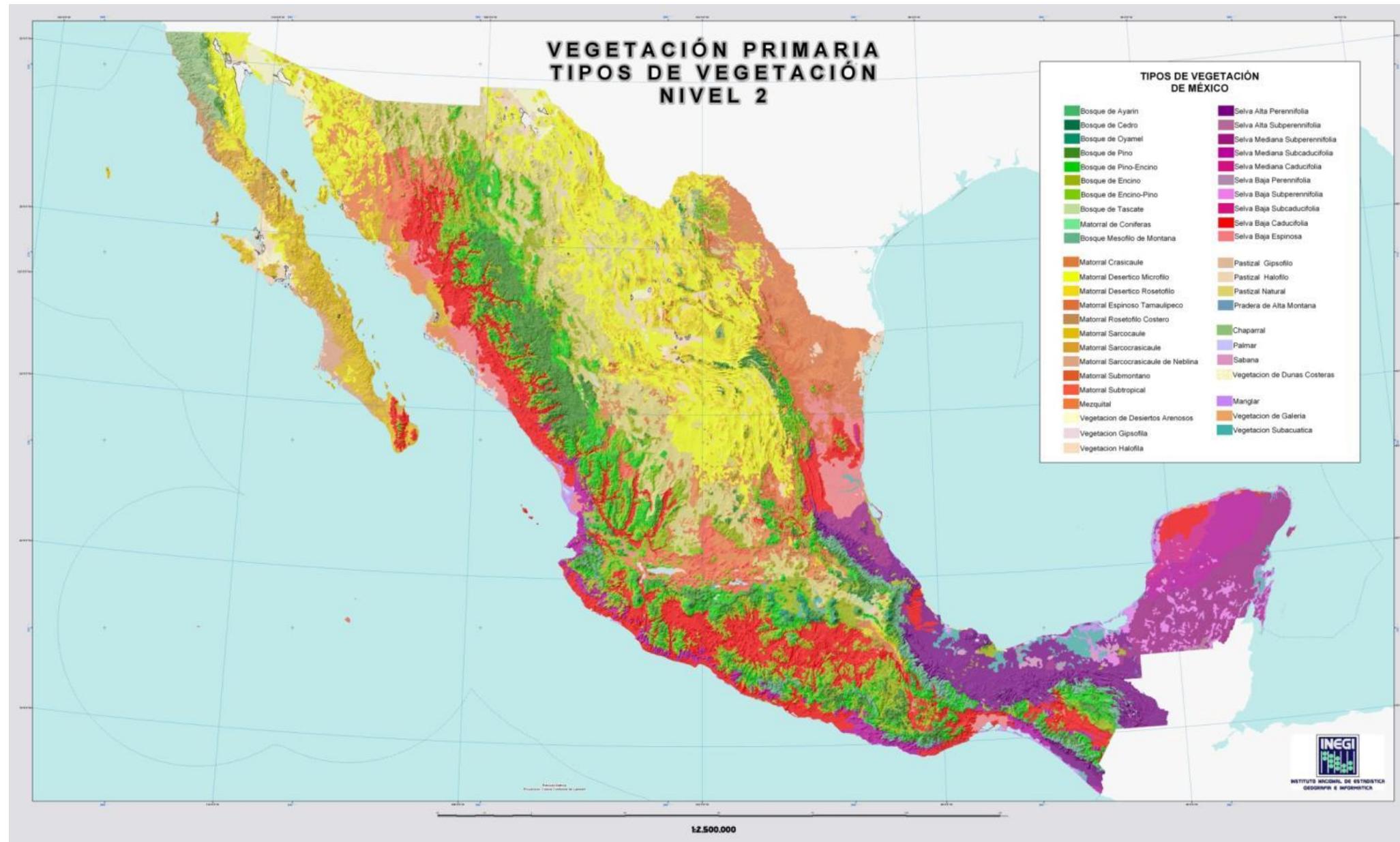


# Natural and Induced Vegetation Classification System by INEGI

The Natural and Induced Vegetation of Mexico Types classification includes the following types.

## Vegetation types (58)

Type of Vegetation
Douglas-Fir Forest
Cedar Forest
Fir Forest
Pine Forest
Pine-Oak Forest
Juniper Forest
Coniferous scrub
Oak Forest
Oak-Pine Forest
Mountain Cloud Forest
High Evergreen Tropical Forest
High Semievergreen Tropical Forest
Medium Evergreen tropical Forest
Medium Semievergreen Tropical Forest
Low Evergreen Tropical Forest
Low Semievergreen Tropical forest
Semideciduous medium Tropical Forest
Semideciduous low tropical Forest
Deciduous medium tropical Forest
Deciduous low tropical Forest
Subtropical scrub
Thorny low tropical Forest
Semievergreen low tropical forest
Tropical Mezquite



Type of Vegetation
Induced Grassland
Induced Savanna
Induced Palm grove
Induced Forest

Type of Vegetation
Natural grassland
Halophytic grassland
Gypsophytic grassland
High mountain prairie
Savanna
Sandy desert vegetation
Gypsophytic vegetation
Microphyllous desert scrub
Roseted desert scrub
Pachycaulous scrub
Sarcopachycaulous scrub
Sarcopachycaulous scrub
Fog sarcopachycaulous scrub
Coastal rosetted scrub
Tamaulipan thorny scrub
Submountain scrub
Chaparral
Mezquital
Riparian tropical Forest
Riparian Forest
Petén vegetation
Mangrove
Riparian vegetation
Halophytic vegetation
Aquatic vegetation ( <i>Thalia geniculata</i> ): fire flag.
Aquatic vegetation ( <i>Typha spp.</i> ), cattails
Coastal Dune Vegetation
Natural palm grove



Western Sierra Madre, Chihuahua



8.4% of the national territory

## Coniferous Forests



Laurel Sierra, Aguascalientes



7.6% of the national territory

## Oak Forests

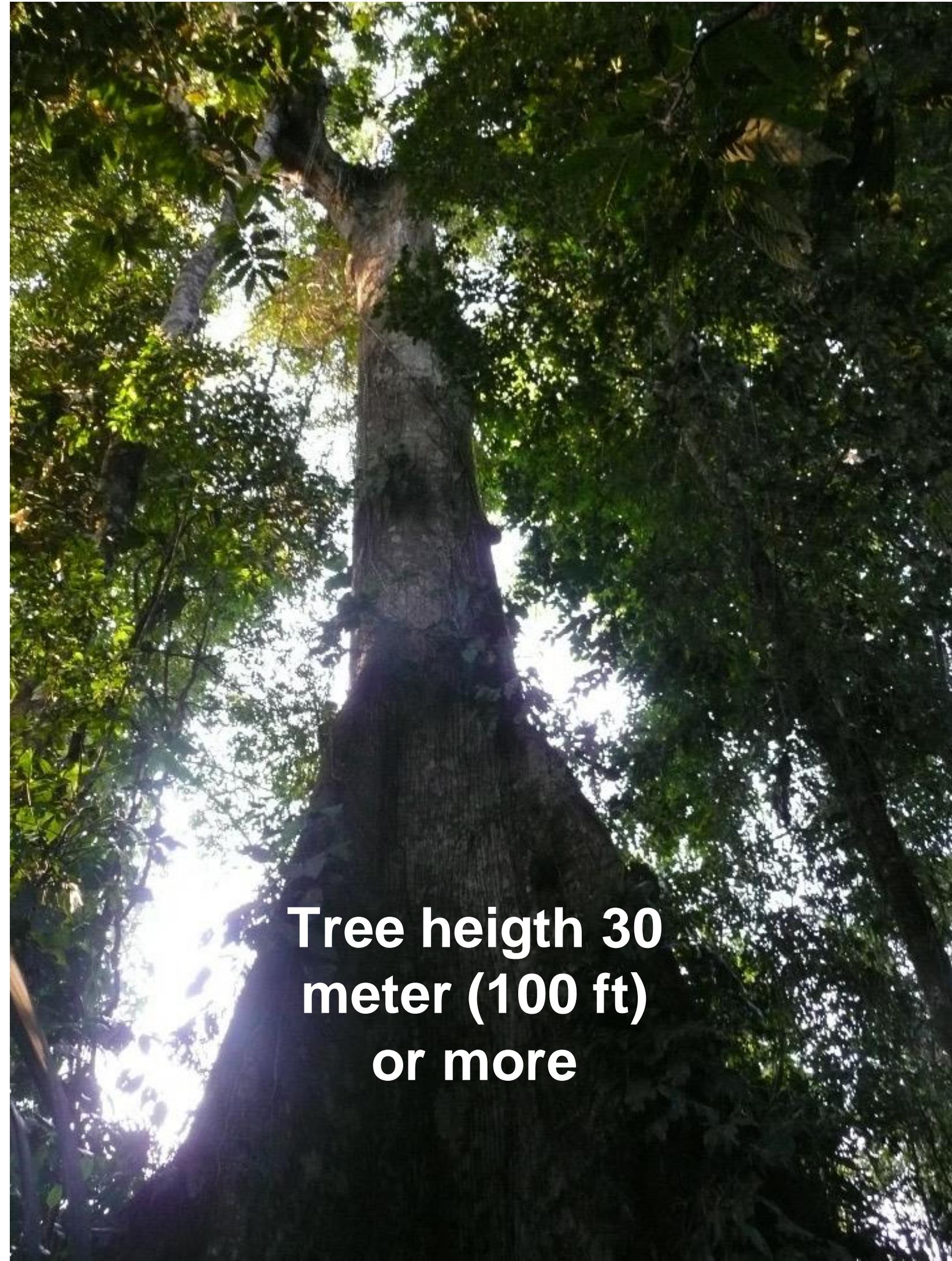


Talpa de Allende, Jalisco



0.7% of the national territory

## Mountain Cloud Forests



Tree height 30  
meter (100 ft)  
or more



Montes Azules Biosphere reserve, Chiapas

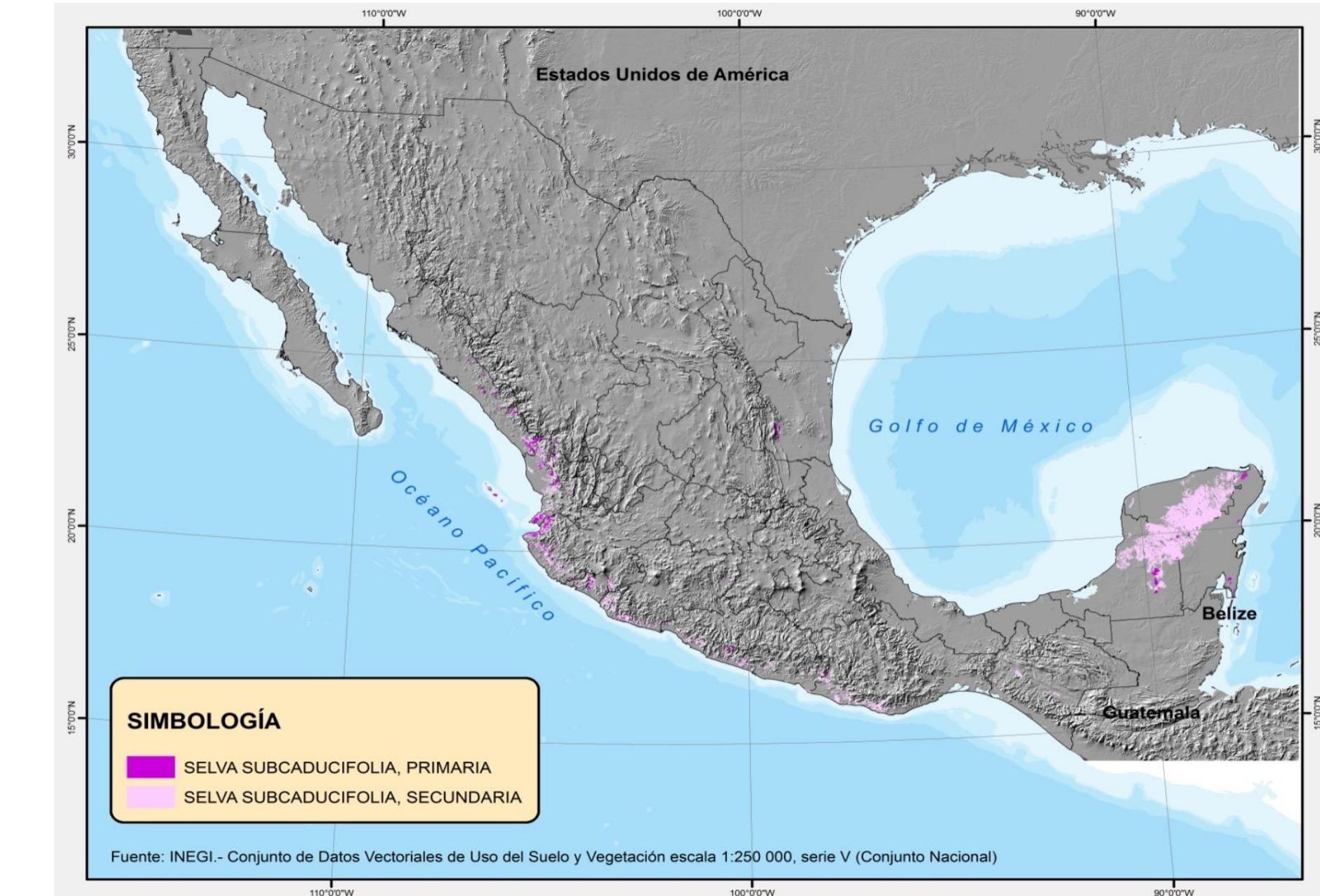


4.5% of the national territory

## Evergreen Tropical Forests



Oaxaca, Southern Pacific Coast

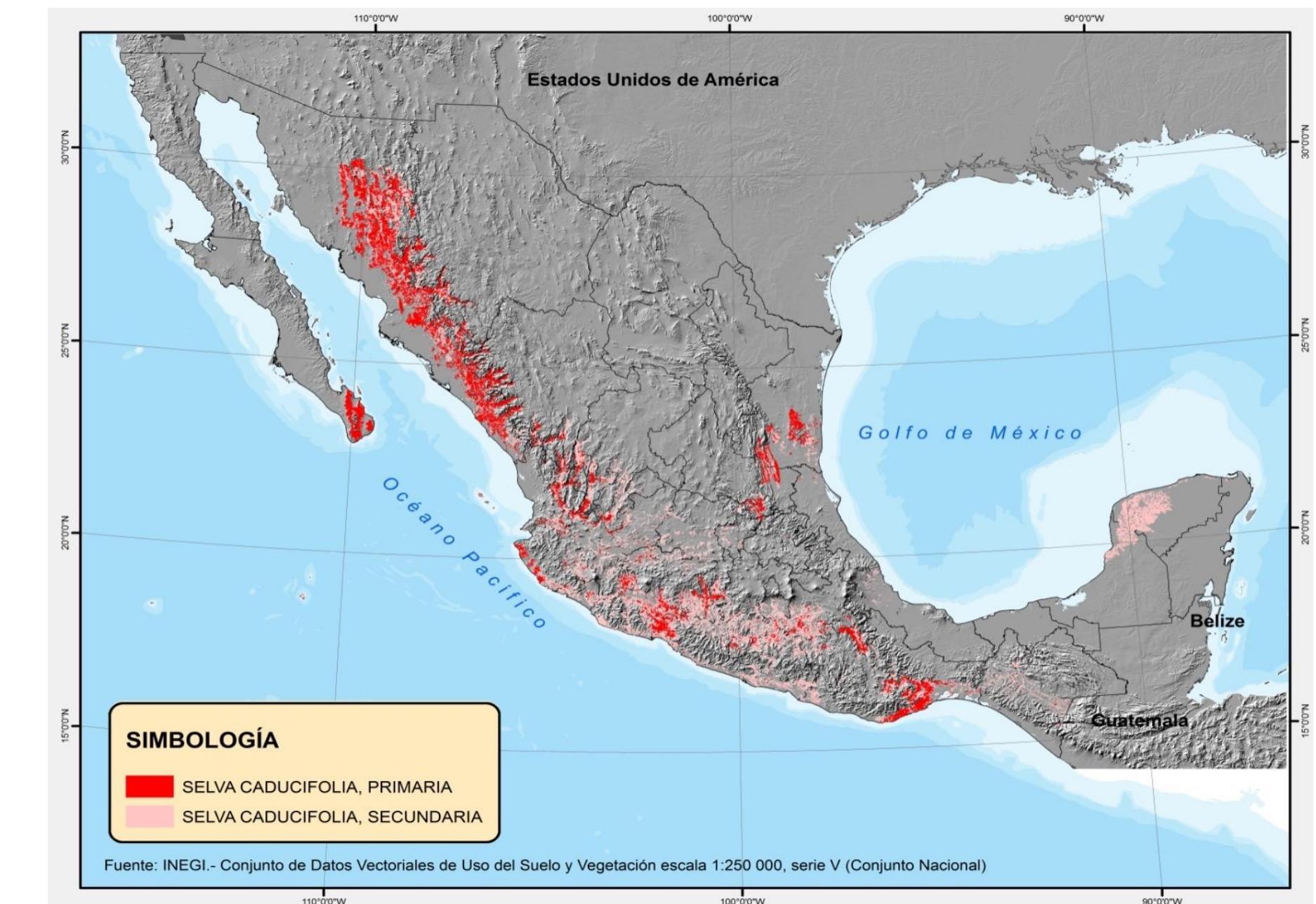


2.8% of the national territory

## Semideciduous Tropical Forests



Calvillo, Aguascalientes



7.4% of the national territory

## Deciduous Tropical Forests

Información de Uso del Suelo y Vegetación



Tehuantepec Isthmus, Oaxaca-Chiapas



0.4% of the national territory

## Thorny Tropical Forest



Nevado de Toluca, México

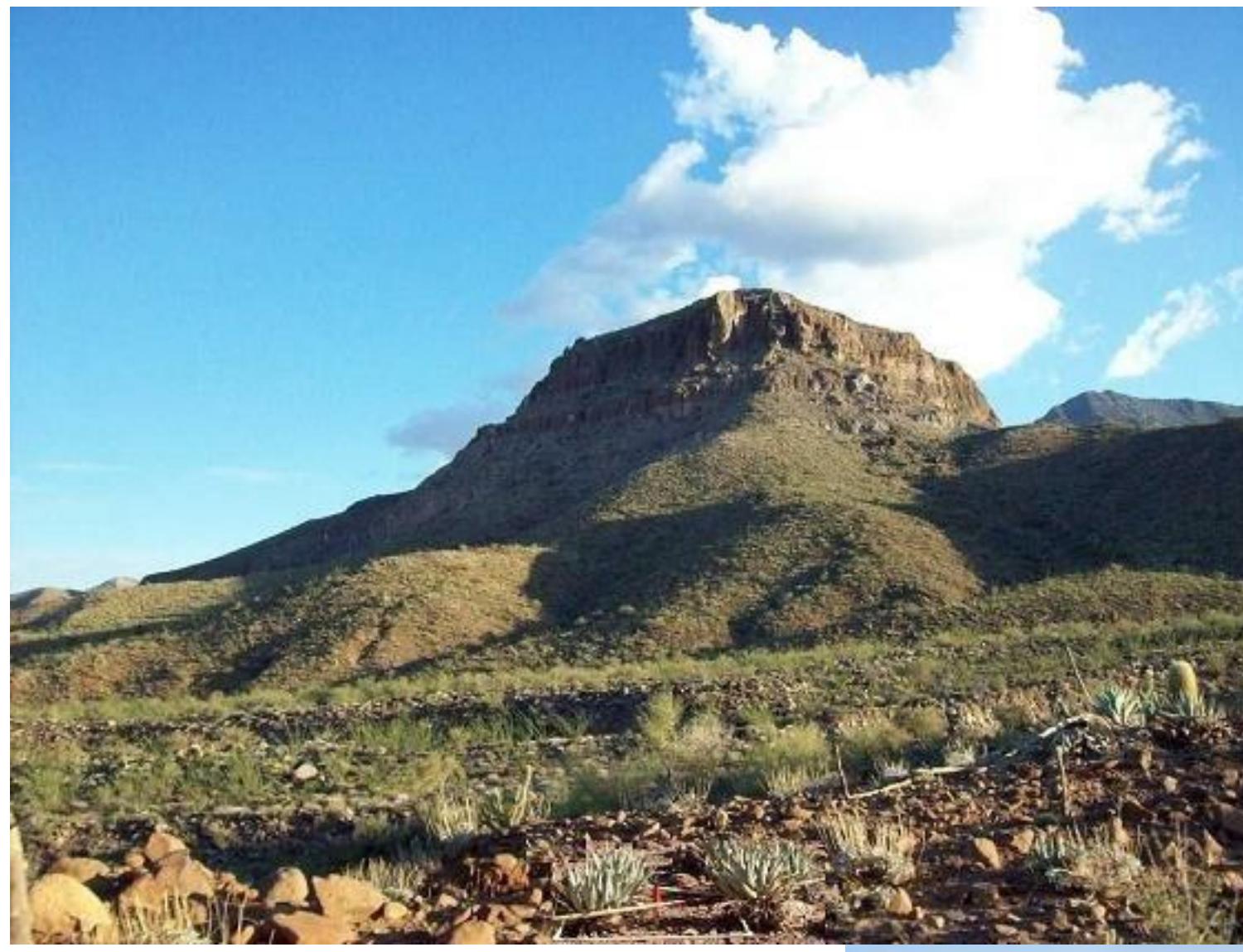


Piedmont Western Sierra Madre, Durango



6.9% of the national territory

## Grasslands



Zacatecas



Samalayuca, Chihuahua



28.0% of the national territory

## Xerophytic Scrub



Cattail Aquatic vegetation:  
Cuatro Ciénegas, Coahuila



Mangrove in La Encrucijada, Chiapas



1.4% of the national territory

# Hydrophytic Vegetation



Coastal sand dunes vegetation, Veracruz



2.0% of the national territory

## Other Vegetation Types



**Sabanna like vegetation**  
Lázaro Cárdenas, Cintalapa,  
Chiapas



**Induced grassland**, San Luis Potosí



**3.1% of the national territory**

## **Induced Vegetation**



Sugar cane; Huimanguillo,  
Tabasco



Avocado: Los Reyes, Michoacán

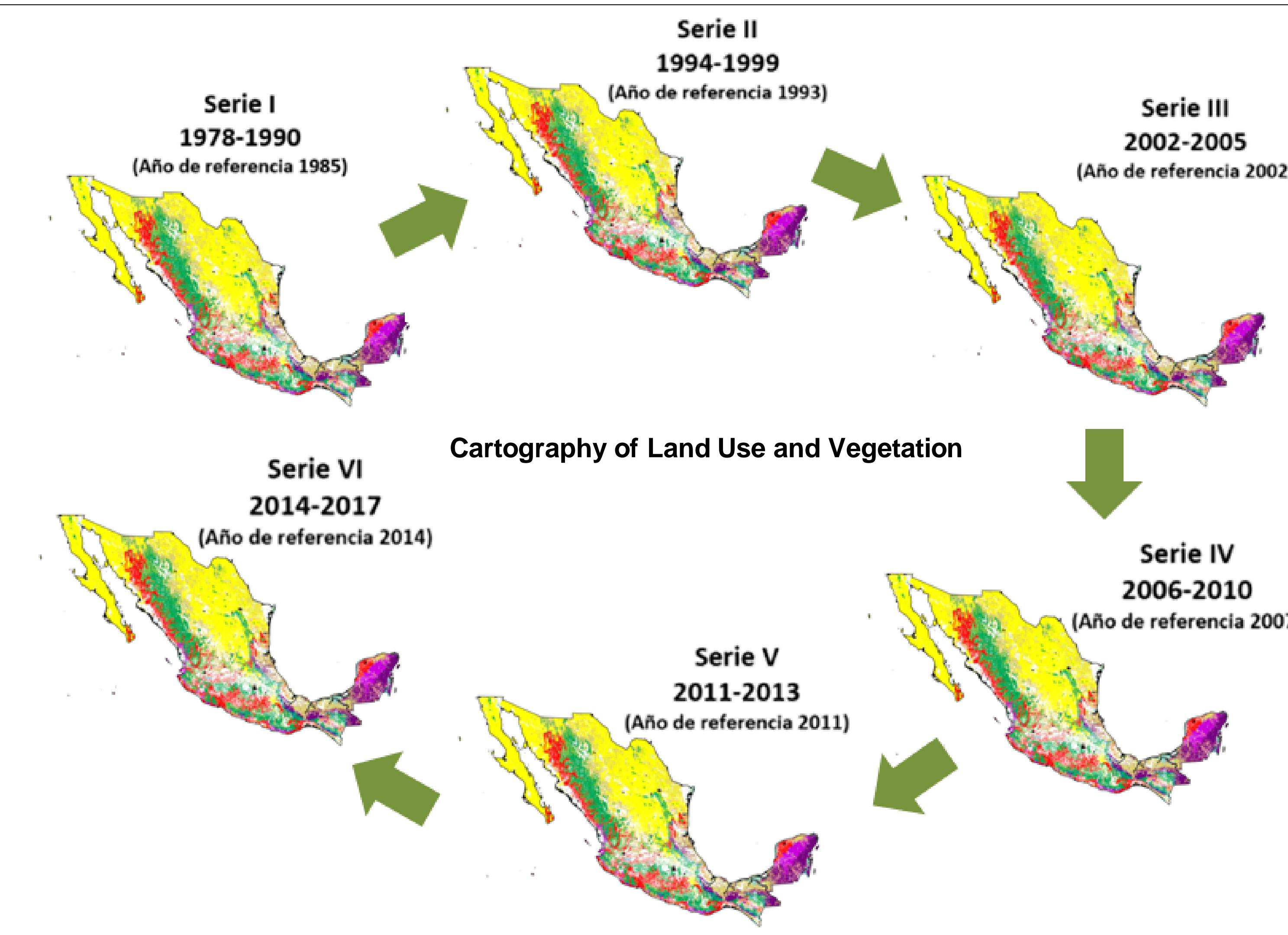


23.6% of the national territory

# Agriculture

AGROSYSTEMS					
AGROSYSTEMS	RAINFED AGRICULTURE	IRRIGATED AGRICULTURE	SOIL MOISTURE DEPENDENT AGRICULTURE	ARTIFICIAL GRASSLANDS	ARTIFICIAL FORESTS
CROP TYPES	ANNUAL (A)				PERMANENT
	SEMIPERMANENT (S)				
	PERMANENT (P)				

# Information on Land Use and Vegetation: Evolution of the series

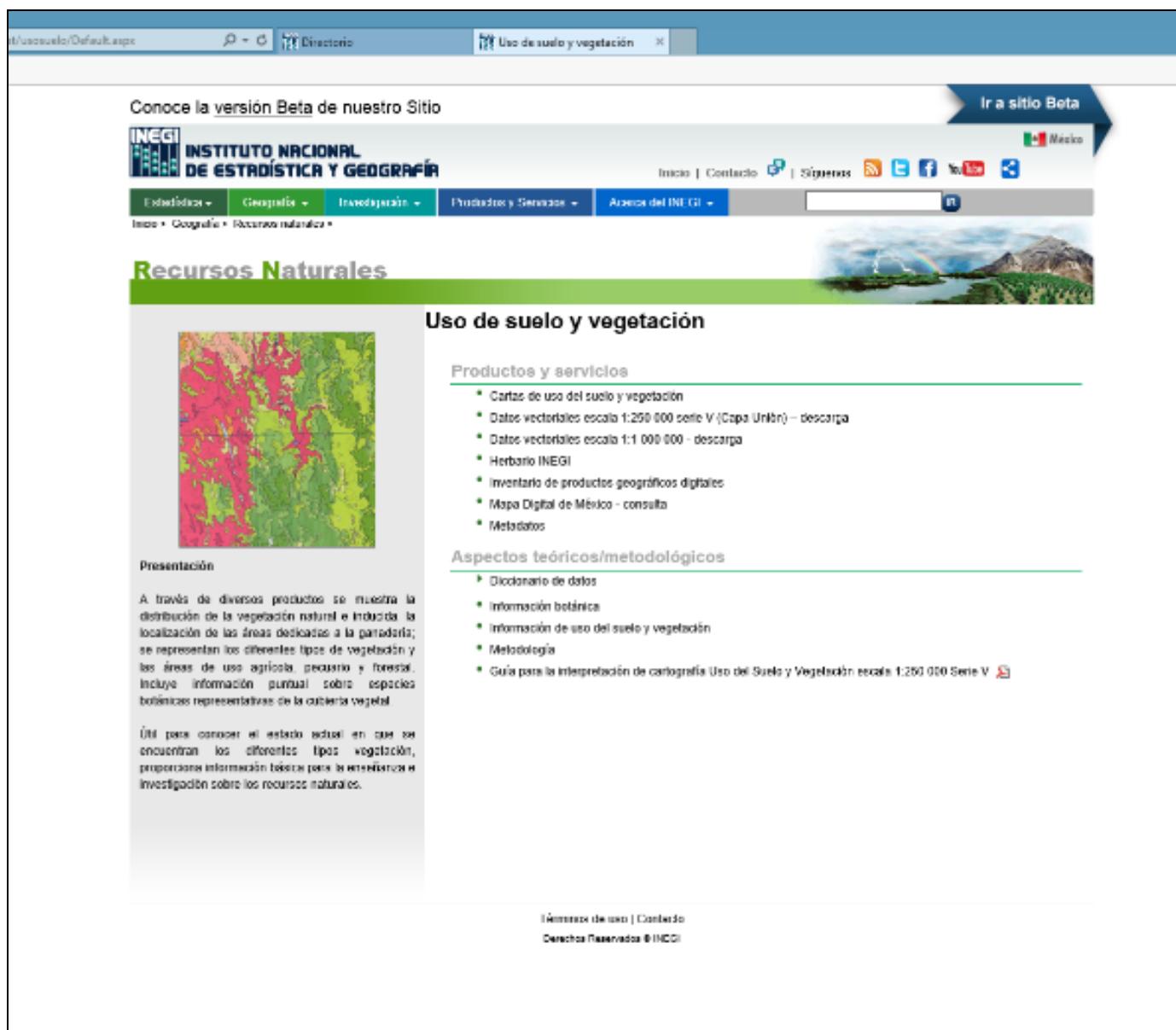


The **INEGI** contributes with the knowledge of the spatial distribution and condition of the vegetation through the Information of Land Use and Vegetation

	SERIES I	SERIES II	SERIES III	SERIES IV	SERIES V	SERIES VI
Production period	1978-1991	1995-2000	2002-2005	2007-2010	2011-2014	2015-2017
Field work period	1978-1990	1996 - 1999	2002-2003	2007-2008	2012-2013	2015
Data (map) reference date	1985	1993	2002	2007	2011	2014
Scale	1:250,000	1:250,000	1:250,000	1:250,000	1:250,000	1:250 000
Imagery						
Source imagery	Aerial photographs	Image maps	LANDSAT TM (30m)	SPOT 5 (10m)	LANDSAT 5 TM (30m)	LANDSAT 8 (30m)
Product	Analog map	Analog and digital	Digital	Digital	Digital	Digital
Layers	1 (Analog)	5 data layers	14 data layers	13 data layers	13 data layers	15 data layers

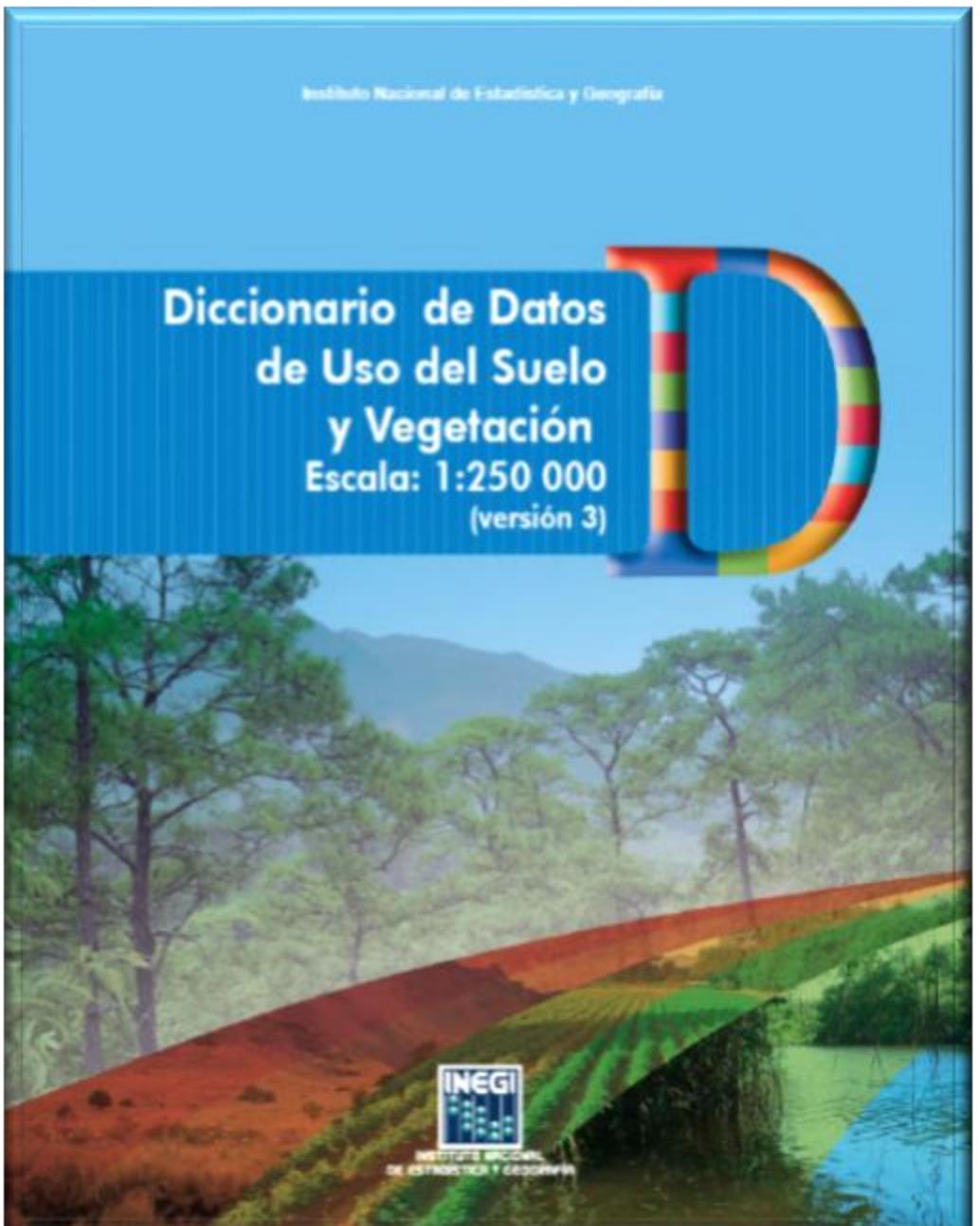
Digital data on Land Use and Vegetation and its documentation is available to users free of charge through the INEGI website.

## Download data



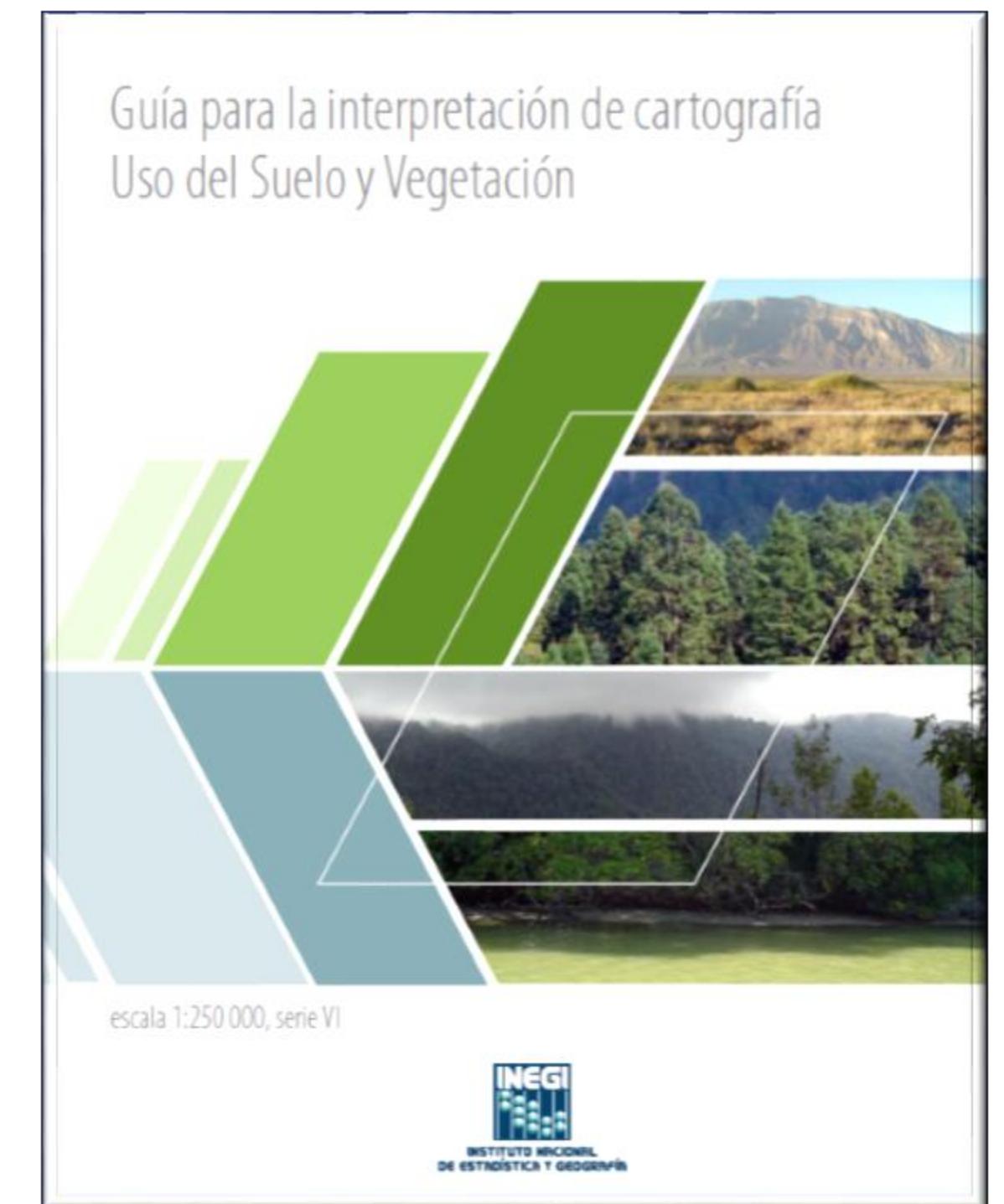
<http://www.inegi.org.mx/geo/contenidos/recnat/usosuelo/Default.aspx>

## Data Dictionary



<http://www.beta.inegi.org.mx/app/biblioteca/ficha.html?upc=702825063443>

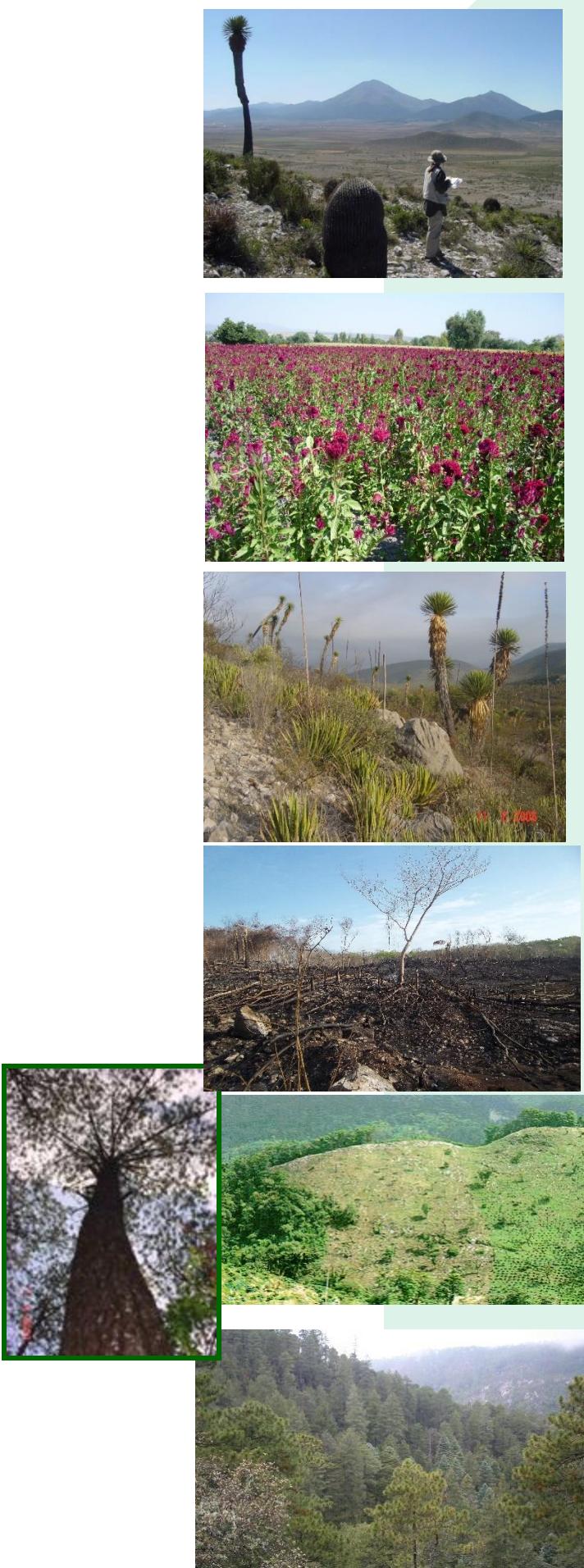
## Interpretation Guide



<http://www.beta.inegi.org.mx/app/biblioteca/ficha.html?upc=702825092030>

# Land Use and Vegetation Information: Series VI

# Information in 15 digital data layers



## Polygonal layers:

- Vegetation** Usv250s6v.- Information layer of the vegetation cover using the INEGI vegetation classification system.
- Agriculture** Usv250s6g.- Information layer of types of systems or agricultural uses, classified by presence / absence of irrigation and periodicity of the crop (duration of the agricultural cycle).
- Physiognomy** Usv250s6a.- Information layer that shows the appearance or physiognomy of the different types of bushes, with emphasis on the recognition of distinctive ecological, floristic and physiognomic elements and adaptations.
- Nomadism** Usv250s6n.- Layer of complementary information that contains the distribution of the areas where non-permanent and / or non-fixed agricultural activities have been observed, denominated generically as nomadism.
- Height** Usv250s6h.- Forest information layer that contains the qualitative height of the arboreal vegetation.
- Coverage** Usv250s6d.- Forest information layer that contains the relative estimate of the area covered by the upper canopy of the tree vegetation.

# Information in 15 digital data layers

	<b>Species Vegetables</b>	<b>Point layers:</b> <b>Usv250s6e.-</b> Layer that contains the floristic information, includes the observation points of determining species or of ecological and / or economic importance, as well as the geographic reference of the ecological data collection points (field verification points).
	<b>Crops</b>	<b>Usv250s6c.-</b> A layer that contains information on crops, includes points of observation of most common crops or of greater economic importance, as well as the geographical reference of the points of agronomic data collection (field verification points).
	<b>Livestock activities</b>	<b>Usv250s6p.-</b> Layer that contains information about the presence of livestock activities.
	<b>Activity Forest</b>	<b>Usv250s6f.-</b> Layer that contains information about the presence of forestry activities.
	<b>Sites of Ecological Importance</b>	<b>Usv250s6i.-</b> Point information layer, of the plant communities of ecological importance sites whose area is not represented as a 1: 250,000 scale polygon, these are areas under 50 hectares and special associations not considered in the classification system.
	<b>Other Activities</b>	<b>Usv250s6o.-</b> Information layer about the presence of other non-traditional or special activities such as beekeeping, hunting ranches, etc.

# Information in 15 digital data layers



## Lines of Importance Ecological

### Line layer:

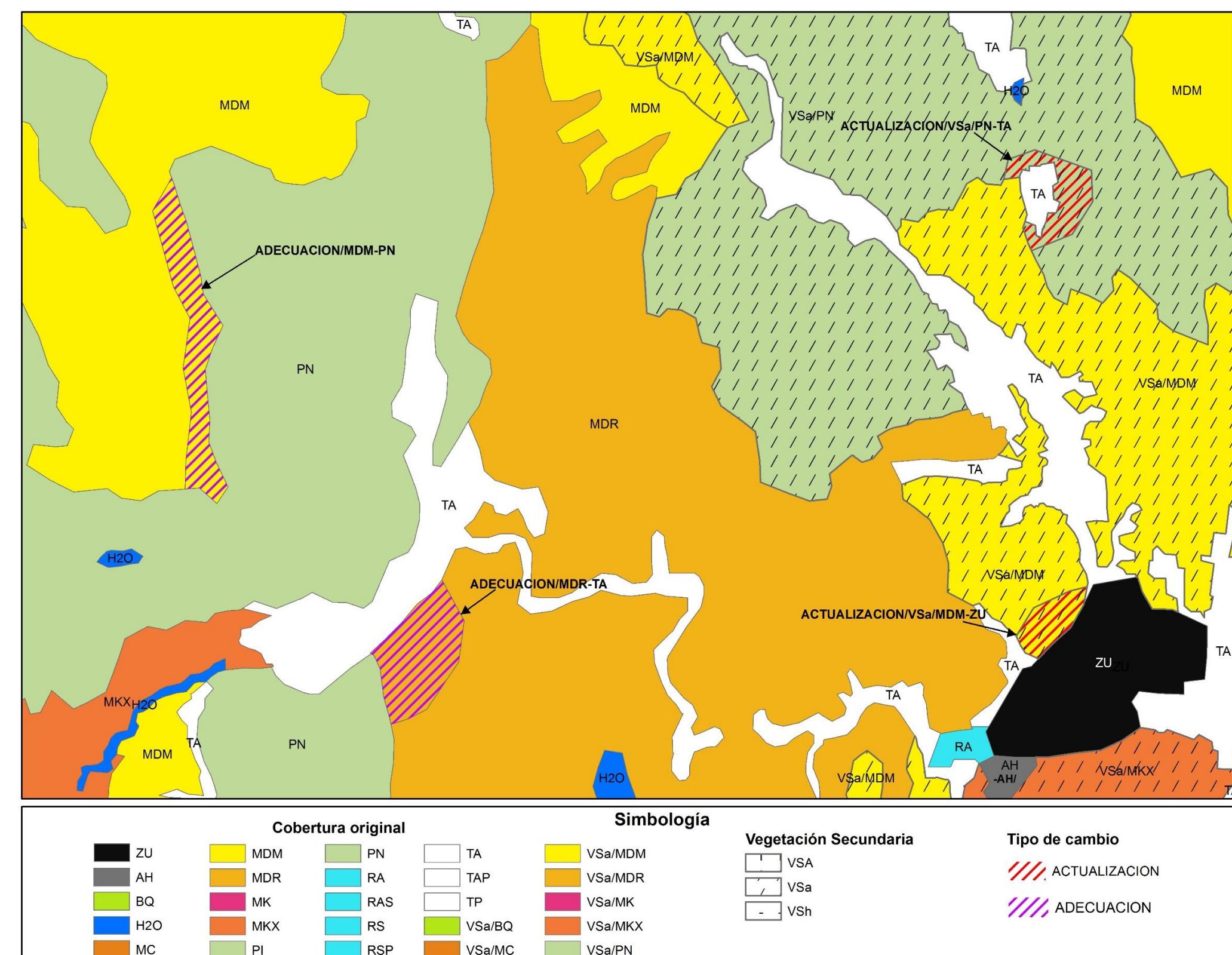
**Usv250s6l.- Linear information layer, of the plant communities of corridors of ecological importance which area is not representable as a polygon at a scale of 1: 250,000, these are areas smaller than 50 hectares.**

## Layer of changes

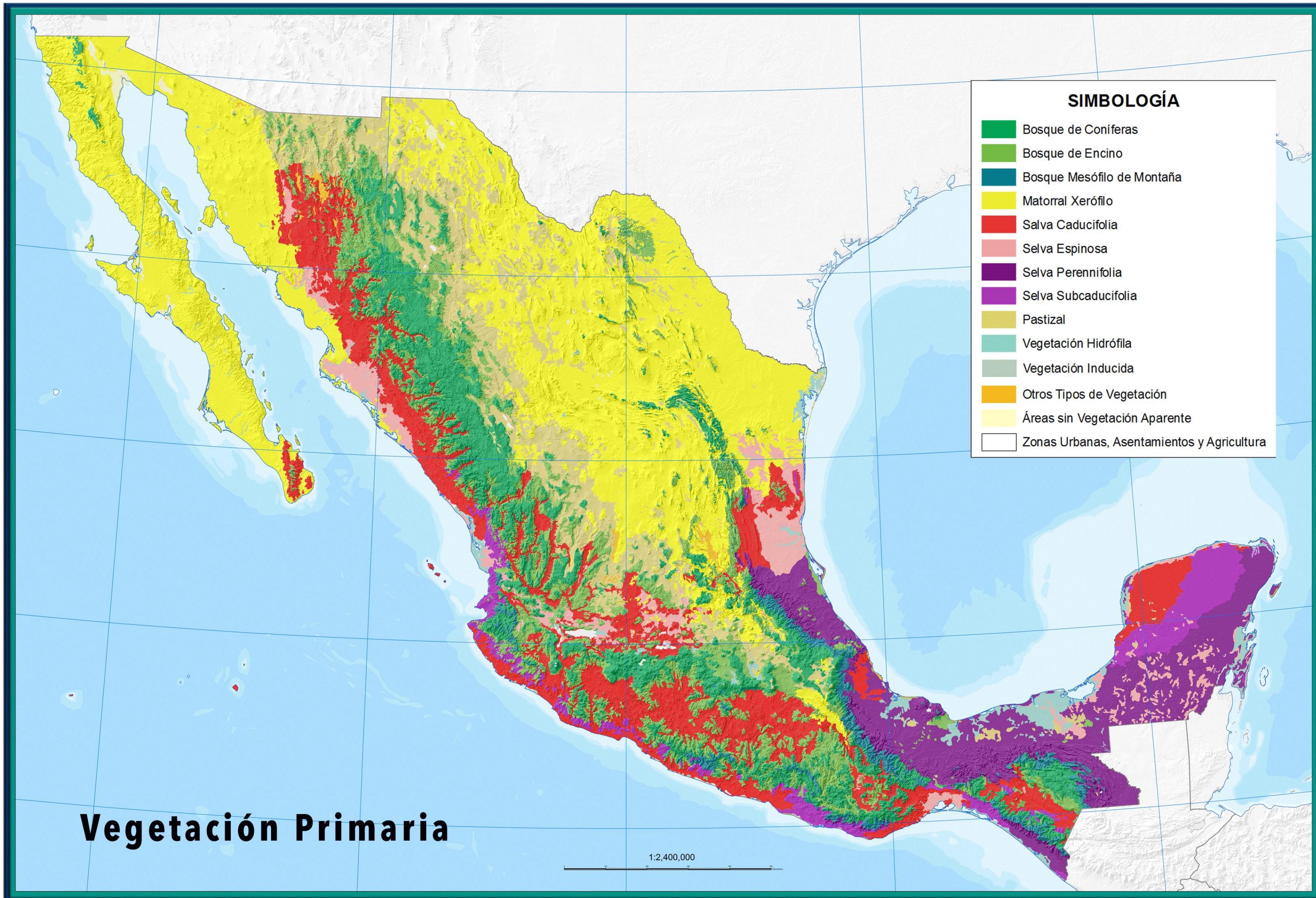
**Usv\_Cambios.-** Polygonal data layers with the areas of land cover changes between two reference dates and greater spatial detail.,.

As part of a methodological adjustment to record the changes in the terrain, updates and corrections of the information (changes) between the information generated in the year 2011 and its update for the year 2014, a layer is generated that contains both the polygons of the Series V , the polygons with changes and the updated polygons.

It consists of 199 513 polygons.



# Dynamic Map



# Information on Land Use and Vegetation: Botanical information

# Generation and Processing of Botanical Information.

Fieldwork includes taking plant samples from visited sites. The scientific name of the plant specimens is determined (Family, Genus, Species), as support data for vegetation characterization.

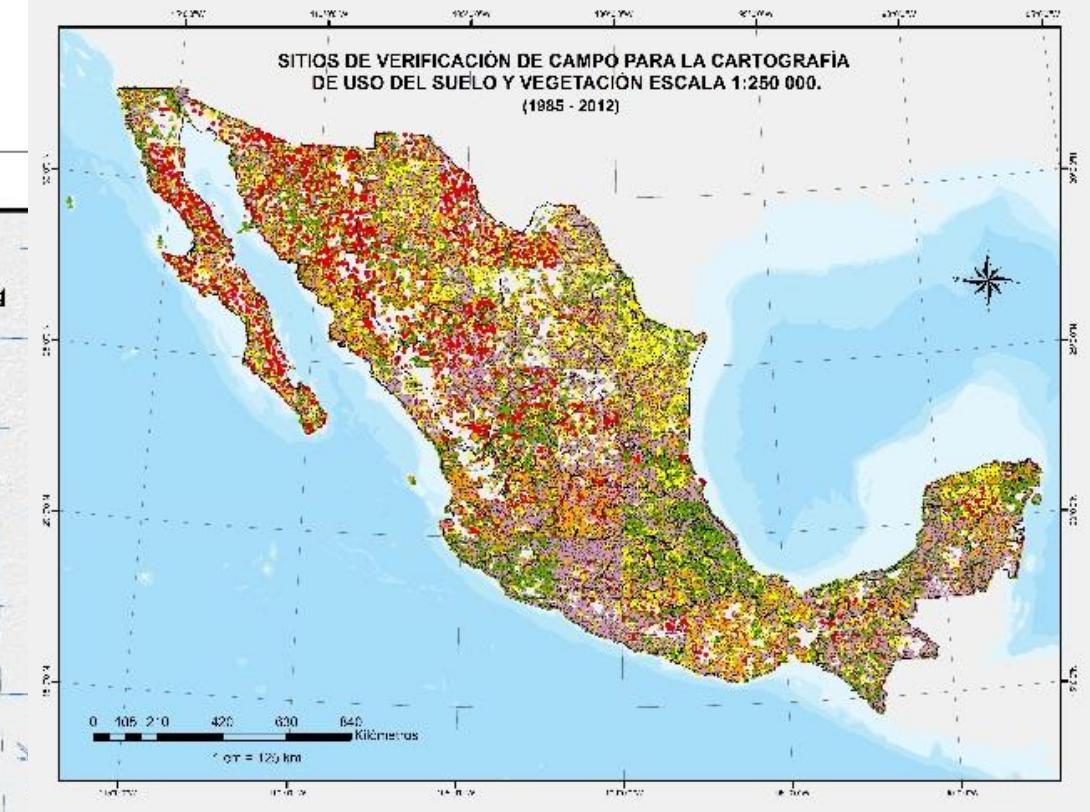
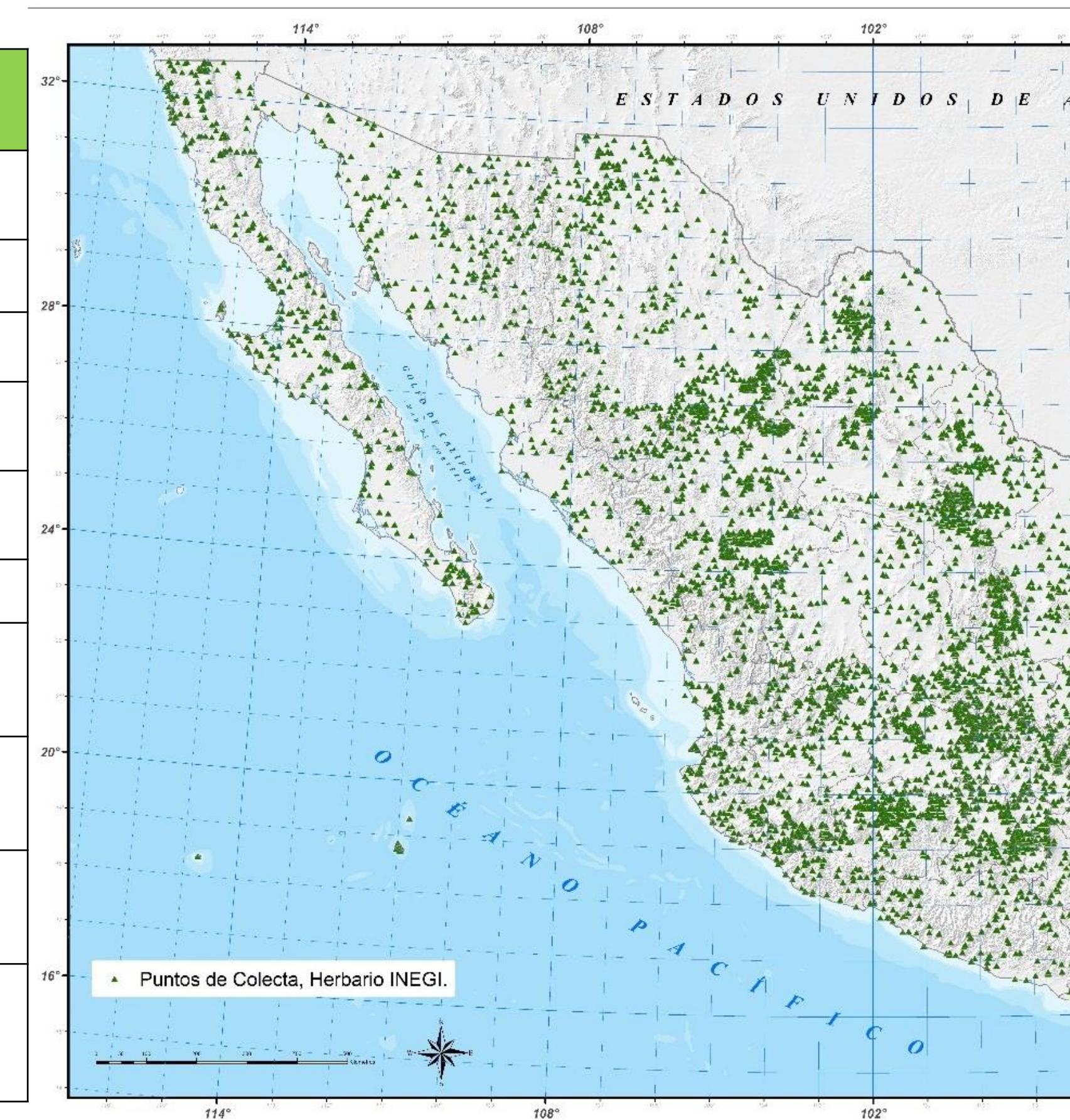
Part of the plant samples are included in the INEGI Herbarium (> 50,000 specimens so far).



# DATA INCORPORATED IN THE INEGI BOTANICAL COLLECTION AND DATABASE



Data from the INEGI Herbarium	
	Numbers
Records	50,954
Families	280
Genera	2,024
Species	8,550
Taxas	9,308
Sampling Sites	22,366
Digitized Exemplars	8,158
Images Released	4,000
New Species	6



Puntos de colecta ingresados al Herbario

# DIGITIZATION OF HERBARIUM SPECIMENS



**Holotipo** INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA  
DIRECCIÓN GENERAL DE GEOGRAFÍA Y MEDIO AMBIENTE  
HERBARIO INEGI

Registro: 40000

N. Científico: *Psychotria inegi* I. García-González et Borhidi

Familia: RUBIACEAE

Nombre local:

Localidad: 4.5 KM SE EL REFUGIO.

Municipio: TALPA DE ALLENDE

Coord: Lat: 20 12 59 N Long: 104 45 23 W Hoja F13-11 PUNTO 4

Estado: JALISCO

Escala: 1: 250 000

Fecha: 21/05/2012

Habitat

Bosque mesófilo de montaña

Asociación: *Acer skutchii* - *Juglans* sp. - *Podocarpus* sp. - *Pinus maximinoi*

Topografía: Ladera alta PEND.: Moderada

Substrato: Toba acida del Oligoceno-Mioceno. Regosol districo-Cambisol districo-Litosol-Leptosol. Arcilloso.

Erosión: No Apreciable. Disturbio: No perceptible.

U.del suelo:

Descripción: Arbusto. Perenne. Erecto 3.00 m. Escaso.

Usos: P.útil:

Flor: Pequeña blanca Fruto:

Observ: Ejemplar: Ramillas jóvenes rojizas, estípulas caedizas grandes, color café.

Sitio: Cobertura arborea cerrado:>40%. Se organizan salidas turísticas de Talpa de Allende para apreciar el Bosque de Maple.

Altitud: 1713 m

Estrato: 5.00 - 10.00 m.

Fenología: Floración

Semilla:

Archivo Imprimir

03:19 p. m.  
16/03/2018

# Conclusion

The National System of Statistical and Geographical Information enables Mexico to produce and integrate various sources of information in support of official statistics, addressing global initiatives and monitoring disasters.





INSTITUTO NACIONAL  
DE ESTADÍSTICA Y GEOGRAFÍA

# ¡Thank you!

Comments and questions:  
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