SEEA NATURAL CAPITAL ACCOUNTING AND VALUATION OF ECOSYSTEM SERVICES

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INEGI

OVERVIEW OF THE SEEA EXPERIMENTAL ECOSYSTEM ACCOUNTING

LEGAL AND POLITICAL COMMITMENTS

THE SYSTEM OF ENVIRONMENTAL ECONOMIC ACCOUNTING

- An internationally agreed statistical framework to measure the environment and its interactions with economy
- The SEEA Central Framework was adopted as an international statistical standard by the UN Statistical Commission in 2012
- The SEEA Experimental Ecosystem Accounting complement the Central Framework and represent international efforts toward coherent ecosystem accounting

NATURAL CAPITAL ACCOUNTING

Individual environmental **assets & resources:**

Timber
Water
Soil
Fish

Ecosystems: Biotic and abiotic elements functioning together:

Forests
Lakes
Cropland

SEEA Central Framework (SEEA_CF) starts with economy and links to physical information on natural assets, flows and residuals

+

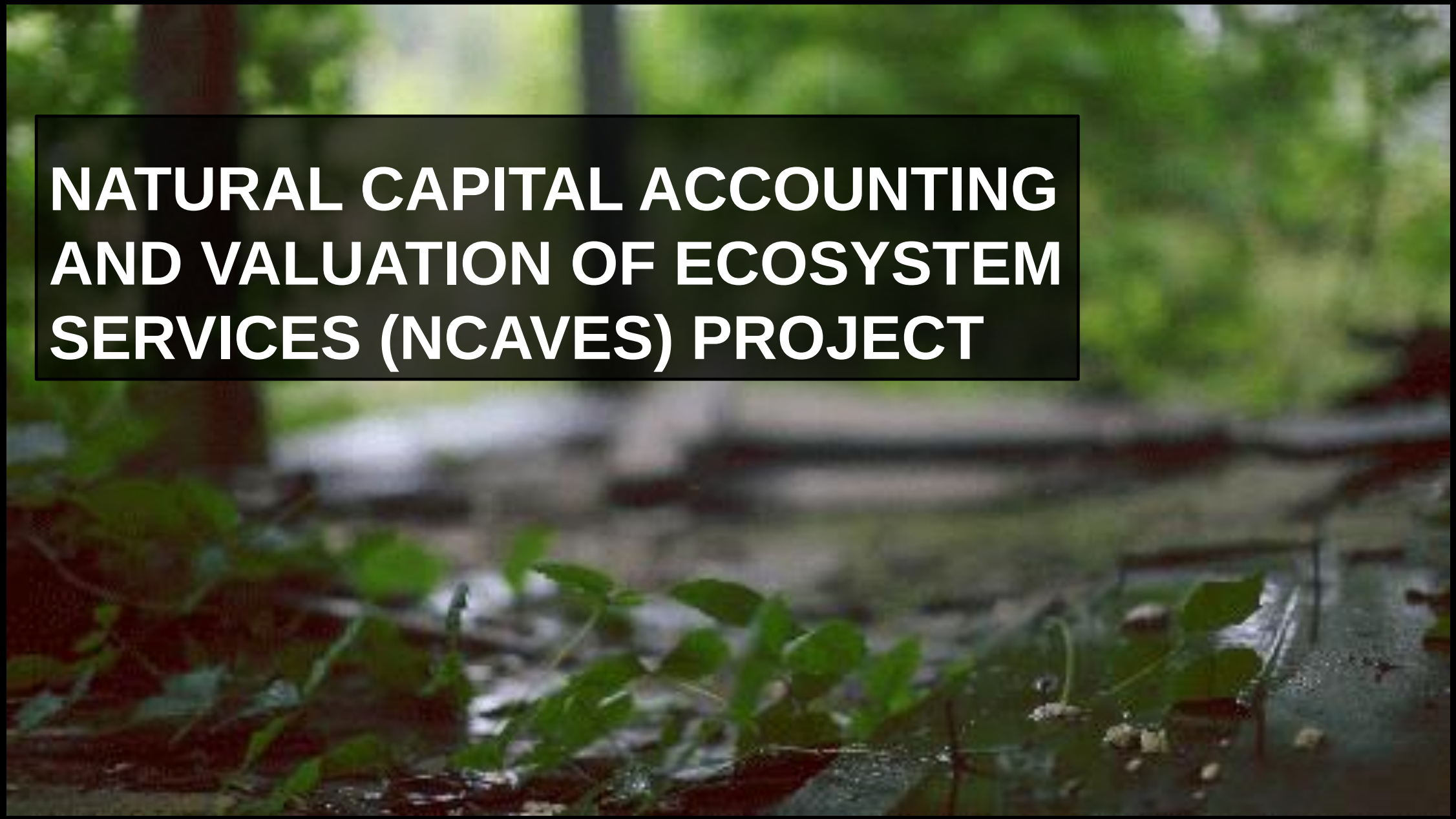
SEEA Experimental Ecosystem Accounting (SEEA-EEA) starts with ecosystems and links their services to economic and other human activity

=

Together, they provide the foundation for measuring the relationship between the environment, and economic and other human activity

SEEA

SEEA-CF (Central Framework)	• **Assets** • **Physical flows** • **Monetary flows**	• Minerals & Energy, Land, Timber, Soil, Water, Aquatic, Other Biological • Materials, Energy, Water, Emissions, Effluents, Wastes • Protection expenditures, taxes & subsidies
SEEA Water; **SEEA Energy;** **SEEA Agriculture, Forestry and Fisheries**	Add sector detail	As above for • Water • Energy • Agricultural, Forestry and Fisheries
SEEA-EEA (Experimental Ecosystem Accounting)	Adds spatial detail and ecosystem perspective	Extent, Condition, Ecosystem Services, Thematic: Carbon, Water, Biodiversity



NATURAL CAPITAL ACCOUNTING AND VALUATION OF ECOSYSTEM SERVICES (NCAVES) PROJECT

PARTNERS

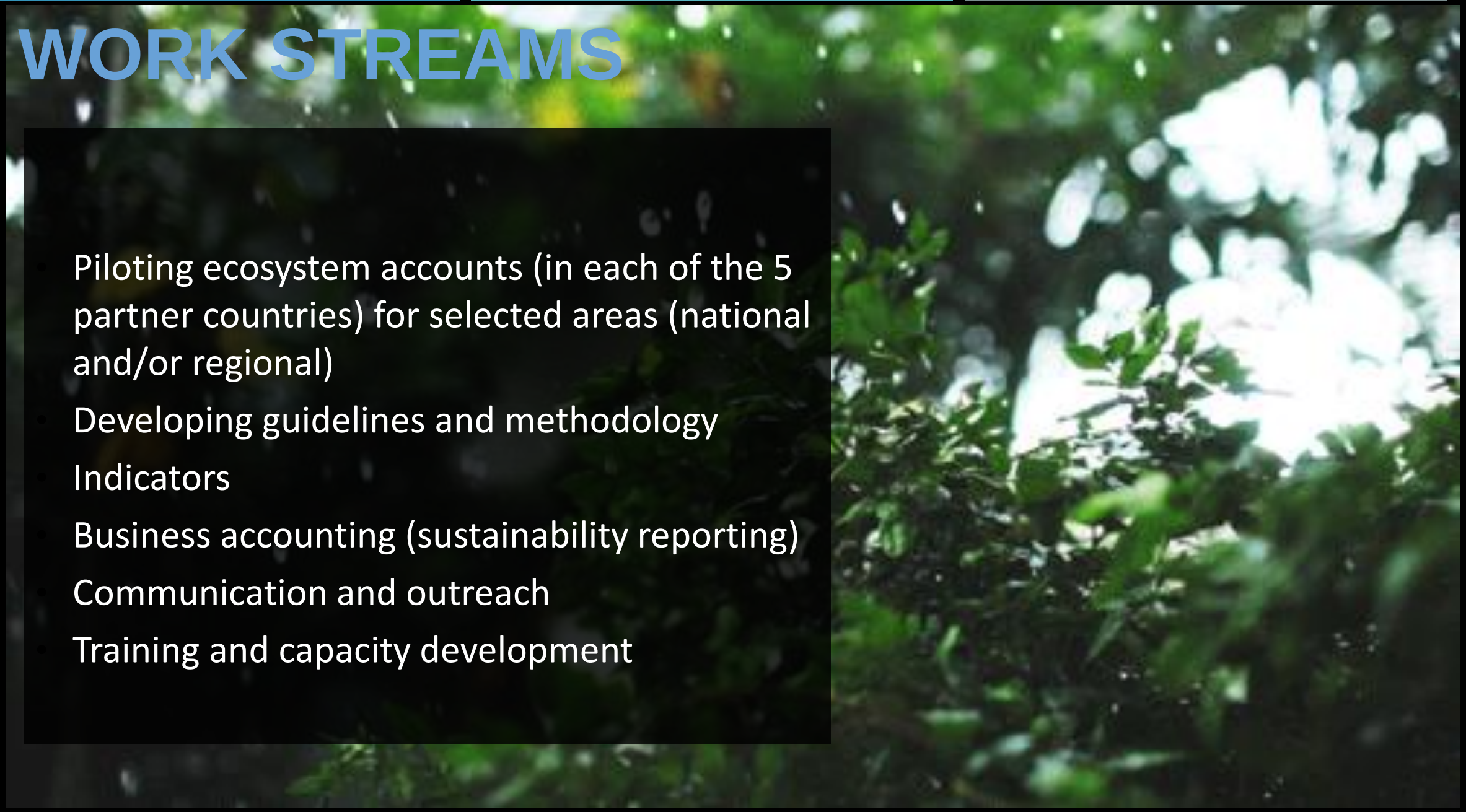
- Implementing partners
  - United Nations Statistics Division
  - United Nations Environment Programme
  - (CBD)
- Sponsor
  - European Union
  - Partnership Instrument
- Five partner countries
  - Brazil, China, India, Mexico, South Africa
- Project duration
  - 4 years from 2017-2020

OVERALL OBJECTIVES

- Advance the knowledge agenda on environmental-economic and ecosystem accounting
- Initiate pilot testing of SEEA Experimental Ecosystem Accounting, ecosystem valuation and environmental-economic analysis with a view to:
  - improving the measurement of natural biotic resources, ecosystems and their services at the (sub)national level
  - mainstreaming biodiversity and ecosystems in (sub)national level policy-planning and implementation

WORK STREAMS

- Piloting ecosystem accounts (in each of the 5 partner countries) for selected areas (national and/or regional)
- Developing guidelines and methodology
- Indicators
- Business accounting (sustainability reporting)
- Communication and outreach
- Training and capacity development



TIMEFRAME OF THE PROJECT

Sep 2016 – April 2017	• Design
May 2017 – April 2018	• Development
May 2018- Q1 2020	• Implementation
Q2 2020	• Closure + follow-up

COUNTRY ACTIVITIES IN 2017

- Project launched in each partner country
- Inception missions were undertaken for in-country assessments
- Discussions of the national work programme to advance Natural Capital Accounting initiated and work plan drafted

GLOBAL ACTIVITIES IN 2017

- Technical Recommendations of the SEEA EEA published
- Regional Training Workshop on the SEEA EEA in Asia-Pacific jointly organized with the National Bureau of Statistics of China
- 2nd Policy Forum on Natural Capital Accounting jointly organized with the Dutch Ministry of Foreign Affairs and the World Bank.

GLOBAL EVENTS IN 2018

- Follow up mission to 5 partner countries
- Expert meeting on Ecosystem Valuation in the context of Natural Capital Accounting (24-26 April, Bonn)
- Forum of Experts in Ecosystem Accounting (18-20 June, New York, USA)
- Side-event UN World Geospatial Congress (Deqing, China 19-21 Nov)
- Side-event Convention on Biodiversity COP -14 (22 Nov. 2018, Cairo, Egypt)
- Regional Training Workshop on the SEEA Experimental Ecosystem Accounting in Latin America region (28-30 November, Rio de Janeiro)
- 3rd Policy Forum on Natural Capital Accounting (26-27 November, Paris)
- Expert meeting on SEEA indicators (5-7 February 2019, Cambridge, UK)
- Forum of Experts in Ecosystems Accounting 2018 (April/May 2019, New York, USA)

Natural Capital Accounting and Valuation of Ecosystem Services in Mexico 2017-2020

MEXICO: PILOT COUNTRY FOR THE IMPLEMENTATION OF THE SEEA-EEA 2014

SHCP
SECRETARÍA DE HACIENDA
Y CRÉDITO PÚBLICO

CONANP
COMISIÓN NACIONAL
DE ÁREAS NATURALES
PROTEGIDAS

SEMARNAT
SECRETARÍA DE MEDIO AMBIENTE
Y RECURSOS NATURALES

INECC
INSTITUTO NACIONAL
DE ECOLOGÍA
Y CAMBIO CLIMÁTICO

CONAGUA
COMISIÓN NACIONAL DEL AGUA

CONAFOR
COMISIÓN NACIONAL FORESTAL

CONABIO
COMISIÓN NACIONAL PARA EL
CONOCIMIENTO Y USO DE LA BIODIVERSIDAD

BACKGROUND

1. MÉXICO - ADVANCING NATURAL CAPITAL ACCOUNTING (ANCA) 2014 - 2016

2014: Mexico, Bhutan, Chile, Indonesia, Vietnam, Mauritius and South Africa pilot countries for the *Advancing Natural Capital Accounting* (ANCA) project.

Mexican project

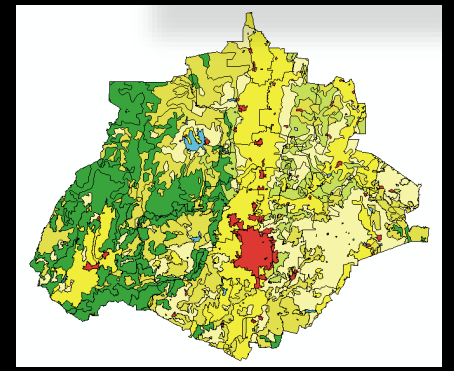
- suppliers and users of environmental-economic information identified
- country's environmental policy priorities identified
- stakeholders and existent technical capacities identified

2. MÉXICO - NATURAL CAPITAL ACCOUNTING AND VALUATION OF ECOSYSTEMS SERVICES PROJECT 2017 - 2020

Mexico, Brazil China, India and South Africa, pilot countries

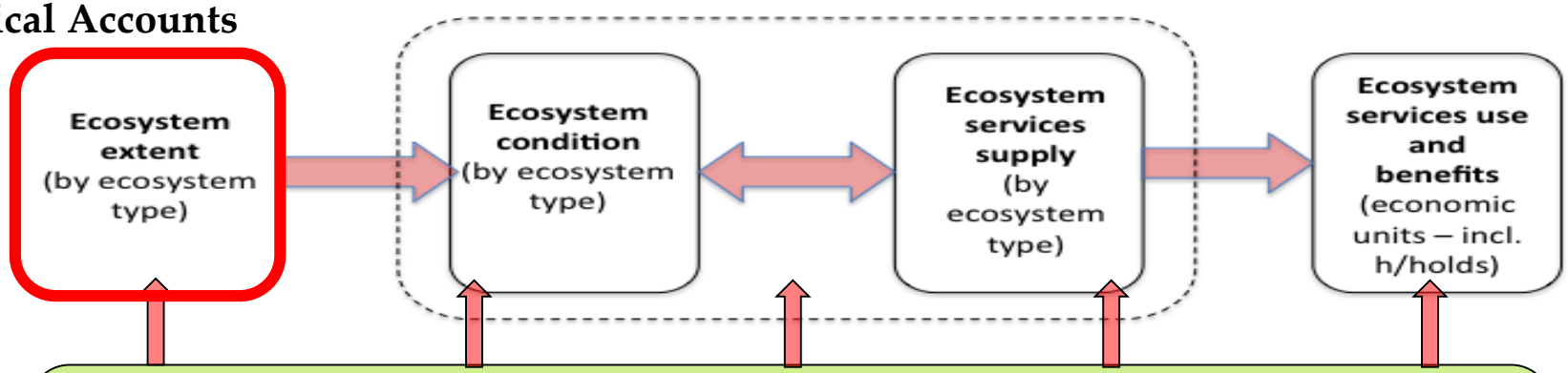
Main objectives:

- Compiling select ecosystem accounts (physical and monetary terms)
- Developing guidelines and methodology that contribute to the implementation of SEEA – EEA.
- Conduct capacity-building and knowledge-sharing activities as ways to enlarge the community of



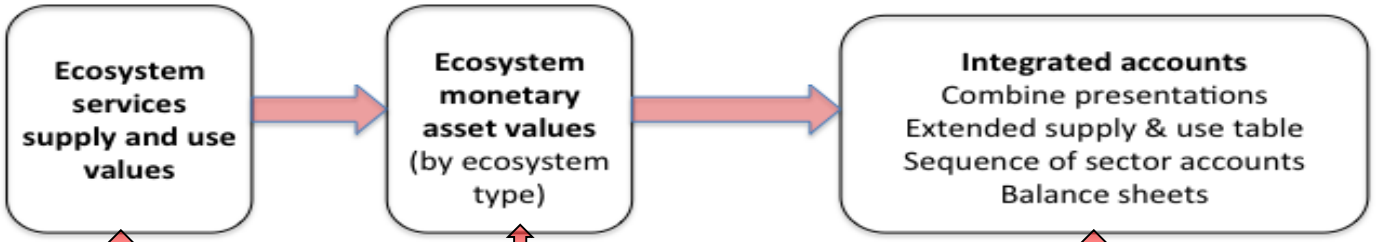
BROAD STEPS IN ECOSYSTEM ACCOUNTING

a. Physical Accounts



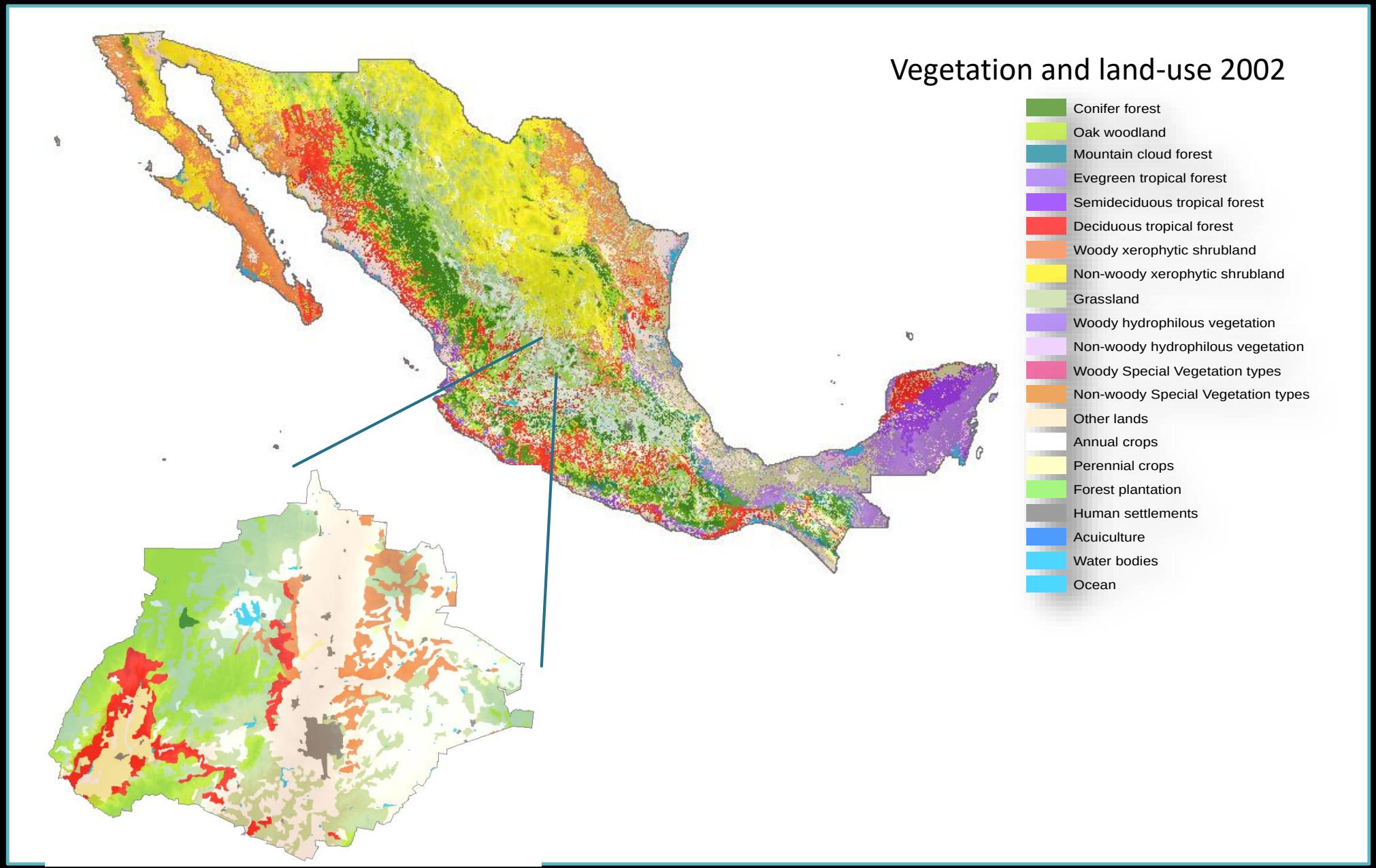
Ecosystem thematic accounts: Land, Carbon, Water, Biodiversity
Supporting information: Socio-economic conditions and activities, ecological production functions
Tools: classifications, spatial units, scaling, aggregation, biophysical modelling
Source: Official statistics, spatial data, remote sensing data

b. Monetary Accounts



Supporting information: SNA accounts, I-O tables
Tools: Valuation techniques

ECOSYSTEM CLASSIFICATION - Vegetation and land-use



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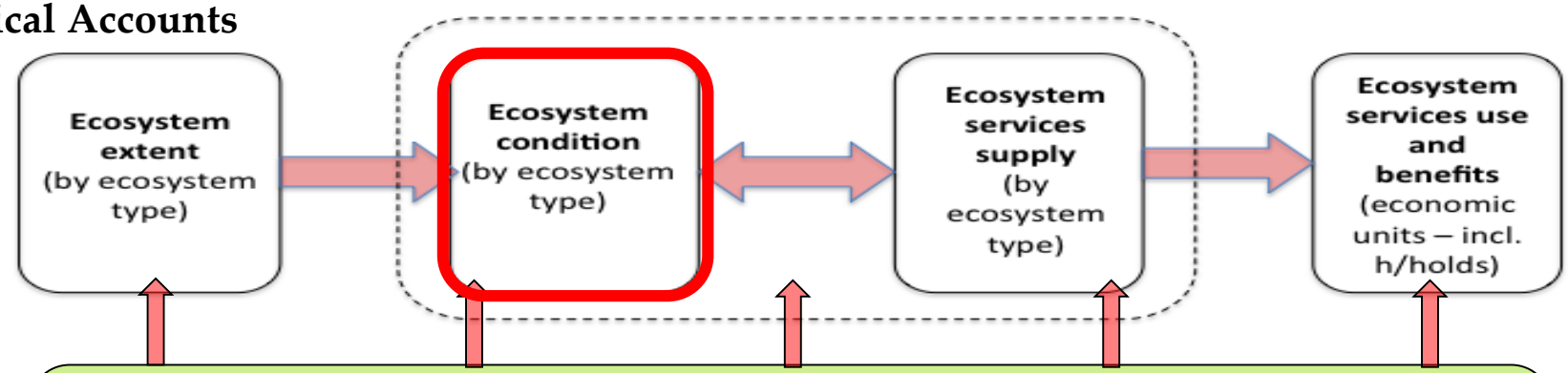

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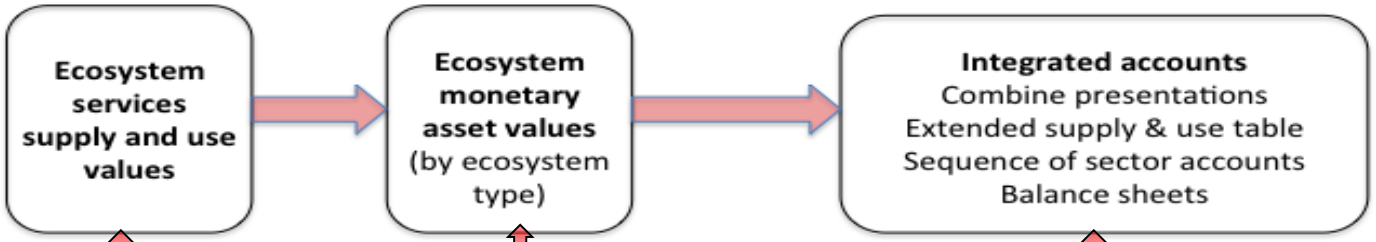

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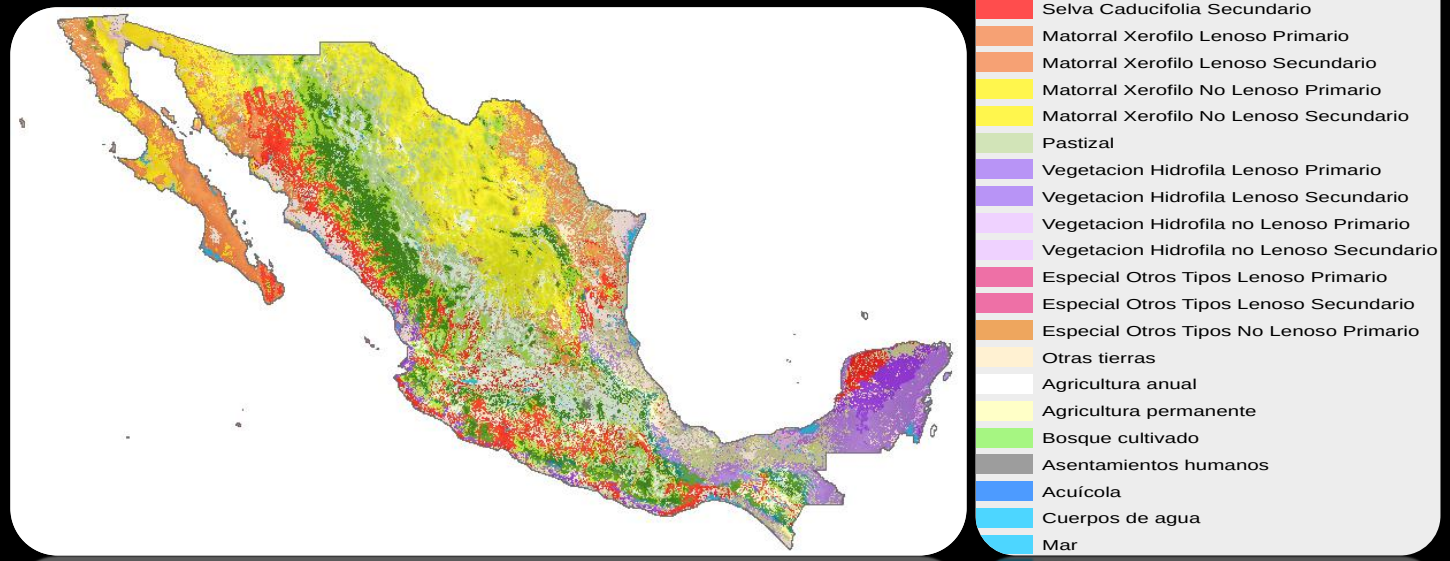
Ecosystem condition

1.- Conservation status of vegetation (primary vs. second-growth)
- Based on INEGI's vegetation and land-use charts

2. Soil erosion (INEGI's hydric soil erosion chart, 2015)
3. Soil organic carbon content (INEGI's chart)
4. Biodiversity: Collection records for 14,424 plant species (CONABIO)
- No. species of higher plants,
- No. of species at risk,
- Presence/No. of exotic invasive species

Vegetation and land-use



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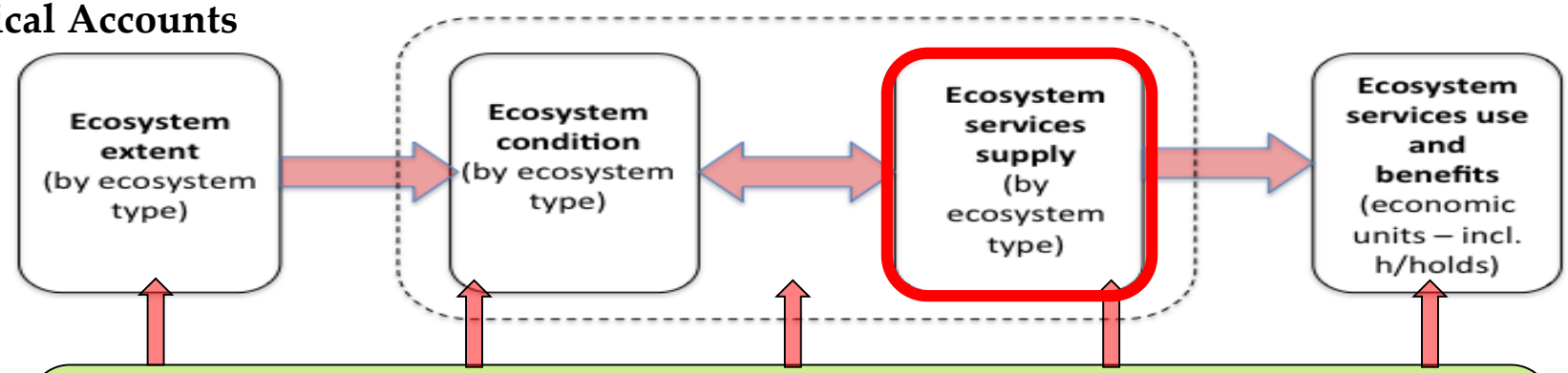

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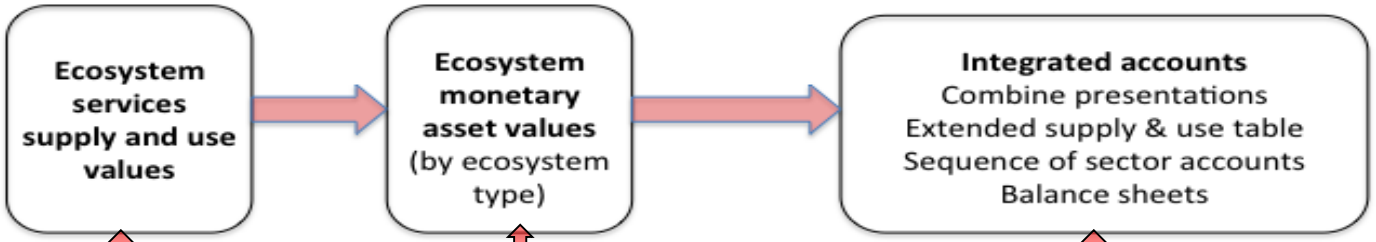

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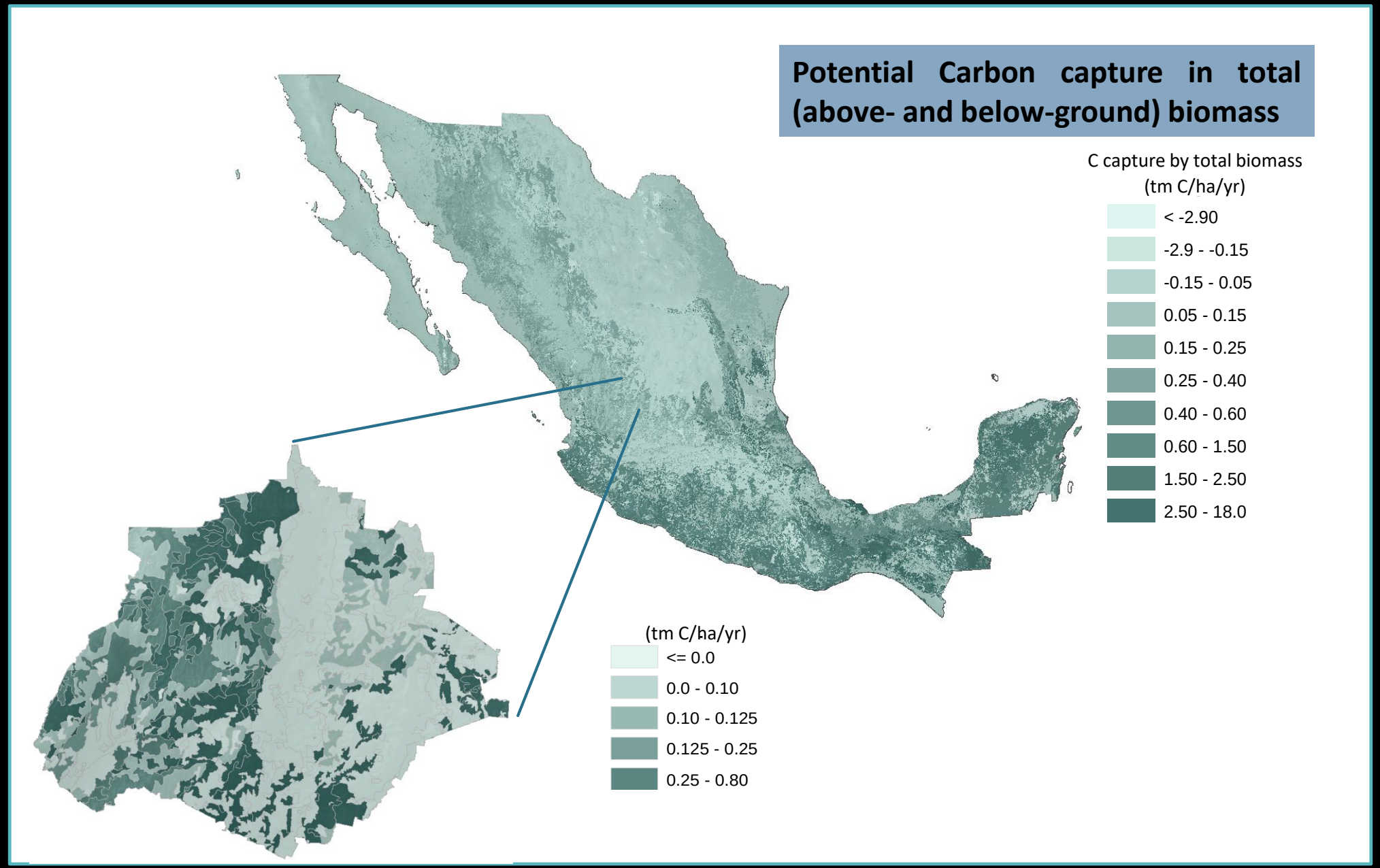
Mapping and valuation (physical terms) of ecosystem services



Mapping and valuation (physical terms) of ecosystem services in Aguascalientes

Carbon storage and Carbon capture by Aguascalientes ecosystems in 2007 and 2011

	Ecosystem condition	ECOSYSTEMS					STATE-WIDE TOTAL
		Conifer forest	Oak woodland	Woody xerophytic shrubland	Grassland	Deciduous tropical forest	
Carbon stored ca. 2007 (tm)	**Primary**	**43,730**	**795,746**	**33,8379**	**716,732**	**-**	**2,591,033**
	Secondary	-	701,878	5,045	-	294,064	
Carbon stored ca. 2011 (tm)	**Primary**	**44,135**	**817,806**	**42,581**	**854,161**	**-**	**3,021,576**
	Secondary	-	848,266	10,550	-	404,077	
Potential Carbon capture (tm/yr)	**Primary**	165	8,759	285	39,378	-	**59,352**
	Secondary	-	4,375	1,316	-	5,074	

Mapping and valuation (physical terms) of ecosystem services

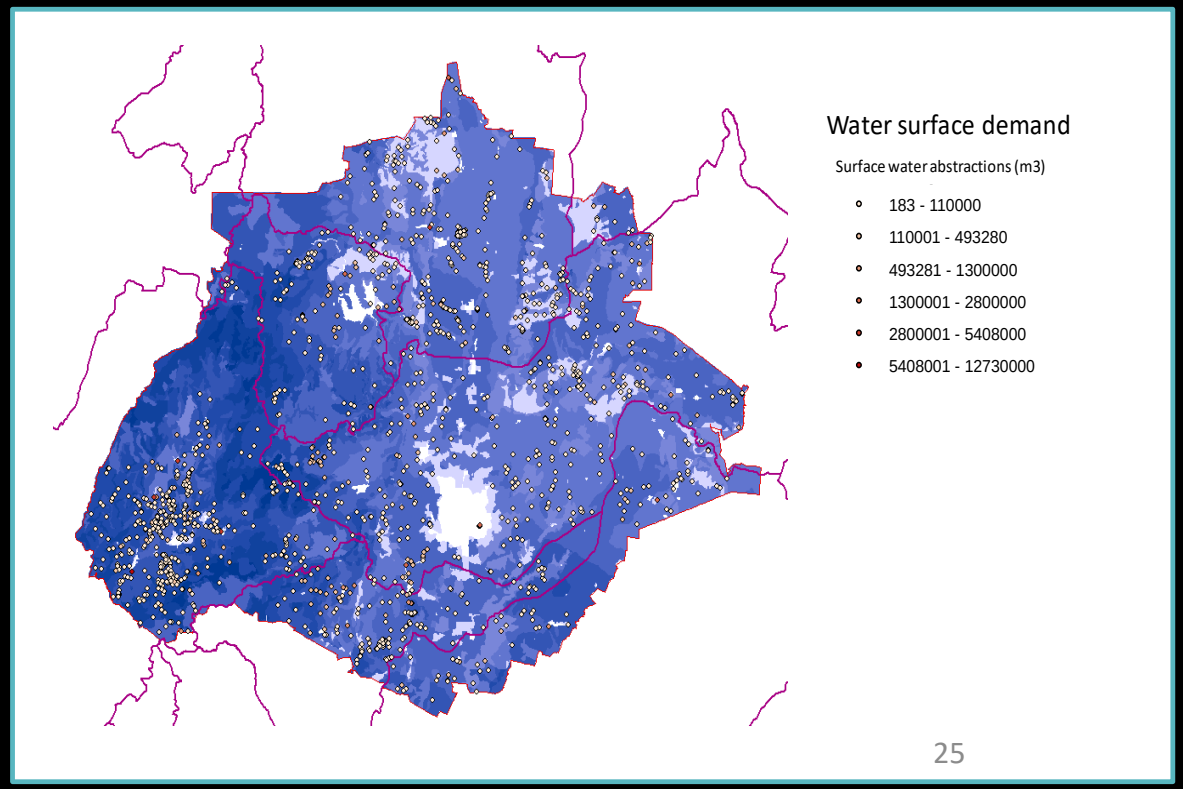
SURFACE WATER SUPPLY

$$Pp = ETR + ES + I$$

Water balance:
Total amount of rain **(Pp)**
Evapotranspiration **(ETR)**
Infiltration **(I)**
Runs-off over the soil's surface **(ES)**

Water yield is estimated as the contribution of each portion of the landscape to surface run-off, considering the effects of land-use and land-cover, and subtracting these from the average annual precipitation.

Water yield was estimated based on the Indirect Method stated in Standard NOM-011 of the Mexican National Water Agency, with coefficients refined by INEGI's Hydrology Department



Lessons and challenges

Abundance of data
Data available
Data about specific services

KEY PRINCIPLES OF THE LAND CLASSIFICATION IN MEXICO

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.

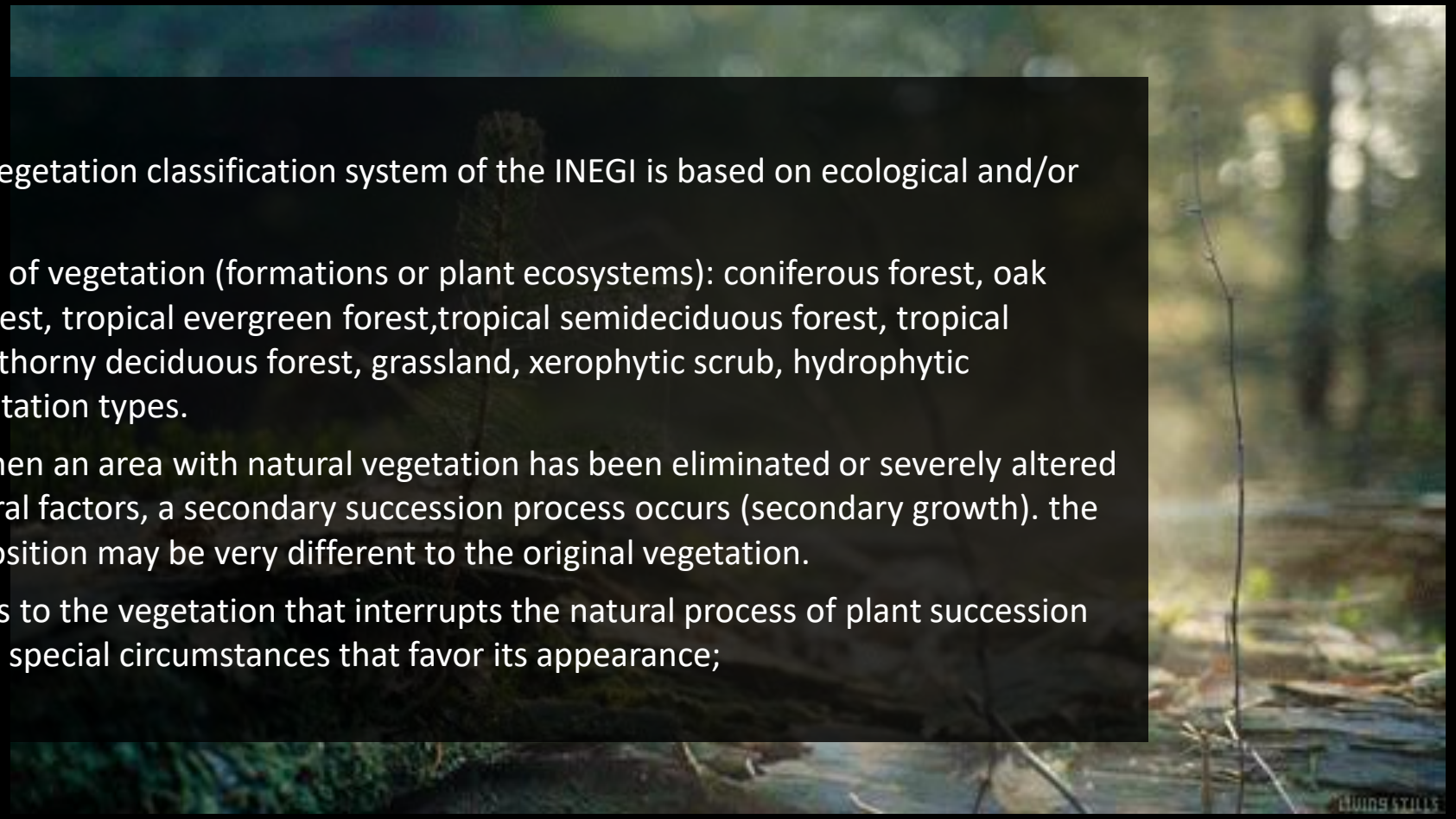
- As such, a vegetation type is a reflection and a synthesis of all those factors: climate, soil, plant composition, vegetation structure, and the ecological succession processes. so the vegetation is a good approximation to an ecosystem.

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: shrub lands, 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

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;

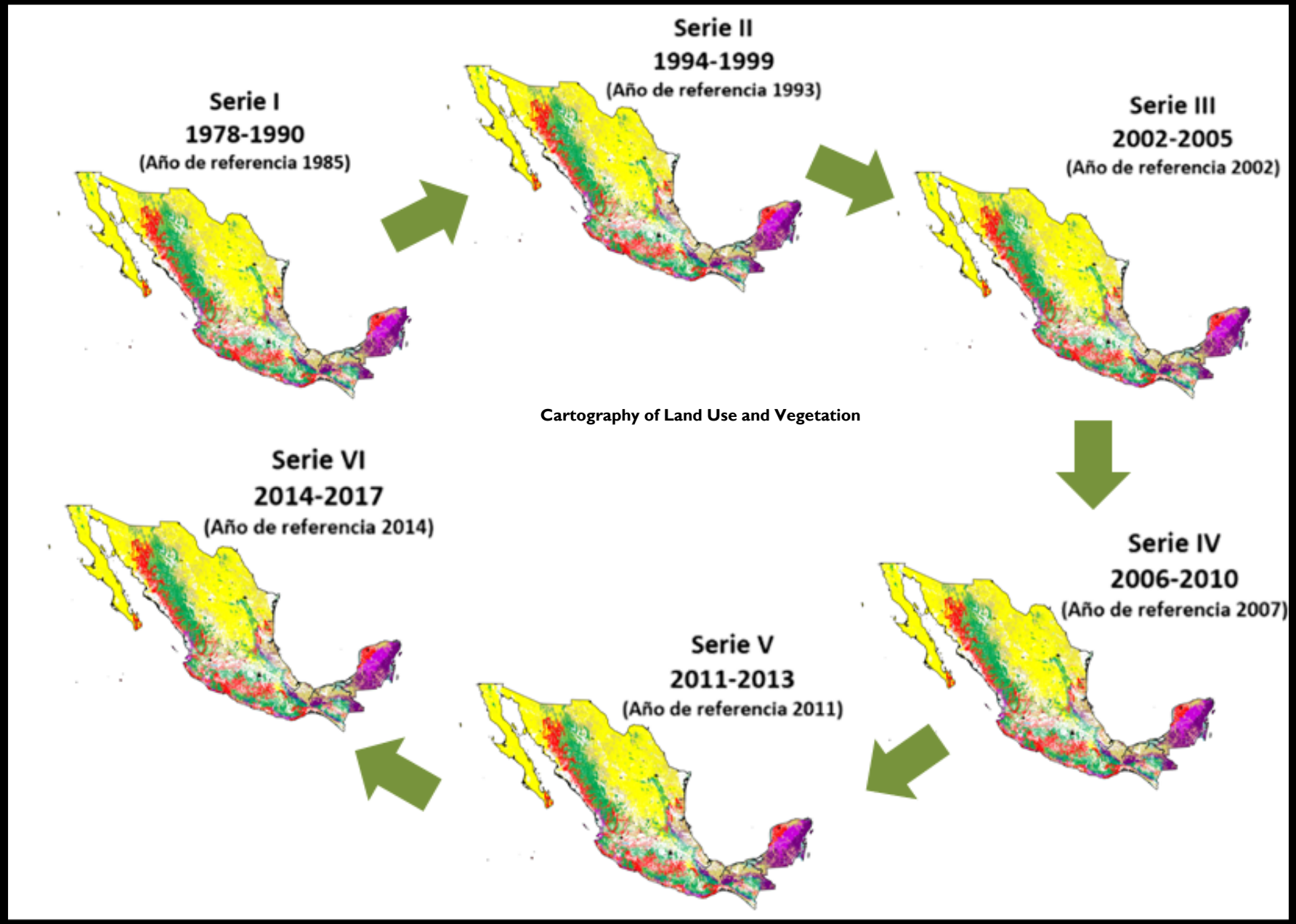
Natural and Induced Vegetation Classification

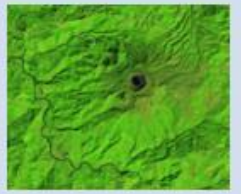
The country's vegetation cover is described considering 12 biomes and 58 types of vegetation, in addition to considering the current state of the vegetation in successional phases (Secondary growth in Tree, Shrubby and Herbaceous seral phases) in 219 combinations registered so far.

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

Information on Land Use and Vegetation:
Evolution of the series


Serie I
1978-1990
(Año de referencia 1985)
Serie II
1994-1999
(Año de referencia 1993)
Serie III
2002-2005
(Año de referencia 2002)
Cartography of Land Use and Vegetation
Serie IV
2006-2010
(Año de referencia 2007)
Serie V
2011-2013
(Año de referencia 2011)
Serie VI
2014-2017
(Año de referencia 2014)

	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

Dynamic Map

SIMBOLOGÍA
Bosque de Coníferas
Bosque de Encino
Bosque Mesófilo de Montaña
Matorral Xerófilo
Selva Caducifolia
Selva Espinosa
Selva Perennifolia
Selva Subcaducifolia
Pastizal
Vegetación Hidrófila
Vegetación Inducida
Otros Tipos de Vegetación
Áreas sin Vegetación Aparente
Zonas Urbanas, Asentamientos y Agricultura
Vegetación Primaria
1:2,400,000

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.

THANK YOU.