

# Ecosystems and agro-biodiversity across small and large-scale **maize** production systems

TEEBAF - CONABIO



# SOME PRELIMINARY FACTS ON MAIZE

- The most abundant and expanded crop in the world.
- The highest area, production and yield growth rate in the last decades.
- No crop is used in such a variety of ways.
- A staple crop for a great number of communities.
- A wide genetic diversity of landraces and wild relatives still evolving on-farm in different regions.
- Intensive large-scale systems (including GMO) account for most of its production, but drag high negative externalities.
- Most national and international agriculture policies related to maize imply perverse incentives, but can be positively redirected.

# RESEARCH OBJECTIVES

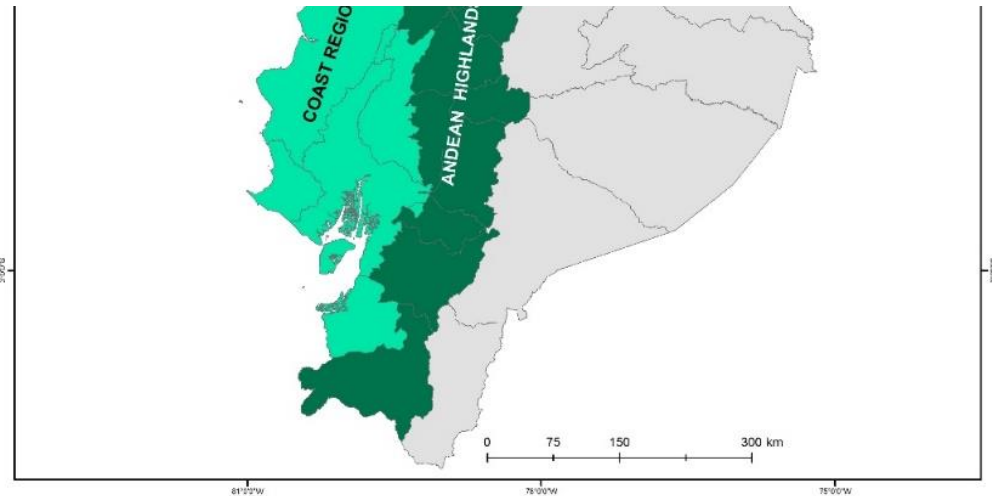
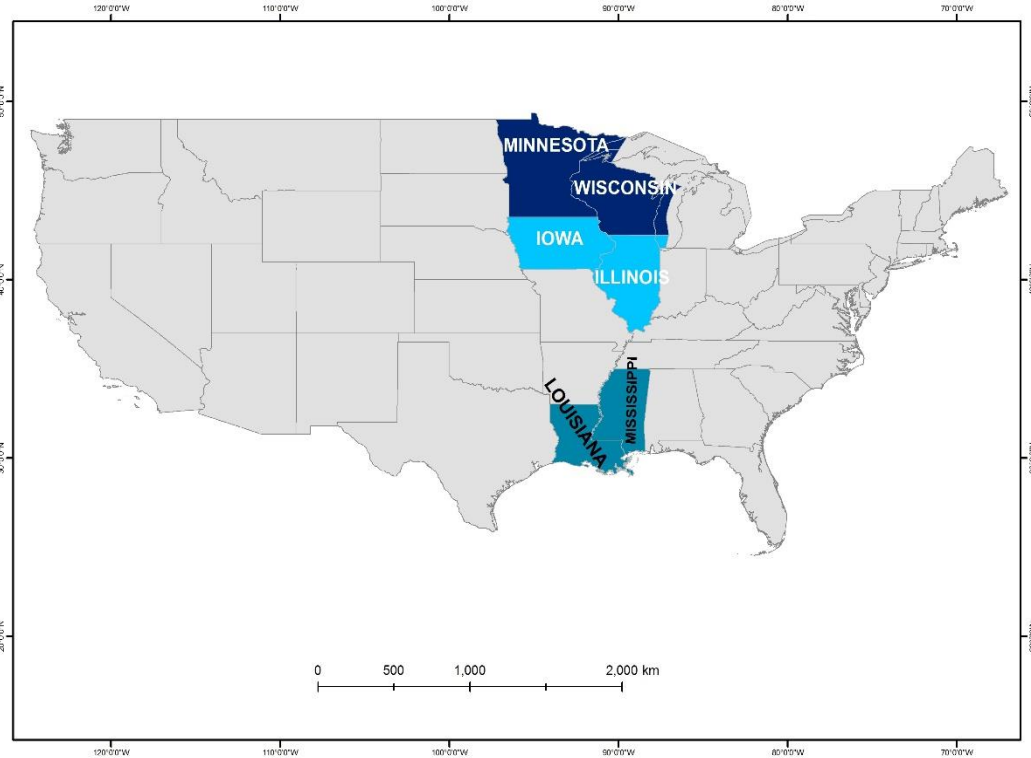
- I. **To compare the costs and benefits (both visible and invisible) of different maize production systems, in terms of a bundle of ecosystem services (ES): food provision, soil fertility, carbon storage, fresh water provision, and cultural services.**
  - I.1 To compare differences across the selected case studies, within and between countries, in terms of ES dependency and provisioning.
  - I.2 To provide a valuation for each one and the bundle of ES assessed in the case studies, in either monetary or non-monetary terms.
  - I.3 To set out and compare the constituency of affected parties, for each case study and each ES.
  - I.4 To assess and document the extent to which these results can be scaled up and/or extrapolated.
  
- II. **Formulate policy options and recommendations towards improving the sustainability of production practices and enabling an agricultural transition that better balances economic costs and benefits for maize systems.**

# CASE STUDIES

United States

Mexico

Ecuador



# CASE STUDIES

<p style="text-align: center;"><b>Mexico</b></p> <p style="text-align: center;">a major maize producer; maize center of origin and diversity; agro-biodiversity hotspot;</p>	<p style="text-align: center;"><b>United States</b></p> <p style="text-align: center;">the largest producer and exporter of maize; main GM and ethanol maize producer</p>	<p style="text-align: center;"><b>Ecuador</b></p> <p style="text-align: center;">a maize center of diversity; agro-biodiversity hotspot</p>
<p style="text-align: center;">3 study regions</p>	<p style="text-align: center;">3 study regions</p>	<p style="text-align: center;">2 study regions</p>
<p><b><u>1. Sinaloa</u></b>: irrigated, large-size private property, intensive commercial farming system, producing non-genetically modified (GM) hybrid maize for feed and industrial products.</p>	<p><b><u>1. Minnesota / Wisconsin</u></b>: small-scale “specialty corn” (organic and sweet) for food, as well as feed corn for dairy (both GM and non-GM) mainly for domestic consumption.</p>	<p><b><u>1. Coast region</u></b>: intensive commercial farming system producing high-yield hybrid non-GM maize for national consumption of feed and processing.</p>
<p><b><u>2. Jalisco</u></b>: rainfed, medium-size private property, intensive commercial farming system, producing non-GM hybrid maize mainly for feed and industrial products.</p>	<p><b><u>2. Iowa / Illinois</u></b>: intensive commercial farming system in the upper Mississippi basin that belongs to the Corn Belt, producing hybrid – genetically modified (GM) and non-GM– maize mainly for ethanol, feed, processing and exports.</p>	<p><b><u>2. Andean highlands</u></b>: small-scale and self-consumption production with a variety of landraces in a high biodiversity region, for food and cultural purposes.</p>
<p><b><u>3. Chiapas</u></b>: rainfed, small-size common property, often indigenous, family managed and mixed-crop farms in high biodiversity landscapes, producing a variety of native maize mainly for self-consumption food and cultural purposes.</p>	<p><b><u>3. Mississippi / Louisiana</u></b>: commercial farming system in the lower Mississippi Basin, producing hybrid –GM and non-GM– maize mainly for domestic livestock feed.</p>	

## System typology of maize production

Defined by practices:

1. irrigation
2. fertilizers and pesticides
3. agro-biodiversity
4. seed type
5. grain uses
6. property type and size

# TEEBAgFood

economic valuation  
of eco-agri-food  
systems complex

supply chain

PRODUCTION

PROCESS/DISTRIB

CONSUMPTION

## ECOSYSTEM SERVICES

DEPENDENCY

and

IMPACT

provisioning	food fresh water raw material medical resources
regulating	local climate / air quality waste-water treatment carbon seq and storage extreme events pollination biological control soil erosion and fertility
cultural	recreation tourism spiritual experience aesthetic appreciation
habitat	species genetic diversity

# TEEBAgFood

## How does each system depend on and impact (+/-) ESs in the supply chain?

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**PRODUCTION**

**PROCESS/DISTRIB**

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### ECOSYSTEM SERVICES

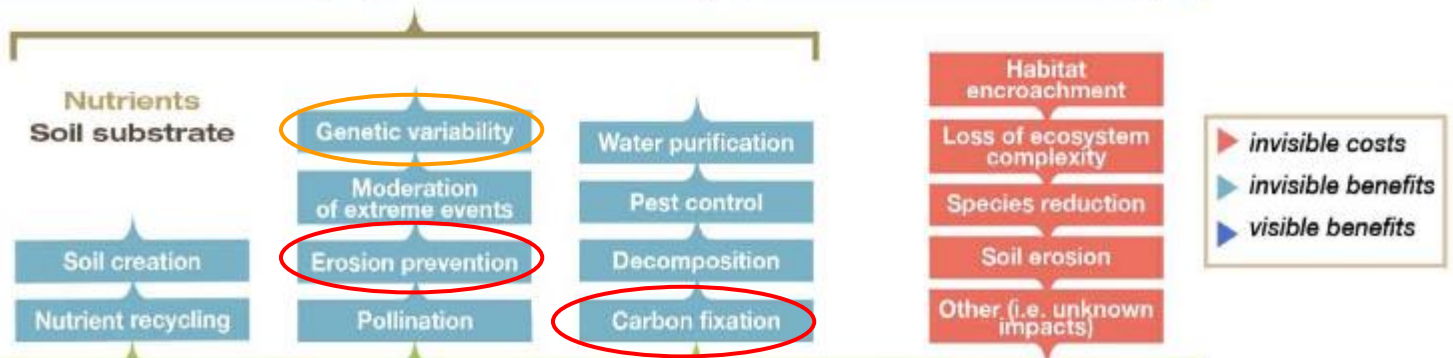
**DEPENDENCY and IMPACT**

provisioning	food	I
	fresh water	D / I
	raw material medical resources	
regulating	local climate / air quality waste-water treatment	
	carbon seq and storage	I
	extreme events pollination biological control	
	soil erosion and fertility	D / I
	recreation tourism	
cultural	spiritual experience	D / I
	aesthetic appreciation	
habitat	species	
	genetic diversity	D / I

# HUMAN (economic & social) SYSTEMS



# AGRICULTURAL & FOOD SYSTEMS



# BIODIVERSITY & ECOSYSTEMS



the end

