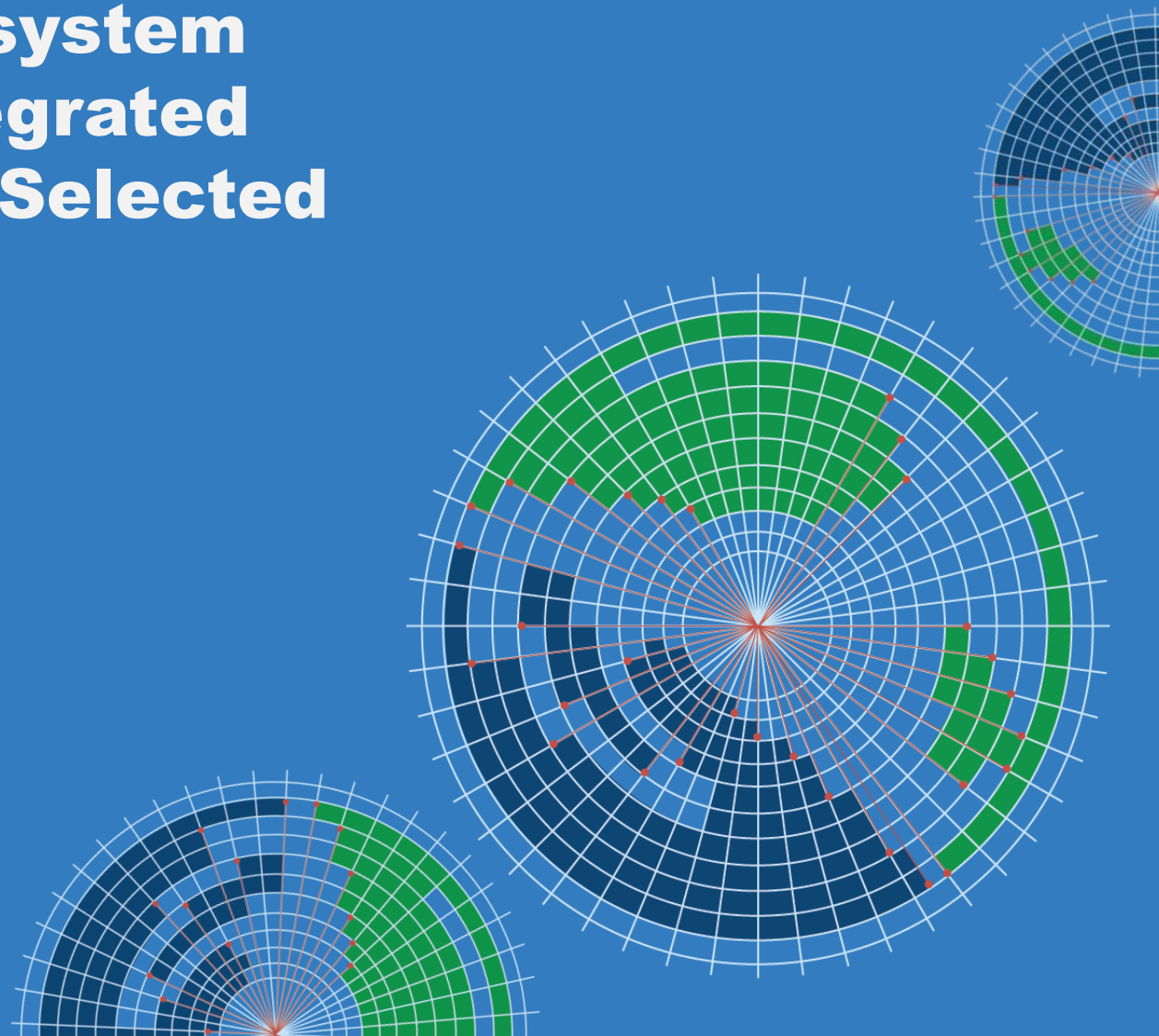
SEMINAR SERIES

Sharing cutting–edge knowledge on valuing natural capital & ecosystem services

GPS Global Program on Sustainability

Economic Valuation of Ecosystem Services to Strengthen Integrated Landscape Management in Selected Watersheds in Mexico



María del Pilar Salazar Vargas and Janet Meléndez Campillo
National Institute of Ecology and Climate Change (INECC)

June 21, 2022

Context

The economic valuation (EV) of ecosystem services (ES) is part of the efforts and tools needed to:

- provide information on contribution of ES to maintain livelihoods of rural population and generation and distribution of wealth; and
- ensure that the goods and services that nature provides to society are quantified in the formulation of public policies.

EV supports better decision-making through:

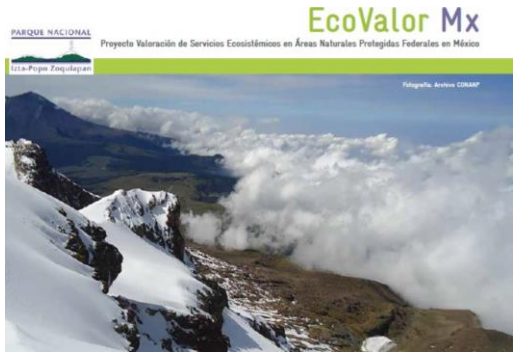
- elements of analysis for the formulation and design of public policies;
- analysis of fair trade-offs between benefits and impacts; for example in Puerto Vallarta, Jalisco, an EV of ES and opportunity cost analysis was carried out on proposed payment for ES in the watersheds supplying water to support establishment of local markets for ES.

In Mexico, the progress in the EV of ES has contributed to the determination of their economic value, including the social benefits and co-benefits generated.

Progress and use of EV of ES in Mexico

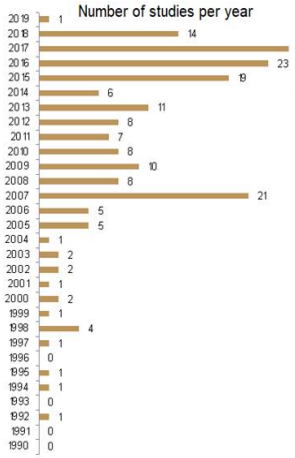
The EV of ES has contributed to the development of the following instruments:

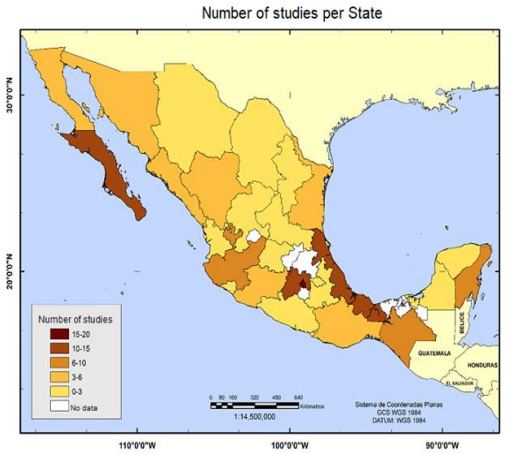
- *Pago por Servicios Ambientales.* Payment for Environmental Services program of the National Forestry Commission (CONAFOR).
- *Ecovalor.* Development of tools with spatial models of ecosystem processes by the National Commission of Natural Protected Areas (CONANP).
- *Paisaje biocultural.* Development of trend scenarios that correlate ES with development measures by the NGO, public and private institutions.



In 2020, INECC published a review and analysis on EV of SE conducted in Mexico from 1990 to 2019. The review highlighted:

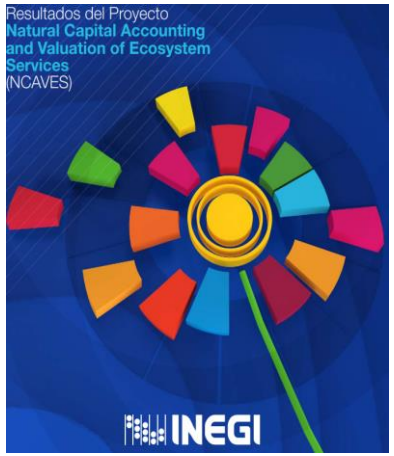
- sustained interest in analyzing ES from the economic perspective;
- the importance of choosing appropriate methodologies;
- interest in forest and coastal ecosystems; and
- need to communicate the importance, benefits, and productivity of arid ecosystems.





In 2021, the Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) Project, funded by the European Union (EU), assessed different services at the national level, highlighting:

- Provision to agricultural production and selected crops;
- Carbon regulation and storage (as **two distinct** services);
- Household water supply; and
- Sustainable tourism and pollination.



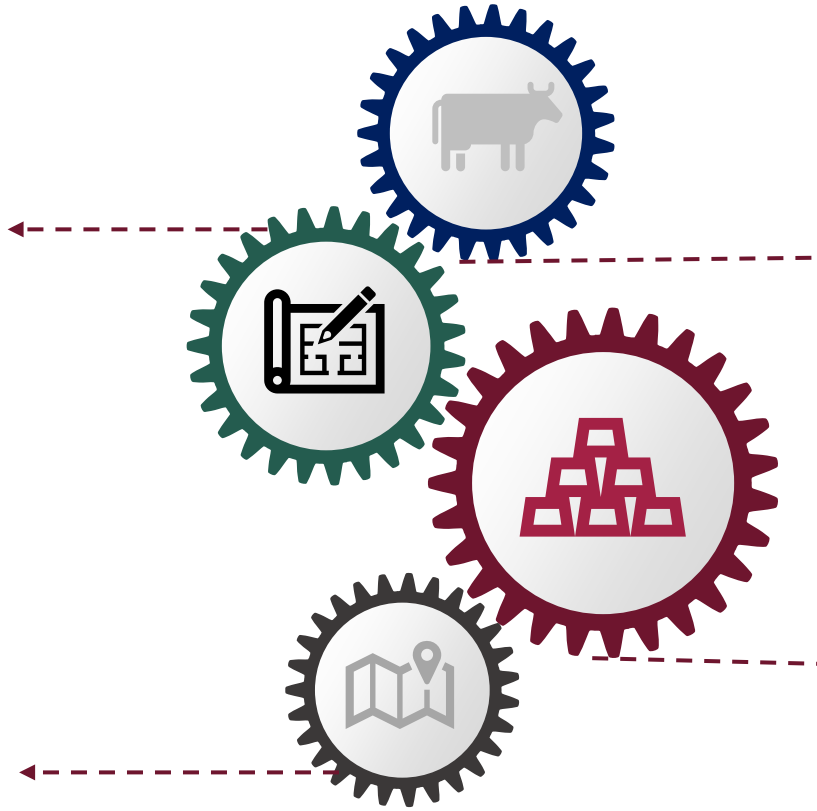
Expected GPS results and potential uses of information generated

Support for the design and implementation of landscape planning instruments

Strengthening of Connecting Watershed Health with Sustainable Livestock and Agroforestry Production Project (CONECTA) by incorporating EV of ES in the development of new Integrated Watershed Action Plans (IWAP) and improving existing ones to develop financing schemes for their implementation.

Technical capacity building

Biophysical and economic quantifications of assessed ES will provide critical information for better decision-making and timely intervention in ecosystems that are highly vulnerable to climate change.



Public policy opportunities

Identification of relevant public policy options and private sector incentives through analysis of the linkages between environmental degradation and socio-economic outcomes to promote sustainable rural livelihoods along climate-smart productive practices and agroforestry value chains, as well as those related to sustainable agrotourism.

Indirect benefits

Analysis of project benefits by defining the marginal gains considered in the CONECTA project scenario compared to business as usual (BAU).

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Thank You!

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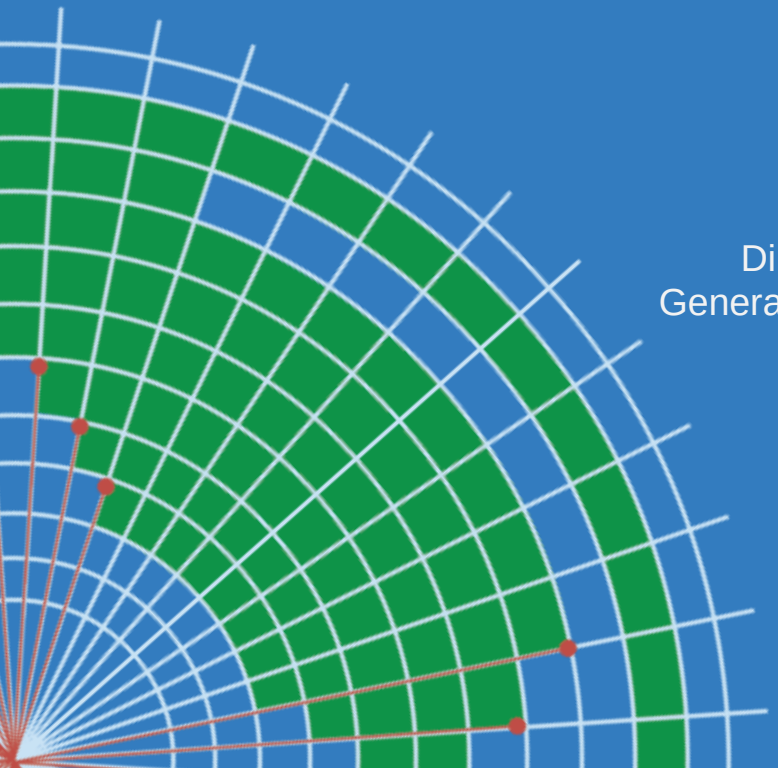

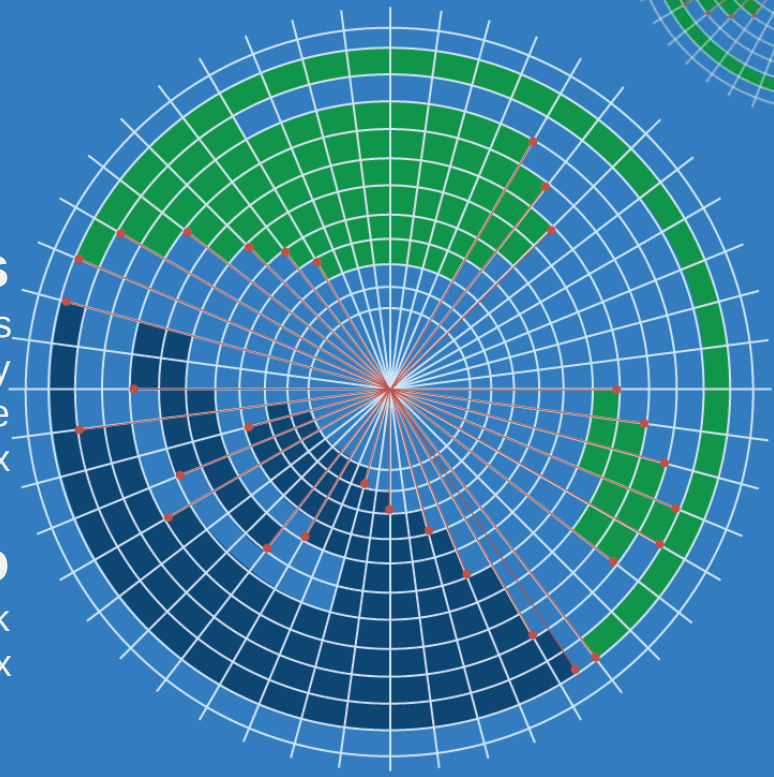

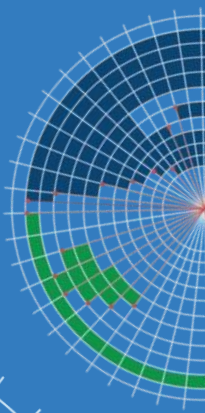

GPS
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GPS Seminar Series

Sharing cutting–edge knowledge on valuing natural capital & ecosystem services

Using Ecosystem Services Valuation to Strengthen Integrated Landscape Management in Mexico's Watersheds

June 21, 2022 | **10:00 – 11:30 EST**

Objectives

July 2021 → August 2021 → June 2022

A

Identification of 2-3 priority watersheds and ecosystem services to EV

B

Economic valuation of key ES, supported by a biophysical assessment, provided by the selected watersheds

C

Assessment of ES changes under two scenarios: BAU and CONECTA

Priority watersheds to ESV

Step 1 Research

Step 2 Criteria formulation

Step 3 CONECTA-GPS feedback

Step 4

Criteria assessment

Final indicators

Criterion 1: Viability

Indicators

- EV conditions
- Number of direct beneficiaries
- Potential EV interest

Criterion 2: Environmental degradation

Indicators

- Loss of ecosystem integrity
- Economic pressure for deforestation
- Climate Change vulnerability

Criterion 3: Project benefits

Indicators

- Green recovery opportunities
- Livestock importance
- Landscape connectivity

Assessment on the 15 watersheds

Step 5

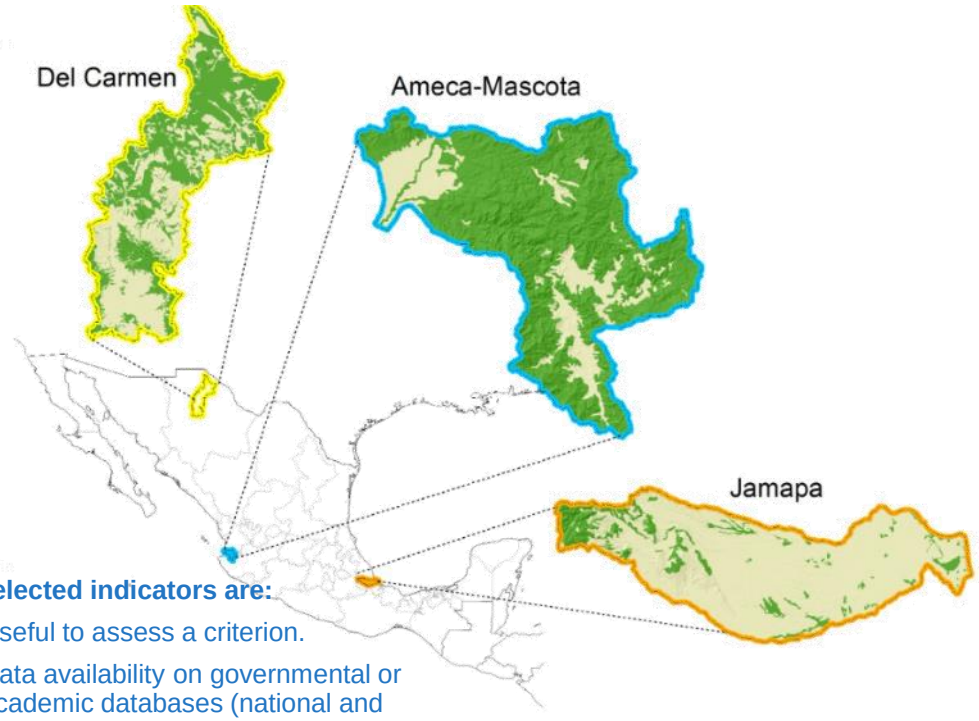
Technique for Order of Preference by Similarity to Ideal Solution

TOPSIS process

- Performance matrix definition
- Matrix normalization
- Positive and negative ideal solutions
- Relative closeness to ideal solution
- Preference order ranking

Selected watersheds

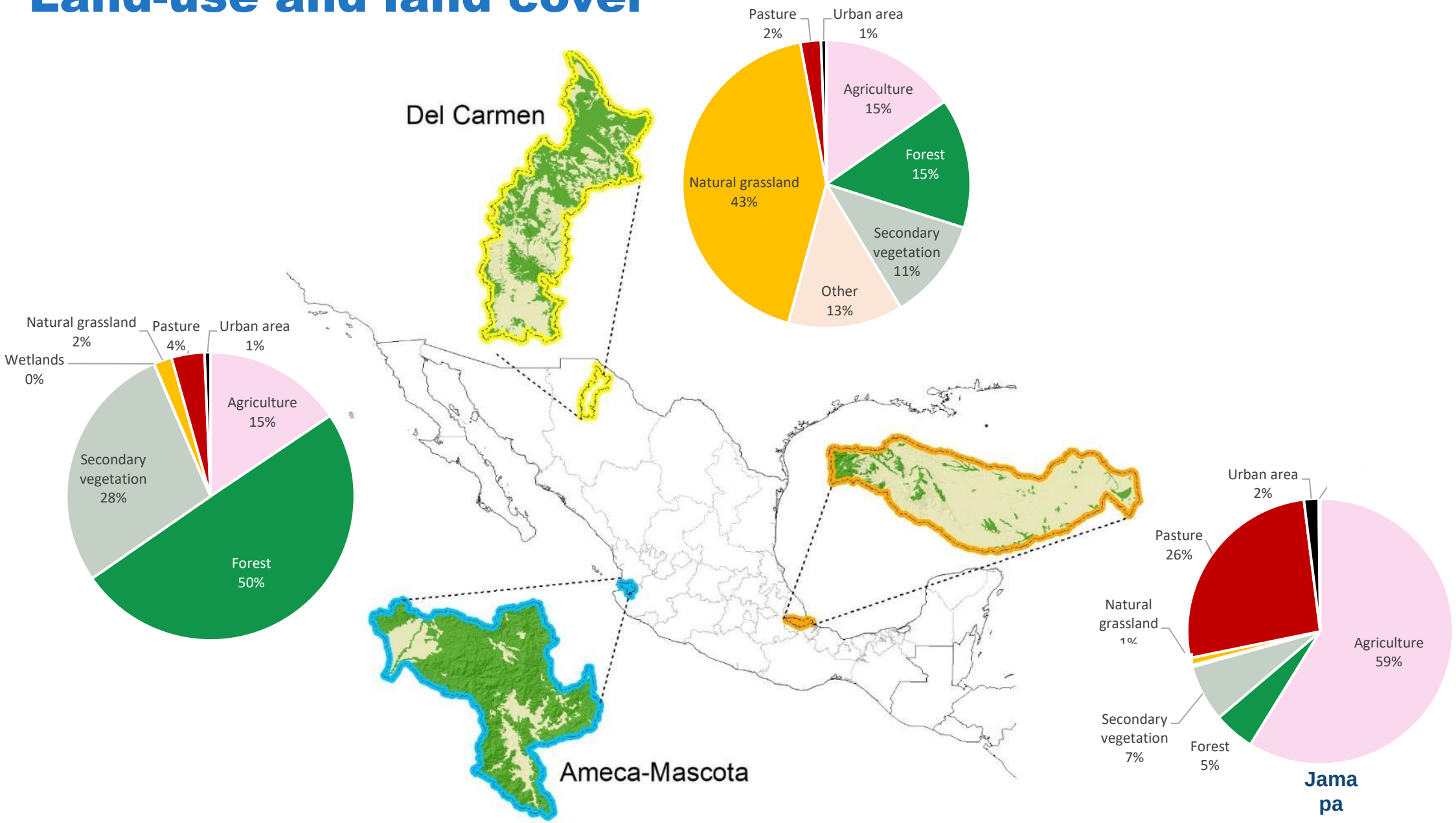
1. Del Carmen, Chihuahua
2. Jamapa, Veracruz
3. Ameca-Mascota, Jalisco



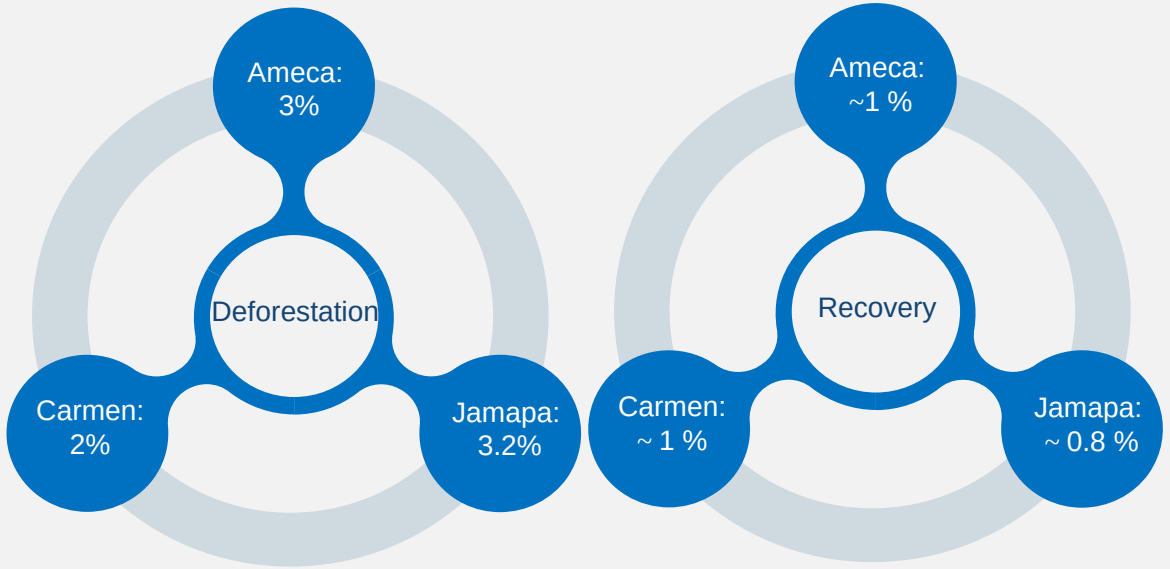
The selected indicators are:

- Useful to assess a criterion.
- Data availability on governmental or academic databases (national and international sources) or CONECTA products.
- Homogeneous data among watersheds.
- Some key indicators such as landscape connectivity were

Land-use and land cover



Land use change



Series III (2002) & IV INEGI (2014)

Highlights

The main change in the three watersheds was from natural vegetation to agricultural activities.

- Ameca: From Tropical dry forest to secondary tropical dry forest
- Carmen: From Pine-oak forest to oak forest due to selective extraction
- Jamapa: From secondary tropical dry forest to crops

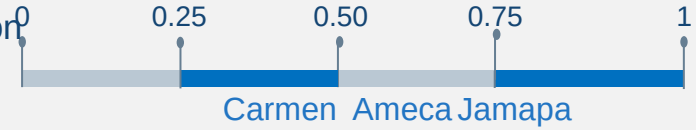
Main Land use changes

From	To
Ameca-Mascota	
Tropical dry forests Agricultural activities Pine-oak forests	Secondary tropical dry forests Urban areas Secondary pine-oak forests

From	To
Del Carmen	
Secondary pine-oak forests Halophile vegetation	Secondary oak-pine forests Agricultural activities

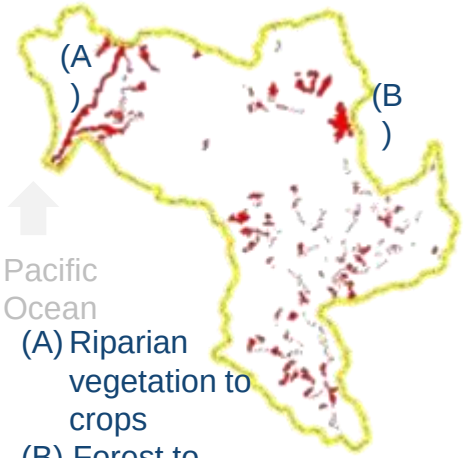
From	To
Jamapa	
Secondary dry forests Cloud forests Secondary pine-oak forests Mangrove forests	Agricultural activities Secondary cloud forests Agricultural activities Agricultural activities

Vulnerability of livestock production to water stress (ANVCC, INECC)



Method: Logistic regression step-wise

Ameca-Mascota

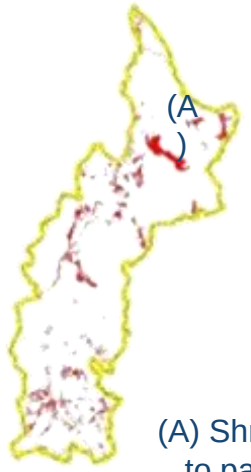


(A) Riparian vegetation to crops
(B) Forest to pasture

Deforestation (1993 – 2018)

Drivers
Distance to NPA **
Slope**
Distance to roads* Distance to vegetation edge***
Precipitation ***
Distance to rivers***

Del Carmen

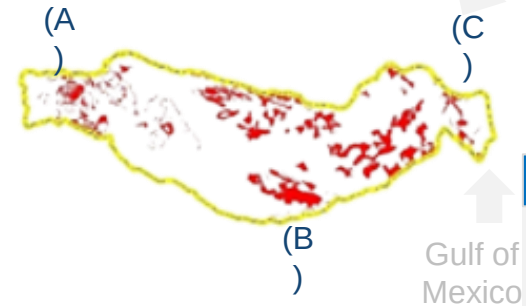


(A) Shrubland to pasture

Deforestation (1993 – 2018)

Drivers
Distance to human settlements***
Population growth**
DEM***
Distance to roads*,
Distance to crops**
Distance to grassland**
Distance to vegetation edge*

Jamapa



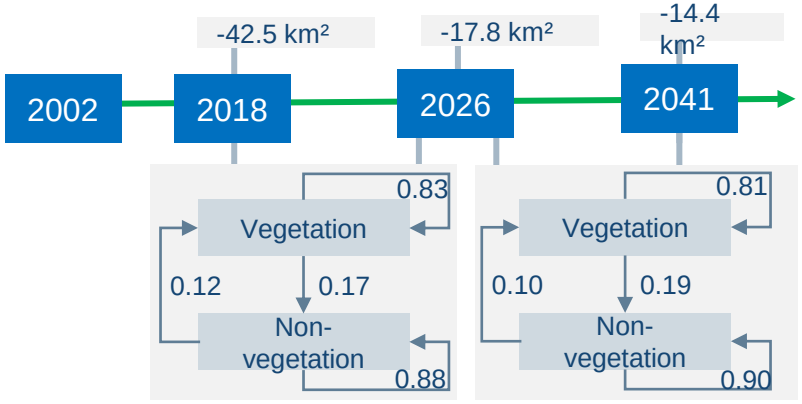
(A) Cloud forests to agricultural activities
(B) Tropical dry forest to crops
(C) Dunes and wetlands to pasture

Deforestation (1993 – 2018)

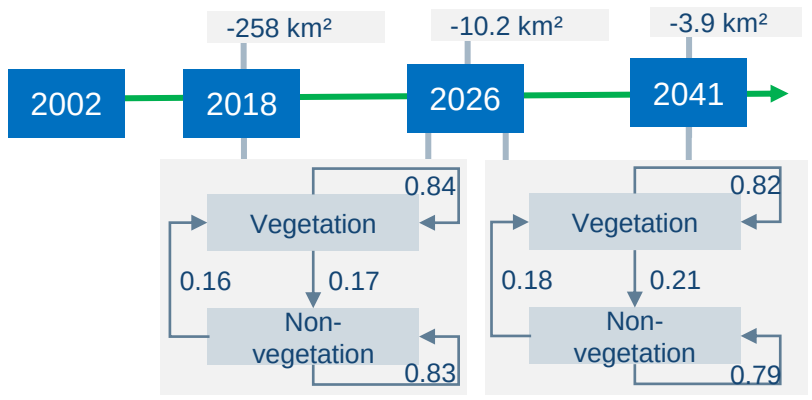
Drivers
Slope***
Distance to roads**
Distance to grassland***
Distance to vegetation edge**
Precipitation*

Method: Cellular Automata (CA)-Markov chain model

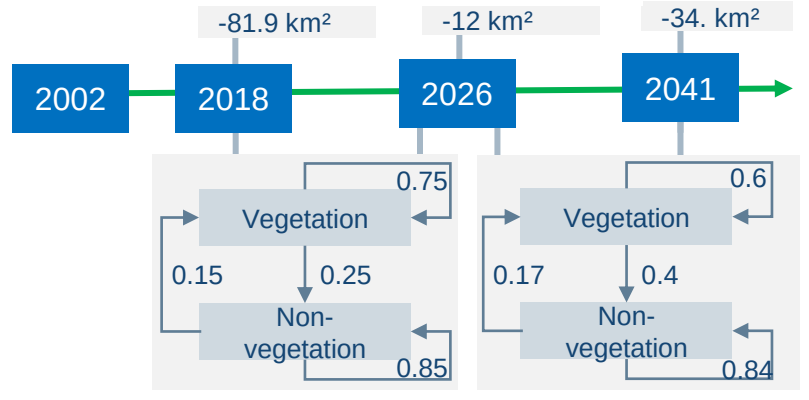
Transition probability (2026 and 2041)

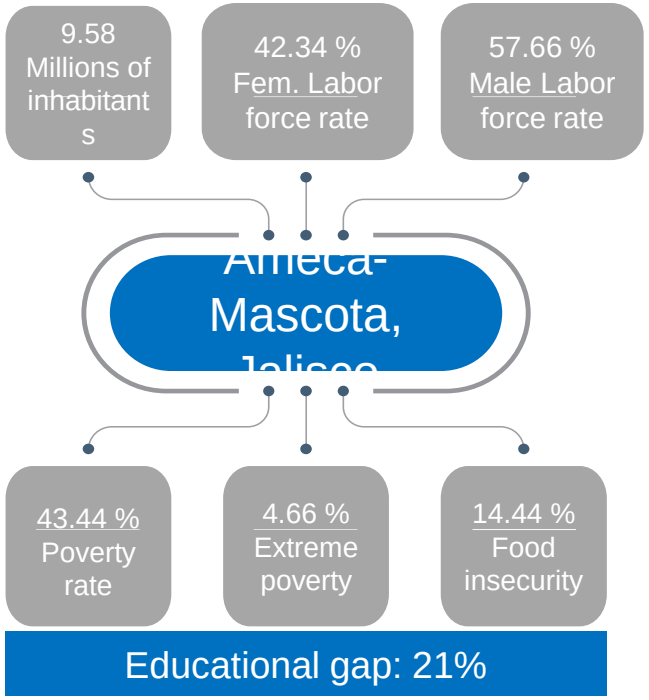


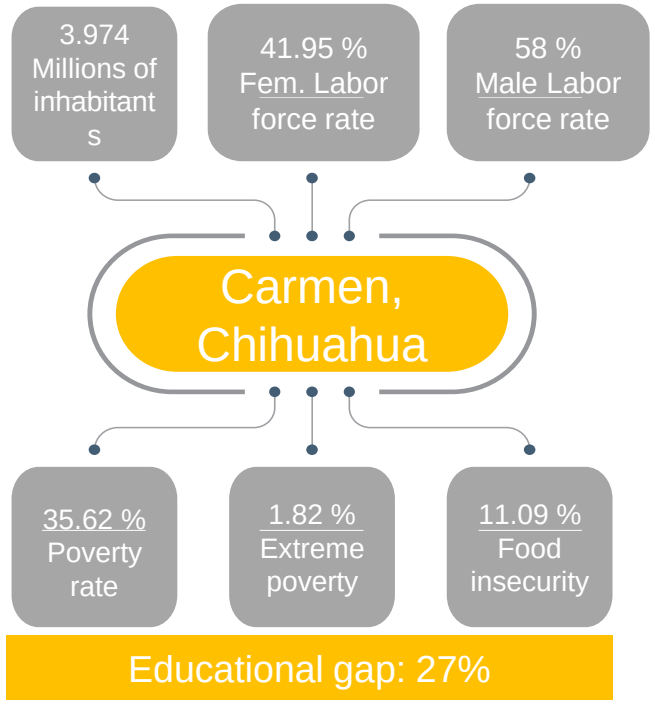
Transition probability (2026 and 2041)

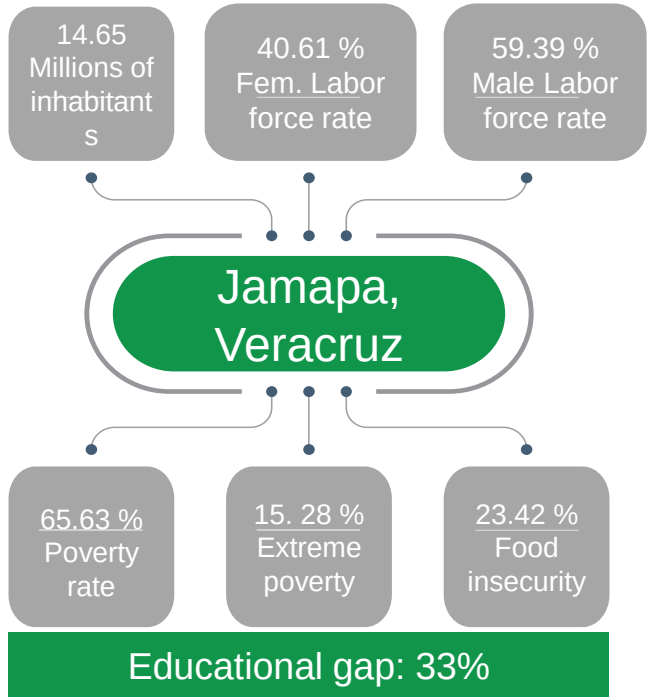


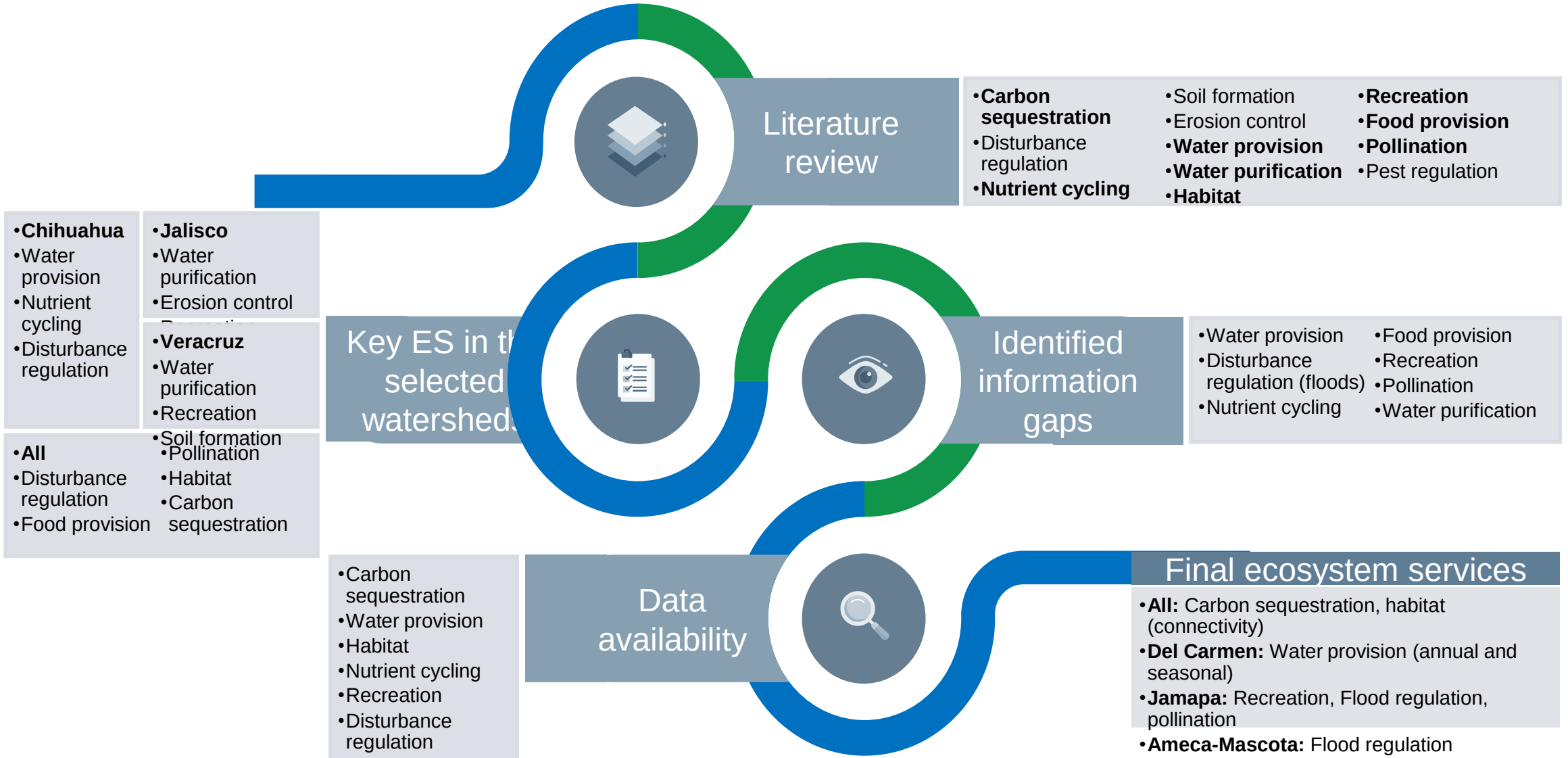
Transition probability (2026 and 2041)




9.58 Millions of inhabitants
42.34 % Fem. Labor force rate
57.66 % Male Labor force rate
Ameca-Mascota, Jalisco
43.44 % Poverty rate
4.66 % Extreme poverty
14.44 % Food insecurity
Educational gap: 21%


3.974 Millions of inhabitants
41.95 % Fem. Labor force rate
58 % Male Labor force rate
Carmen, Chihuahua
35.62 % Poverty rate
1.82 % Extreme poverty
11.09 % Food insecurity
Educational gap: 27%


14.65 Millions of inhabitants
40.61 % Fem. Labor force rate
59.39 % Male Labor force rate
Jamapa, Veracruz
65.63 % Poverty rate
15. 28 % Extreme poverty
23.42 % Food insecurity
Educational gap: 33%

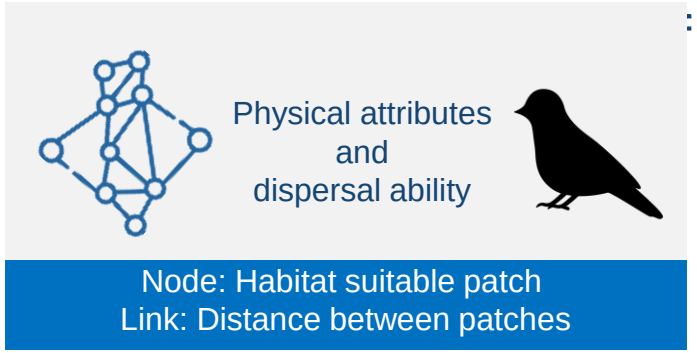

Literature review
•Carbon sequestration
•Disturbance regulation
•Nutrient cycling
•Soil formation
•Erosion control
•Water provision
•Water purification
•Habitat
•Recreation
•Food provision
•Pollination
•Pest regulation
Identified information gaps
•Water provision
•Disturbance regulation (floods)
•Nutrient cycling
•Food provision
•Recreation
•Pollination
•Water purification
Key ES in th selected watersheds
•Chihuahua
•Water provision
•Nutrient cycling
•Disturbance regulation
•Jalisco
•Water purification
•Erosion control
•Veracruz
•Water purification
•Recreation
•Soil formation
•All
•Disturbance regulation
•Food provision
•Pollination
•Habitat
•Carbon sequestration
Data availability
•Carbon sequestration
•Water provision
•Habitat
•Nutrient cycling
•Recreation
•Disturbance regulation
•Food production
•Pollination*
Final ecosystem services
•All: Carbon sequestration, habitat (connectivity)
•Del Carmen: Water provision (annual and seasonal)
•Jamapa: Recreation, Flood regulation, pollination
•Ameca-Mascota: Flood regulation

Landscape connectivity as a proxy of habitat

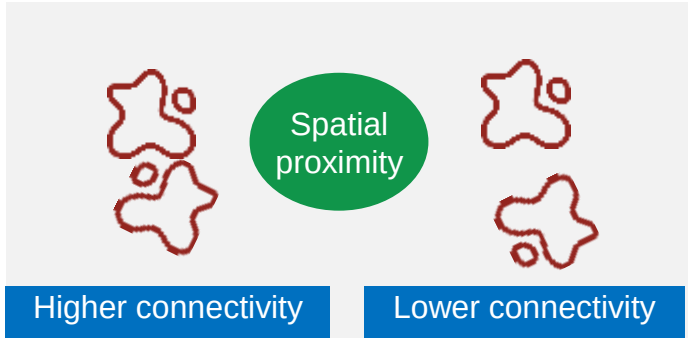
- Connectivity is a crucial element of landscape management and biodiversity conservation.

  - Connectivity loss is a major threat for biodiversity conservation and the ecological functions of the landscape

- Functional connectivity: Considers the :

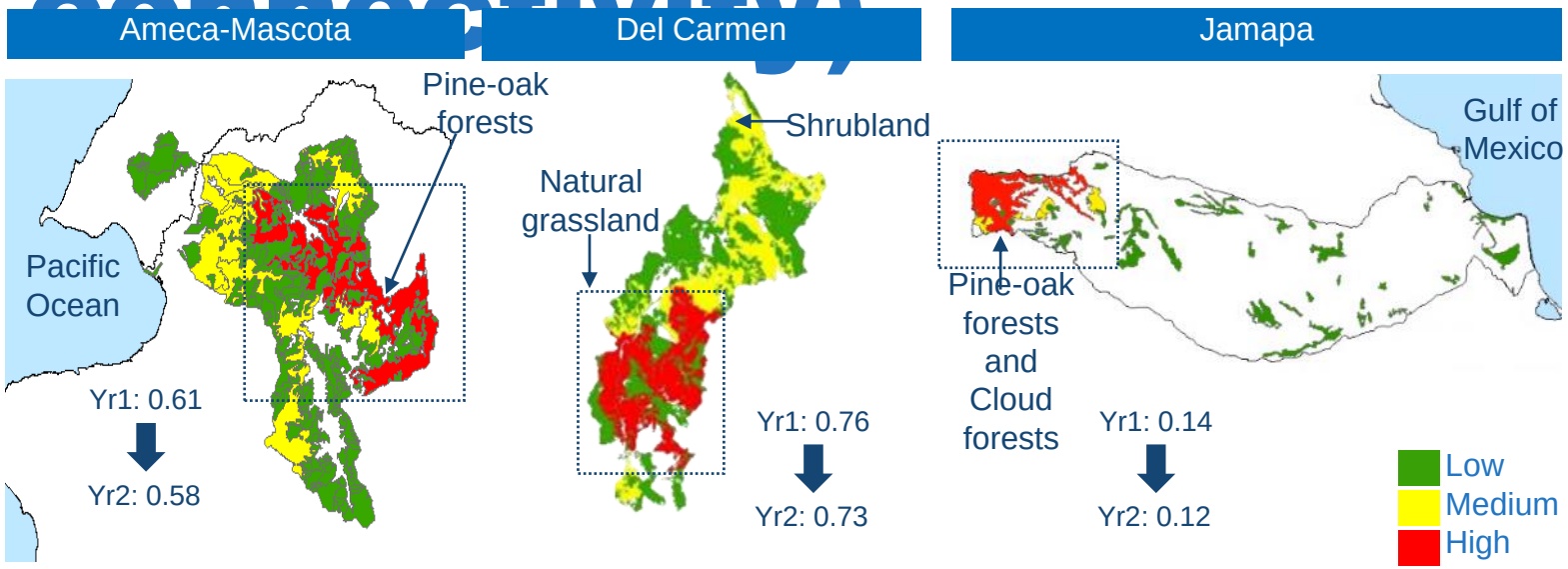


- Structural connectivity: Spatial arrangement of different elements of the landscape.



Habitat provision (proxy - landscape

Patch importance in the landscape connectivity



Willingness to pay for natural conservation and scenery protection

Ameca-Mascota		Del Carmen		Jamapa	
+10% tourists	+40% tourists	+10% tourists	+40% tourists	+10% tourists	+40% tourists
US$ 22.7 million	US$ 90.9 million	US$ 19.1 million	US$ 76.1 million	US$ 16.6 million	US$ 66.4 million

Opportunity costs

Ameca-Mascota	Del Carmen	Jamapa
US$ 22.7 million	US$ 19 million	US$ 16.6 million

Methods: Biophysical evaluation

- Probability of connectivity index (PC) CONEFOR 2.6:
  - Functional perspective
  - Structural perspective
- Importance of each patch to connectivity (dPC).
  - Allows to evaluate the contribution of each patch to the global connectivity

Methods: Economic valuation

- Willingness to pay
  - WTP previous - hedonic value
  - Degree of connectivity
  - Number of tourists per municipality
- Opportunity costs
  - Habitat provision area
  - Value of productive alternative

CONEFOR: Saura, S. & J. Torné. 2009.

Carbon storage and sequestration

InVEST - Carbon storage and sequestration model

1. Calculation of C storage by ecosystem

Carbon pools:
- Ground biomass
- Undergroun d biomass
- Soil carbon
- Litter and dead wood

2. Analysis of C sequestration by LULC (2002-1208)

Economic valuation

3. Valuation of C storage and sequestration

- Social value
- Market value

Social value : Avg (2019) USD$25.83/ton
Market value (California):USD$ 15/ton

InVEST: Natural Capital Project, Stanford University.

Ameca-Mascota

Carbon storage

2002: 57.1 MtC (208 tC/ha)
2018: 55.8 MtC (203

Annual sequestration

-82,852 tC/year

Del Carmen

Carbon storage

2002: 200.1MtC (123 tC/ha)
2018: 199.6 MtC (124.7

Annual sequestration

-27,260 tC/year

Jamapa

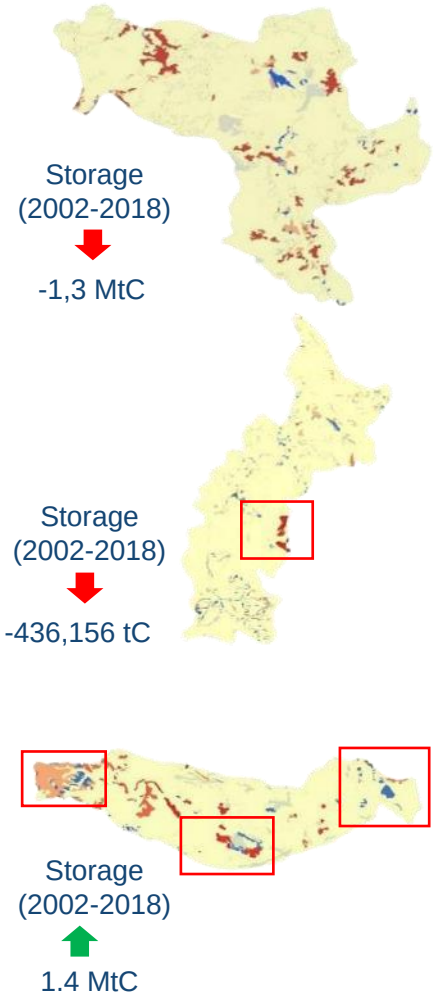
Carbon storage

tC/ha)
2018: 69.9 MtC (178

Annual sequestration

88,828 tC/year

Areas with carbon storage change (2002-2018)



Storage (2002-2018) -1,3 MtC

Social value -US$1.8 million

Market value -US$1.1 million

Storage (2002-2018) -436,156 tC

Social value - US$605,000

Market value - US$351,000

Storage (2002-2018) 1.4 MtC

Social value US$1.9 million

Market value US$1.15 million

Social value	Market value
Total carbon storage	
$77 million ($282 /ha)	$45 million ($163 /ha)
Annual sequestration	
- US$115,000	- US$67,000

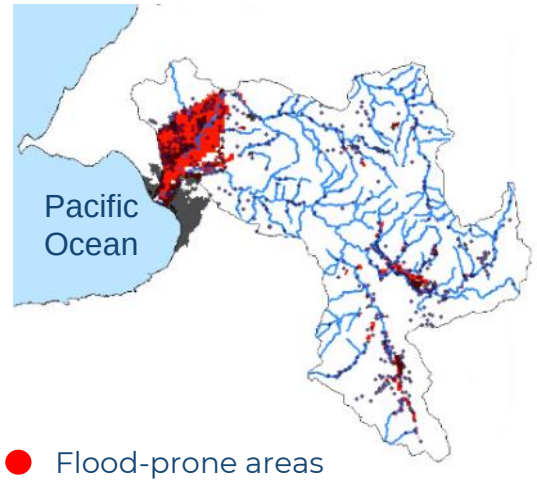
Social value	Market value
Total carbon storage	
$277 million ($173 /ha)	$161 million ($101 /ha)
Annual sequestration	
- US$38,000	- US$22,000

Social value	Market value
Total carbon storage	
$97 million ($247 /ha)	$56 million ($144 /ha)
Annual sequestration	
US$123,000	US$71,000

Flood control: Ameca - Mascota

Areas and localities prone to flooding

Scenario: 280 mm



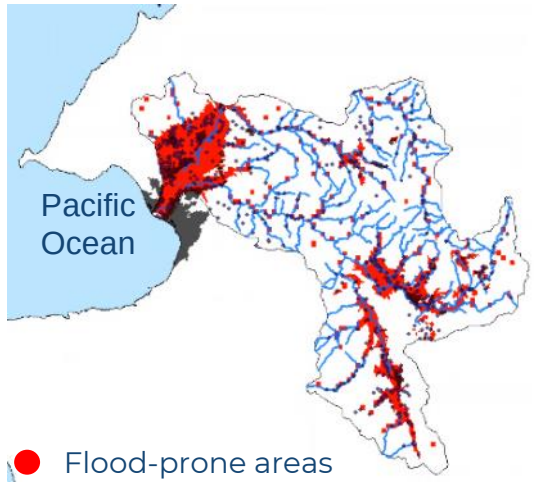
Flood-prone areas

Urban areas ● Rural localities

Flooded area: 231 km^2

61 rural localities
40 / 54 urban areas

Scenario: 560 mm



Flood-prone areas

Urban areas ● Rural localities

Flooded area: 557 km^2

426 / 601 rural localities
53 / 54 urban areas

Economic value: 280 mm and 560 mm scenarios

Flooded area 280 mm scenario:

- 120 km^2 (~ 50 % crops) 110 km^2 (~ 47 % urban)

- 10% of crops = USD$ 3.0 million
- 30 % of crops = USD$ 9.0 million
- 80% of crops = USD$ 24.2 million

Flooded area 560 mm scenario:

- 332 km^2 (~ 60% crops) 112 km^2 (~ 20 % urban)

- 10% of crops =USD$ 8.3 million
- 30% of crops = USD$ 24.9 million
- 80% of crops = USD$ 66.6 million

Methods: InVEST - Urban Flood Risk Mitigation model

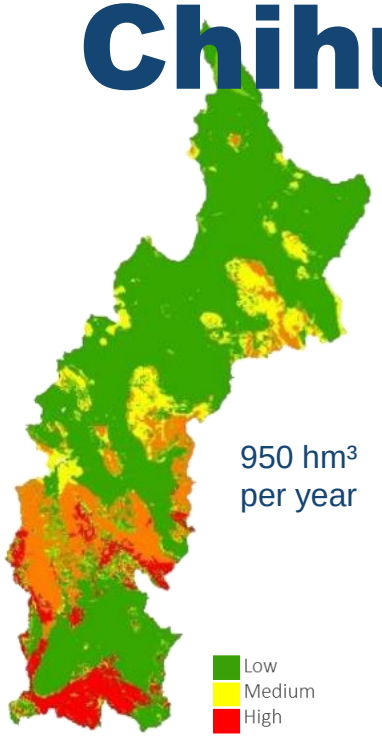
Runoff production and runoff attenuation index

- LULC
- Soil hydrologic group
- Rainfall Depth: 280 and 560 mm
- Table of curve number data for each LULC class

Economic valuation: Market prices

- Flooded area
- Crop area
- Types of crops
- Value of each crop produced in each municipality

Water provision: del Carmen, Chihuahua



950 hm³ per year

Annual water provision

Base flow

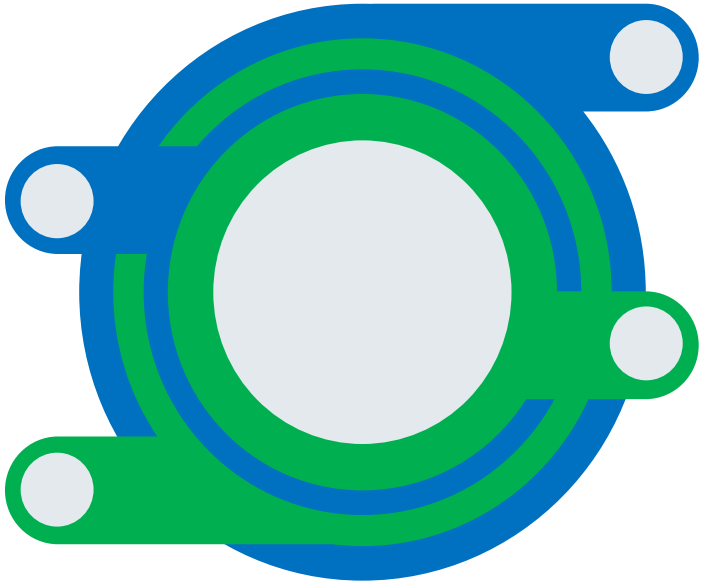
Quick flow

Seasonal water yield

Surface water irrigated area: 4,000 ha
Water consumption (2019-2020): 51.99 hm³

Consumptive surface water use: 96% of agricultural districts

Economic valuation



Del Carmen agricultural district: 11,300 ha - 96 users

Surface water availability per year: 950 hm³

Surface water rate: US$25 m³

Alternative water

Aquaculture: US$ 10.6 million

Drinking water: US$ 1,284 million

InVEST - Annual and Seasonal Water Yield models

Annual key inputs:
- Average annual precipitation
- Evapotranspiration rate
- Root restricting layer depth
- LULC

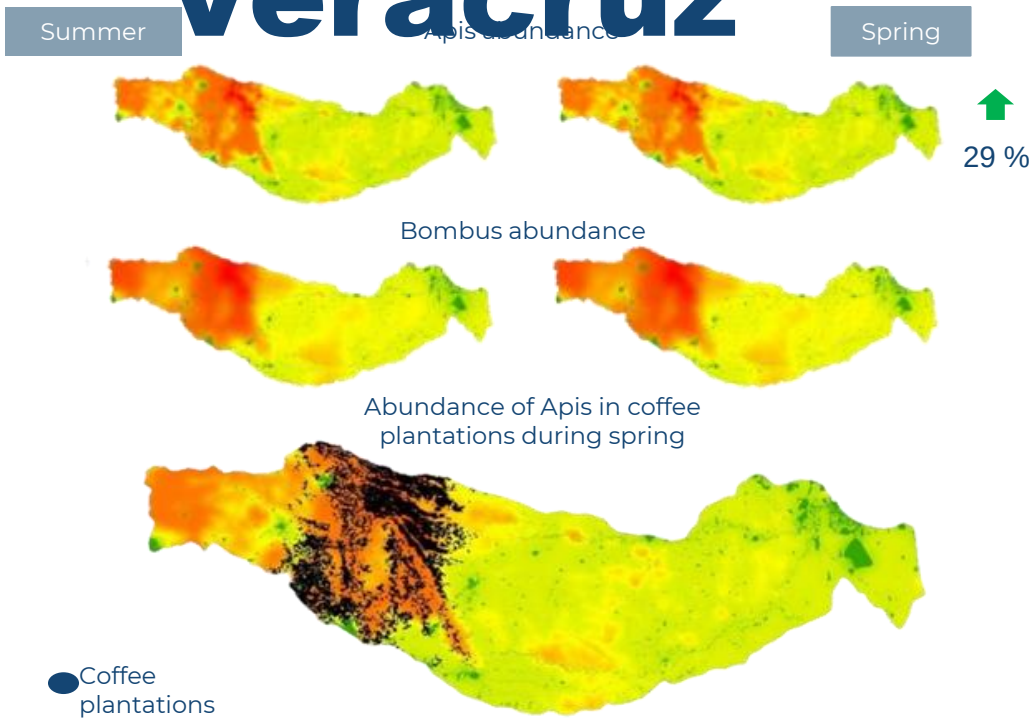
Seasonal key inputs:
- Monthly precipitation
- Monthly evapotranspiration rates
- Soil hydrologic group
- LULC

EV: Opportunity cost

- Water yield per year (InVEST)
- Water rates
- Water consumption

Pollination services: Jamapa, Veracruz

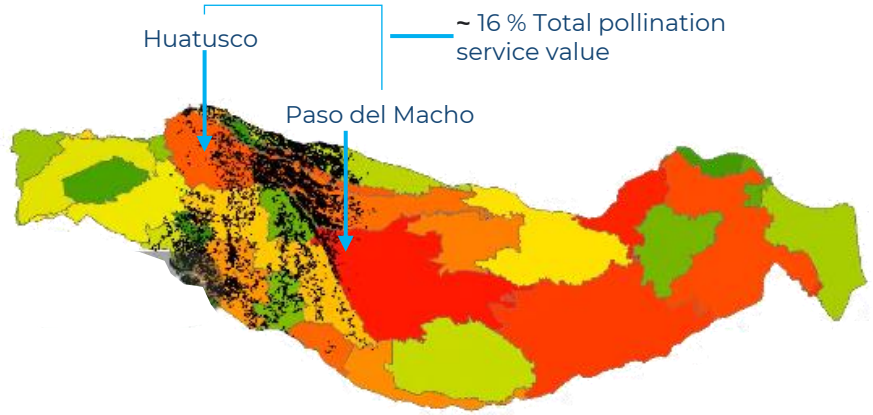
Coffee production: Apis and Bombus



Economic value of pollination services

Annual crop value: ~US$ 342.6 million

- Pollination services (26.4 %): US$ 90.4 million annually
- Coffee production (2020): US$ 20,353,788 (65% dependence ratio)



InVEST: Crop Pollination (Pollinator Abundance)

Key inputs:

- LULC
- Nesting cavity index
- Nesting substrate index for LC type
- Relative abundance of floral resources on landcover during Spring
- Relative abundance of floral resources on landcover during Summer

Land-use type:

- Coffee plantations
- Human settlements
- Bare soil
- Forests
- Grasslands
- Shrubland
- Water bodies

Economic Value: Market price - Dependence ratio method [1]

Key inputs:

- Crop type and dependance on pollinators
- Crop production value for each crop produced in each municipality for the year 2019

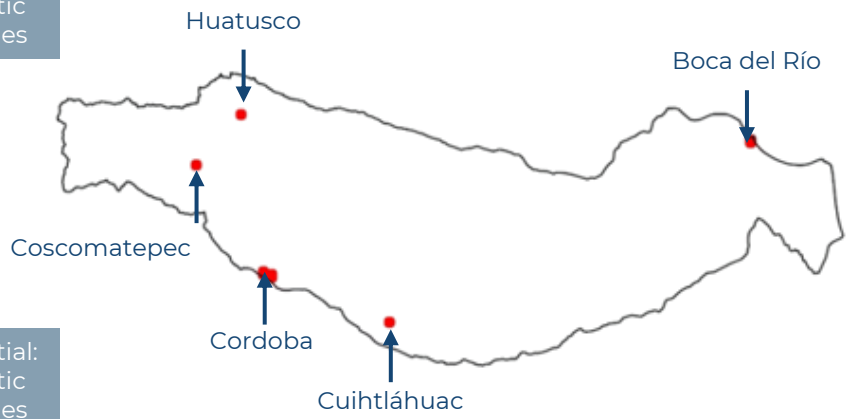
Main results

- Annual agricultural crop value
- Pollination service value

[1] *Gallai et al. 2009*

Recreation model

Touristic localities



Potential: Touristic localities

Economic valuation (Choice experiment)

Number of responses:

Respondent's profile
Gender: 51% female Age: 35 - 39
Residency: Mexico City, Veracruz
Household income: US$1000 – US$

Agroforestry
Respondents: 66 %
WTP: US$ 22.55 – 29.1

Sustainable livestock production
Respondents: 34 %
WTP: US$ 20.5 – 21

Tourists per year in Veracruz: 5.3 million

Potential tourists	Agroforestry	Sustainable livestock	Potential income
1 %	US$1.5 million	US$1.1 million	
5%	US$7.8 million	US$5.5 million	
10 %	US$15.5 million	US$11 million	

Note: 70 % of the respondents are interested in the ecotourism alternatives

InVEST – Visitation: Recreation and tourism

- Area of interest
- Start/end year
- Geotagged photographs Flickr

Scenario predictor variables:
- Airports
- Roads
- DEM
- Beaches

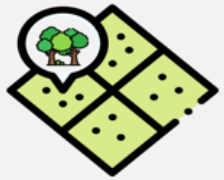
Choice Experiment

- Online survey in the WB web site
- Two alternatives of tourism:
  - Agroforestry (Coffee tourism)
  - Sustainable livestock

Biophysical and economic valuation

Ameca and Jamapa

Multistrata live fences

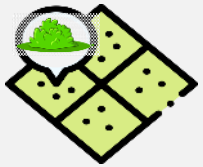


Isolated trees in pasture

Riparian vegetation

Del Carmen

Live fences (shrubs)



Improved grazing management to restore soil carbon sequestration

Sustainable livestock production includes rotational grazing

+

Economic valuation

Ameca-Mascota, del Carmen and Jamapa

1. Protein fodder banks

2 Silvopastoral production

3 Water distribution systems

4 Technical assistance on breeding techniques and reproductive technologies

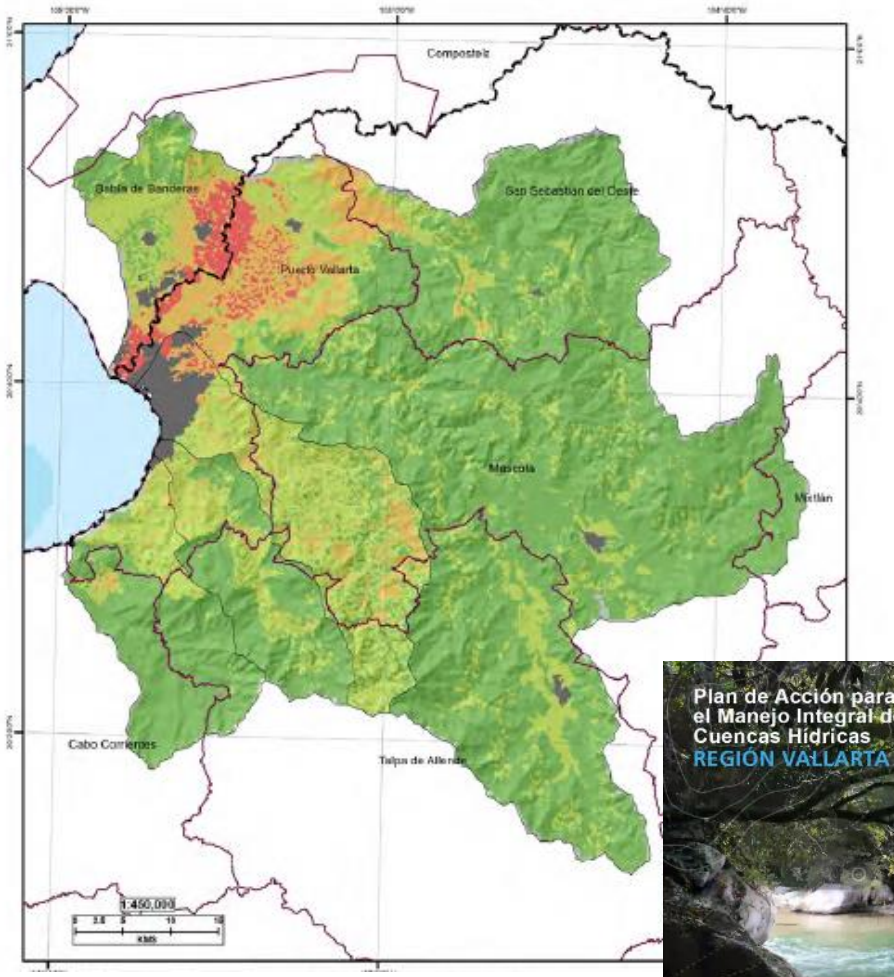
5 Technical assistance on livestock water-quality monitoring

6 Traditional subsistence/small-scale farming

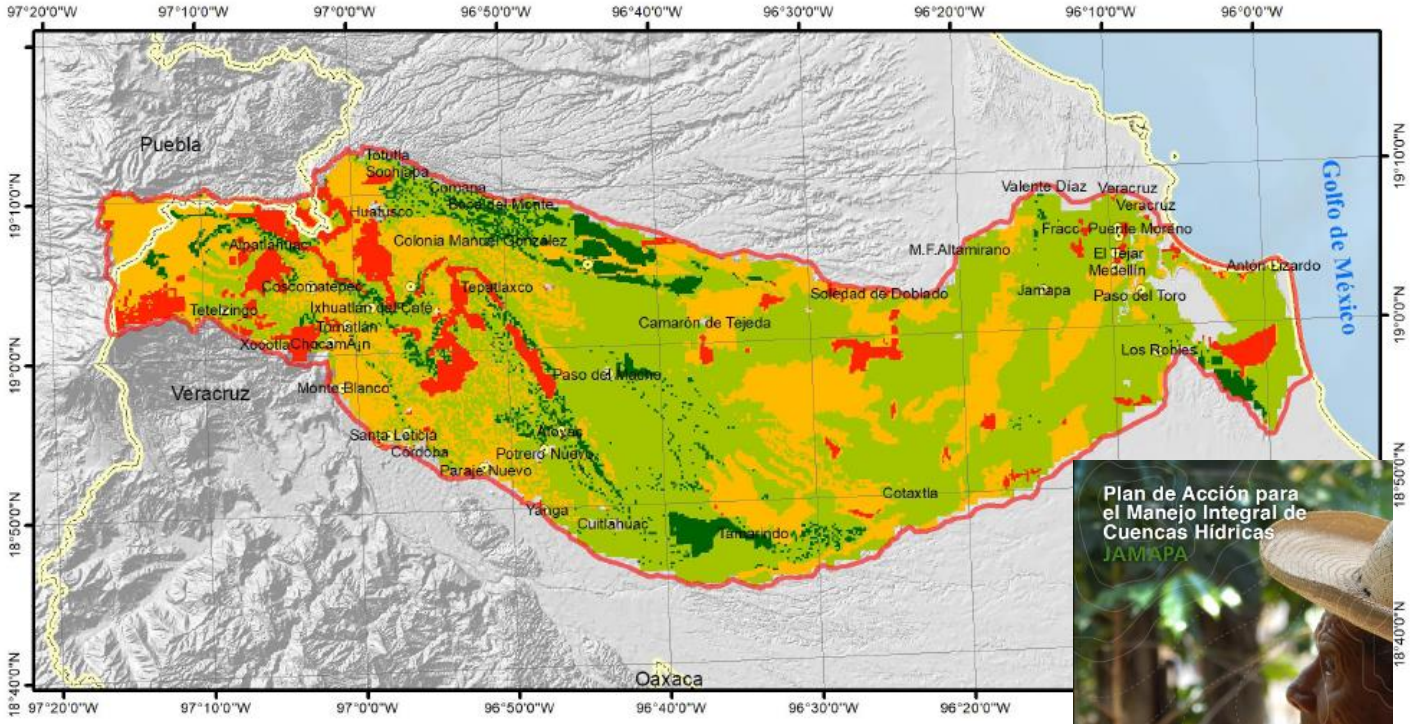
Priority areas

Ameca-Mascota: 280 ha
Jamapa: 400 ha
Carmen: 1,631 ha.

Ameca Mascota



Jamapa



Del Carmen

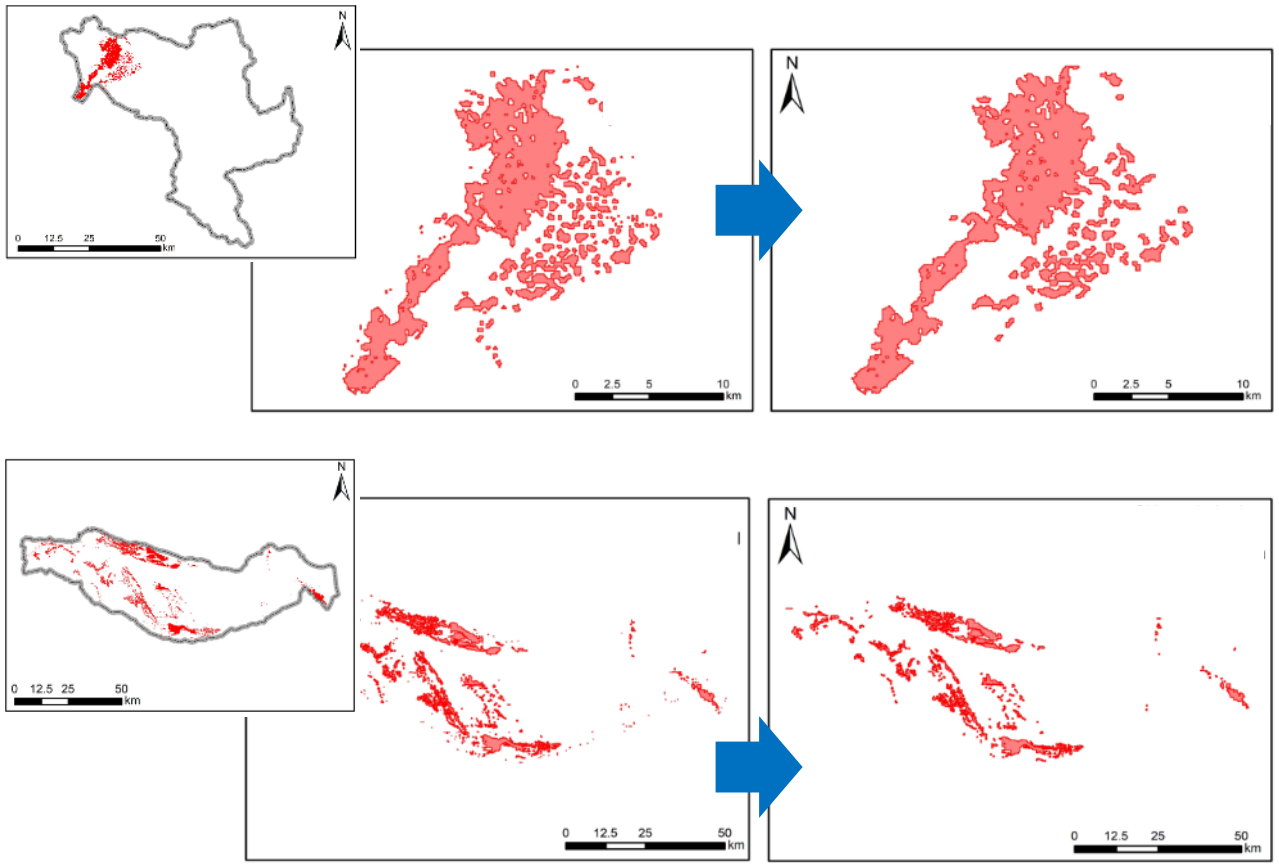
Non available

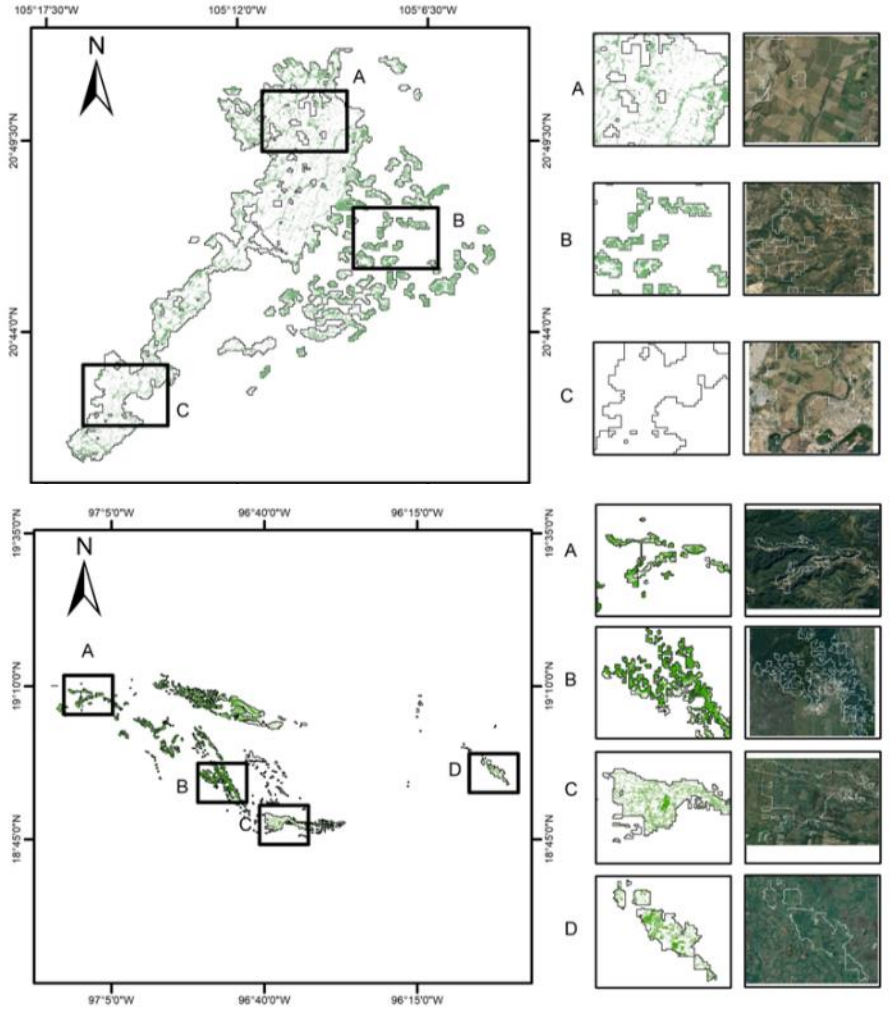
Human-induced grassland areas

Refinement of priority areas

Forest area within the priority sites:

- Ameca-Mascota: 1,725 ha (19%)
- Jamapa: 12,025 ha (44%)



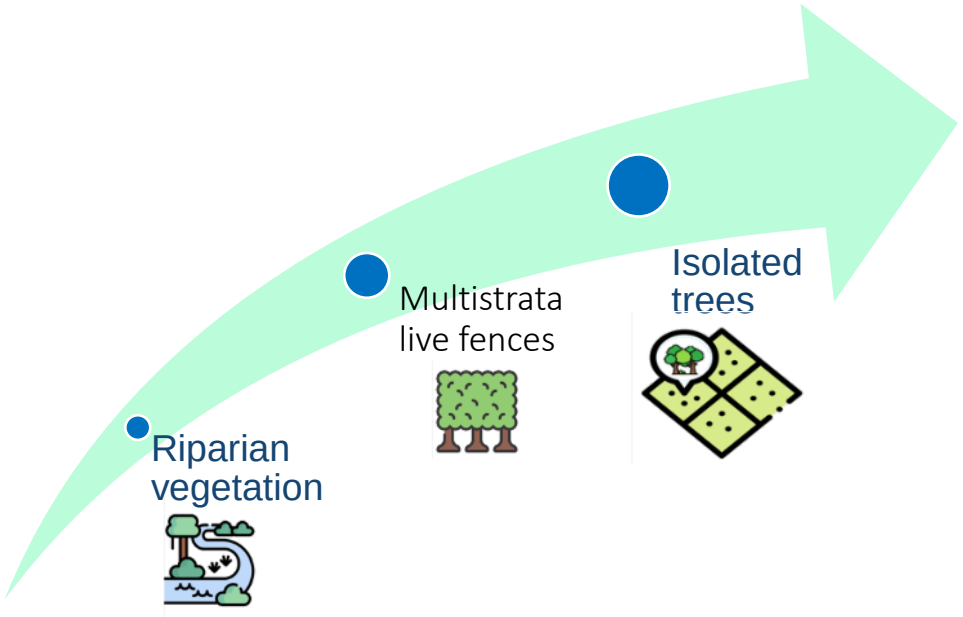


CONECTA scenario assessment

Decision rules

Restoration target: 10, 500 ha - 15 watersheds

Ameca-Mascota: 274,484 ha	280 ha
del Carmen: 1, 600,780 ha	1,631 ha
Jamapa: 392, 191 ha	400 ha

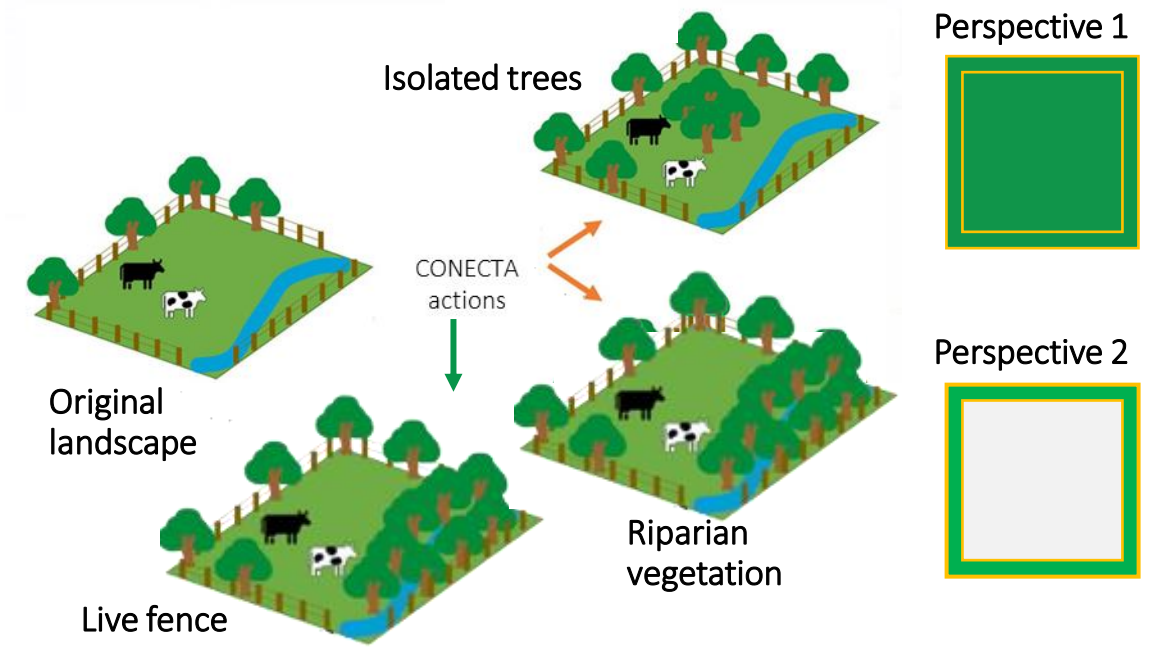


CONECTA scenario (Biophysical evaluation)

Note: The plots were randomly selected

Two perspectives

The effective CONECTA area under two perspectives:



Perspective 1: The total area of the plot where the actions are implemented is considered.

Perspective 2: The area occupied by the CONECTA action (e.g., 5 m wide live fences) is considered.

Modified from: Von Thaden, J., Salazar-Arteaga, H., Laborde, J., Estrada-Contreras, I., & Romero-Uribe, H. (2022). Arboreal elements of the agricultural matrix as structural connecting devices in fragmented landscapes–A case study in the Los Tuxtlas Biosphere Reserve. Ecological Engineering, 179, 106633.

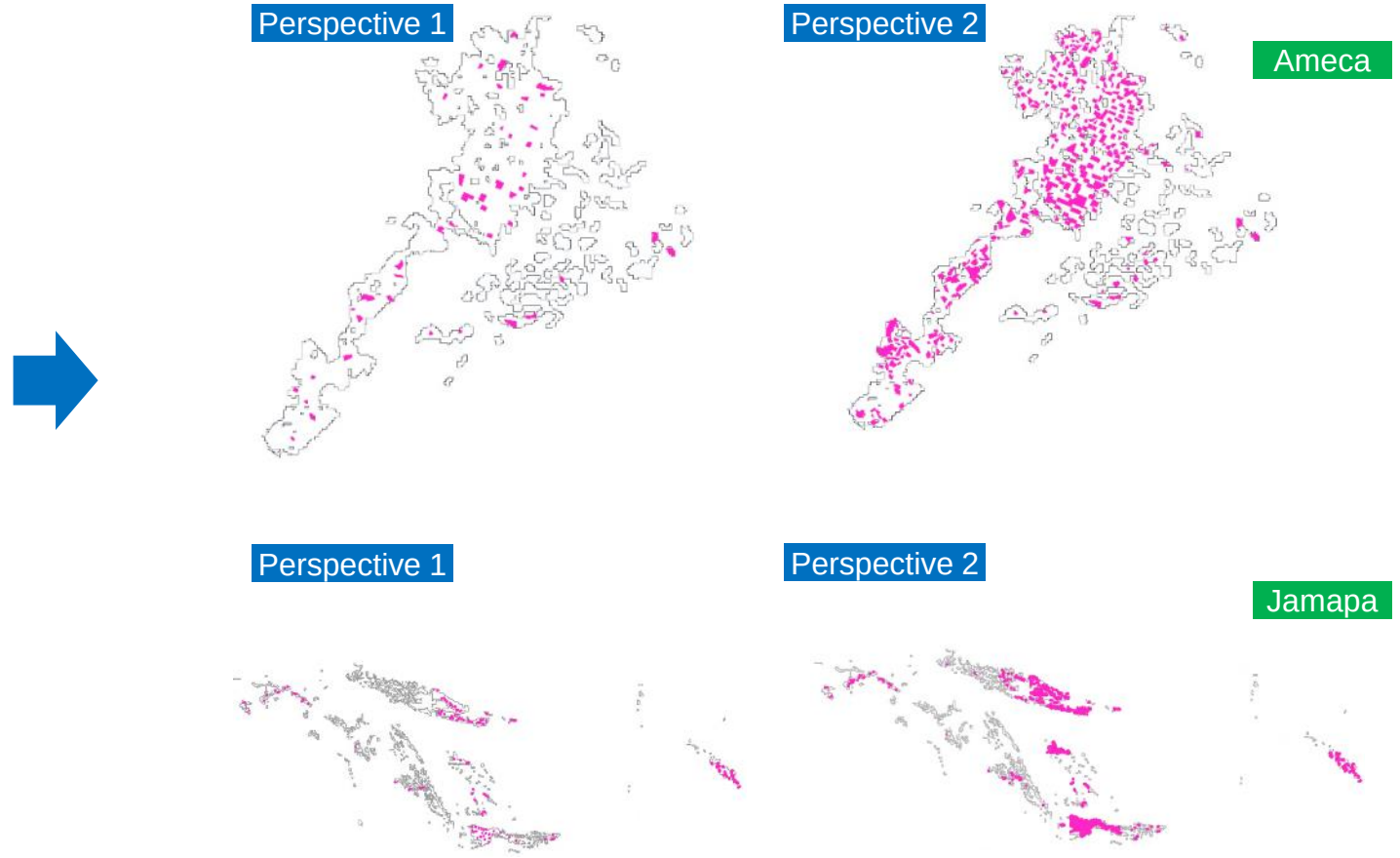
Examples of perspectives 1 and 2

Number of plots per perspective

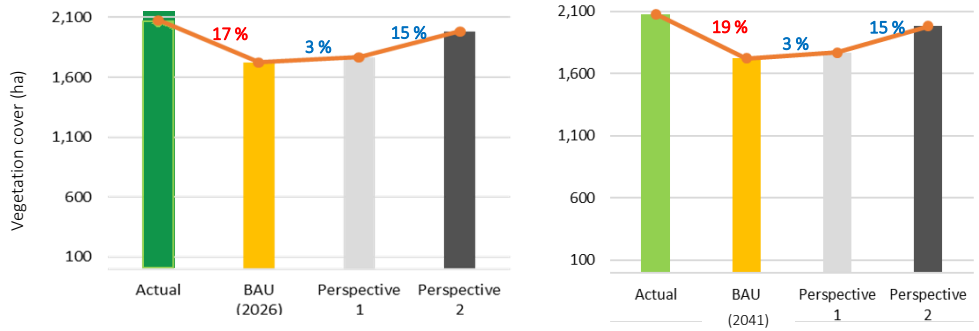
	P1	P2
Ameca-Mascota	47	344
Jamapa	139	808
del Carmen	15	

Perspective 1: The total area of the plot where the actions are implemented is considered.

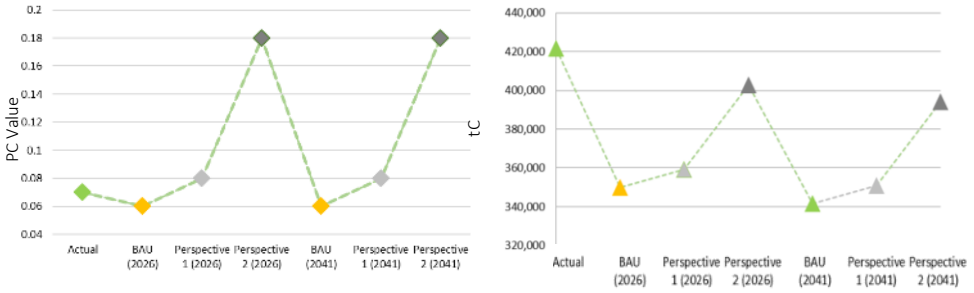
Perspective 2: The area occupied by the CONECTA action (e.g., 5 m wide live fences) is considered.



Ameca-Mascota

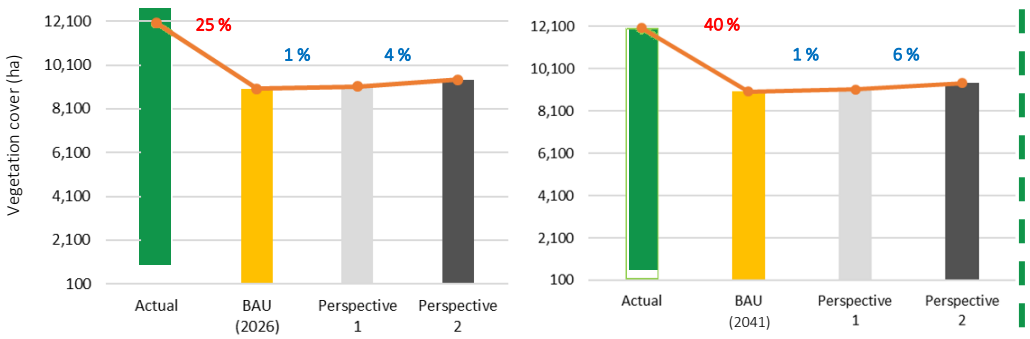


Loss of forest cover in the future BAU and CONECTA scenario

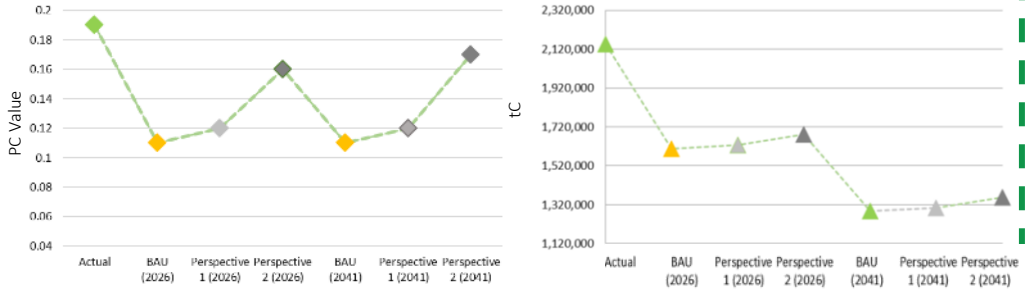


Correlation BAU and CONECTA scenario with the connectivity and carbon storage

Jamapa



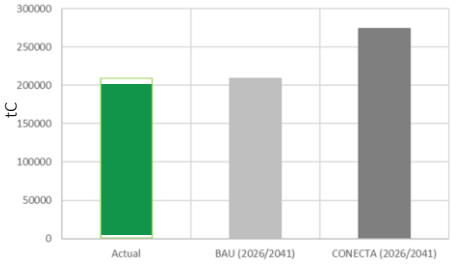
Loss of forest cover in the future BAU and CONECTA scenario



Correlation BAU and CONECTA scenario with the connectivity and carbon storage

Del Carmen

Grassland rehabilitation associated with more sustainable management practices.
Note: grassland area remains the same in BAU and CONECTA scenarios (1,670.44 ha)



Correlation BAU and CONECTA scenario with carbon storage

Economic valuation of complementary actions

Sustainable livestock production

BAU	
Ameca - Mascota	US$
NPV 2022	-97.25
NPV 2026	-389
NPV 2041	-1,848

BAU	
Jamapa	US$
NPV 2022	409
NPV 2026	1,636
NPV 2041	7,772

BAU	
Del Carmen	US$
NPV 2022	22
NPV 2026	1,636
NPV 2041	7,772

BAU (2022) and CONECTA	
Ameca - Mascota	US$
NPV 2022	13
NPV 2026	51
NPV 2041	241

Jamapa	US$
NPV 2022	756
NPV 2026	3024
NPV 2041	14,364

Del Carmen	US$
NPV 2022	18.25
NPV 2026	73
NPV 2041	335

Private CBA

Economic valuation of complementary actions

Technical assistance on reproductive tech.

BAU (2022) and CONECTA

Ameca-Mascota	US$
NPV 2022	465
NPV 2026	2,043
NPV 2041	6,768

Jamapa	US$
NPV 2022	629
NPV 2026	2,767
NPV 2041	9,166

Del Carmen	US$
NPV 2022	73
NPV 2026	321
NPV 2041	1,065

Multistrata live fences

	BAU	CONECTA	
Ameca	US$	P1	P2
NPV 2022	2.4	952	5,859
NPV 2026	10.5	4,220	25,974
NPV 2041	26.5	10,621	65,370

	BAU	CONECTA	
Jamapa	US$	P1	P2
NPV 2022	2.4	2,064	9,357
NPV 2026	10.5	9,151	41,481
NPV 2041	26.5	23,031	104,309

Isolated trees

	BAU	CONECTA	
Ameca/ Jamapa	US$	P1	P2
NPV 2022	146	573	573
NPV 2026	981	3,852	3,852
NPV 2041	2,618	10,283	10,283

Private CBA

Economic valuation of complementary actions

Traditional home gardens

BAU (2022) and CONECTA	
Three watersheds	US$
NPV 2022	-40
NPV 2026	84
NPV 2041	308

Shrubs next to fences

	BAU	CONECTA
Carmen	US$	P1
NPV 2022	59	-3,187
NPV 2026	268	14,556
NPV 2041	907	49,305

Private CBA

Protein fodder banks

BAU (2022) and CONECTA	
Three Watersheds	US$
NPV 2022	-343
NPV 2026	-136
NPV 2041	267

Economic valuation of complementary actions

Riparian vegetation

	BAU	CONECTA	
Ameca	US$	P1	P2
NPV 2022	-453	-752	-17,819
NPV 2026	-498	-827	-19,592
NPV 2041	-591	-981	-23,242

	BAU	CONECTA	
Jamapa	US$	P1	P2
NPV 2022	-453	-3,420	-8,471
NPV 2026	-498	-3,760	-9,314
NPV 2041	-591	-4,461	-11,049

Perspective 1: The total area of the plot where the actions are implemented is considered.

Perspective 2: The area occupied by the CONECTA action (e.g., 5 m wide live fences) is considered.

Water distribution systems

BAU (2022) and CONECTA

Water pumping (m)	US$
NPV 2022	-0.8
NPV 2026	-0.9
NPV 2041	-1.1

Gravity (m)	US$
NPV 2022	-0.6
NPV 2026	-0.7
NPV 2041	-0.9

Technical assistance on water monitoring

BAU (2022) and CONECTA

Water monitoring	US$
NPV 2022	-1,429
NPV 2026	-4,984
NPV 2041	-11,958

Private CBA

Note: there are many benefits from the actions, but only investment and expenses were considered due to no available data.

Economic valuation of complementary actions

Carbon sequestration

Social	BAU	CONECTA	
Ameca	US$	P1	P2
NPV 2022	6.8 M		
NPV 2026	5.6 M	5.8 M	6.5 M
NPV 2041	5.5 M	5.7 M	6.3 M

Social	BAU	CONECTA	
Jamapa	US$	P1	P2
NPV 2022	1.1 B		
NPV 2026	848 M	857 M	885 M
NPV 2041	678 M	678 M	678 M

Social	BAU	CONECTA
Carmen	US$	P1
NPV 2022	5.5 M	
NPV 2026	5.5 M	7.2 M
NPV 2041	5.5 M	7.2 M

California	BAU	CONECTA	
Ameca	US$	P1	P2
NPV 2022	4 M		
NPV 2026	3.3 M	3.4 M	3.8 M
NPV 2041	3.2 M	3.3 M	3.7 M

BAU < CONECTA

California	BAU	CONECTA	
Jamapa	US$	P1	P2
NPV 2022	32 M		
NPV 2026	25 M	25 M	26 M
NPV 2041	20 M	20 M	20 M

BAU < CONECTA

California	BAU	CONECTA
Carmen	US$	P1
NPV 2022	3.1 M	
NPV 2026	3.1 M	3.1 M
NPV 2041	3.1 M	4.2 M

BAU < CONECTA

Social CBA

Economic valuation of complementary actions

Landscape connectivity

Ameca	BAU	CONECTA	
	US$	P1	P2
NPV 2022	13,000		
NPV 2026	9, 500	12,500	22,300
NPV 2041	9, 290	12,100	21,800

BAU < CONECTA

Jamapa	BAU	CONECTA	
	US$	P1	P2
NPV 2022	75,400		
NPV 2026	49,800	64,000	101,550
NPV 2041	39,700	50,700	81,250

BAU < CONECTA

Social CBA

- **CBA-P:** it is preferable to have a low-interest rate than to have a higher return on investment.
- **CBA-S:** a low rate implies having a higher value of ES in the medium and long term.

Sensitivity analysis

Expert worksh

Live fences

Riparian vegetation

Scattered trees

Traditional farming

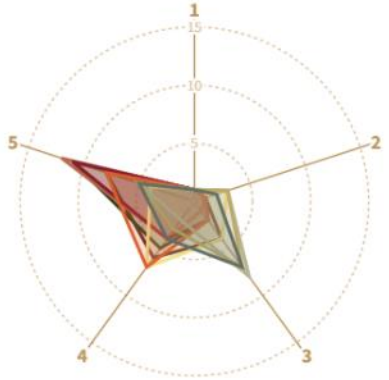
Protein banks

Silvopastoral systems

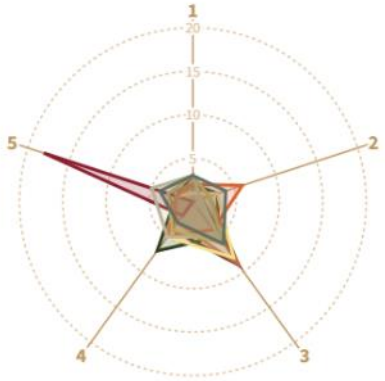
Water quality monitoring

Reproduction tech.

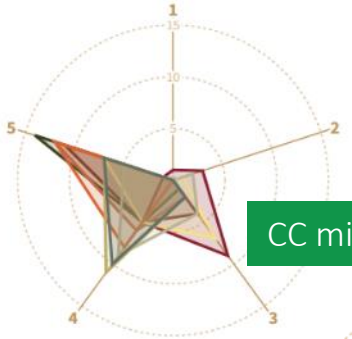
Green recovery from COVID-19



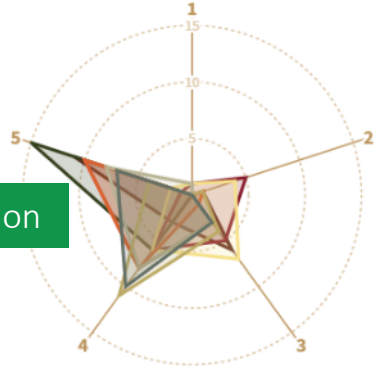
Women participation



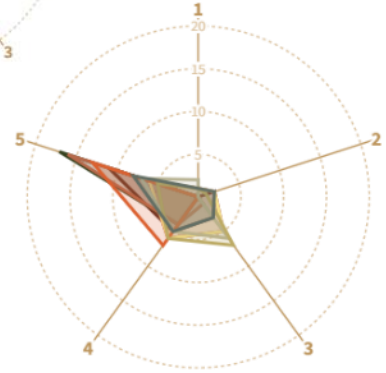
Sustainable food production



Integrated landscape management



CC mitigation & adaptation



Budget assignment exercise

Silvopastoral systems (21.2%)

Riparian vegetation (19.8%)

Scattered trees (14.3%)

Live fences (13.3%)

Trad. farming (10.3%)

Water monit. (9.8)

Protein banks (9.4%)

Rep. tech. (8.5%)

SEMINAR SERIES

Sharing cutting–edge knowledge on valuing natural capital & ecosystem services

GPS Global Program on Sustainability

Thank You!

Debora Lithgow
Researcher, Consultant
Instituto de Ecología, A.C (INECOL)

Daniel Revollo
Researcher, Economic Consultant
Universidad Autónoma Metropolitana

Juan José Von Thaden
Postdoctoral researcher &
Biophysical Consultant