

HOT SPOTS TO ENHACE LARGE VERTEBRATE CONSERVATION IN MEXICO

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Doctoral work

INTRODUCTION

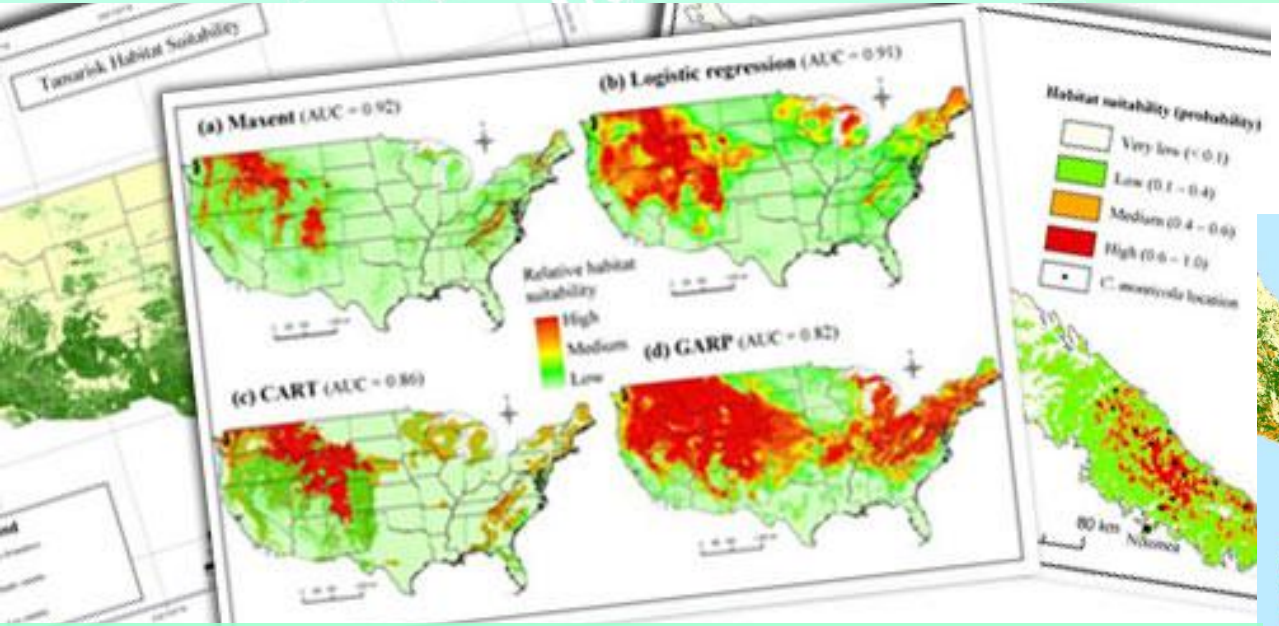
- Biodiversity depletion.

- We focused on assemblages of umbrella species as conservation targets.

True surrogate	Estimate surrogate
Large vertebrate (Ritchie y Johnson 2009)	Tope predators NOM-059-ECOL-2010 e IUCN 2011 (Drummond *et al.* 2010)

Umbrella and key species

INTRODUCTION

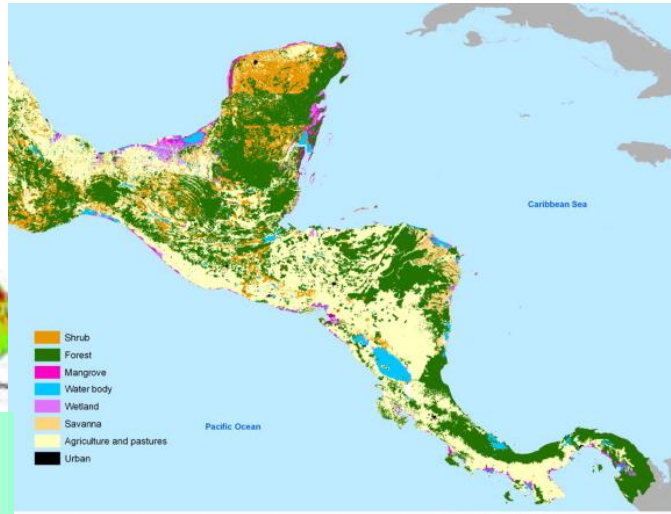


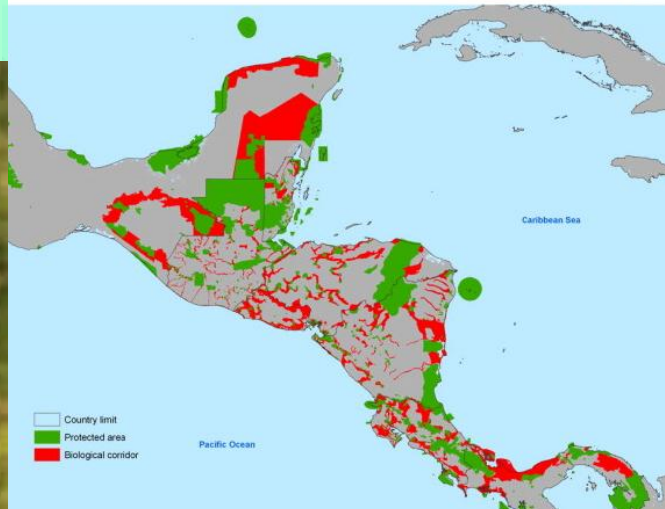
Enhance biodiversity conservation

Underlying governance trigging attributes

Tools

Trade-off analyses














OBJECTIVE:

Provide a holistic framework to delineate territories of opportunity to enhance large vertebrate conservation in Mexico; since trigging attributes.

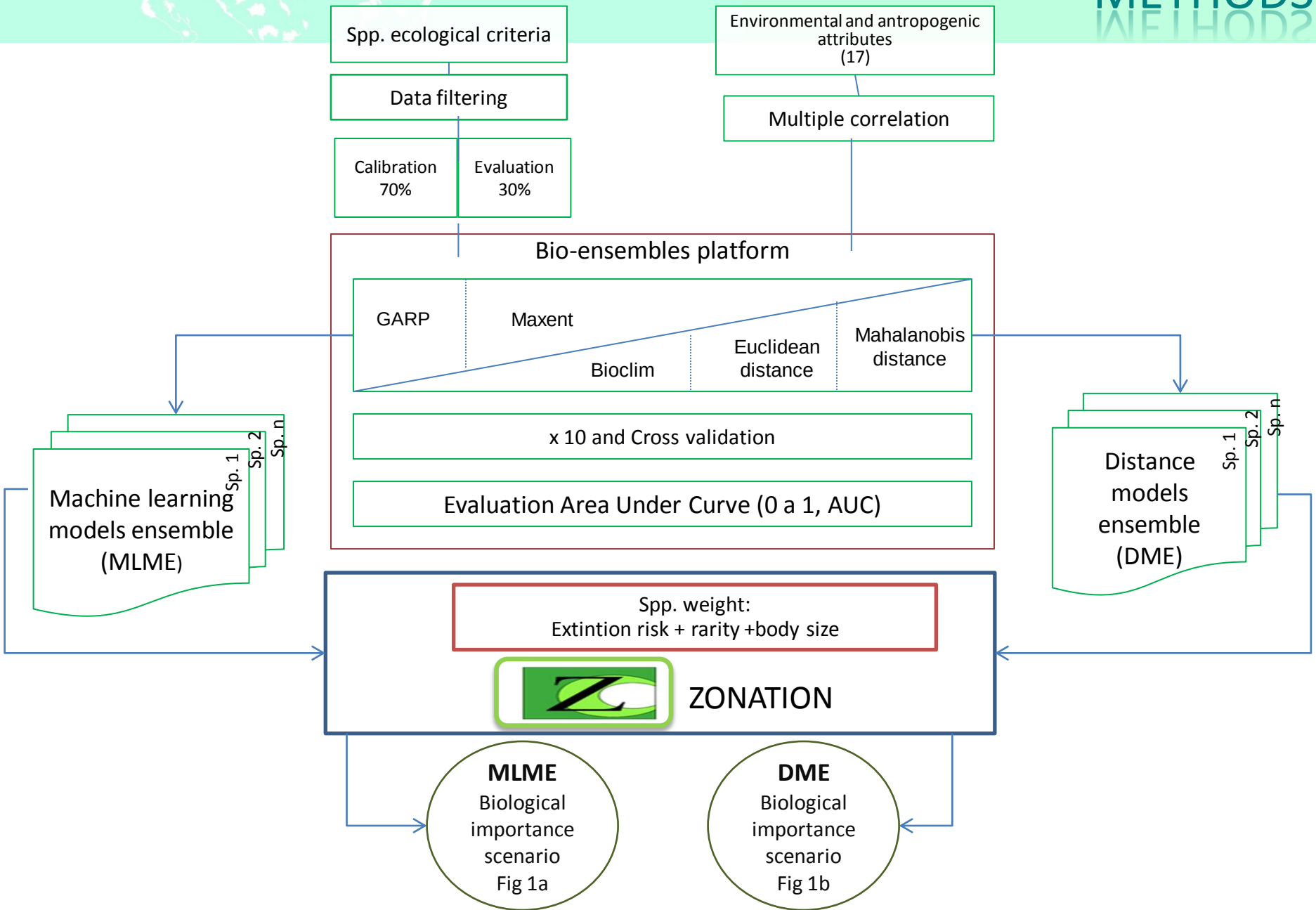
Trigging attributes:
biological,
social,
cultural,
economic, and
political-administrative

Hot spots were identified

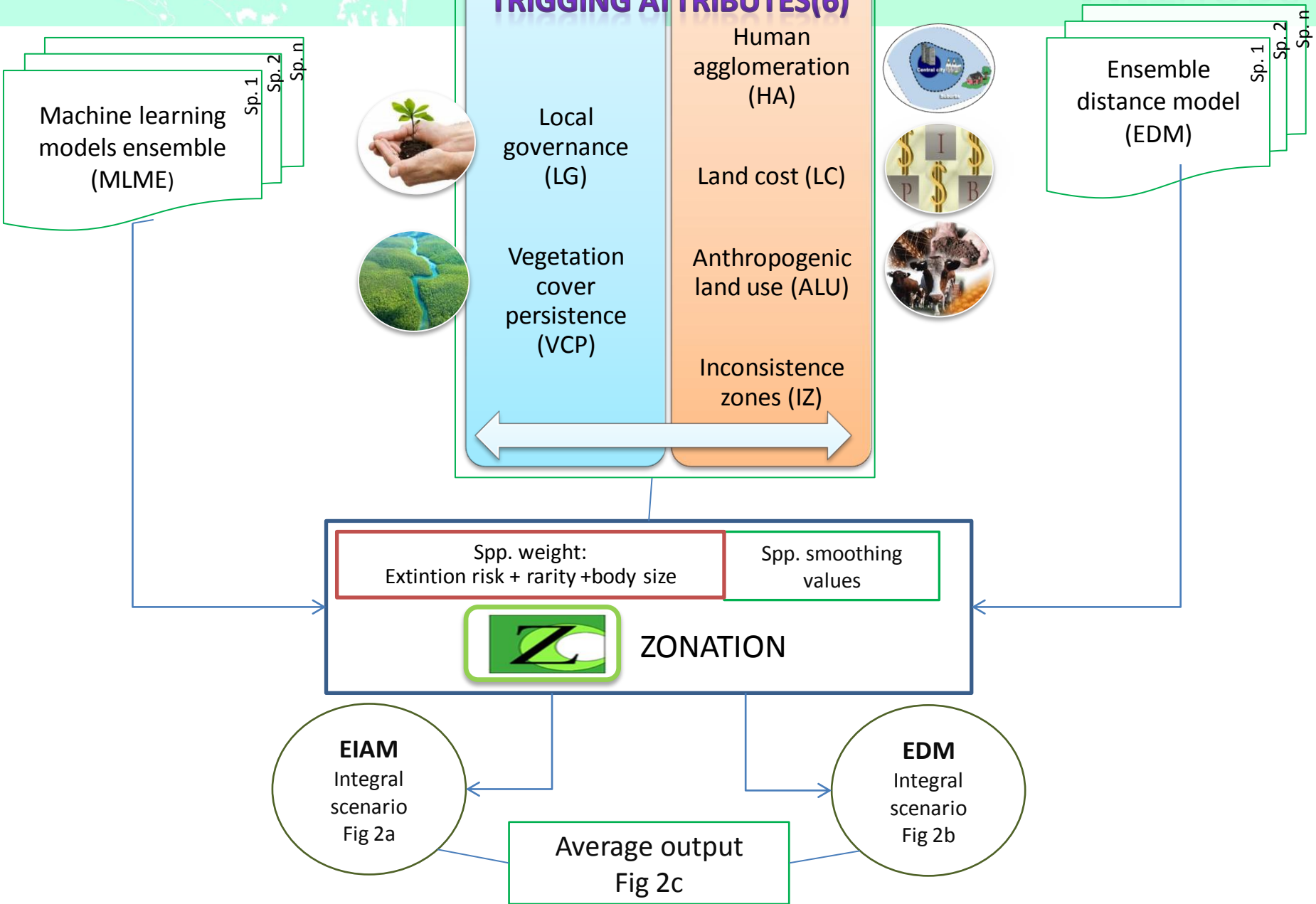
Contrasts previous conservation actions and the likely implications of the outcomes .

Mexico as a surrogate.

METHODS


Spp. ecological criteria
Data filtering
Calibration 70%
Evaluation 30%
Environmental and antropogenic attributes (17)
Multiple correlation
Bio-ensembles platform
GARP
Maxent
Bioclim
Euclidean distance
Mahalanobis distance
x 10 and Cross validation
Evaluation Area Under Curve (0 a 1, AUC)
Machine learning models ensemble (MLME)
Sp. 1
Sp. 2
Sp. n
Distance models ensemble (DME)
Sp. 1
Sp. 2
Sp. n
Spp. weight:
Extintion risk + rarity +body size
ZONATION
MLME
Biological importance scenario
Fig 1a
DME
Biological importance scenario
Fig 1b

METHODS


+2
−1
TRIGGING ATTRIBUTES(6)
Local governance (LG)
Vegetation cover persistence (VCP)
Human agglomeration (HA)
Land cost (LC)
Anthropogenic land use (ALU)
Inconsistence zones (IZ)
Machine learning models ensemble (MLME)
Sp. 1
Sp. 2
Sp. n
Ensemble distance model (EDM)
Spp. weight:
Extintion risk + rarity +body size
Spp. smoothing values
ZONATION
EIAM
Integral scenario
Fig 2a
EDM
Integral scenario
Fig 2b
Average output
Fig 2c

METHODS

INTEGRAL SCENARIO
Average output
Fig 2c

Scenarios clasification
(17% and 50%)

Agrarian cores (AC)

Hot spots
Fig 3

Natural
Protected
Areas (ANP)

Data
comparation

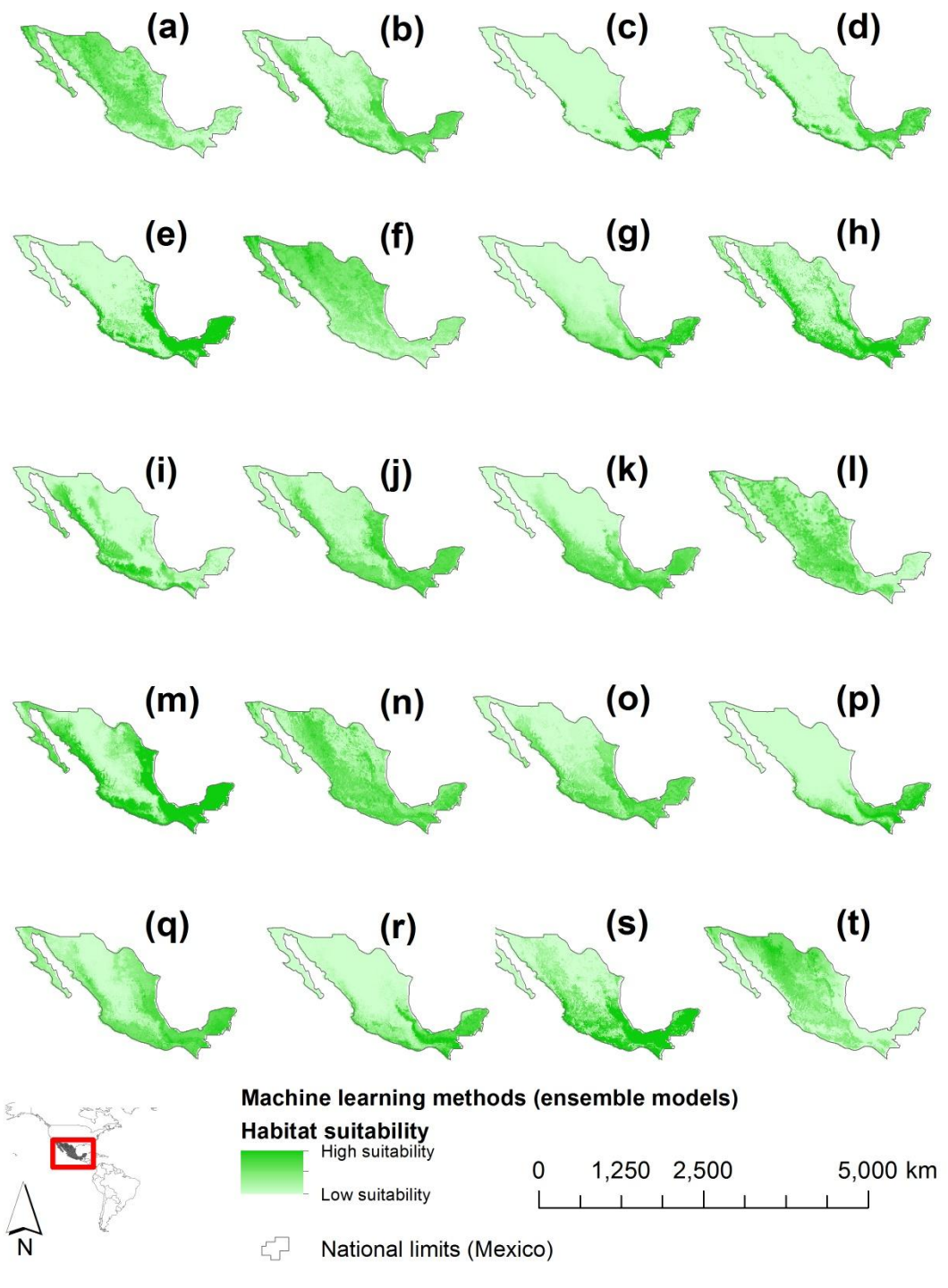
RESULTS

Family	Genus	Species	Number of records	Suma riesgo
Crocodylidae	Crocodylus	*acutus*	60	2.5
	Crocodylus	*moreletii*	25	1.76
Boidae	Boa	*constrictor*	**350**	1.2
Helodermatidae	Heloderma	*horridum*	102	1.3
Accipitridae	*Aquila*	*chrysaetos*	185	1.45
	Haliaeetus	*leucocephalus*	85	1.79
	Harpia	*harpyja*	12	**2.3**
	Harpyhaliaetus	*solitarius*	57	**2.15**
	Spizaetus	*ornatus*	123	1.74
	Spizaetus	*tyrannus*	118	1.73
	Spizastur	*melanoleucus*	17	1.72
Cathartidae	*Cathartes*	*burrovianus*	250	1.24
	Sarcoramphus	*papa*	116	1.78
Felidae	*Leopardus*	*pardalis*	261	1.57
	Leopardus	*wiedii*	121	**1.91**
	Lynx	*rufus*	**265**	0.67
	Panthera	*onca*	**510**	**2.16**
	Puma	*concolor*	245	0.68
	Puma	*yagouaroundi*	167	1.45
Ursidae	*Ursus*	*americanus*	166	**2.57**
			3235	

RESULTS

AUC promedio: 0.83

Figure s1. Ensemble models of Machine learning methods for the 20 selected species.



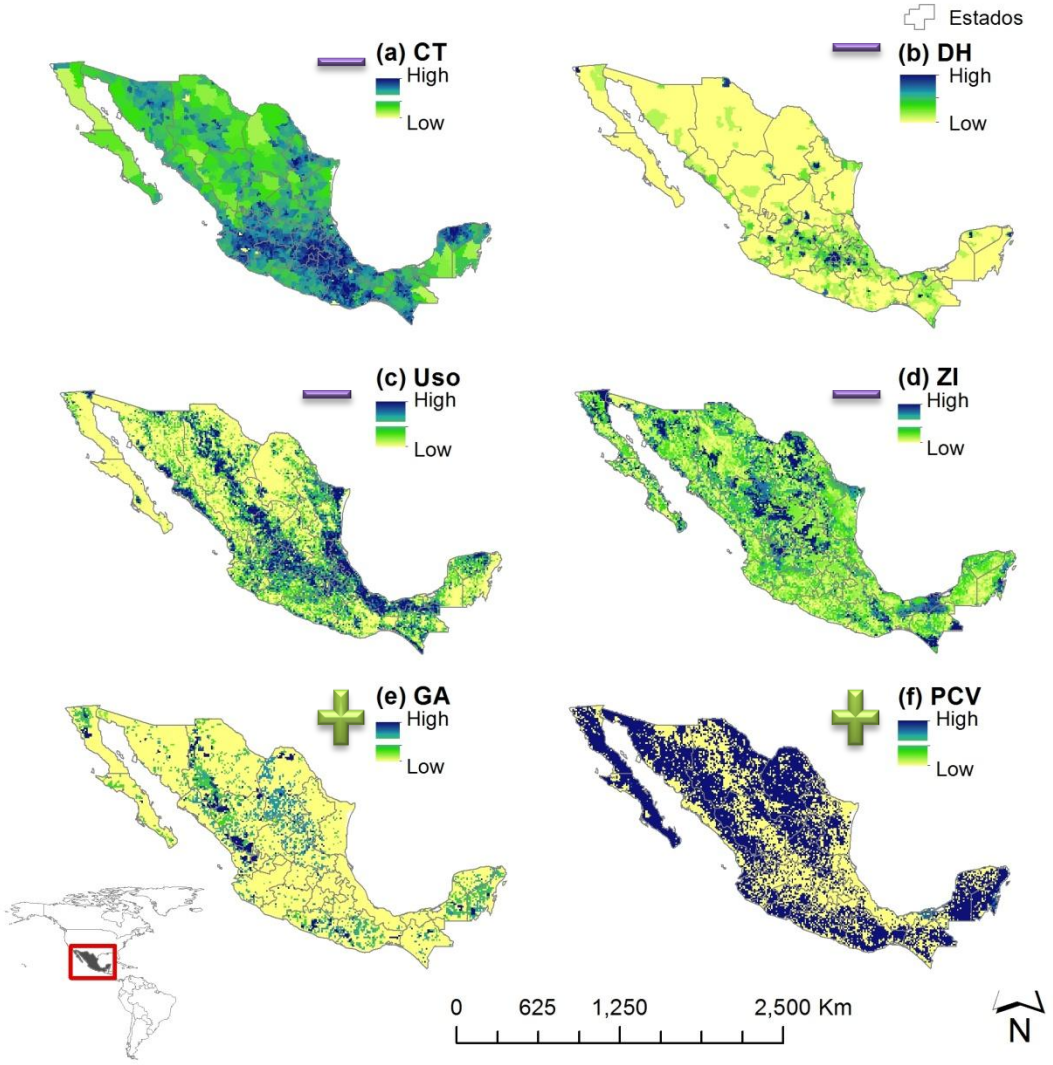


Figura S2. Spatilal pattern of the trigging attributes used in the trade-off analysis. (a) Land cost, (b) Human agglomeration, (c) Antropogenic use, (e) Local governance, (d) Inconsistence zones , and (f) Land cover change.

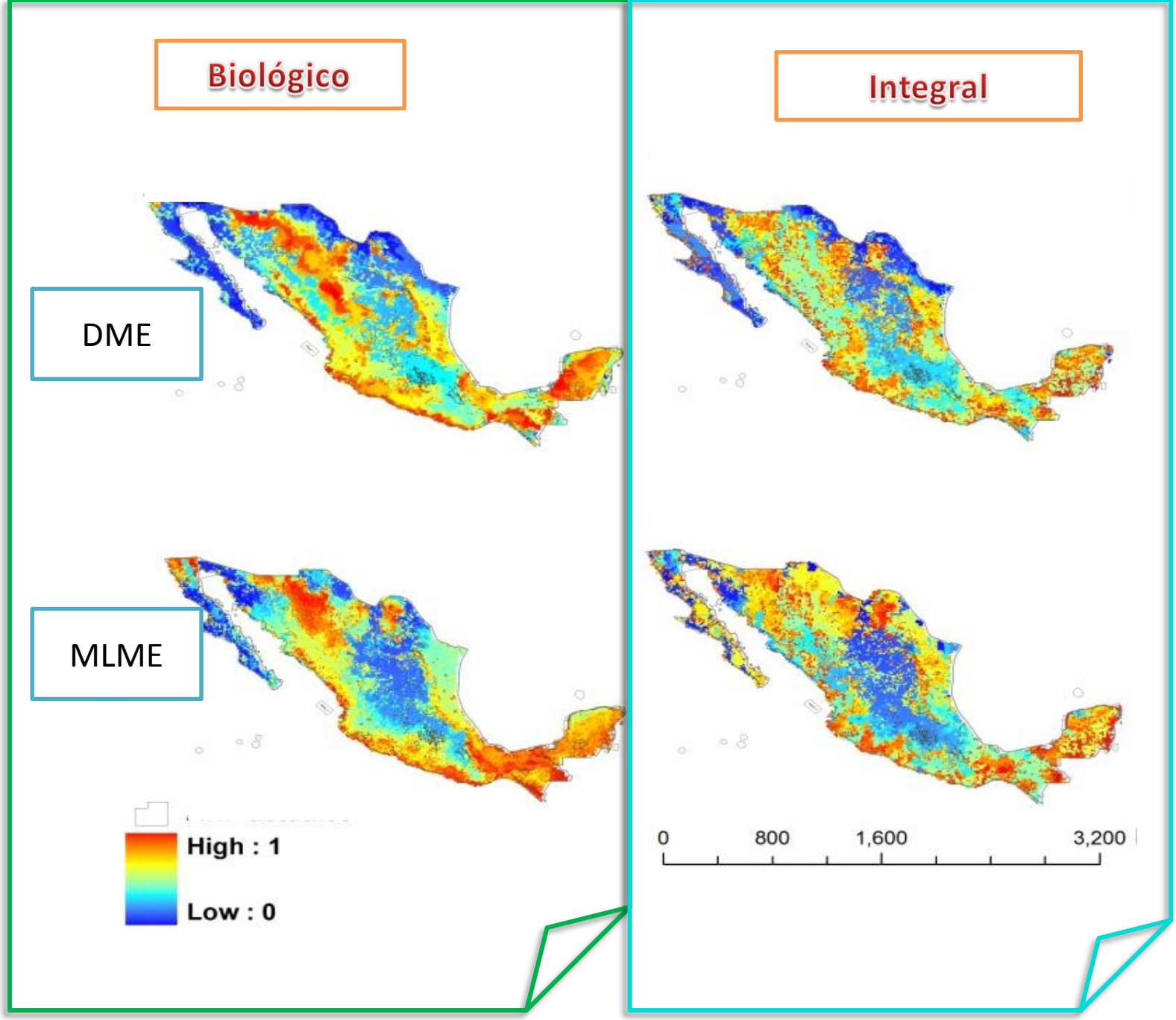
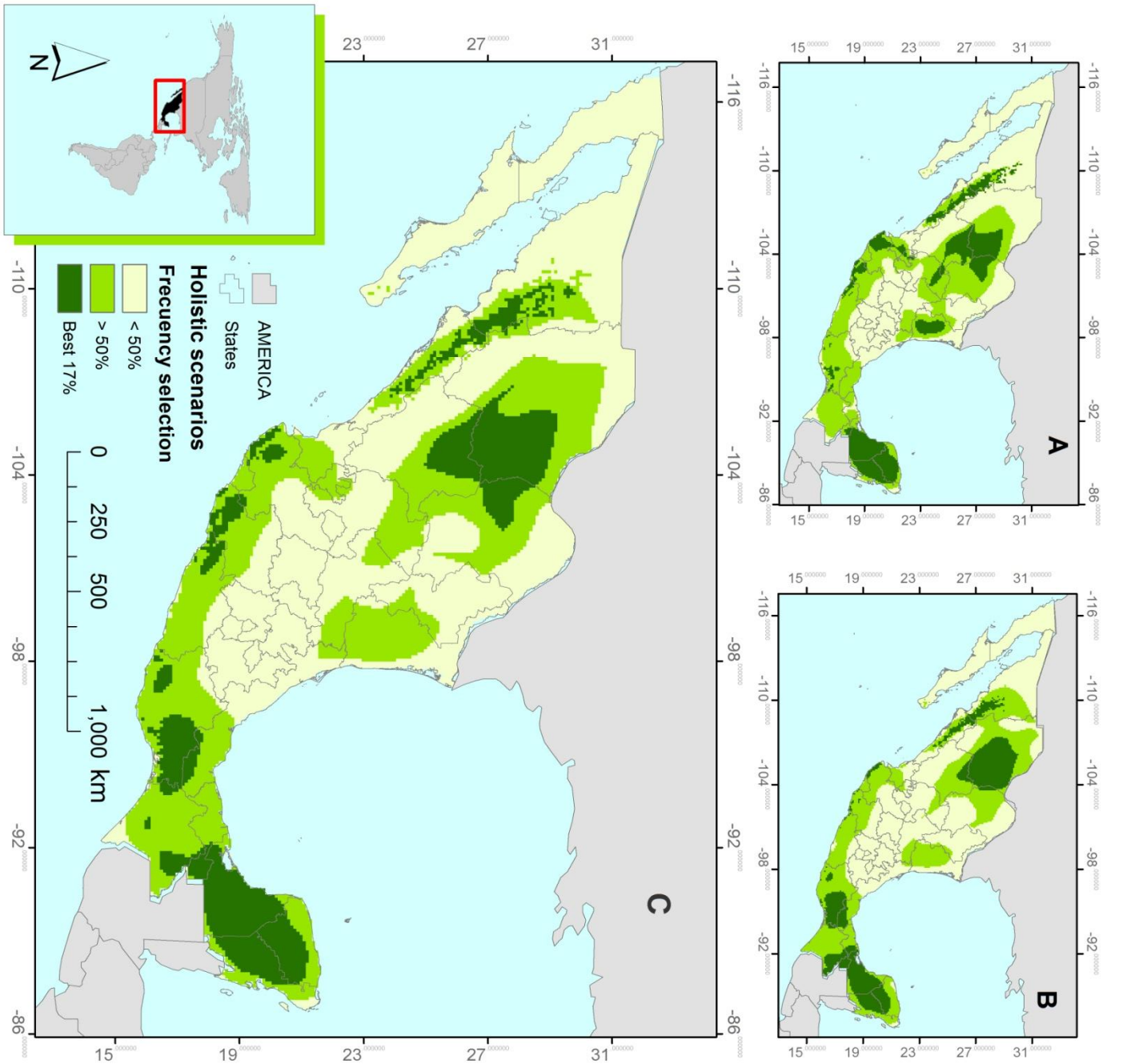


Figura 1. Biological importance scenario for machine learning models ensemble (MLME, a) and for distance models ensemble (DME, b).

Figure 2. Integral scenarios for EIAM (A) and for DME (B). Average output of the integral scenarios (C).



RESULTS

State	>17%		>50%	
	Area (km2)	Mexican territory %	Area (km2)	Mexican territory %
Campeche	50111.68	2.54	54783.13	2.78
Chiapas	10988.22	0.56	67071.20	3.40
Chihuahua	62329.42	3.16	151669.59	7.69
Coahuila	17627.37	0.89	72046.55	3.65
Guerrero	6571.07	0.33	53303.08	2.70
Jalisco	8477.47	0.43	46886.52	2.38
Michoacán	9244.31	0.47	36905.74	1.87
Nayarit	0.00	0.00	13788.74	0.70
Nuevo león	0.00	0.00	9083.86	0.46
Oaxaca	31192.32	1.58	84451.03	4.28
Queretaro	0.00	0.00	19150.29	0.97
Quintana Roo	25027.86	1.27	39314.31	1.99
Sinaloa	10687.78	0.54	33284.23	1.69
Sonora	15259.16	0.77	46716.22	2.37
Tamaulipas	0.00	0.00	45889.12	2.33
Veracruz	5888.35	0.30	33705.31	1.71
Yucatán	15317.47	1.21	39248.02	1.99

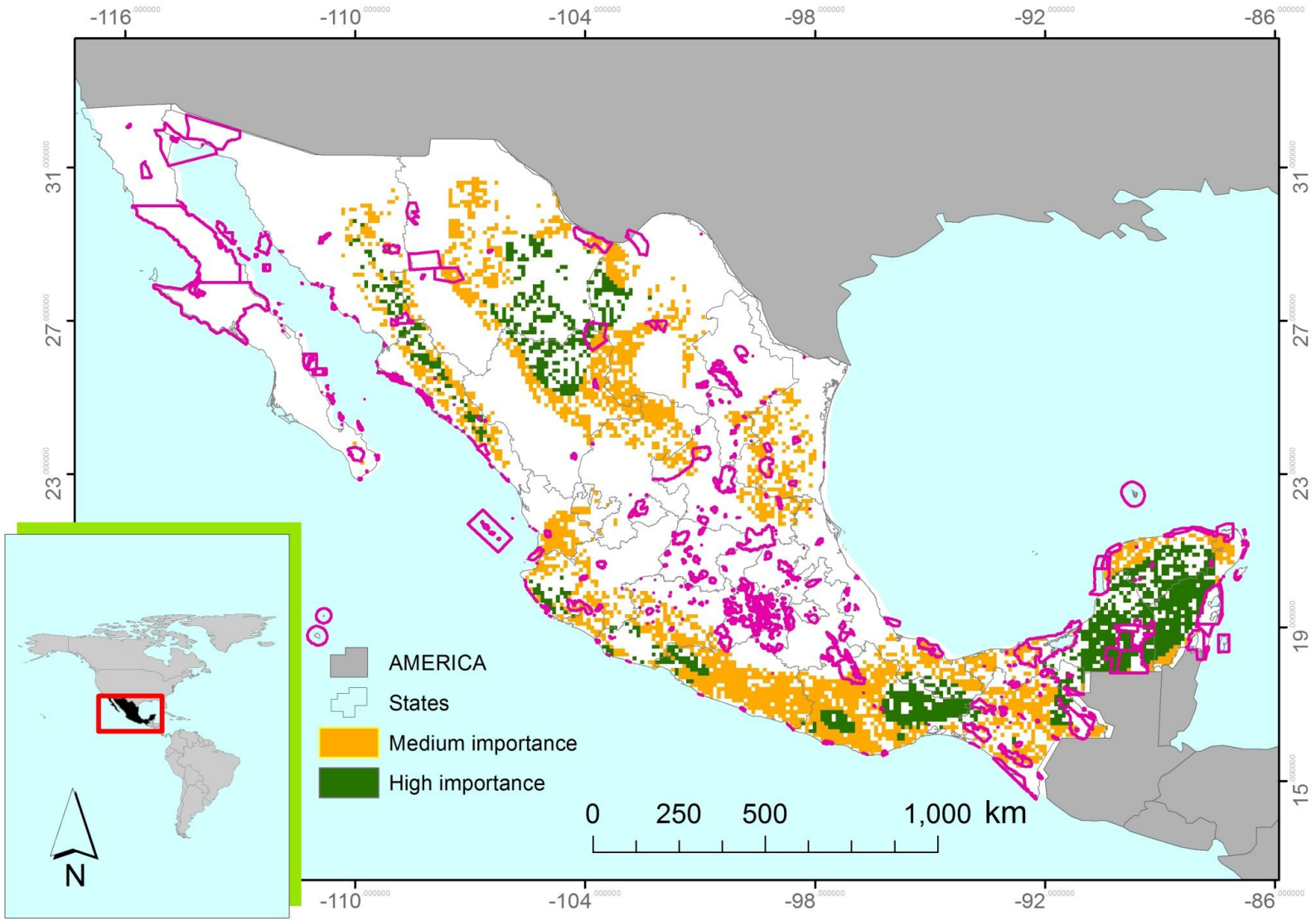


Figure 3. Hot spot re-coined. Medium (in orange) an high (in green) importance territories of opportunity to enhance large vertebrate conservation in Mexico.

The actual PNA´s just can protect less than 1% of the territories of opportunity to enhance large vertebrate conservation in Mexico.

Trigging attributes for Mexico

Ecological niche model methods.

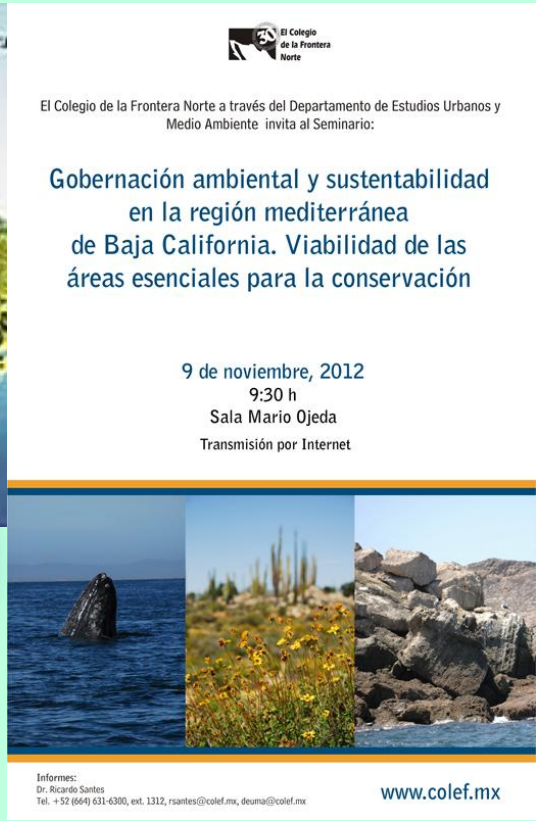
Combined methodologies.

↑ Succesfull probability

SEMARNAT
SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES

ESTADOS UNIDOS MEXICANOS

Gulf Coast Ecosystem Restoration Task Force

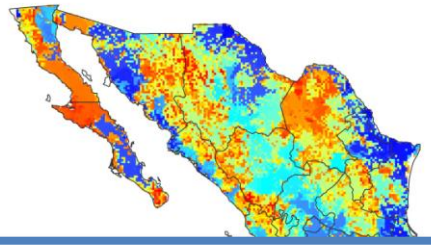


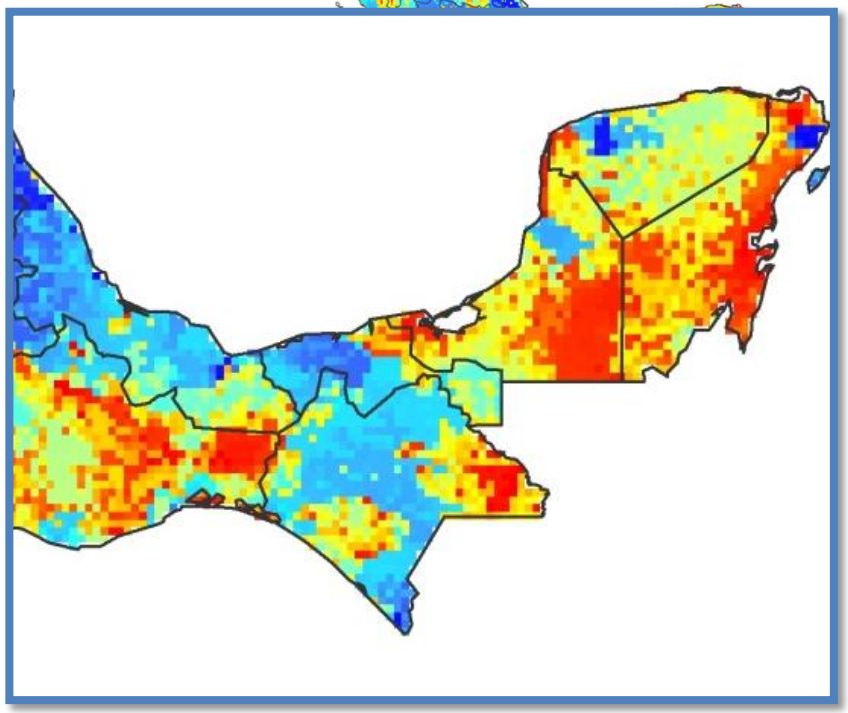
DISCUSION

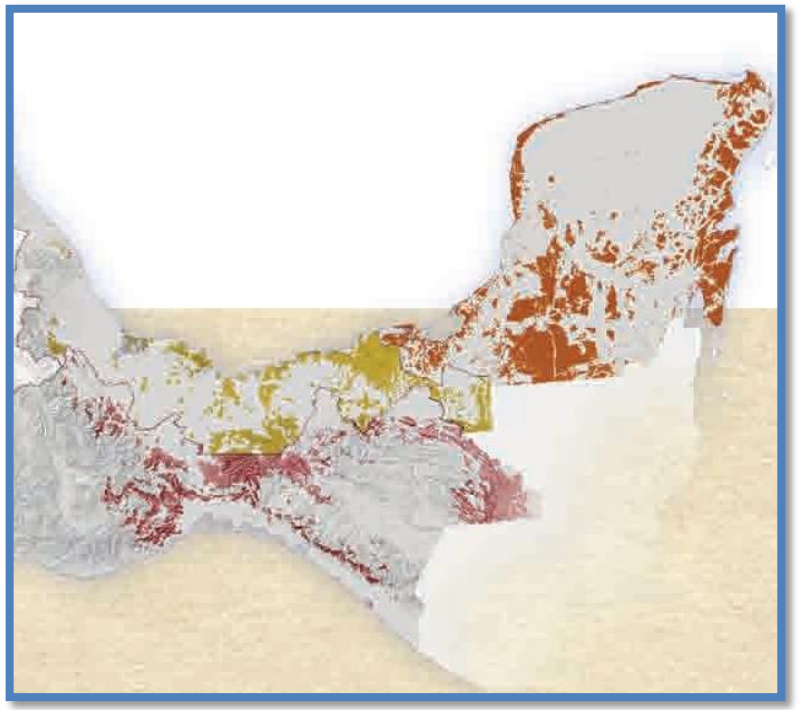
Strenghten synergyes for the biodiversity conservation.

X
- Climate change
- Invasor species
- Hunt
- Etc.

Comparación







Depredadores tope

Primates (Tobón *et al.* 2012)

DISCUSION

Aknowledgements


Gracías!