



IMPLICATIONS OF INDUSTRIALIZATION TO THE PROVISION OF ECO~~S~~YSTEM SERVICES

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Posgrado en Ciencias Ambientales

A Community on Ecosystem Services 2016

Session 30

12 / 07 / 2016

AGENDA

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Background information



Theoretical framework



Methodology



Results for land cover assessment



Results for ecosystem services assessment



Results for social – economic outcomes



Conclusions



Follow up questions...



PRIMERA ETAPA

Arranca vivienda en Ciudad Modelo de Audi

Las primeras 1,200 casas estarán listas en segundo semestre del año, confirmó la Canadevi.

MIGUEL HERNÁNDEZ

MAR 13, 2016 | 20:13

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Audi y autoparleras generarán 8,500 empleos en la zona, por lo que habrá un alto rendimiento. Cuartoscuro



Audi invertirá en México 1,300 mdd

La automotriz construye una planta en Puebla para el modelo Q5 y generará 3,800 empleos directos; se prevé que la producción inicie en 2016 y se logren 150,000 unidades por año.

Sábado, 04 de mayo de 2013 a las 17:03

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Directivos de la firma y funcionarios

CIUDAD DE MÉXICO (CNNExpansión) — La nueva planta armadora de Audi en San José Chiapa, Puebla, cuya primera piedra se colocó este sábado, tendrá una inversión inicial de 1,300 millones de dólares. Se trata de la decimotercera fábrica de la automotriz en el mundo y se prevé la creación de 3,800 nuevos empleos

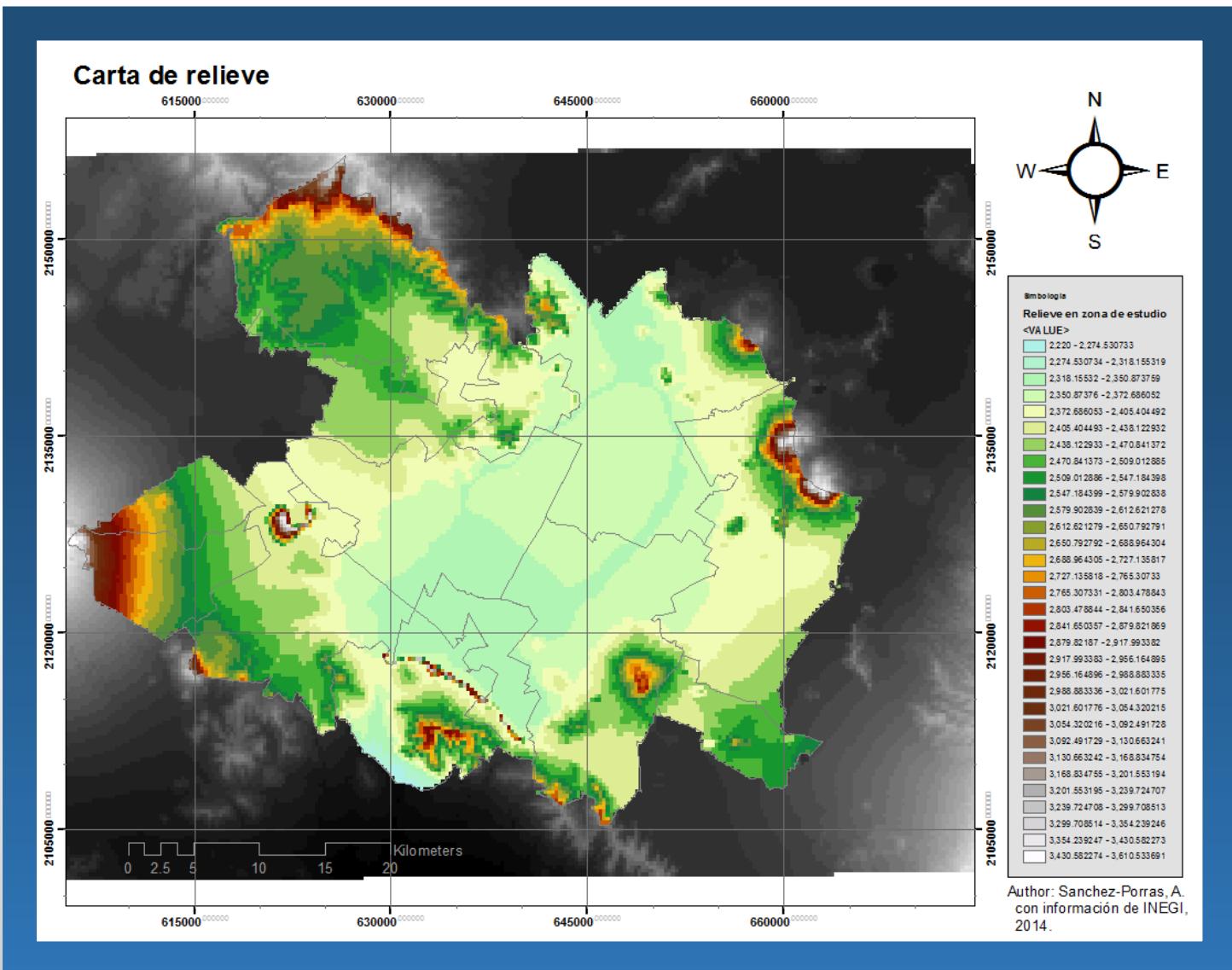
BACKGROUND INFO

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14 municipalities
in central Mexico

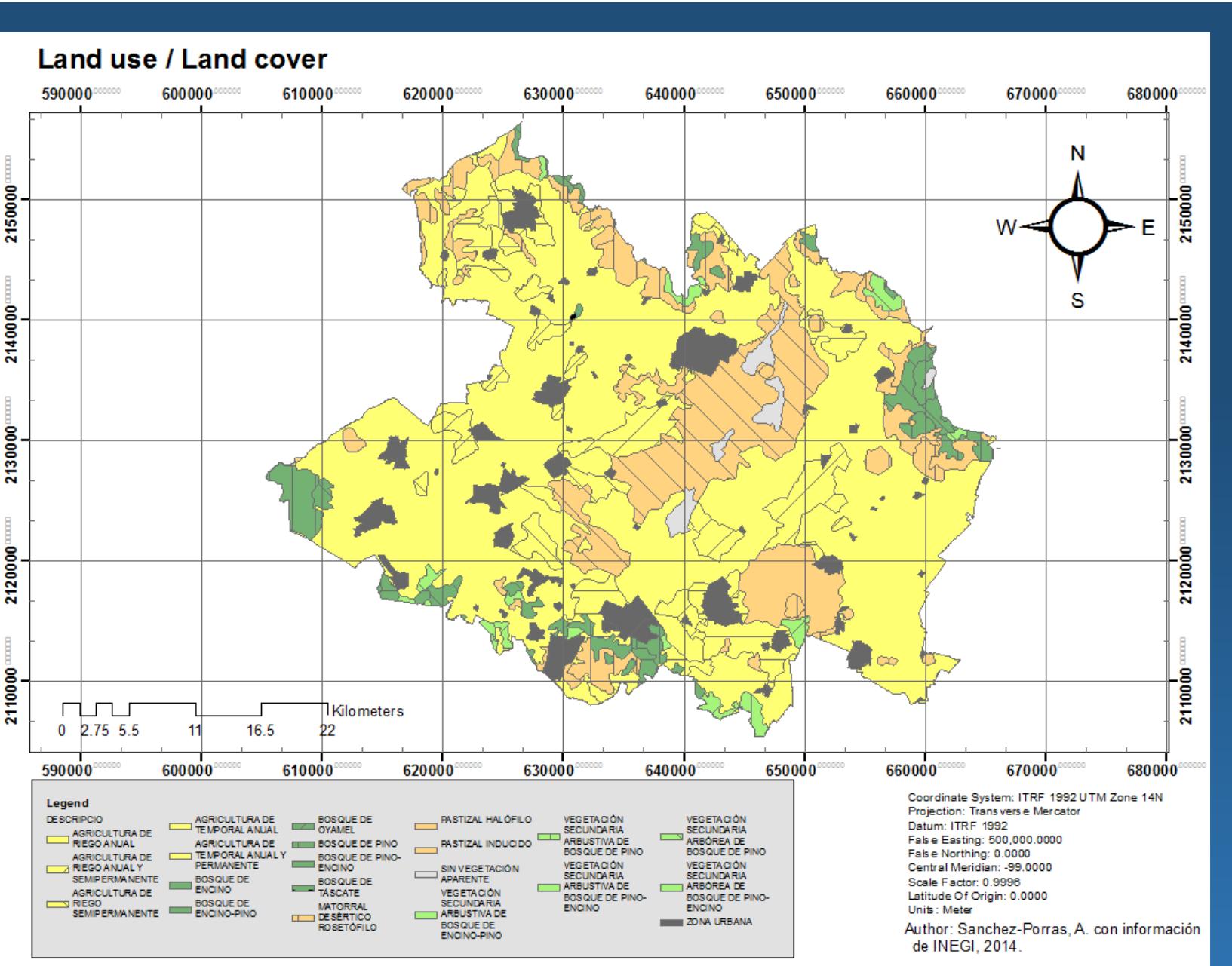
Temperate and
dry climate



Sanchez-Porras (2015) with information from INEGI (2014).

THEORETICAL FRAMEWORK

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Sanchez-Porras (2016), with information from INEGI (2014).



GIS history research

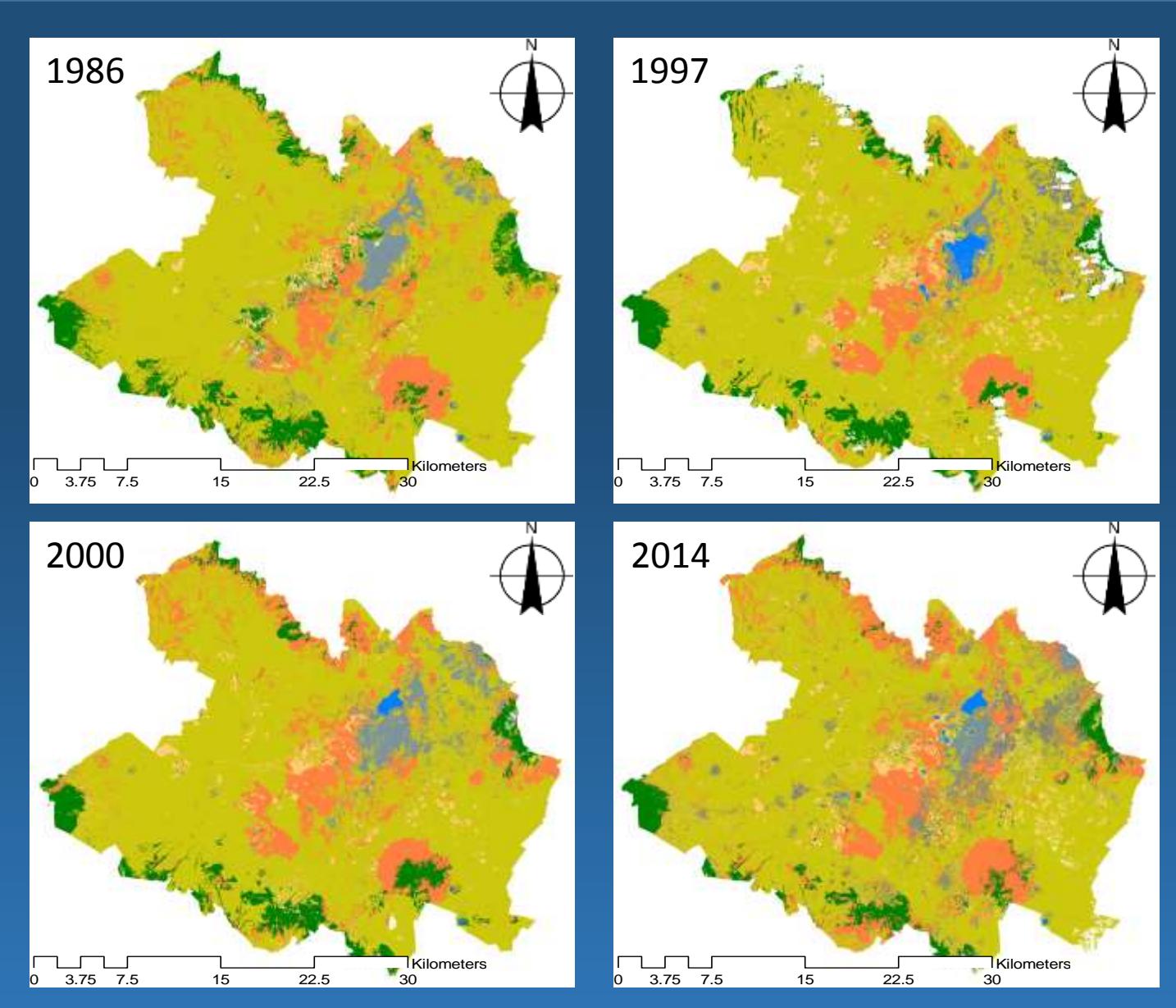
Matrix assessment for Ecosystem Services

Population history research

LANDCOVER ASSESSMENT



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Land cover at different times.

- Water
- No vegetation
- Urban
- Irrigation
- Rain fed agriculture
- Forest
- Grassland
- Erosion

ES ASSESSMENT



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CORINE land cover type:	Regulating services						Provisioning services						Cultural services									
	Local climate regulation	Global climate regulation	Flood protection	Groundwater recharge	Air Quality Regulation	Erosion Regulation	Nutrient regulation	Water purification	Pollination	Crops	Livestock	Fodder	Capture Fisheries	Acquaculture	Wild Foods	Timber	Wood Fuel	Biochemicals / Medicine	Freshwater	Energy	Recreation& Aesthetic Values	Intrinsic Value of Biodiversity
Continuous urban fabric	5	3	4	5	5	1	1	1	3	5	5	1	5	5	5	3	2	5	5	4	2	
Discontinuous urban fabric	5	3	5	5	5	1	2	2	4	4	4	2	4	4	4	3	3	4	5	5	4	3
Industrial or commercial units	1	5	4	5	5	1	3	3	4	5	5	5	4	4	4	5	5	5	5	5	1	1
Road and rail networks	2	4	4	1	4	3	0	0	1	0	0	0	0	0	0	2	0	4	0	1	2	0
Road and rail networks	2	4	4	1	4	3	0	0	1	0	0	0	0	0	0	0	2	0	4	0	1	2
Port areas	2	3	5	2	2	4	0	3	1	2	2	2	2	2	1	5	2	5	1	3	2	1
Airports	2	5	1	1	4	1	1	2	0	2	2	0	1	1	1	1	0	5	1	3	1	0
Mineral extraction sites	0	0	2	4	0	4	0	0	0	0	0	0	0	0	0	2	0	3	0	2	0	0
Dump sites	2	2	0	2	3	0	0	2	0	0	0	0	0	0	0	0	0	1	0	2	0	0
Construction sites	2	0	2	0	1	2	2	2	0	0	0	0	0	0	0	0	4	0	4	0	2	0
Green urban areas	2	0	0	1	1	0	0	0	2	1	1	0	0	0	0	0	0	1	0	2	4	1
Sport and leisure facilities	2	0	0	2	3	0	0	1	0	2	2	1	2	2	2	1	1	3	3	3	3	0
Non-irrigated arable land	2	2	2	0	1	2	3	0	3	1	0	0	0	0	0	0	0	1	1	0	0	0
Permanently irrigated land	2	2	2	2	5	1	2	3	5	3	1	0	0	0	0	0	0	2	1	5	0	0
Ricefields	3	4	5	5	1	5	3	5	1	1	0	0	0	0	0	0	0	2	1	5	0	0
Vineyards	5	2	0	3	1	5	3	4	2	1	0	0	0	0	0	0	1	0	2	2	4	0
Fruit trees	2	1	0	3	1	1	3	2	5	1	0	0	0	0	0	0	1	0	2	2	3	0
Olive groves	2	1	0	1	1	0	2	2	2	1	0	0	0	0	0	0	0	1	2	1	0	0
Pastures	1	3	1	0	0	0	1	2	0	0	1	3	0	0	0	1	0	1	1	2	0	0
Annual arable land	1	1	1	1	1	1	5	2	2	1	0	0	0	0	0	0	0	2	1	1	0	0
Complex cultivation patterns	1	1	1	1	1	1	5	2	3	1	0	0	0	0	0	0	0	2	1	1	0	0
Agriculture & natural vegetation	1	2	0	1	1	1	3	2	2	1	0	0	0	0	0	0	0	2	1	2	0	0
Agro-forestry areas	1	1	0	1	1	0	3	2	2	1	0	0	0	0	0	0	0	1	1	2	0	0
Broad-leaved forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Coniferous forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Mixed forest	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Natural grasslands	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

scale for assessing demands:

- 0 = no relevant demand
- 1 = low relevant demand
- 2 = relevant demand
- 3 = medium relevant demand
- 4 = high relevant demand
- 5 = very high relevant demand

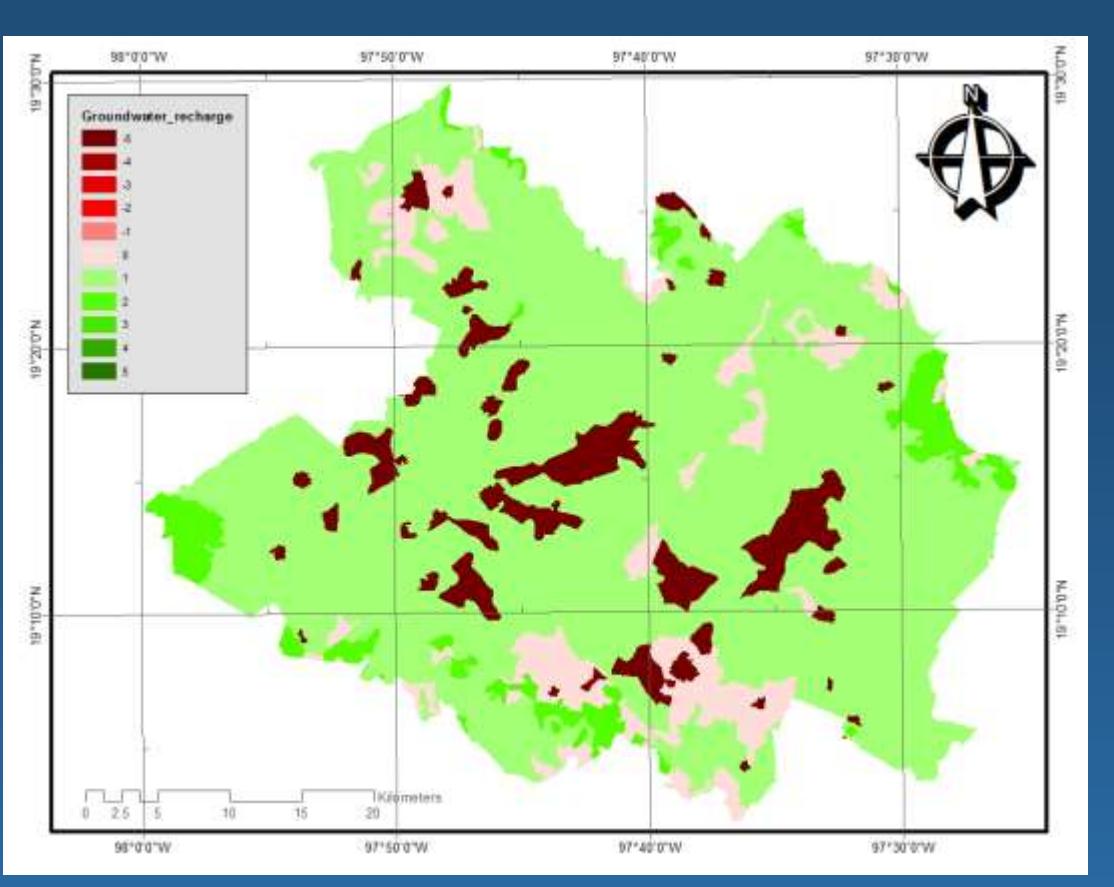
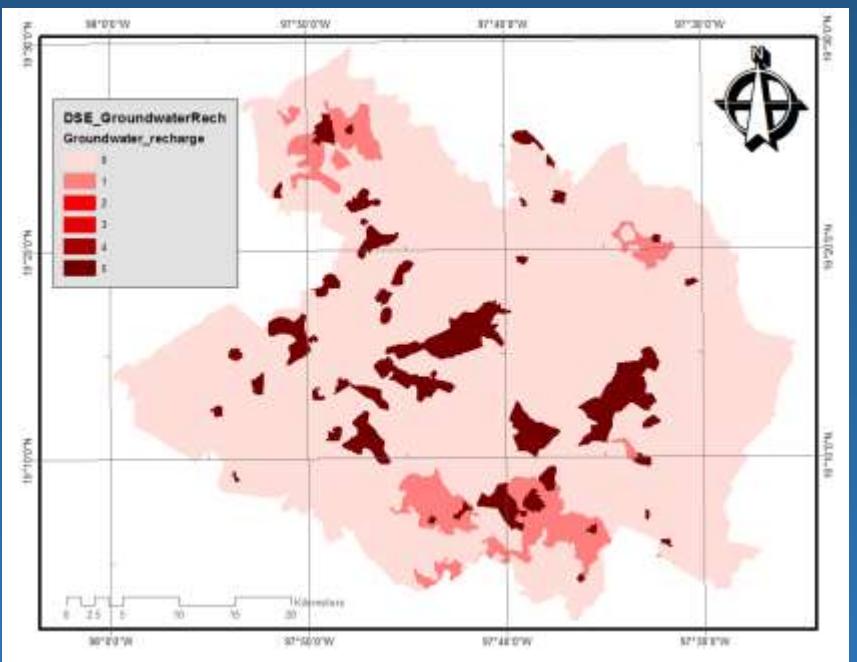
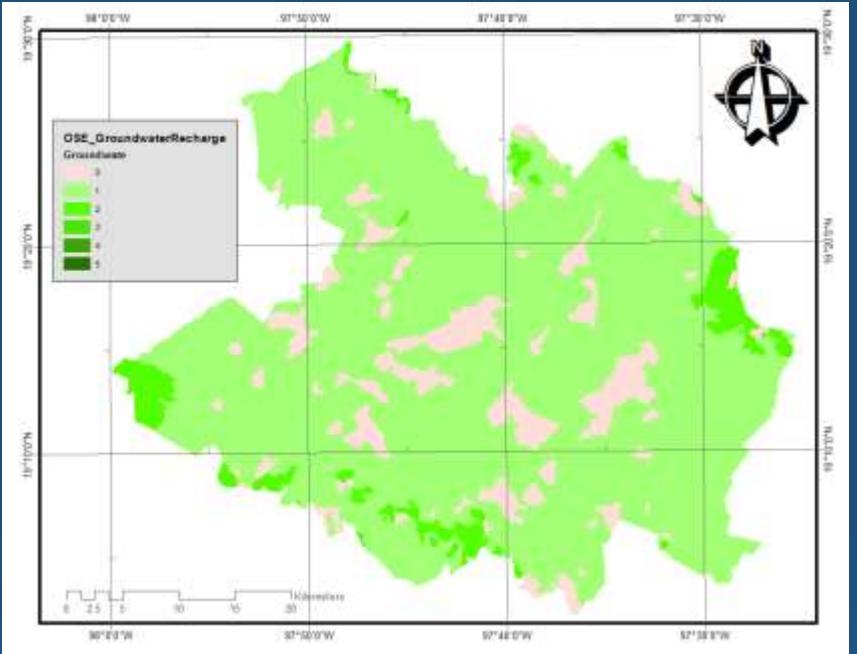
Burkhard, B., Kroll, F., Nedkov, S., & Müller, F. (2012). Mapping ecosystem service supply, demand and budgets. *Ecological Indicators*, 21, 17-29. doi:10.1016/j.ecolind.2011.06.019

The matrix assessment.

ES ASSESSMENT



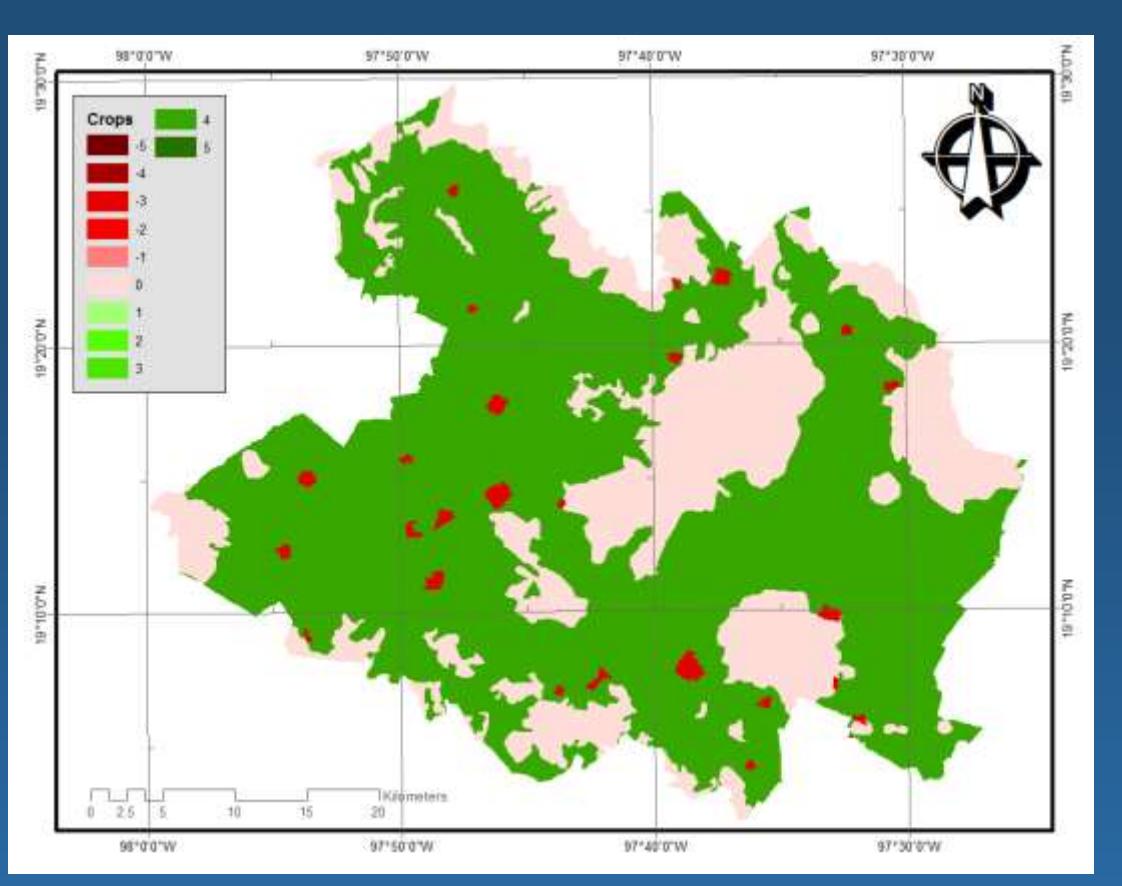
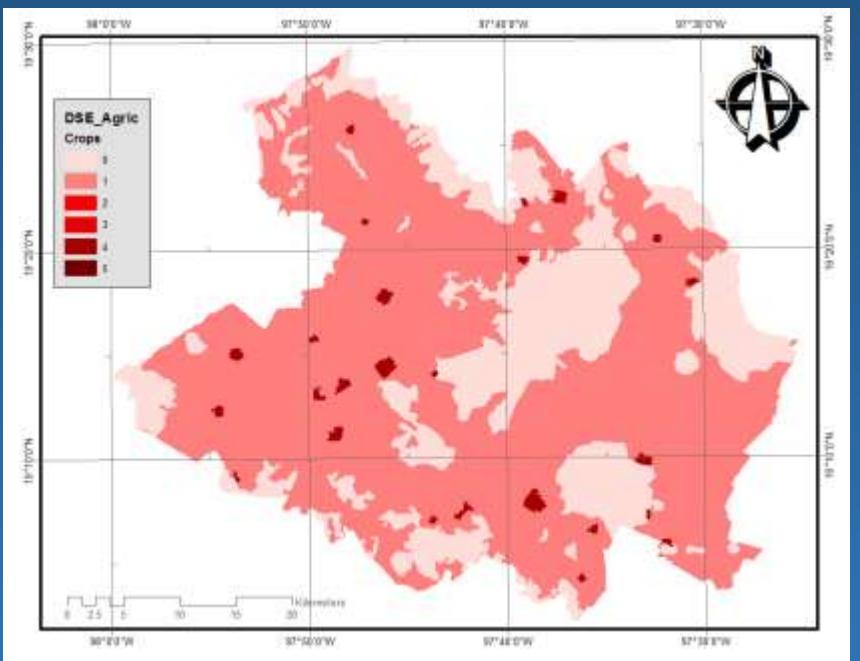
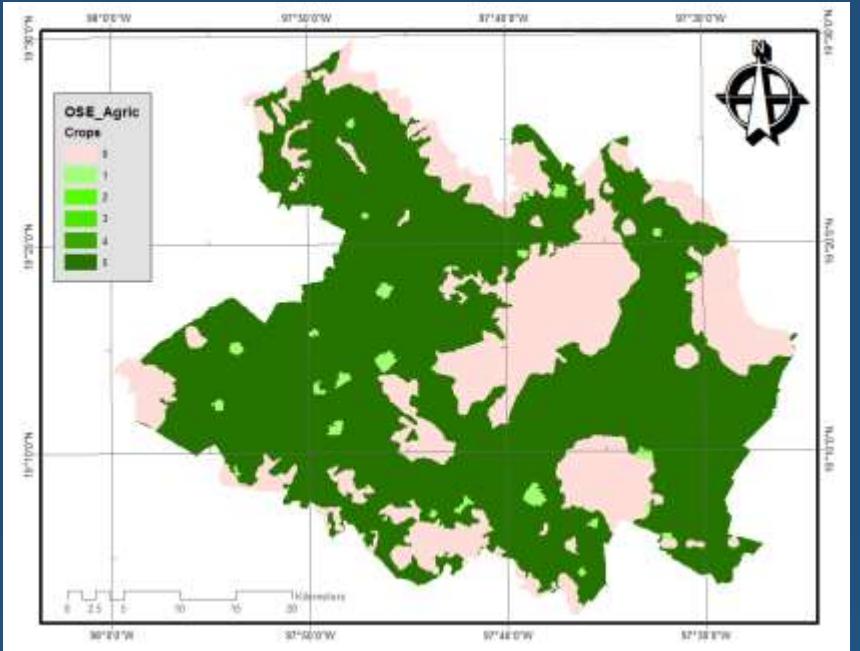
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Potential provision, demand, and budget of
Groundwater recharge. Sanchez-Porras (2016) based
on Burkhard et al. (2012), with information from INEGI (2014).

ES ASSESSMENT

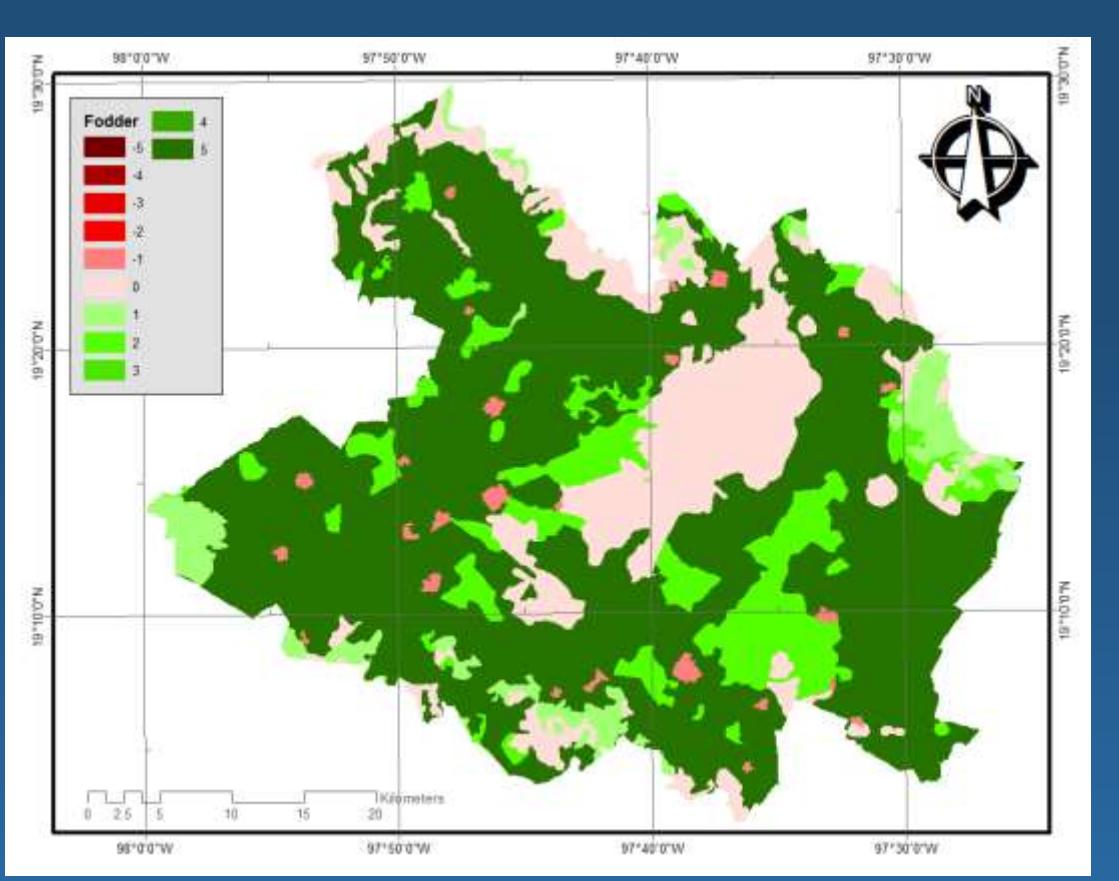
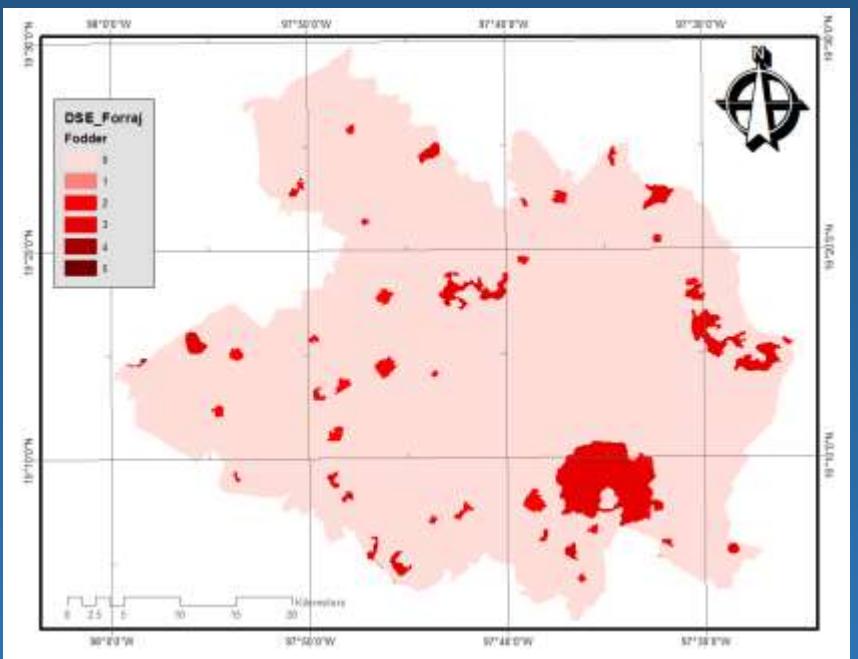
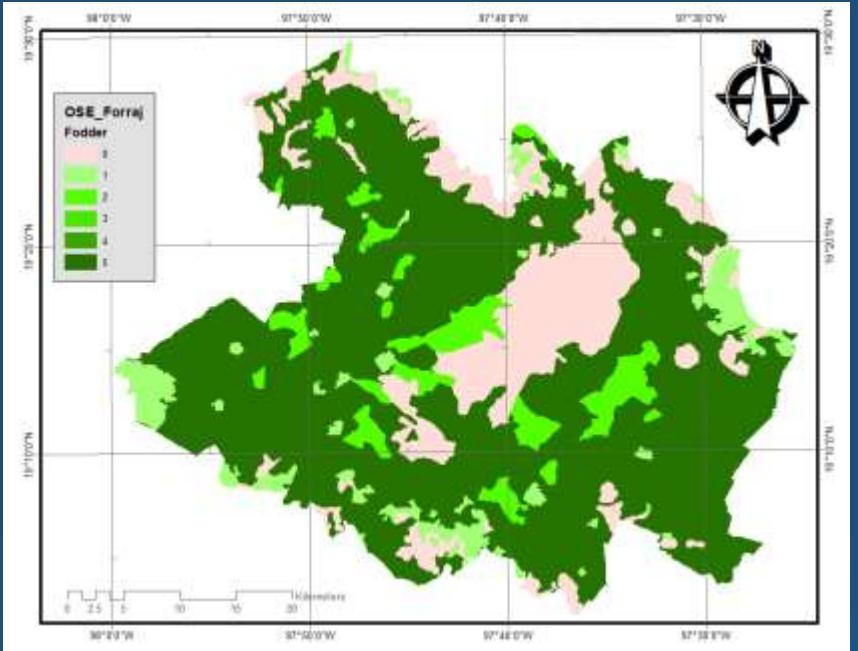
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Potential provision, demand, and budget of Crops. Sanchez-Porras (2016) based on Burkhard et al. (2012), with information from INEGI (2014).

ES ASSESSMENT

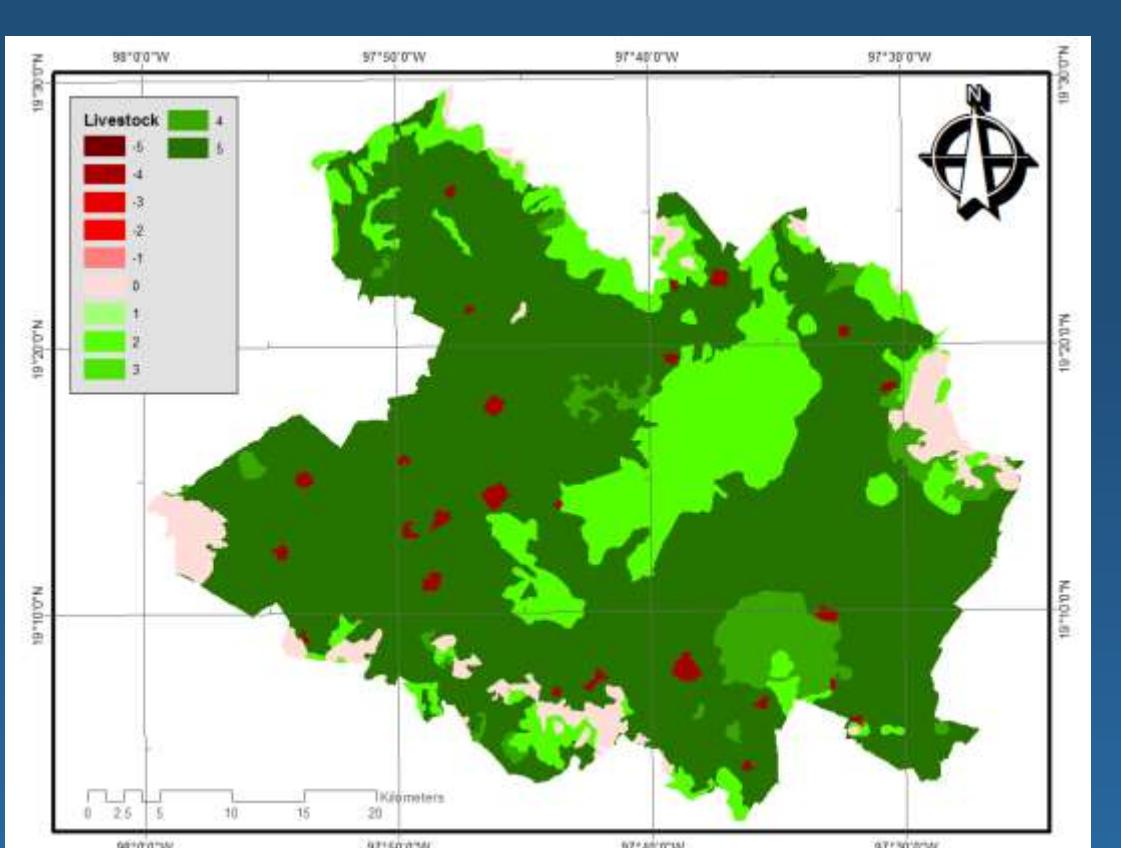
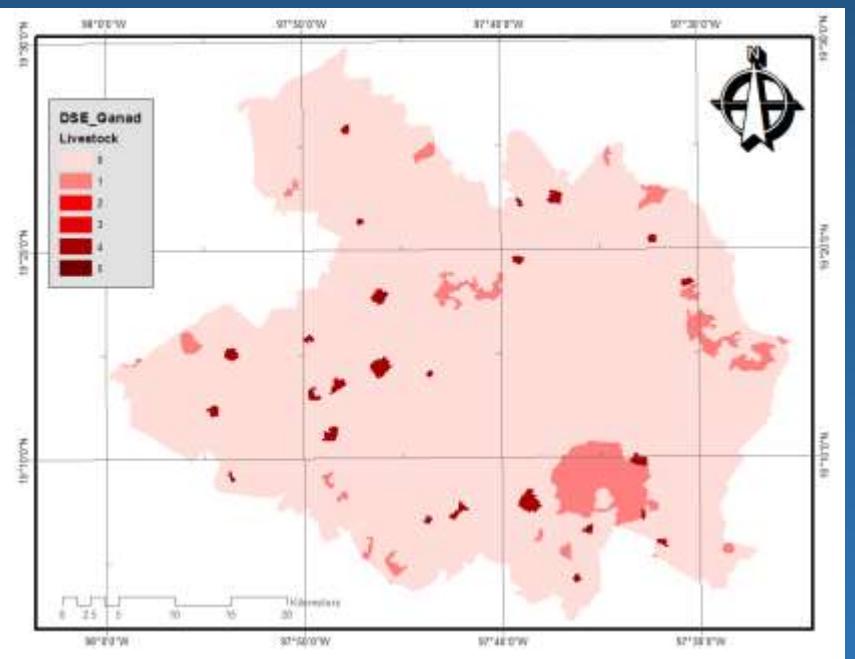
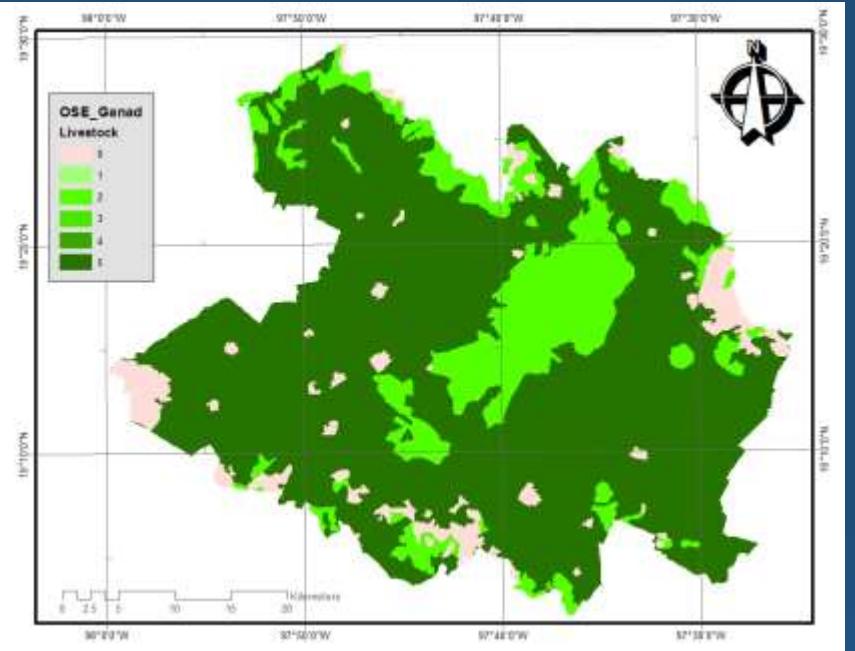
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Potential provision, demand, and budget of Fodder. Sanchez-Porras (2016) based on Burkhard et al. (2012), with information from INEGI (2014).

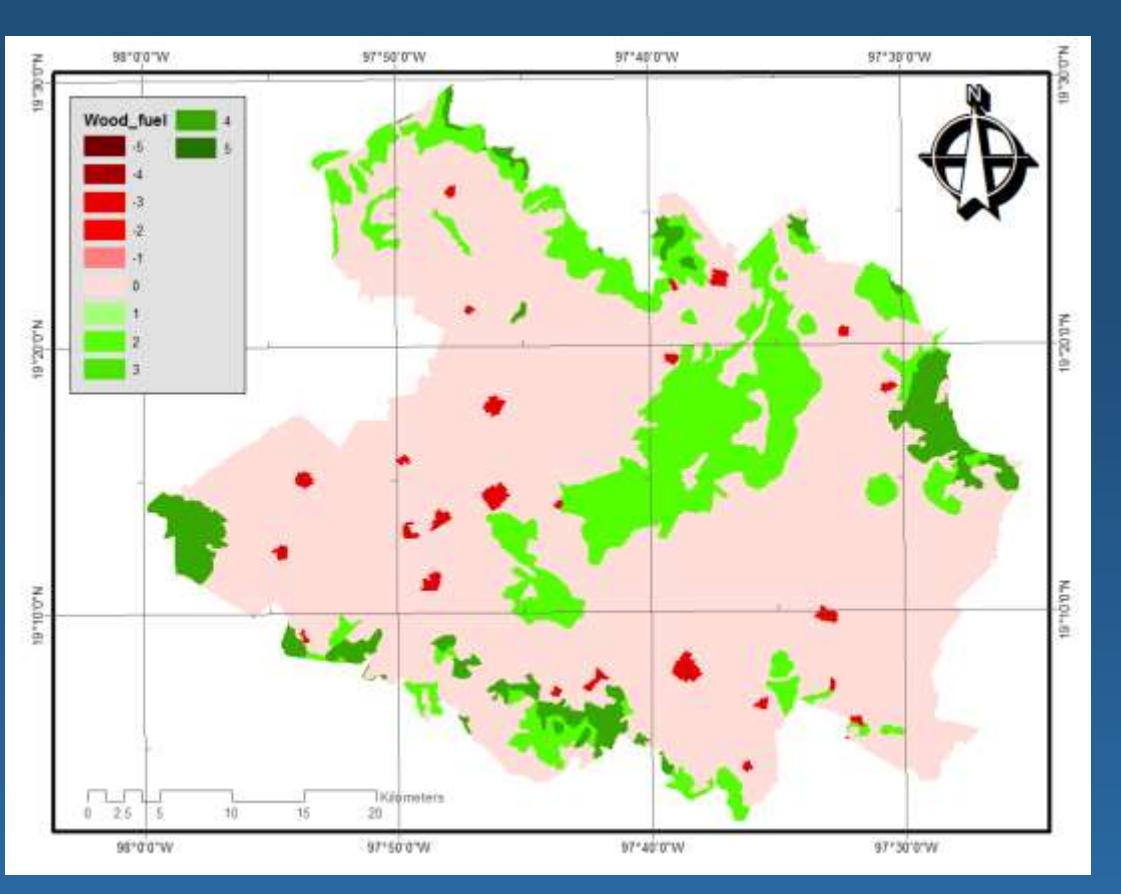
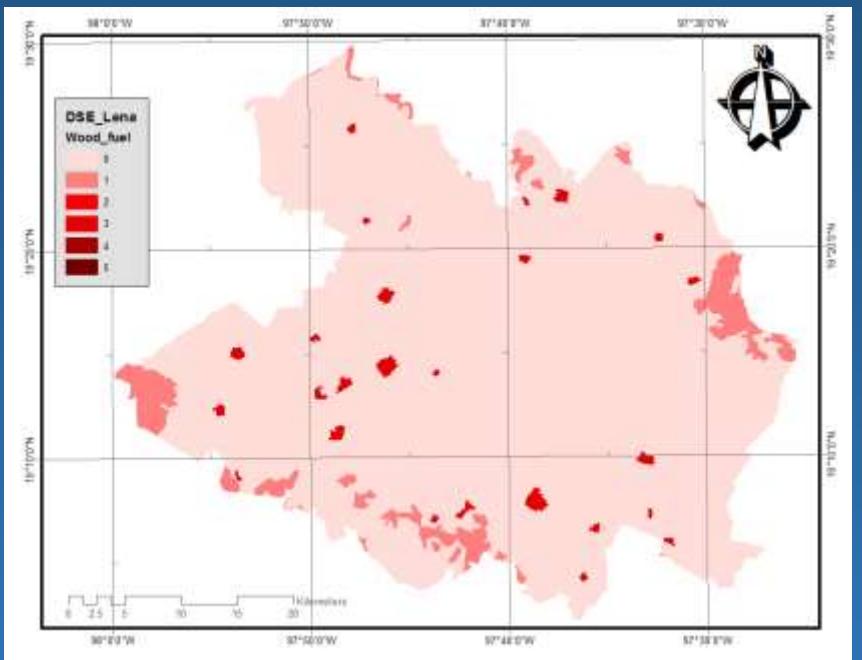
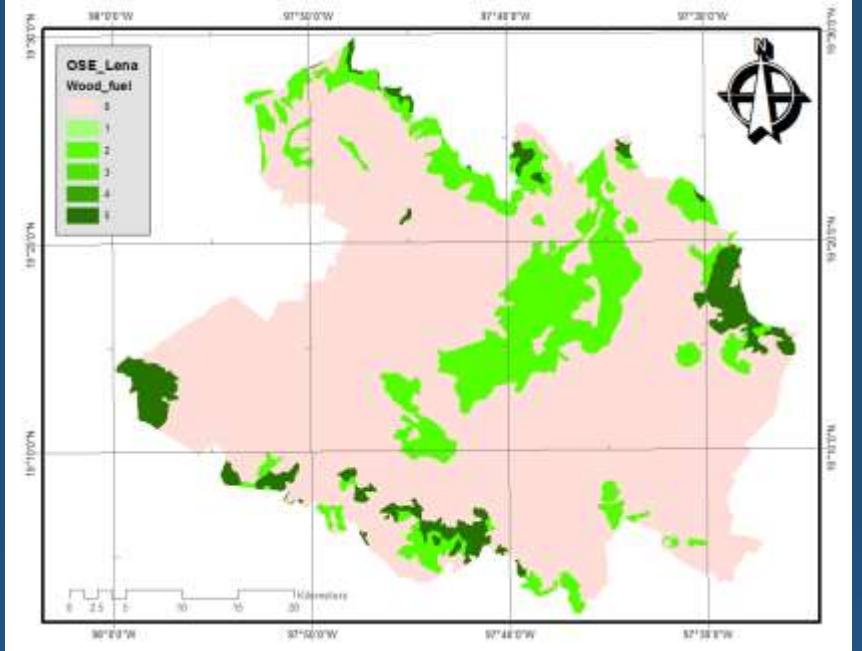
ES ASSESSMENT

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Potential provision, demand, and budget of
Livestock. Sanchez-Porras (2016) based on Burkhard et al.
(2012), with information from INEGI (2014).

ES ASSESSMENT



Potential provision, demand, and budget of Wood fuel. Sanchez-Porras (2016) based on Burkhard et al. (2012), with information from INEGI (2014).

POPULATION ASSESSMENT

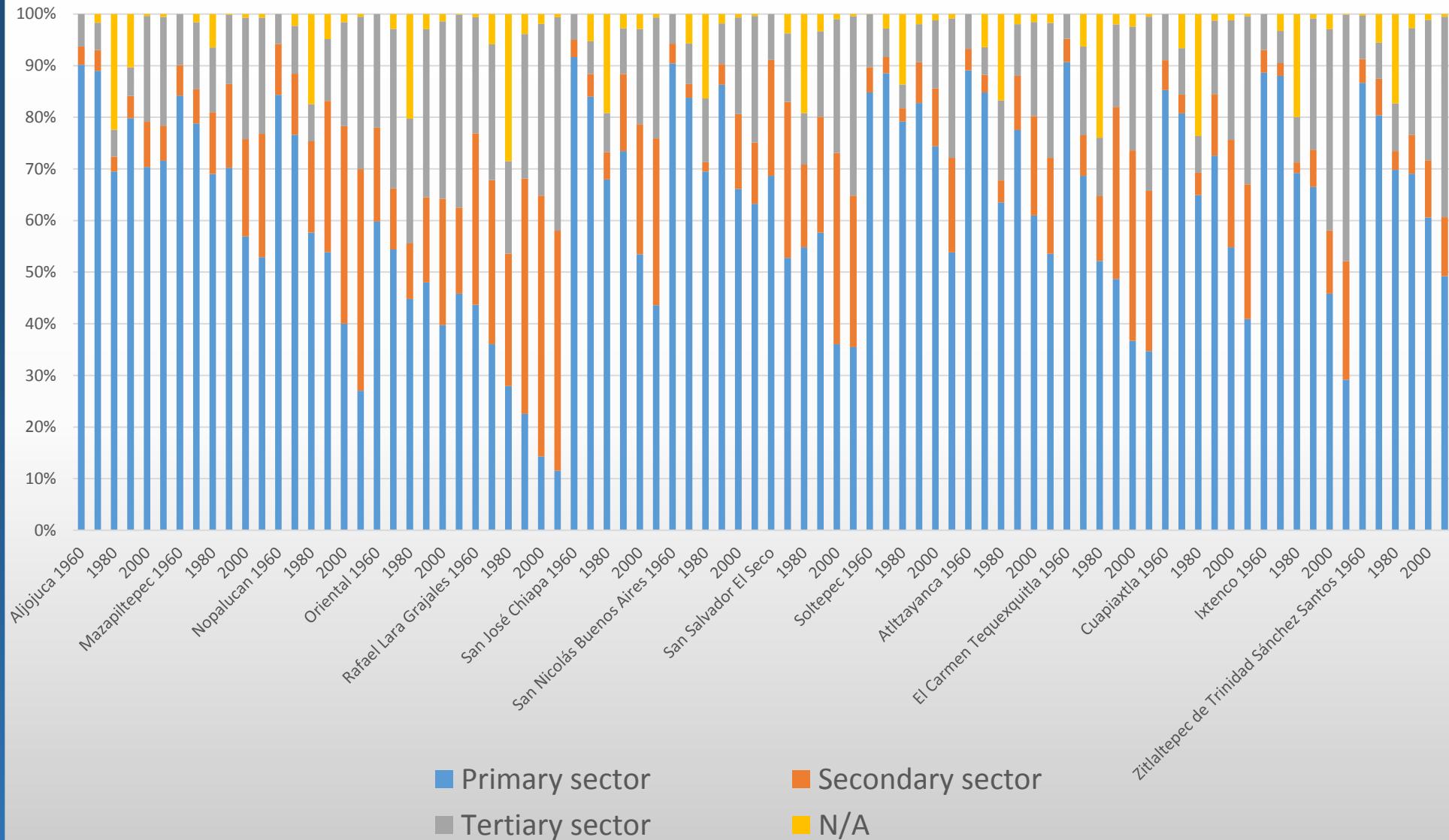


	1960	1970	1980	1990	2000	2010	2020	2030	2040	2050	Equation	R ²	Growth curve
Aljojuca	4904	5491	5989	6502	6632	6288	6771	6897	7009	7109	$y = 946.01\ln(x) + 4930.3$	R ² = 0.8978	
Mazapiltepec de Juárez	1782	1825	1919	2152	2396	2633	2738	2915	3092	3269	$y = 177.17x + 1497.7$	R ² = 0.9438	
Nopalucan	7528	9212	13635	13697	19033	27292	32533	41619	53242	68112	$y = 5801.7e^{0.2463x}$	R ² = 0.9661	
Oriental	6840	7944	10216	11590	13769	16575	17908	19838	21767	23696	$y = 1929.3x + 4403.3$	R ² = 0.9838	
Rafael Lara Grajales	4575	6103	8240	11443	14766	14052	17521	19709	21897	24085	$y = 2187.9x + 2205.5$	R ² = 0.9432	
San José Chiapa	3157	3438	4494	5613	6744	8087	9941	12124	14786	18033	$y = 2477.4e^{0.1985x}$	R ² = 0.9893	
San Nicolás Buenos Aires	4155	4429	5977	7107	8334	9185	10331	11417	12502	13588	$y = 1085.6x + 2731.7$	R ² = 0.9822	
San Salvador el Seco	10434	12787	17660	20526	23342	27622	30775	34217	37659	41101	$y = 3442x + 6681.4$	R ² = 0.9927	
Soltepec	5925	6975	8606	10991	11068	11706	12193	12662	13076	13445	$y = 3510.3\ln(x) + 5362.7$	R ² = 0.9327	
Atltzayanca	6726	7846	9494	11819	13122	15935	19028	22636	26927	32032	$y = 5644.8e^{0.1736x}$	R ² = 0.9945	
El Carmen Tequexquitla	5113	5098	7785	9749	12412	15368	19683	25020	31803	40426	$y = 3671e^{0.2399x}$	R ² = 0.9683	
Cuapiaxtla	5405	4946	6747	8592	10964	13671	16220	19964	24573	30245	$y = 3789.9e^{0.2077x}$	R ² = 0.94	
Ixtenco	5655	5035	5980	5356	5840	6791	7525	8597	9884	11386	$y = 107.34x^2 - 537.92x + 6030.9$	R ² = 0.6759	
Zitlaltepec de Trinidad Sánchez Santos	4686	5576	6935	7847	7959	8224	8689	8975	9227	9453	$y = 2140.7\ln(x) + 4523.8$	R ² = 0.9654	

POPULATION ASSESSMENT



Composition of the employed population within economic activities 1960-2016





CONCLUSIONS

The expected quantity of people will make difficult for them to access natural resources and services.

The provision of Ecosystem Services is prone to fall down within years.

We need participatory **planning** options.

We need **planning** options at regional level.



We need planning, lots of planning.



FOLLOW UP
QUESTIONS

How will the fracture of the ecosystems' continuity will affect the provision of Ecosystem Services?

Water will become an issue in the near future so, where will the “Ciudad Modelo” take their water from?

THANK YOU!



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