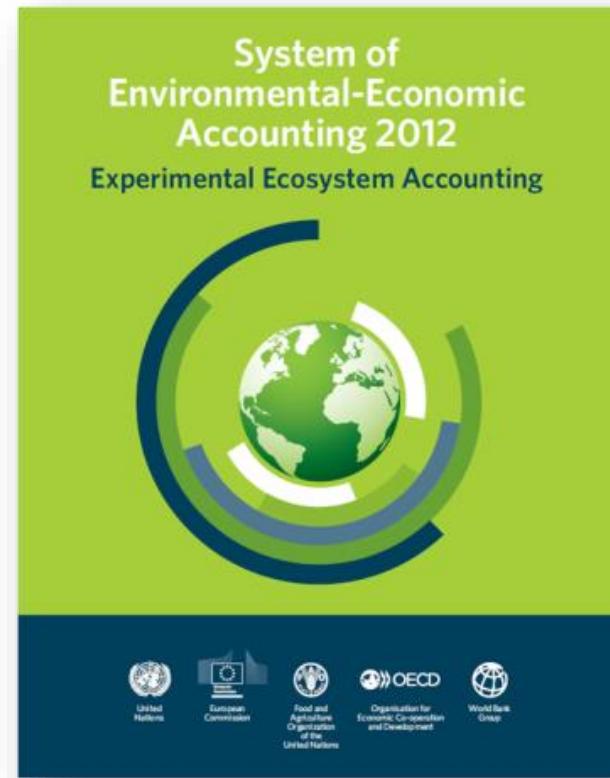


Experimental Ecosystem Accounting (SEEA-EEA) – Mexico

Pilot project



Background

UNSD has promoted an approach with INEGI in order to establish the first working scheme about **Experimental Ecosystem Accounting (SEEA-EEA)**, which measures the contribution of **ecosystem services** to the economy and other human activities.



Why Mexico?



SEMARNAT
SECRETARÍA DE MEDIO AMBIENTE
Y RECURSOS NATURALES



CONABIO
COMISIÓN NACIONAL PARA EL
CONOCIMIENTO Y USO DE LA BIODIVERSIDAD

CONANP
COMISIÓN NACIONAL
DE ÁREAS NATURALES
PROTEGIDAS

CONAGUA
COMISIÓN NACIONAL DEL AGUA

INECC
INSTITUTO NACIONAL
DE ECOLOGÍA
Y CAMBIO CLIMÁTICO

CONAFOR
COMISIÓN NACIONAL FORESTAL

cooperación alemana
DEUTSCHE ZUSAMMENARBEIT

Implementada por
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

BIOFIN
Biodiversity Finance Initiative

Aims of the mexican participation



To teste the application of SEEA-EEA

To collect experiences from Mexico and share it with other countries

Based on this, the Handbook will be updated



1st. Stage. 2014-2016.

Two missions from UNSD to Mexico

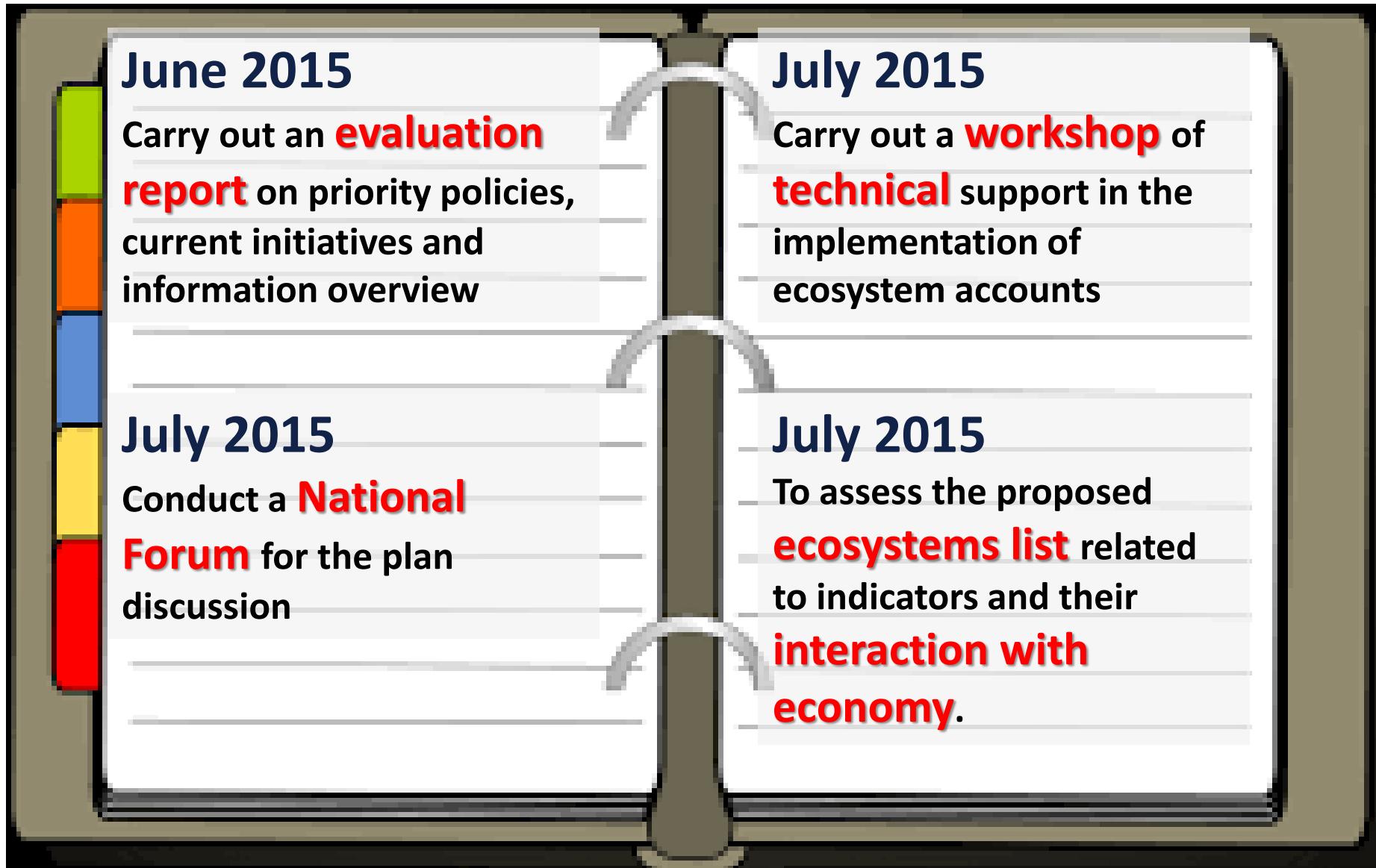
Setting a **National Plan, which is linked to ANCA Project**



2nd. Stage. 2017-2019.

Implementation of the accounts at countries

Main items at National Plan



Commitments

- Due to **National Plan**, and using **SEEA-EEA** as well as the **Tematicic Technical Guide** in developing:
 - ✓ **Ecosystem extensions accounts (land cover).**
 - ✓ **Condition accounts of ecosystem components:**
 - **land;**
 - **water;**
 - **biodiversity;**
 - **carbon.**
 - ✓ **Ecosystem services supply and use tables accounts (physical and monetary terms).**

Main objectives of SEEA-EEA



To measurement the ecosystem **assets**

Physical terms



To measurement the ecosystem **services**

Physical terms



To estimate the **economic value** of the ecosystem services



To incorporate the information to SNA

Generate economic and hybrid indicators

Accounts included into SEEA-EEA

EXTENTION ACCOUNT	CONDITION ACCOUNT				SUPPLY AND USE TABLES	ECONOMIC VALUATION
	Ecosystem components					
	Land	Water	Biodiversity	Carbon		
• Extension	• Erosion	• Water quality	• Species abundance	• Carbon in soil	• Supply and use tables	• Land
• Changes in land cover and land use	• Soil types	• Extraction	• Threatened species			• Water
		• Aquifer condition (over/sub exploitation)	•Genetic diversity			• Vegetation
						• Biodiversity
						• Carbon

NATIONAL PLAN: Detail of obtained results

PRIORITY ACCOUNTS



- Ecosystem assets
- Water accounts
- Supply and use table for food security and water

ECOSYSTEM ASSETS



Changes in land **cover** and land **use** tables

- 32 states

CASE STUDIES



- Human dependence on ecosystems

FEASIBILITY STUDIES



- Carbon accounts
- Condition accounts
- Extended supply and use tables

WATER ACCOUNTS



- Water quality
 - National and 11 municipalities of Aguascalientes
 - DBO, DQO and SST
- Extraction
 - 653 aquifers
 - Aquifers **condition** (over/sub exploitation)
 - 653 aquifers



SUPPLY AND USE TABLES

- Water accounts
 - National
 - Aguascalientes
 - 11 municipalities of Aguascalientes

NATIONAL PLAN: Detail of obtained results

PRIORITY ACCOUNTS

- Ecosystem assets
- Water accounts
- Supply and use table for food security and water



CASE STUDIES

- Human **dependence** on ecosystems



FEASIBILITY STUDIES

- Carbon accounts
- Condition accounts
- Extended supply and use tables



Human dependence of ecosystems



- SUT **Agriculture (Ha)**
 - Cultivated area, harvested, yield per hectare
- STATE AND MUNICIPALITIES:
Aguascalientes, Colima and Veracruz
- SUT **Raising (Ha)**
 - Cattle standing, meat, milk and wax
- SUT **Forestry (Ha)**

NATIONAL PLAN: Detail of obtained results

PRIORITY ACCOUNTS

- Ecosystem assets
- Water accounts
- Supply and use table for food security and water



CASE STUDIES

- Human dependence on ecosystems



FEASIBILITY STUDIES

- Carbon accounts
- Condition accounts
- Extended supply and use tables



Carbon accounts

- Carbon in soil
 - National
 - State and Municipal: Aguascalientes, Chihuahua and Yucatán



Condition account

- Soil: Erosion area and soil types
 - Aguascalientes, Colima, Veracruz and Yucatán
- Biodiversity: Abundance and threatened species
 - National



Extended supply and use tables

Changes in land cover matrix

- 32 States



NATIONAL PLAN: Detail of obtained results

PRIORITY ACCOUNTS



- Ecosystem **assets**
- **Water** accounts
- **Supply and use** table for food security and water

CASE STUDIES



- Human **dependence** on ecosystems

FEASIBILITY STUDIES



- **Carbon** accounts
- **Condition** accounts
- **Extended supply and use** tables

“...The construction of both human resources and statistical infrastructure should occurred in first 2 years, with pilot accounts produced in 3 years.”

National Plan, page 36

NATIONAL PLAN: Detail of obtained results

PRIORITY ACCOUNTS

- Ecosystem assets
- Water accounts
- Supply and use table for food security and water



CASE STUDIES

- Human dep



FEASIBILITY STUDIES

- Carbon accounts
- Condition accounts
- Extended supply and use tables



5 national technical meetings in 2015



6 national technical meetings
in 2016

Experiences in the application of SEEA-EEA

- ✓ The project is strengthened by using vector format (polygons).
- ✓ The use of homogenized cartography (Albers Equal Area ITRF92) allows the comparability in space and time.
- ✓ It is considered that the use of municipality as minimum unit of study is suitable than LCEU (Land Cover / Ecosystem Unit)
- ✓ A tutorial was written for development the extension accounts based on Digital Map of Mexico [“Mr. Pancho”](#)



Commitments of Mexico in the international agenda



- **Strategic Plan for Biodiversity
2011-2020**

“To incorporate the **biodiversity value** in national accounts”

- **Aichi Targets. (Target 2)**

“For 2020, as a deadline, the **biodiversity values** will has to been integrated into development planning strategies and processes (...) and will being integrated into **systems of national accounts**, as appropriate.”



Commitments of Mexico in the international agenda

- **Sustainable Development Goals and ecosystem accounting**

- Ensure the conservation, restoration and sustainable use of terrestrial ecosystems
- Promote sustainable management of all types of forest
- Combating desertification, rehabilitation degraded lands and soils
- Take urgent and significant measures to reduce natural habitats degradation
- ...



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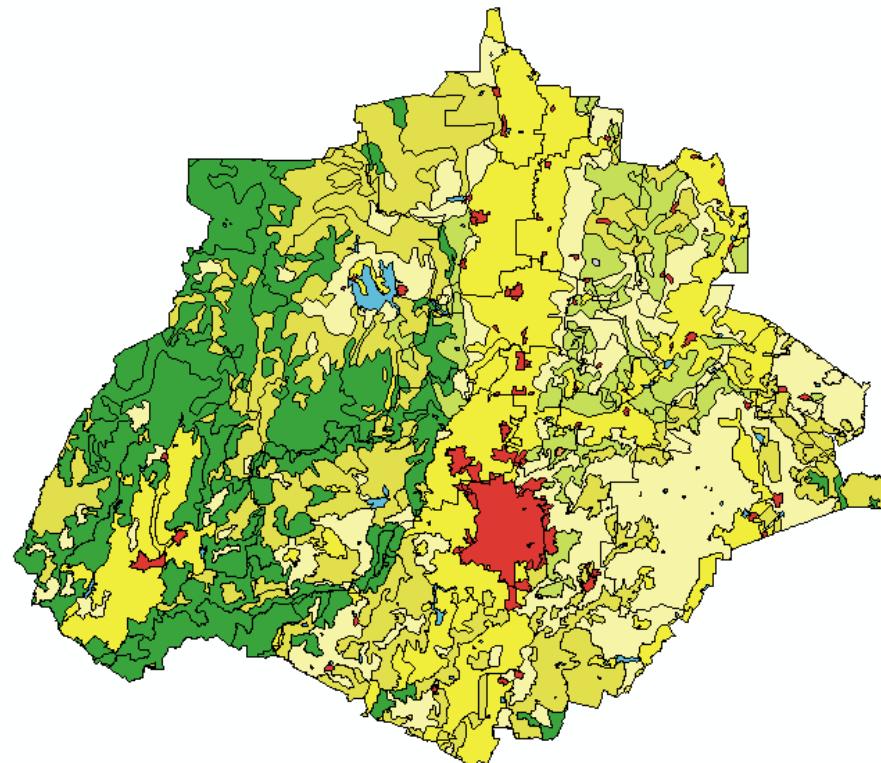
Mexico has the INEGI!



Ecosystem extension accounts: Example Aguascalientes

11 Municipalities
9 Types of land use and
vegetation

- █ Áreas urbanas y asociadas desarrolladas
- █ Pasturas y pastizales naturales
- █ Matorrales, zonas de arbustos, brezales
- █ Cultivos permanentes, plantaciones agrícolas
- █ Cuerpos de agua continentales
- █ Cobertura forestal
- █ Campos medianos a grandes, tierra de cultivo herbácea irrigada
- █ Campos medianos a grandes, tierra de cultivo herbácea alimentada por lluvia
- █ Tierra estéril





1.2 Area data by type of soil / ecosystem cover unit (SEEA-EEA classification): Example Aguascalientes (Municipality)

Clasificación SEEA	SERIE III	SERIE V
	Km ² por LCEU	Km ² por LCEU
Áreas urbanas y asociadas desarrolladas	80.2	119.48
Campos medianos a grandes, tierra de cultivo herbácea alimentada por lluvia	277.12	29.25
Campos medianos a grandes, tierra de cultivo herbácea irrigada	301.81	301.78
Cultivos permanentes, plantaciones agrícolas	0.76	0.76
Asociaciones y mosaicos agrícolas	0	0
Pasturas y pastizales naturales	380.44	323.21
Cobertura forestal	58.59	56.61
Matorrales, zonas de arbustos, brezales	72.13	68.66
Áreas con escasa vegetación	0	0
Mosaicos y asociaciones de vegetación natural	0	0
Tierra estéril	0	0
Nieve permanente y glaciares	0	0
Humedales abiertos	0	0
Cuerpos de agua continentales	7.05	8.35
Cuerpos de agua costera	0	0
Mar	0	0
Total	1,178.10	1,178.10

1.3. Tables of changes of use and land cover: Example

Aguascalientes (Municipality)

	Áreas urbanas y asociadas	Cultivos	Pastizales	Cobertura forestal	Matorrales	Tierra estéril	Cuerpos de agua cont.	Total
Stock de apertura de recursos (serie III)	80.2	579.69	380.44	58.59	72.13	0	7.05	1178.10
Adiciones a stock								
Expansión controlada	39.28	22.1						
Expansión natural								
Revaluación a la alta								
<i>Adiciones totales a stock</i>	39.28	22.1					1.3	
Reducciones en stock								
Regresión controlada								
Regresión natural								
Revaluación a la baja								
<i>Reducciones totales en stock</i>			57.23	1.98	3.47			
Stock de cierre de recursos (serie V)	119.48	601.79	323.21	56.61	68.66	0	8.35	1178.10

1.3 Tables of changes of use and land cover: Example

Aguascalientes

	Áreas urbanas y asociadas	Cultivos	Pastizales	Cobertura forestal	Matorrales	Tierra estéril	Cuerpos de agua cont.	Total
Stock de apertura de recursos (serie III)	80.2	579.69	380.44	58.59	72.13	0	7.05	1178.10
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<i>Adiciones totales a stock</i>	39.28	22.1					1.3	
Reducciones en stock								
Regresión controlada								
Regresión natural								
Revaluación a la baja								
<i>Reducciones totales en stock</i>			57.23	1.98	3.47			
Stock de cierre de recursos (serie V)	119.48	601.79	323.21	56.61	68.66	0	8.35	1178.10

1.4. Matrix of changes in land cover: Example

Campeche



Serie V \ Serie III	A	B	C	D	E	F	G	H	I	J	K	Total	USV3_SEEA (sin ajustes)	Ajustes a la medición de Serie III a Serie V	USV3_SEEA (ajustado)
													K	L	
Superficie sin cambio															
A	180.0	0.3	0.4	1.3	0.0	2.0	0.2	0.0	0.0	0.0	0.0	184.3	184.3		184.3
B	8.3	1,187.0	95.3	55.9	2.8	323.6	0.0	0.0	2.4	0.2	0.0	1,675.4	1,675.4		1,675.4
C	4.8	25.8	518.3	22.9	1.3	79.1	0.0	0.0	0.3	0.0	0.0	652.5	652.5		652.5
D	23.1	86.8	34.6	4,823.2	19.8	1,451.3	0.0	0.0	67.1	6.8	0.0	6,512.8	6,512.8	0.2	6,512.9
E	3.8	20.9	5.3	44.9	997.4	279.7	0.0	0.0	13.8	0.0	0.0	1,365.8	1,365.8		1,365.8
F	38.8	609.7	155.6	1,869.9	73.4	37,510.6	0.0	0.3	219.3	2.5	0.0	40,480.0	40,480.0	2.4	40,482.4
G	0.0	0.0	0.0	0.0	0.0	248.1	0.0	12.3	0.0	3.2	263.5	263.5		263.5	
H	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	0.0	0.0	2.4	2.4		2.4	
I	0.5	0.0	0.9	97.8	0.6	41.8	34.3	0.0	3,981.0	0.0	0.0	4,157.0	4,157.0		4,157.0
J	0.0	0.2	0.2	2.1	0.0	0.7	0.0	0.0	0.2	200.2	0.0	203.7	203.7		203.7
K	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.9	4.9	4.9	4.9		2,015.8
Total	259.5	1,930.6	810.5	6,918.1	1,095.4	39,688.8	282.6	2.7	4,296.3	209.7	8.1	55,502.3	55,502.3		
USV5_SEEA (sin ajustes)	259.5	1,930.6	810.5	6,918.1	1,095.4	39,688.8	282.6	2.7	4,296.3	209.7	2,019.0	57,513.2		Discrepancia de la información geográfica	
Ajustes a la medición de Serie III a Serie V	K													2,010.9	
	L				0.2	2.3									2.5
USV5_SEEA (ajustado)	259.5	1,930.6	810.5	6,918.1	1,095.6	39,691.2	282.6	2.7	4,296.3	209.7	2,019.0				57,515.7

A: Áreas urbanas y asociadas desarrolladas

B: Campos medianos a grandes, tierra de cultivo herbácea alimentada por lluvia

C: Campos medianos a grandes, tierra de cultivo herbácea irrigada

D: Cultivos permanentes, plantaciones agrícolas

E: Pasturas y pastizales naturales

F: Cobertura forestal

G: Áreas con escasa vegetación

H: Tierra estéril

I: Humedales abiertos

J: Cuerpos de agua continentales

K: Cuerpos de agua costera

L: País extranjero

Nota: La suma de los parciales puede no coincidir con los totales debido al redondeo de las cifras.

2.1.1 Area eroded by SEEA-EEA classification and types of erosion (Erosion): Example Aguascalientes (Municipality)



RESULTADOS ESTATALES	Extensión del ecosistema	UNIDADES DE EROSIÓN DEL SUELO (%)*														SUELLO ESTABLE (km ²)	UNIDADES GEOMORFOLÓGICAS (%)	UNIDADES COMPLEMENTARIAS (%)				Total (%)		
Tipos de LCEU**	Área Km ²	HÍDRICA LAMINAR				HÍDRICA SURCOS				HÍDRICA CÁRCAVAS				EÓLICA			ANTRÓPICA			AH	H2O	ISLAS	ZU	
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3								
Tierra de cultivo de temporal	299.25	4.95	3.10	7.32		0.84	0.79	0.61		10.98							0.06	66.45	3.57	1.30	0.00		0.01	100.00
Tierra de cultivo irrigada	301.78	8.92	4.70	6.53		0.18	0.01	0.16		3.16	0.51	0.22					0.04	65.78	7.47	2.27	0.00		0.05	100.00
Cultivos permanentes	0.76					4.03											95.97							100.00
Pasturas y pastizales naturales	323.21	16.51	14.54	20.76	0.18	0.05	1.10	1.48		20.72							0.32	21.28	2.81	0.23	0.00		0.00	100.00
Cobertura forestal	56.61	1.30	17.26	2.40			1.30	0.22		65.86							11.07	0.60						100.00
Matorrales, zonas de arbustos, brezales	68.66	23.29	25.60			0.94											49.32	0.14	0.69	0.00			0.02	100.00
Tierra Estéril	0.00																							
Total	1,050.27	10.65	9.31	10.48	0.06	0.37	0.64	0.69		13.96	0.15	0.06					0.13	48.27	4.07	1.14	0.00		0.02	100.00

2.1.2 Types of soil by classification SEEA-EEA: Example

Aguascalientes (Municipality)



Tipos de LCEU**	Extensión del ecosistema	TIPOS DE SUELO *										TOTAL
		Área Km2	CL	CM	DU	FL	KS	LP	LV	PH	PL	
Tierra de cultivo de temporal	299.25	0.00	0.36	22.69	1.25	0.04	1.26	0.00	62.25	1.23	10.93	100.00
Tierra de cultivo irrigada	301.78	0.11	0.49	5.75	0.62	1.85	0.95	0.00	78.54	7.07	4.63	100.00
Cultivos permanentes	0.76	0.00	0.00	0.00	0.00	0.00	0.00	0.00	100.00	0.00	0.00	100.00
Pasturas y pastizales naturales	323.21	0.00	0.00	3.34	0.85	0.00	4.75	0.00	81.60	0.02	9.44	100.00
Cobertura forestal	56.61	0.00	0.51	2.05	0.00	0.00	42.59	0.00	48.88	0.00	5.97	100.00
Matorrales, zonas de arbustos, brezales	68.66	0.80	0.00	0.00	0.00	25.13	0.26	0.00	73.72	0.00	0.09	100.00
Discrepancia***	0.04	0.02	0.39	19.09	1.12	0.42	1.19	0.00	65.70	2.47	9.59	100.00
Total	1,050.31	0.08	0.27	9.26	0.80	2.18	4.41	0.00	72.94	2.39	7.68	100.00

2.2.2-4. Water quality (surface) extracted by BOD5, COD and TSS



2011					
Indicador	AGUA SUPERFICIAL				
	(Distribución porcentual de sitios de monitoreo por indicador de calidad del agua)				
	Excelente	Buena	Aceptable	Contaminada	Fuertemente contaminada
DBO ₅	--	--	71.40%	28.60%	--
DQO	--	--	--	100%	--
SST	--	--	--	100%	--
2014					
Indicador	AGUA SUPERFICIAL				
	(Distribución porcentual de sitios de monitoreo por indicador de calidad del agua)				
	Excelente	Buena	Aceptable	Contaminada	Fuertemente contaminada
DBO ₅	--	--	83.30%	16.70%	--
DQO	--	--	--	91.70%	8.30%
SST	--	--	--	91.70%	8.30%

2.2.1. Data extraction of groundwater and surface water by municipality: Example Aguascalientes (municipality)



AGUASCALIENTES (extracción)	Aprovechamientos subterráneos		Aprovechamientos superficiales	
	2011 (m ³)	2014 (m ³)	2011 (m ³)	2014 (m ³)
TOTAL	178,683,173	180,301,278	36,836,524	36,657,687
Número de aprovechamientos	1,257	1,301	313	315



2.5 Aquifer status (Exploited over / under)

Condición del agua subterránea. Aguascalientes (2014)

Acuífero	Área (km ²)	Extracción (hm ³)	Recarga (hm ³)	Relación Extracción / Recarga	Condición Geohidrológica
Venadero	111	2	2	1.11	Sobreexplotado
Valle de Chicalote	725	48	35	1.37	Sobreexplotado
Valle de Calvillo	1,048	40	25	1.60	Sobreexplotado
Valle de Aguascalientes	3,129	430	235	1.83	Sobreexplotado
El Llano	555	24	15	1.60	Sobreexplotado

2.4.1. Abundance of species: Example Aguascalientes (State)



ESPECIE	NOMBRE COMÚN	ABUNDANCIA				ZONA
		RARA	POCO COMÚN	COMÚN	ABUNDANTE	
<i>Didelphis virginiana</i>	Tlacuache o zarigüeya				X	TODAS
<i>Cryptotis parva</i>	Musaraña	X				FRÍA
<i>Notiosorex crawfordi</i>	Musaraña	X				FRÍA
<i>Sorex saussurei</i>	Musaraña	X				FRÍA
<i>Dasypus novemcinctus</i>	Armadillo	X				MUE, VAG, SAB
<i>Balantiopteryx plicata</i>	Murciélagos sacóptero		X			VAG
<i>Mormoops megalophylla</i>	Murciélagos bigotudo de cara plegada		X			HUA, CAL
<i>Desmodus rotundus</i>	Murciélagos vampiro			X		FRÍA, PINA, MONT LAU, HUA
<i>Choeronycteris mexicana</i>	Murciélagos nectarívoros	X				VAG, HUA
<i>Glossophaga soricina</i>	Murciélagos siroco		X			VAG
<i>Leptonycteris curasoae</i>	Murciélagos nectarívoros		X			PINA, LAU, HUA



2.4.2. Endangered Species(NOM-059):

Example Aguascalientes (State)

Taxa	Familia	Género	Especie	Nombre común	NOM-059	Endémica	Criterios
Anfibios	Plethodontidae	Pseudoeurycea	bellii	Tlaconete pinto	A	Sí	2
Anfibios	Hylidae	Smilisca	dentata	Rana de madriguera	A	Sí	1,2
Reptiles	Kinosternidae	Kinosternon	hirtipes	Tortuga casquito	Pr	No	2
Aves	Accipitridae	Aquila	chrysaetos	Águila real	A	No	1,2,3,4
Aves	Anatidae	Anas	platyrhynchos diazi	Pato mexicano	A	Sí	2,3
Aves	Psittacidae	Ara	militaris	Guacamaya verde	P	No	1,2,3,4
Aves	Falconidae	Falco	mexicanus	Halcón mexicano	A	No	2
Aves	Strigidae	Strix	occidentalis	Búho moteado	A	No	2



2.3.1.1. Carbon in soils: Aguascalientes (Municipality)

AGUASCALENTES	Serie III*		Serie V**	
	Extensión del ecosistema	BIOCARBONO (toneladas)	Extensión del ecosistema	BIOCARBONO (toneladas)
Tipos de LCEU	Área Km ²	Suelo	Área Km ²	Suelo
Áreas urbanas y asociadas desarrolladas	80.20	0.00	119.48	0.00
Tierra de cultivo de temporal	277.12	836,569.18	299.25	903,357.96
Tierra de cultivo irrigada	301.81	793,847.45	301.78	794,495.21
Cultivos permanentes	0.76	2,783.17	0.76	2,783.13
Pasturas y pastizales naturales	380.44	931,519.94	323.21	784,194.32
Cobertura forestal	58.59	179,863.55	56.61	173,982.52
Matorrales, zonas de arbustos, brezales	72.13	179,102.12	68.66	169,979.79
Tierra estéril				
Total	1,171.05	2,923,685.42	1169.75	2,828,792.93

Hybrid supply and use tables: Example municipality El Llano

Cuadro híbrido de Producción Agrícola en el Municipio El Llano. 2011.

Producto	Superficie sembrada (Ha)	Superficie cosechada (Ha)	Producción (Ton)	Rendimiento (Ton/Ha)	Producción (Miles de pesos)	Consumo intermedio (Miles de pesos)	Valor agregado bruto (Miles de pesos)
Agave	93	25	175	7	754	275	479
Alfalfa Verde	213	213	20,661	97	16,546	6,036	10,510
Avena Forrajera	673	143	3,319	23	1,267	462	805
Cebolla	4	4	80	20	259	94	164
Chile Verde	36	36	510	14	3,291	1,201	2,090
Frijol	3,145	30	63	2	855	312	543
Maíz Forrajero	9,597	277	16,305	59	10,169	3,710	6,459
Maíz Grano	7,302	208	1,414	7	4,602	1,679	2,923
Manzana	5	5	27	5	160	58	102
Nopal Forrajero	93	89	2,225	25	480	175	305
Nuez	2	2	3	1	102	37	65
Pastos	964	769	4,220	5	1,294	472	822
Tomate Verde	5	5	95	19	512	187	325
Tuna	58	58	104	2	225	82	143
Uva	96	93	751	8	4,859	1,773	3,086
Total	22,286	1,957	49,953	26	45,375	16,554	28,822

Hybrid supply and use tables :

Example municipality El Llano



Cuadro híbrido de Producción Agrícola en el Municipio El Llano. 2014.

Producto	Superficie sembrada (Ha)	Superficie cosechada (Ha)	Producción (Ton)	Rendimiento (Ton/Ha)	Producción (Miles de pesos)	Consumo intermedio (Miles de pesos)	Valor agregado bruto (Miles de pesos)
Agave					0	0	0
Alfalfa Verde	336	336	29,504	88	19,172	7,132	12,040
Avena Forrajera	200	200	4,956	25	2,337	870	1,468
Cebolla					0	0	0
Chile Verde	1	1	8	8	49	18	31
Frijol	2,436	2,421	925	0	4,969	1,849	3,120
Maiz Forrajero	10,427	10,427	103,787	10	62,430	23,225	39,205
Maiz Grano	8,775	8,745	6,696	1	19,197	7,142	12,056
Manzana	2	2	12	6	48	18	30
Nopal Forrajero	88	88	2,804	32	1,002	373	629
Nuez	2	2	3	2	104	39	66
Pastos	761	716	5,376	8	2,593	965	1,629
Tomate Verde					0	0	0
Tuna	32	32	102	3	296	110	186
Uva	91	87	1,226	14	4,766	1,773	2,993
Total	23,151	23,057	155,400	7	116,963	43,511	73,451