IAEG-SDGs
Inter-agency Expert Group on SDG Indicators

Working Group on Geospatial Information

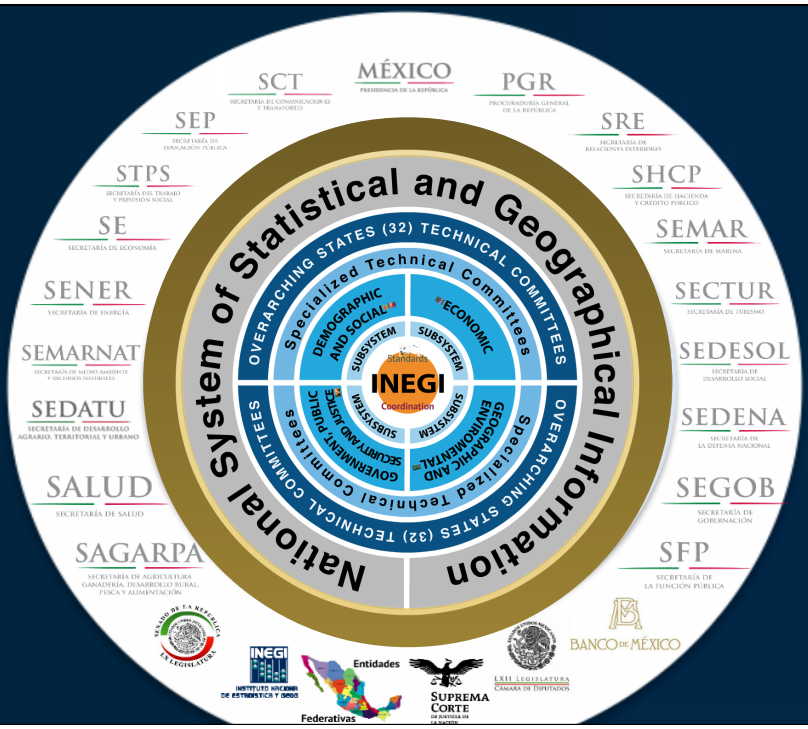
First Expert Meeting
WGGI-IAEG-SDGs
Mexico City, 12-14 December 2016

Mexico's approach to the SDG Indicators

A work in progress

José Luis Ornelas — Eduardo de la Torre
INEGI –México

National System of Statistical and Geographical Information (SNIEG)



National Information Subsystems

Specialized Technical Committees

Demographic and Social
12 Specialized Technical Committees

- Sustainable Development Goals
- Population and Dynamics

Geographic and Environmental
8 Specialized Technical Committees

- Climate Change
- Energy

SNIEG

- Federal Public Administration
- Supreme Court
- States and Municipalities
- Congress
- Central Bank
- Other autonomous bodies

Economic
11 Specialized Technical Committees

- National Accounts
- Tourism

Government, Public Security & Justice
6 Specialized Technical Committees

- Government
- Justice

National lessons learned from monitoring the Millennium Development Goals

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Technical Committee on MDG (now SDG) Indicators

President of the Committee

MÉXICO

Technical Secretary

INEGI

Rapporteur

CONAPO

Members

SALUD | SEP | SEMARNAT | INEGI

SRE | Instituto Nacional de las Mujeres | SEDESOL | STPS

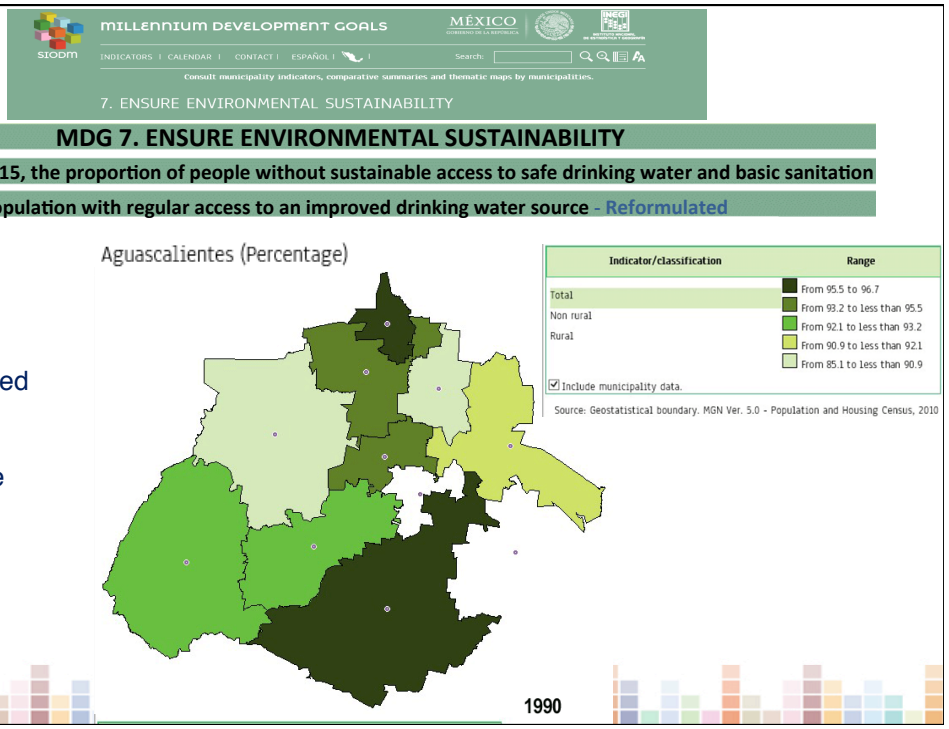
SEDATU | CONAPO | ift Instituto Federal de Telecomunicaciones | CONEVAL

AMEXCID | SHCP | SAGARPA | SENER

SCT | SEGOB | SE

Invited Institutions

CONACYT | imjuve | PNUD



Example of geo-referenced data showing progress for MDG indicator 7.8 by municipality, over time

Geographical coverage of the MDGs indicators

Total	National	By State	By State and Municipality	Urban and rural
80	**26**	**52**	**17**	**7**

UN agreed MDG indicators: 48

National adjustments

Beyond the MDGs: 22
Reformulated: 10

TOTAL FOR MEXICO: 80

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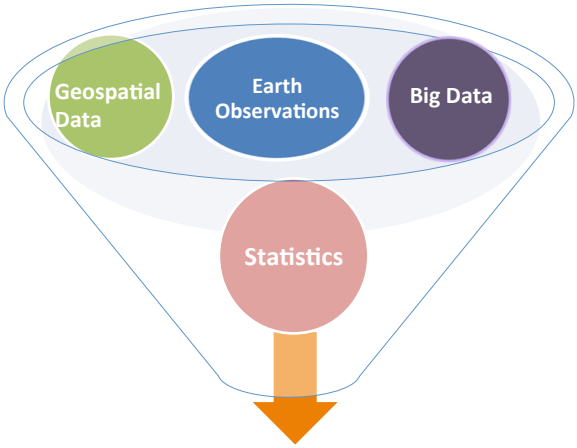
Integration of various sources of information in support of official statistics and the monitoring of global goals



Official Statistics — Policy-making — SDG monitoring

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GEO-STATISTICAL INTEGRATION to MONITOR NATIONAL PRIORITIES & SDGs			
Satellite Imagery	**Other sources**	**National Uses**	**SDG / other applications**
High resolution (2.5 m) **SPOT** **ERMEX** Very high resolution (0.5 m) **GEOEYE** **EVISMAR**	**Population Census** **National Housing Inventory** **Economic Census** **Technical Standard on addresses** **COA-Web** ***In situ* validation**	**Geo-statistical framework** **Updating of:** Topographic charts **Visualization of:** Population, Economic, Housing, Gender, Health, Education & public services Urban & rural development Water and sanitation Infrastructure GHG emissions/hzd waste	**1. No poverty** **2. Zero hunger** **3. Health and well-being** **4. Quality education** **5. Gender equality** **6. Water and sanitation** **7. Affordable & clean energy** **8. Decent work & economic growth** **9. Industry & infrastructure** **10. Reduced Inequalities** **11. Sustainable cities & communities** **12. Life on land**
Medium resolution (5-30m) **RAPIDEYE** **LANDSAT**	**Natural resources & topographic charts** **Forestry & water data** ***In situ* validation**	**Land Use & Vegetation map series** Deforestation, land use changes **Monitoring crops**	**2. Zero hunger** **16. Clean water and sanitation** **13. Climate action** **14. Life below water** **15. Life on land**
Low resolution (250 m) **MODIS**	**Topographic maps** **Land use & vegetation**	**Disaster monitoring** Fires, large flooding	**Sendai Framework** **Climate action**
Radar **RADARSAT**		**Disaster monitoring** Flooding, digital models in foggy areas	**Sendai Framework** **Climate action**

Examples of disaggregated Geospatial data that can be used to build and complement indicators

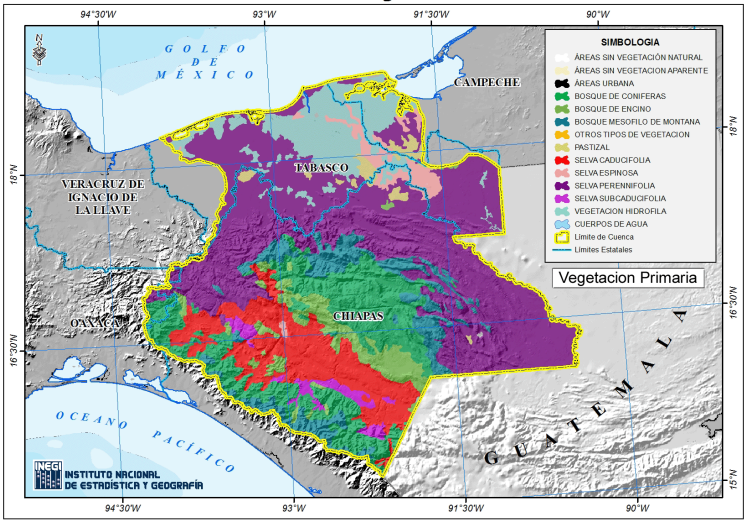
SDG 15. Life on land
Target 2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

Indicator 15.1.2 Forest area as a percentage of total land area
Indicator 15.2.1 Progress towards sustainable forest management

Tier I

Use of INEGI's
Land Use and Vegetation
Map Series
In the Digital Map of Mexico
(various scales available)

Cuenca Grijalva-Usumacinta



SDG 15. Life on land
Target 2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally
Indicator 15.2.2 Net permanent forest loss

Tier I

Changes in tropical broadleaf evergreen forest can be estimated

Marqués de Comillas, Chiapas
Satellite images (from 2006 and 2013).

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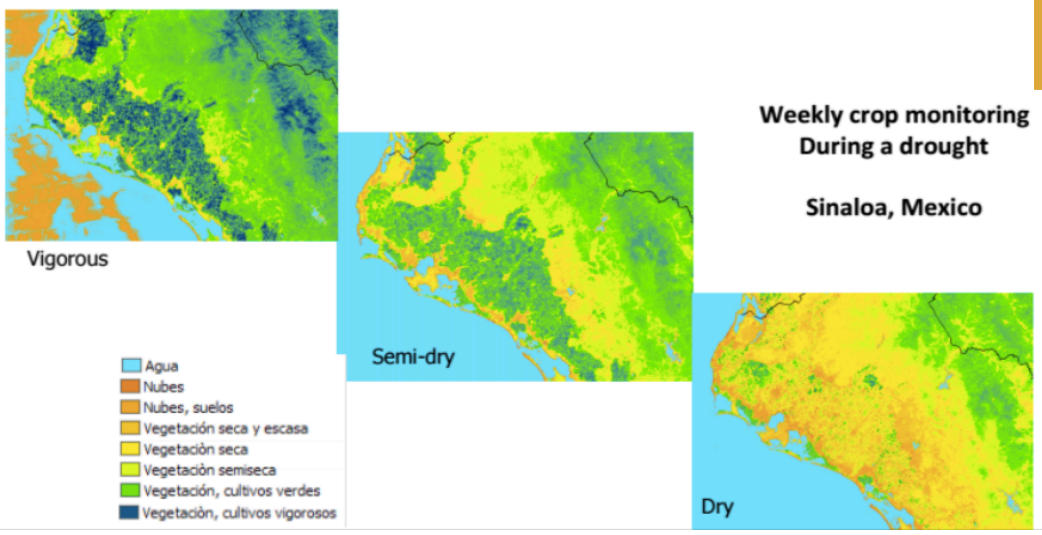
SDG 2. End hunger and achieve food security

Indicator 2.3.1 Volume of production per labour unit

Tier III

2 ZERO HUNGER



Weekly crop monitoring
During a drought

Sinaloa, Mexico

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SDG 1 - No poverty

Target 4: By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance.

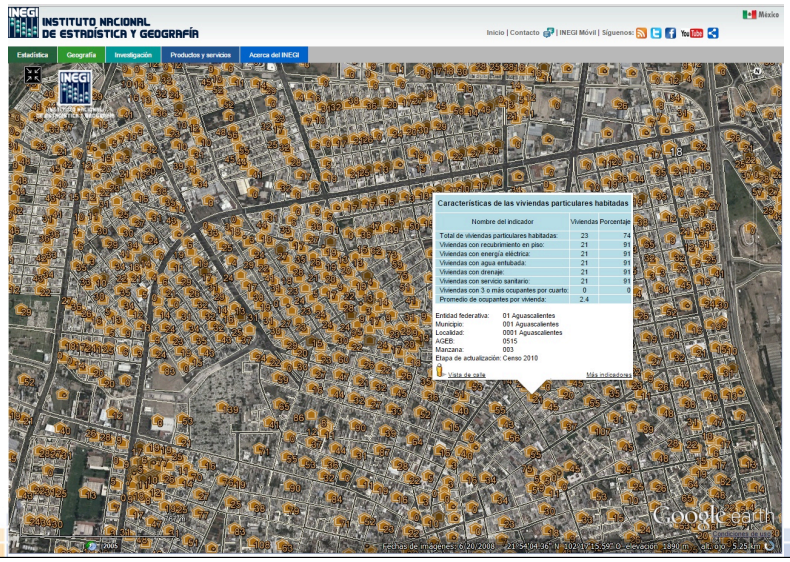
Indicator 1.4.1 Proportion of the population living in households with access to basic services

1 NO POVERTY

Tier III

Use of the geo-referenced National Housing Inventory

Visualized within the Digital Map of Mexico

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National Housing Inventory 2015
Aguascalientes, Total population per block
Google earth


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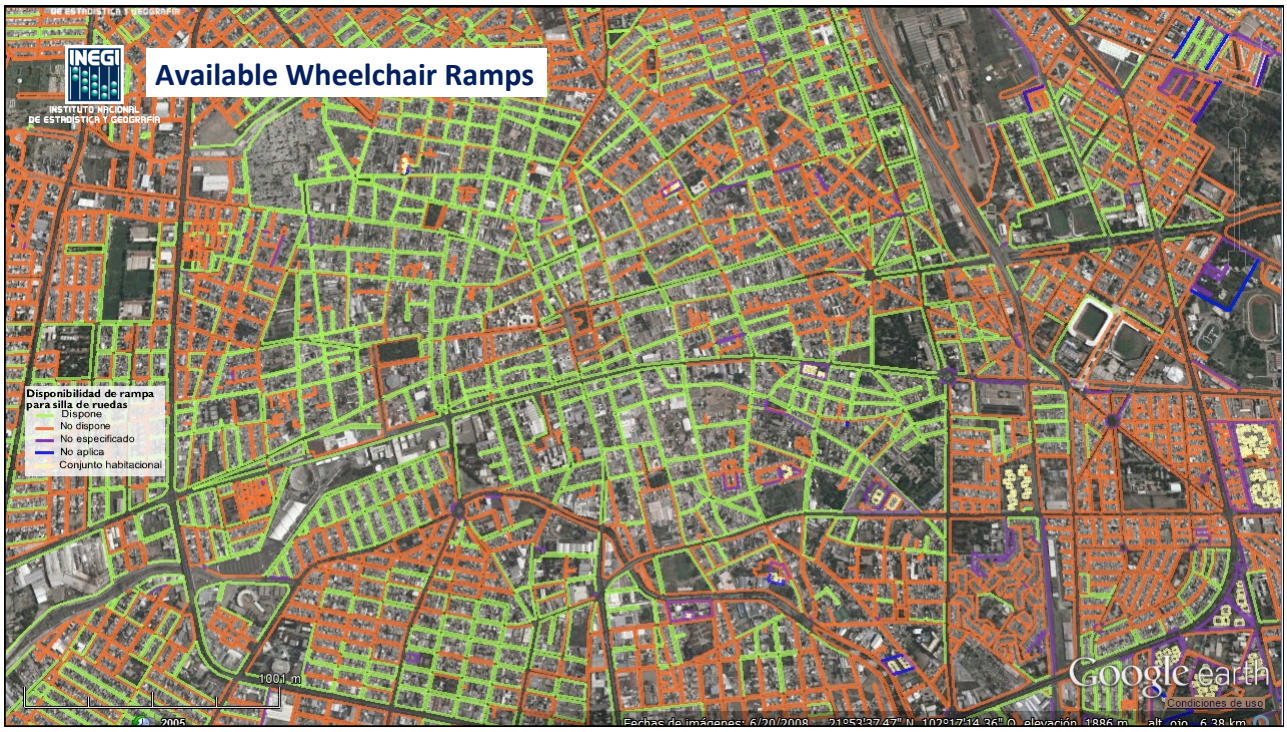
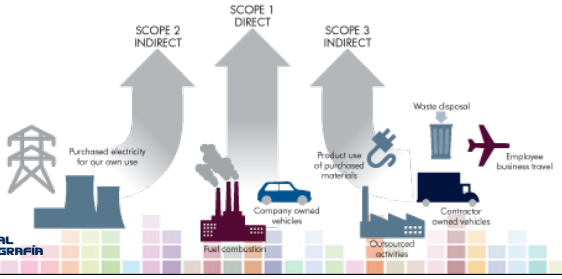
Available Street Lighting
Disponibilidad de alumbrado público
Dispone
No dispone
No especificado
No aplica
Conjunto habitacional
Google earth



Annual Operation Certificate
COA Web

- An online tool for the official reporting of emissions and pollutant transfers to air, water, soil, land and hazardous materials and waste, from industries and establishments from all productive sector
- Reporting is compulsory and free of charge.
- Information is validated and updated in real time



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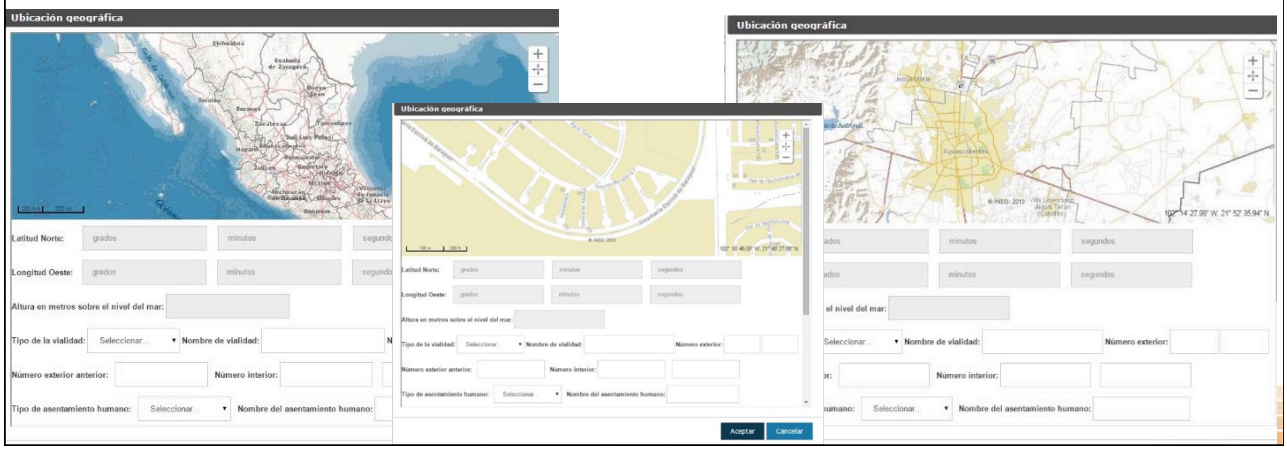
ANNUAL OPERATION CERTIFICATE (COA Web)

- All information about the location of the industries is geo-referenced, considering Technical Geographic Standards (Geographic Addresses)
- ***Currently, COA has a >70% coverage of the industry universe in all of Mexico***



COA-Web is directly linked to the following SDG/Targets/Indicators:

SDG 9 **- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation**
Target 9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

Indicator 9.4.1 CO2 emission per unit of value added **Tier I**

SDG 11 - Make cities and human settlements inclusive, safe, resilient and sustainable
11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted)

SDG 12 - Ensure sustainable consumption and production patterns
Indicator 12.4.2 – Annual average levels of selected contaminants in air, water and soil from industrial sources, energy generation, agriculture, transport and wastewater and waste treatment plants **Tier II**

Indicator 12.6.1 – Sustainability reporting rate and quality: **Tier III**

Target 12.8 **-** By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

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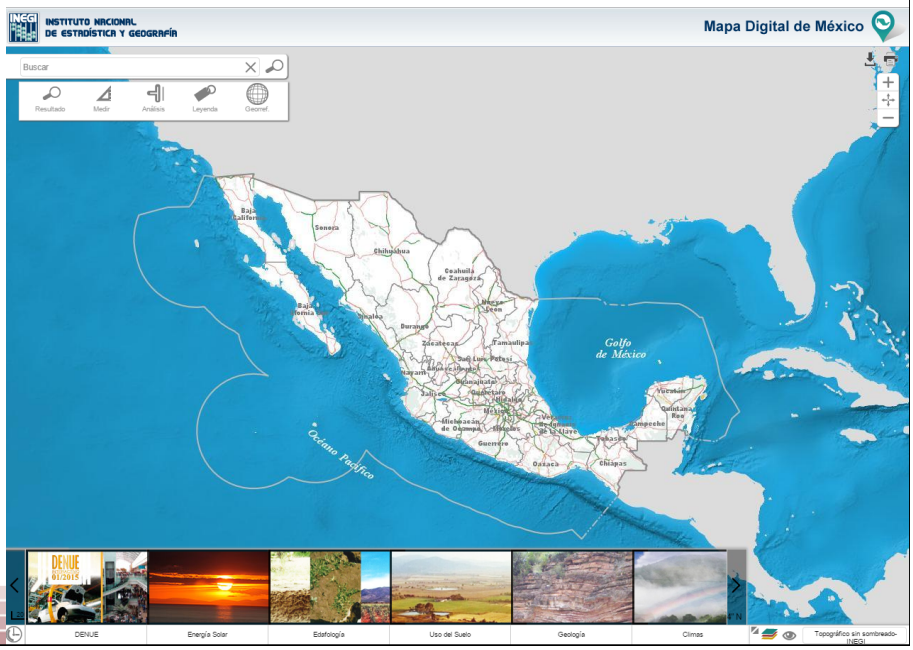
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
11 SUSTAINABLE CITIES AND COMMUNITIES
12 RESPONSIBLE CONSUMPTION AND PRODUCTION

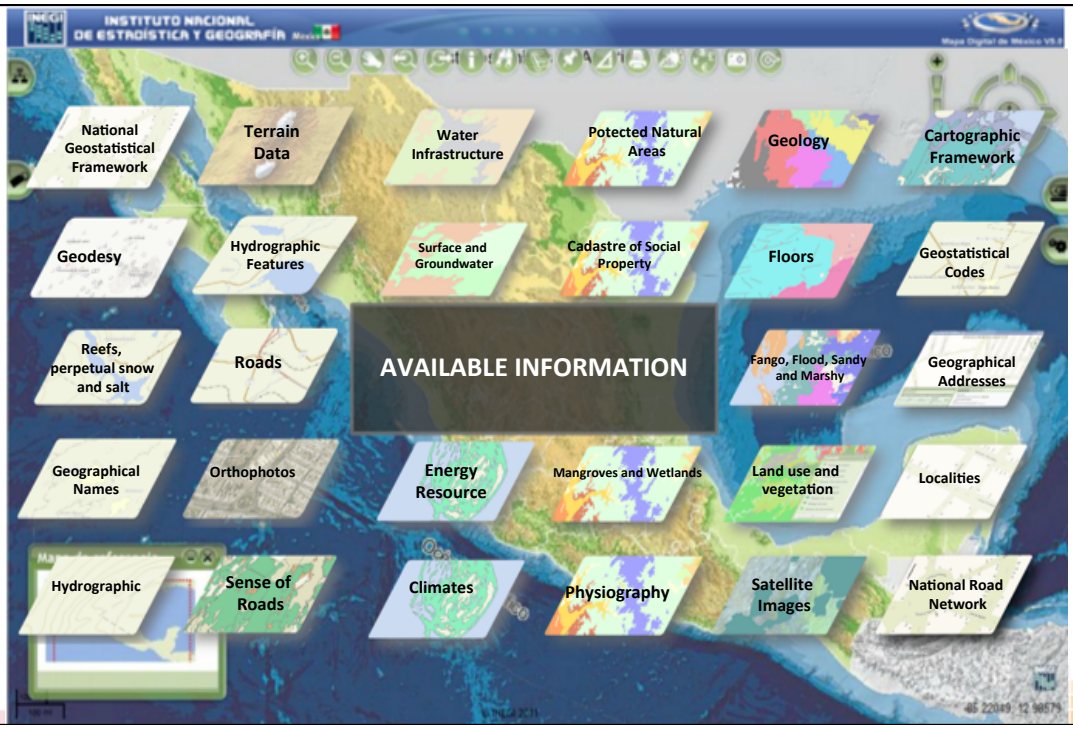
THE PLATFORM

Digital Map of Mexico

Open-source geomatic platform that allows the visualization and analysis of geographic and georeferenced statistical information that contains:

- ✓ 208 vector data layers
- ✓ More than 71 million geographic objects
- ✓ 4 raster layers covering the entire country.





´´2030 Agenda - Sustainable Development Goals Geospatial components for Indicators – Example for Discussion
Goal: 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss Target: 15.1: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements Indicator: 15.1.1: Forest area as a percentage of total land area
Definition of the indicator: (State the definition of the indicator as well as any suggested computational methods). "Forest is defined as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use".
Indicator disaggregation: (List the indicator disaggregation by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts to support the monitoring of the implementation of the SDGs). "Disaggregation by geospatial location is embedded in the indicator".
Current suggested use of geospatial data for the indicator: (Describe the use of geospatial data, as suggested by the existing metadata – the "as-is" situation). "When reporting countries are asked to assign a Tier level 1, 2 or 3 indicating the level of detail of data sources used for reporting (where Tier 3 is regarded as the highest level of detail). Typically, Tier 3 estimates are recent data (i.e., less than 10 years ago) from National Forest Inventories (NFIs) or remote sensing, with ground validation or programme for repeated compatible NFIs. Tier 2 are older estimates (i.e., more than 10 years) from NFIs or full cover mapping/remote sensing. Core is any other data sources including

Examples of "mature" Indicators using different statistical and geographic data sources

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INDICATOR 9.1.1
Proportion of the rural population who live within 2km of an all-season road

Tier III

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Target 9.1 Develop quality, reliable, sustainable and resilient infrastructure, to support economic development and human well-being with a focus on affordable and equitable access for all.

- 9.1.1 Proportion of the rural population who live within 2km of an all-season road.
  - Statistical data: Census Data (ITER 2010) for each population center, with total population, and other census variables, and longitude, latitude for geospatial purposes (192,244 places).
    - Select populated places with 2,500 and less inhabitants as rural.
  - Geospatial data: National Topographic Data Set 1:50,000.
    - Transportation Layer.
    - Paved highways and gravel roads as all season roads.

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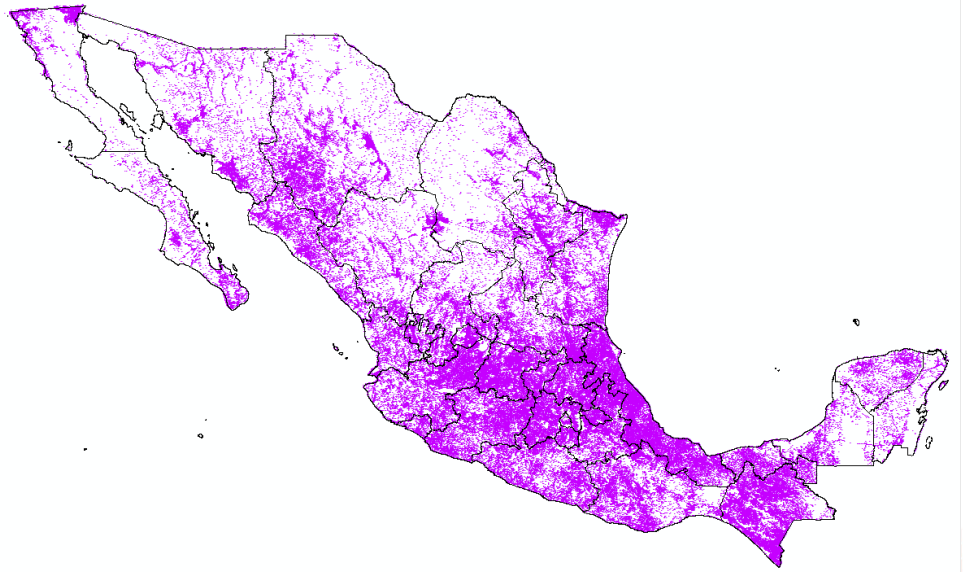
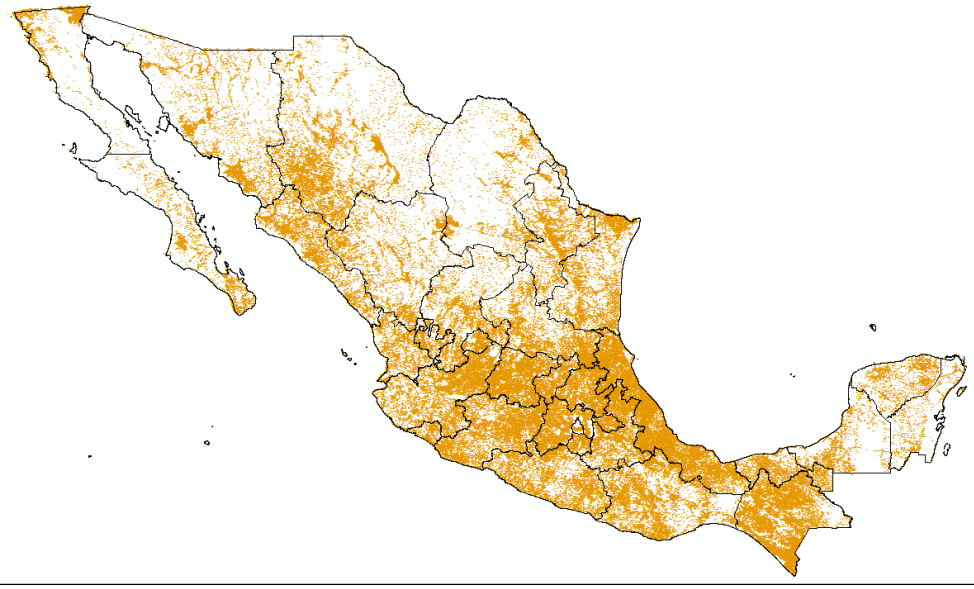
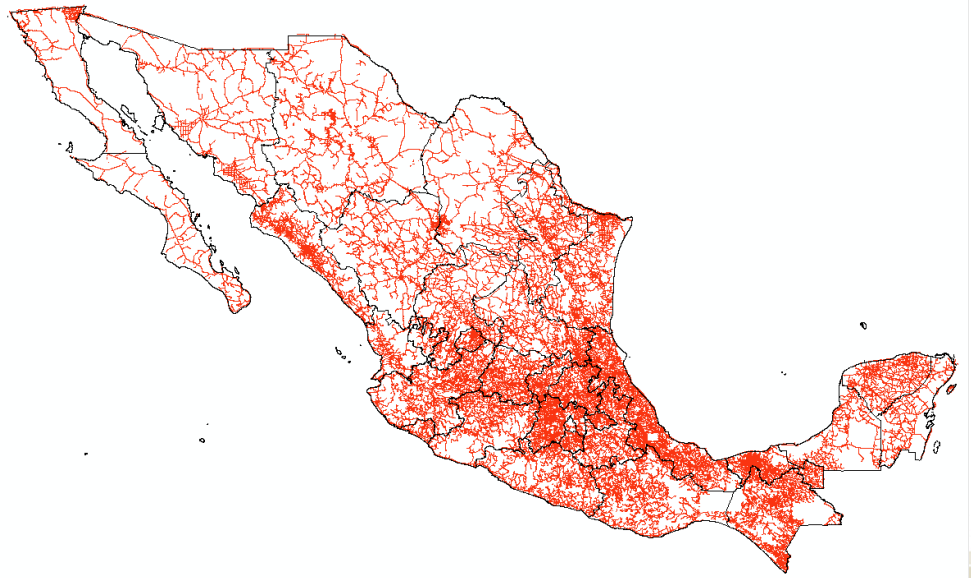
Populated Places (ITER 2010)



188,597 Rural Populated Places (ITER 2010)

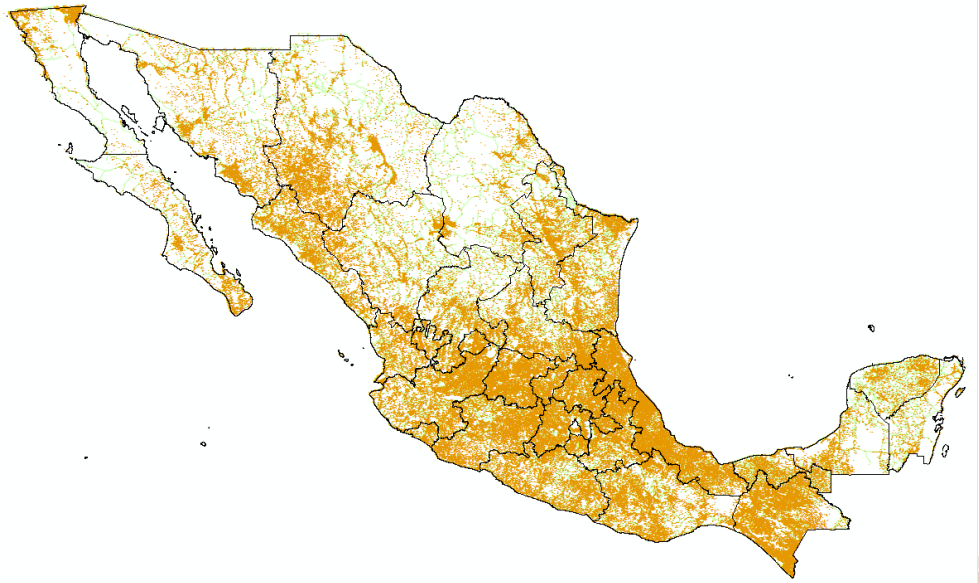


All season roads

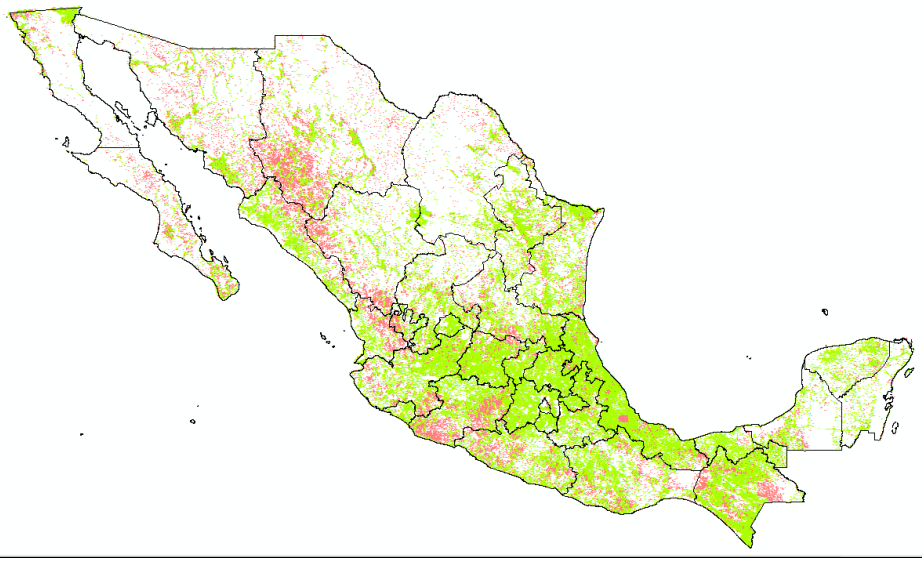


2 km buffer around each road segment

Select rural populated places inside 2 km buffer



Result: Green pop places within 2km of road, pink, pop places farther than 2km from roads.



Obtain total population for each class (within 2km, farther than 2km)

- National
- By state

Rural population within 2Km of an all season road (National, and State)

State	Rural population within 2km of road	Total Rural Population	Proportion (as %) of population within 2km of road
National	24,259,295	26,059,128	93.1
Aguascalientes	228,934	229,907	99.6
Baja California	219,355	243,196	90.2
Baja California Sur	73,469	88,308	83.2
Campeche	196,571	209,032	94.0
Coahuila	260,790	275,003	94.8
Colima	72,540	73,016	99.3
Chiapas	2,131,638	2,459,382	86.7
Chihuahua	366,551	517,269	70.9
Ciudad de México	40,687	40,687	100.0
Durango	427,687	508,499	84.1
Guanajuato	1,590,087	1,653,668	96.2
Guerrero	1,259,310	1,416,920	88.9
Hidalgo	1,247,993	1,273,778	98.0
Jalisco	926,187	985,248	94.0
México	1,956,414	1,976,017	99.0
Michoacán	1,246,190	1,362,688	91.5
Morelos	285,369	286,889	99.5
Nayarit	297,297	336,945	88.2
Nuevo León	239,483	247,333	96.8
Oaxaca	1,737,581	2,002,757	86.8
Puebla	1,563,986	1,633,943	95.7
Quérétaro	527,405	540,664	97.5
Quintana Roo	152,584	157,058	97.2
San Luis Potosí	872,814	935,008	93.3
Sinaloa	702,073	751,994	93.4
Sonora	320,686	372,252	86.1
Tabasco	943,984	954,075	98.9
Tamaulipas	386,563	398,945	96.9
Tlaxcala	232,159	235,696	98.5
Veracruz	2,866,657	2,976,060	96.3
Yucatán	310,569	312,821	99.3
Zacatecas	577,965	604,070	95.7

Target 9.1.1, by state

15.1.1 Forest area as a proportion of total land area

Tier I

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Target 15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

- 15.1.1 Forest area as a proportion of total land area (Tier I)
  - This target can be derived totally from geospatial information.
  - Five map series of Vegetation and Land Use have been developed for Mexico
  - 57 Vegetation types, including Temperate Forests, Tropical Forests, Grasslands, Shrublands, Mangroves and others.
  - Other categories: Agricultural land, urban – builtop areas.

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Methodology

- For the target, all forested classes are grouped for each map series.
- Includes primary and secondary growth forests.
- An appropiate map projection for area calculation is used (Albers Equiarea).
- Each forest polygon has area (m2) as one attribute.
- Sum area for all forest polygons.
- Forest area as a proportion of total land area is calculated as the percentaje of forest area obtained vs. total country area.

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Results

Forest area as a proportion of total land area.				
1985	1993	2002	2007	2011
36.8%	35.4%	34.5%	34.1%	33.7%

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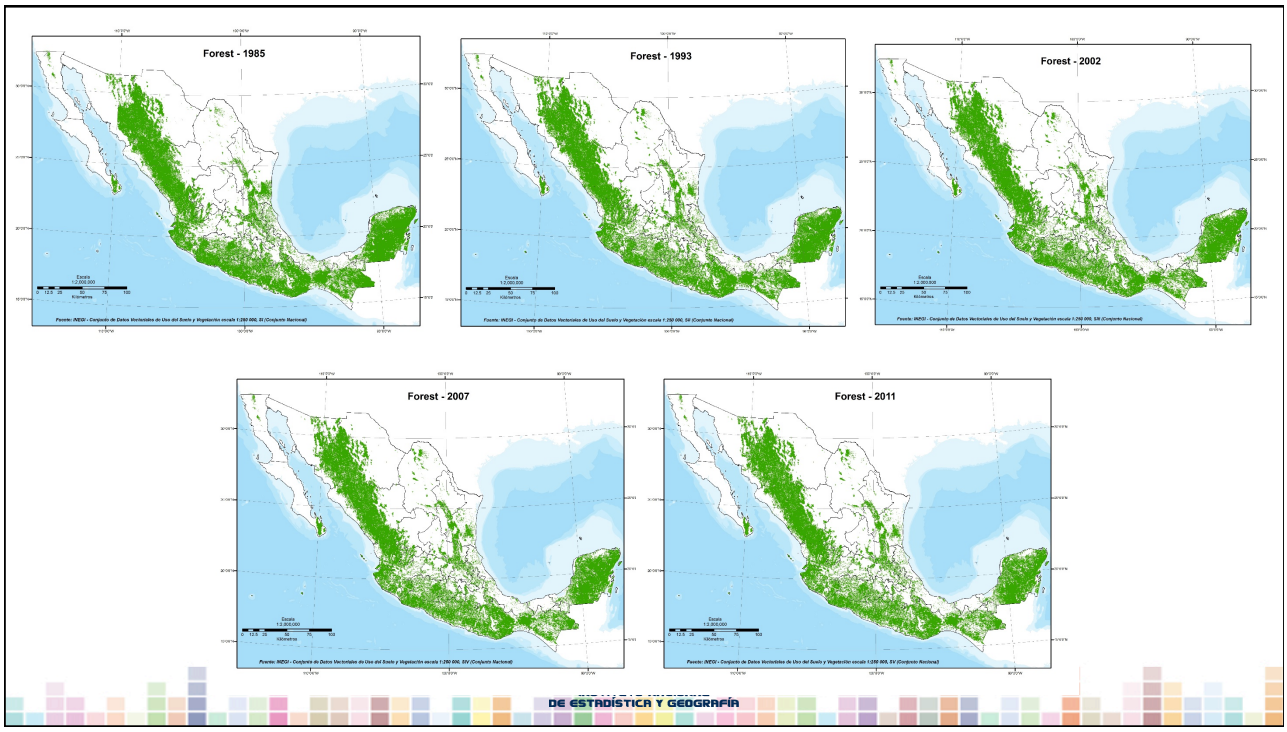

DE ESTADÍSTICA Y GEOGRAFÍA

2 ZERO HUNGER

INDICATOR 2.4.1
Proportion of agricultural area under productive and sustainable agriculture

Tier III

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- 2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help to maintain ecosystems, that strenghten capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.

- 2.4.1 Proportion of agricultural area under productive and sustainable agriculture (Tier III)

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Comments

- This indicator can be obtained from administrative registers.
  - Agriculture Ministry
  - Georreference by place (State, region).
- Considerations.
  - Lack of precise definition of sustainable agriculture and/or sustainable specific practices.
    - Organic agriculture
    - Protected agriculture (greenhouses, etc).
  - Calculation
    - Proportion of sustainable agriculture:
      - Percentaje of protected (and/or organic) of total cultivated area

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Organic agriculture

Anexo 4. Superficie sembrada de la agricultura orgánica por entidad federativa (2.1.3.2)
(Hectáreas)

Concepto	2008	2009	2010	2011	2012	2013P
Superficie sembrada	**11 268**	**13 217**	**17 151**	**17 236**	**26 385**	**24 454**
Baja California	221	591	289	277	2 448	1 897
Baja California Sur	1 468	1 269	1 403	1 560	1 505	1 020
Colima	385	385	385	258	258	258
Chiapas	8 217	10 588	11 105	11 125	11 162	11 062
Guerrero	221	0	0	0	0	0
Jalisco	0	0	0	0	229	59
Nayarit	0	0	0	0	4 906	4 700
Oaxaca	1	0	3 229	3 232	4 941	5 284
Puebla	103	370	740	757	752	164
Sinaloa	0	0	0	0	0	10
Sonora	59	14	0	0	0	0
Tamaulipas	0	0	0	0	150	0
Tlaxcala	593	0	0	27	35	1

	2008	2009	2010	2011	2012	2013P
Nacional (%)	0.051	0.061	0.078	0.078	0.120	0.111

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% of area with organic agriculture

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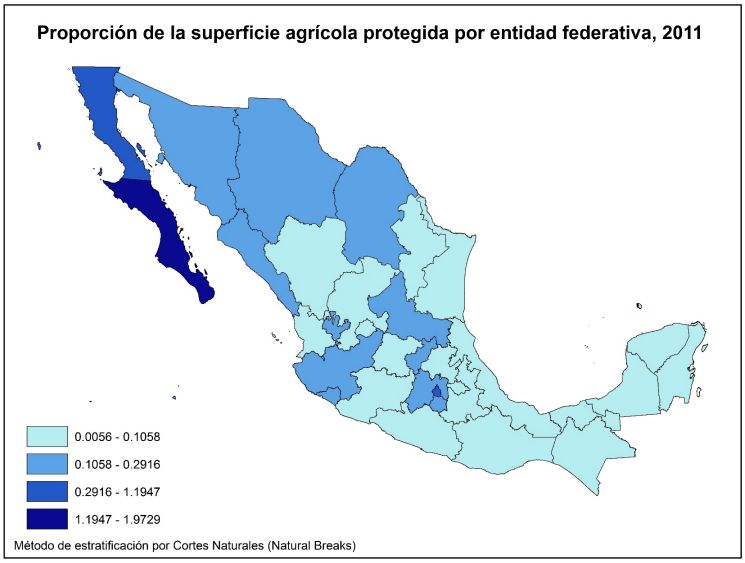
Protected Agriculture by State (% of cultivated land)



DE ESTADÍSTICA Y GEOGRAFÍA

6 CLEAN WATER AND SANITATION

INDICATOR 6.4.2
Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

Tier I

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Goal 6

- Target 6.4: By 2030 substantially increse water – use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.

- 6.4.2: Level of water stress: freswater withdrawal as a proportion of available freswater resources (Tier I)

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Comments

- Data for indicator from administrative records, National Water Commission (CONAGUA).
  - Georreference by Hydrological Regions.

- Calculation.
  - The degree of stress or pressure is obtained by annually adding the extracted water to be used in the various consumptive uses, such as agriculture, municipalities, industrial supply and for the generation of electric energy excluding hydroelectricity.
  - This sum is divided by the total of available or renewable water per year.

- Considerations.
  - There is a considerable variation in freshwater availability in the country because of extreme climatic variability (very arid regions in the North, very humid in the South), population distribution, and demand for water.

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Water stress level as proportion of freswater extraction from available resources, by Hydrological Region

6.4.2 Nivel de estrés hídrico: extracción de agua dulce como proporción de los recursos de agua dulce disponibles
(Porcentaje)

Nombre de la Región Hidrológico-Administrativa (RHA)	Número de la Región Hidrológico-Administrativa (RHA)	2007	2008	2009	2010	2012	2013	2014
Nacional		**17.2**	**17.4**	**17.5**	**17.4**	**17.5**	**17.3**	**19.0**
Península de Baja California	I	75.9	75.9	73.3	76.9	77.9	68.7	79.6
Noroeste	II	92.3	91.4	90.6	88.6	83.9	75.9	81.2
Pacífico Norte	III	40.5	40.7	40.6	40.6	40.3	39.4	41.9
Balsas	IV	49.8	49.4	49.4	47.0	46.5	46.7	48.7
Pacífico Sur	V	4.1	4.1	4.2	4.7	4.7	4.7	5.0
Rio Bravo	VI	76.4	77.4	76.0	70.8	73.7	71.7	77.2
Cuencas Centrales del Norte	VII	49.3	48.6	48.7	45.2	46.3	46.6	48.4
Lerma-Santiago-Pacífico	VIII	40.8	41.5	41.9	45.5	42.1	42.0	43.6
Golfo Norte	IX	18.4	18.6	19.0	18.3	20.0	20.5	21.0
Golfo Centro	X	5.1	5.2	5.2	5.0	5.3	5.2	5.7
Frontera Sur	XI	1.4	1.4	1.4	1.4	1.4	1.4	1.6
Península de Yucatán	XII	7.2	8.0	9.2	9.6	11.2	12.8	14.2
Aguas del Valle de México	XIII	155.0	132.3	132.6	132.9	136.1	137.8	138.0

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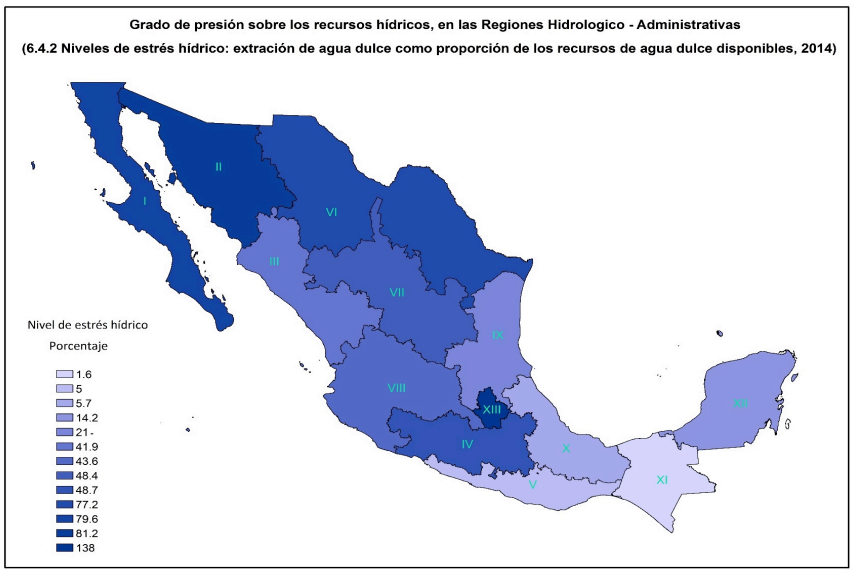
Water stress by Hydrological Region



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INDICATOR 6.4.2
Level of water stress: freswater withdrawal as a proportion of available freswater resources

Tier I

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Percentage of municipalities with adequate final discharge of urban solid waste.

- Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable.
- Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
- 11.6.1 Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities (Tier II)

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- Definition: Percentage of municipalities that declare discharging urban solid waste in controlled final discharge sites respecting the total of municipalities with urban solid waste final discharge sites.
- Indicator Type: National (defined at the CTEODS).
- Unit of measurement: Percentage.
- Geographical Coverage: National.

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- Algorithm for the calculation and meaning of the acronyms or their abbreviations:

$$DAR = \left(\frac{DRS_M}{DF_{TM}}\right) 100$$

DAR: Percentage of municipalities with controlled final discharge of urban solid waste.
DRS_M: Municipalities with controlled discharge of urban solid waste.
DF_{TM}: Municipalities with adequate final discharge of urban solid waste.

- Time reference: Yearly: **2014**
- Opportunity: Two years.
- Indicator periodicity: Bi-annually.

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