# National Institute of Statistics and Geography

## General Directorate of Geography and Environment

### National Report 2011-2015

International Cartographic Association
Association Cartographique Internationale

INSTITUTO NACIONAL DE ESTADÍSTICA Y GEOGRAFÍA

Introduction

As a part of the agenda for the General Assembly of the International Cartographic Association, which this year will be held from 23 to 28 August 2015, it is the review of the actions taken by its members. Therefore this document, where a summary of the activities in terms of geographic information and environmental, the Directorate General of Geography and Environment National Institute of Statistics and Geography has developed in the period shown comprised generated 2011 until first half of 2015.

In accordance with the reform Articles 26 and 73 of the Constitution of the United Mexican States, published in the Official Journal of the Federation (DOF) on April 7, 2006, the Mexican State must have a National Information System statistical and Geographic (SNIEG) and responsibility to ration and coordinate is in charge of an organization with technical and management autonomy, legal personality and its own assets. In order to formalize the above provisions, the April 16, 2008 was published in the Official Gazette the Law of National Statistics and Geographic Information (LSNIEG), which is of public policy, social interest and to be generally observed throughout the Republic. It aims to regulate:

I. The SNIEG;
II. The rights and obligations of informants System;
III. The organization and functioning of the National Institute of Statistics and Geography (INEGI), and
IV. The administrative offenses and administrative means of defense against the acts and resolutions of the Institute.

The system is meant to provide society and the state information of quality, relevant, accurate and timely, in order to contribute to national development and is defined as: Set of State Entities (UE), organized through Subsystems, coordinated by INEGI and articulated by the National Information Network, in order to produce and disseminate information of national interest.

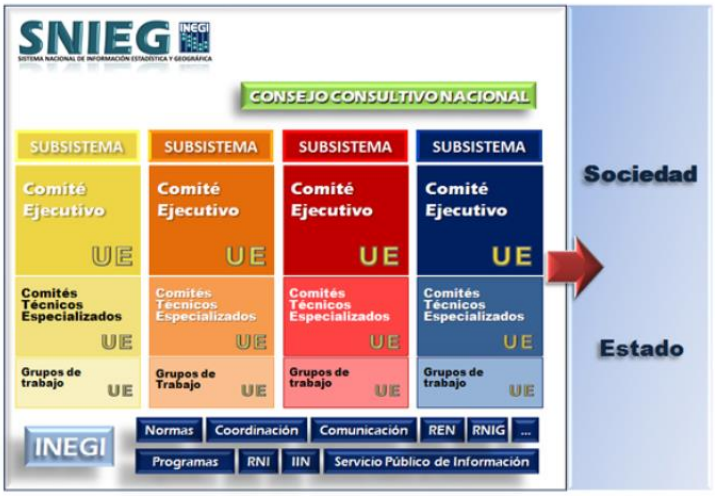
In this context, the SNIEG is composed by the National Advisory, the National Information Subsystems and INEGI Council as coordinating agency. The latter directed by a Governing Board (integrated of a President and four Vice-Presidents).


As part of the system, INEGI is responsible for producing statistical and geographic information, and the role of Central Coordination Unit System, which means to ration and coordinate, maintain its efficient operation, by regulating Geographic and Statistical Activities that Units conducting state, set the operating rules of the corporate bodies, to develop guidelines for the development of the regulations of the system and integrate a National Catalog of Indicators, among other functions.

The National Information Subsystems (currently: Demographic and Social, Economic, Geographic and Environment, as well as, government, public security and justice administration) its aim is to produce, integrate and disseminate information according to the theme they deserve and they have several Specialized Technical Committees (CTE) coordinated by an Executive Committee Subsystem.

The CTE act as collegiate bodies of participation and consulting created by agreement of the Governing Board of the INEGI to support the National Information Subsystem to which they are attached; these units participating State, which are administrative areas that have the power to develop and Statistical Activities Geographic or operate with administrative records to obtain information of National Interest:

a) The agencies of the Federal Government, including those of the Republic Presidency and the Attorney General's Office;
b) The legislative and judicial branches of the Federation;
c) The states and municipalities;
d) The autonomous constitutional bodies, and
e) The federal administrative court.




Such units participating State in the scope of its powers in the system through the National Advisory Council Executive Committees in CTE in the definition, development and promotion of implementation of technical standards, indicators, and information of national interest methodologies used to generate the information, taking into account national and international standards and best practices in the field.

Likewise, at state level, creating committees of Statistics and Geographical Information as bodies that allow for greater coordination among agencies generators and users of information at different levels of government, academia and the private initiative, promotes in order to have quality information, relevant, accurate and timely systemically.

According to Article 26 of the Law of SNIEG, the National Geographic Information Subsystem and the Environment (SNIGMA), part of SNIEG, it is divided into two components: geographical and environmental.

In its geographic component must generate at least the following data groups: geodetic reference frame; coastal, international, state and municipal boundaries; Data continental, insular and submarine relief; cadastral, topographic, natural resources and climate data, and geographical names. This component is called the Infrastructure of Spatial Data of Mexico.


The environmental component, meanwhile, will produce indicators on the following themes: air, water, soil, flora and fauna, and hazardous and solid waste. It will seek to describe the state and trends of the environment, given the natural environments, species of plants and animals and other organisms within these media.


Secretariat of National Defense, Ministry of Environment and Natural Resources Secretariat: The Executive Committee of this subsystem by a vice president of the Governing Board of INEGI, who chairs it, and the coordinators of the following units integrates state Agricultural, Regional and Urban Energy Secretariat, Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food, Ministry of the Navy and development Ministry of Foreign Relations.

Coordination between state units allow information generated in statistics, geographical and environmental matters, as well as its regulations and resources to focus on the SNIEG with information and experience of the different secretaries of state, and municipal governments, as well as society; and obtain a common repository of knowledge that directs public policies and national development activities to support resilience to climate change, land use, natural resource management, among others.

In SNIGMA they have been made to date, the CTE for the following topics:


In the SNIEG Portal (www.snieg.mx) there is available information on the functions, members, meetings and monitoring of agreements SNIGMA Executive Committee and of the Specialized Technical Committees that belong to this subsystem is. The latter also have three sharing sites that promote better communication between its members.

The report begins with a description of the activities related to the geodetic framework, photogrammetric and LIDAR flight, digital elevation models, satellite images and orthophotos, as basic inputs for the generation and updating of basic cartography and natural resources to reach production of topographic and thematic mapping. Also, other relevant activities related to cadastral information, the development of geomatics solutions and the development of technical standards for the production of geographic information are discussed, in addition to strategic alliances and international conventions signed in the INEGI to geographical matters and environment.

This report continues the previous national report, where activities in the period 2008-2011 were recorded.



Content

# 1. Geodetic Framework

It is one of the data groups SNIGMA geographic component, being fundamental to the development of national geographic information element. Geodetic data allow geographically referencing everything that exists on the earth's surface. They are inputs for mapping and cadastral surveys, boundary definition, construction of infrastructure (roads, bridges, dams, etc.)

## 1.1. Active National Geodetic Network (RGNA)

RGNA is currently composed of 26 continuously operating stations distributed throughout the country, of which 23 are owned by the INEGI and 3 are cooperative stations belonging to the Institute of Territorial Information of Jalisco and the Municipal Institute of Research and Planning in Cd. Juárez, Chihuahua and Ensenada, Baja California.


Station Map Active National Geodetic Network



## 1.2 Passive National Geodetic Network (RGNP)

It is composed of three networks: Horizontal, Vertical and Gravimetric.

### 1.2.1 Geodetic Vertical Network

They are migrating height North American Vertical Datum of 1988 (NAVD88), according to the technical standard of the National Geodetic System.

### 1.2.2 Horizontal Geodetic Network

International Terrestrial Reference Frame 2008, period 2010 associated with the reference ellipsoid defined in the Geodetic Reference System from 1980, GRS80: migration to the reference ITRF08 was performed.

### 1.2.3 Gravimetric Network

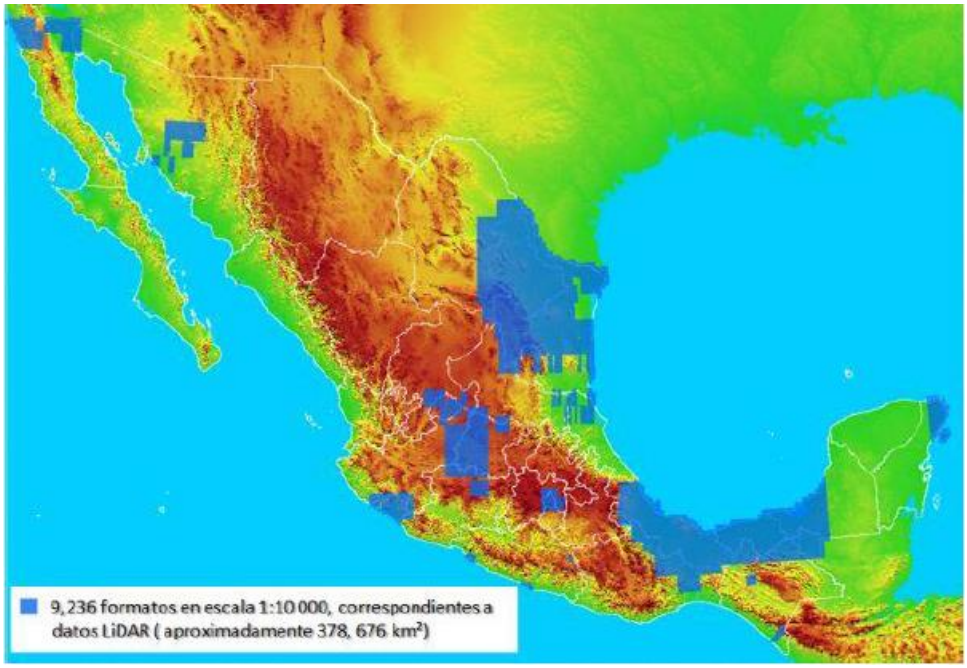
Data collected in the framework IGSN71 apply to generate the basic input for developing and maintaining the Mexican geoid solution.
The following table summarizes the generation of geodetic points validated occurs during the period 2011 -2015:

| Year | Horizontal | Vertical | Gravimetric | Total: |
|---|---|---|---|---|
| 2011 | 3,409 | 3,448 | 3,847 | 10,704 |
| 2012 | 2,397 | 4,228 | 4,569 | 11,194 |
| 2013 | 2,325 | 4,276 | 5,110 | 11,711 |
| 2014 | 2,525 | 3,688 | 5,206 | 11,419 |
| 2015 (30/05/2015) | 538 | 1,905 | 1,760 | 4,203 |
| Total | 22,198 | 28,110 | 29,269 | 79,577 |

## 2. Photogrammetric and LIDAR flight

Production was:

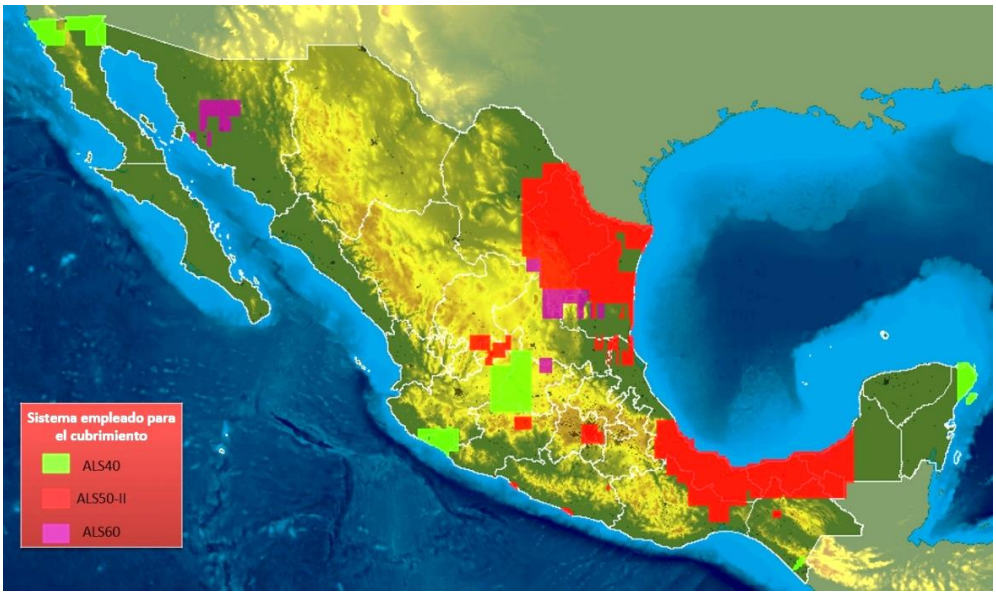
| Flight Type | 2008 | 2009 | 2010 | Total: |
|---|---|---|---|---|
| Photogrammetric flight | 219,954.31 $Km^2$ | 151,251.99 $km^2$ | 22,739 $Km^2$ | 393,945.30 $Km^2$ |
| Flight LIDAR | 140,344.96 $Km^2$ | 131,894.01 $Km^2$ | 27,628 $Km^2$ | 299,866.97 $Km^2$ |




National coverage LIDAR Data

## 3. LIDAR data (km2) Cloud of Points

In the period, taking into database formats 9 126 Lidar cloud points in 1:10 000 scale with an area of approximately 374,166 square kilometers.




LIDAR data cloud of points

## 4. Digital Elevation Models

Similarly, 4465 data sets of digital elevation models were generated with a resolution of 15m in cartographic format in scale 1: 20,000 to be integrated into the National Continuous digital elevation models, terrain type and surface type, comprising a preview of 2465 models and type of land surface 2120, which on average make progress in national coverage of 17.12%, they concentrate mainly in the states of Nuevo Leon, Tabasco, Colima, Mexico City, northern Tamaulipas type south west of Veracruz and Guanajuato.

Additionally, were generated a total of 10,396 Digital Elevation Models with a resolution of five meters, surface type and same amount of soil type, according to the cartographic division in 1:10 000, generated from data collected by laser generated airborne systems LIDAR and generated from images of Very High Resolution Satellites and aerial photography. Digital elevation models generated in this period contribute to various projects and programs such as:

- Northern Gulf Coastal Plain and Gulf Coastal Plain South for risk assessment.
- Digital Mapping 1:20 000 from the state of Nuevo Leon.
- Topographic map of the country 1:20 000 scale.
- National Program of Digital Elevation Models in order to perform the tasks with adherence to the dictates of LSNIEG and Rules of Procedure of the INEGI.

In 2011 it starts with the generation of Digital Terrain Models Shading to meet the needs of the project of the Digital Topographic Map 1:20 000 scale, producing 2 316 Digital Models Shaded Relief, later in 2013 the generation integrates Digital Models Shaded Relief for the topographic map 1:50 000 scale, producing 140 Digital Models Shaded Relief.

For the period a total of 2,960 models, of which 1,480 correspond to the type of surface and the same amount for the field type in 1:10 000 scale mapping formats and resolution of five meters were produced.

Were produced 219 Vector digital files altimetry territorial coverage, according to cartographic format in 1:20 000 scale to meet the needs of the Project of the Digital Topographic Map scale 1:20 000. Additionally occurred for continuous elevation occurred 438 digital elevation models with a resolution of 15 meters.

392 Digital Elevation Models with a resolution of three meters, for the National Risk Atlas CENAPRED and the National System of Civil Protection (NSCP) of the Interior Ministry were made.

## 5. Ground Stations (satellite imagery with high resolution)

During the period covered by this report a total of 620 278 square kilometers of 0.5m resolution images, from the Virtual Station Satellite of Very High Resolution Images (EVISMAR) were received. It should be noted that two thirds of these images are in stereo mode, which means that two images of the same area, for the production of orthophotos and digital elevation models took high resolution.

In the receiving station Constellation Spot Mexico (ERMEXS) were received and processed 6032 images from the satellites 5; they have a resolution in the area from 2.5 to 20 m in panchromatic and multispectral mode. The station stopped receiving data from March 2015. INEGI does not participate in the new station called "Ermex NG", so no progress was reported in this regard; however, it received a national coverage of satellite SPOT-6 for the year 2013.

The receiving Station of Satellite Images (ERIS), it is out of service since 2012 so it no progress was reported. At the moment, it presents electromechanical faults. The Mexican Space Agency (AEM) received by its counterpart in Germany and will be responsible for repair and maintenance. INEGI signed an agreement with the EMP, Conabio (CONABIO), the National Council of Science and Technology (CONACYT), South Border Collage (ECOSUR) to manage and operate the station once re-operate. The acquisition of a new season is also evaluated.

With respect to the virtual station for acquiring high resolution images of GeoEye1 sensor, the GeoEye-1 images can receive basic processing level are:

- Panchromatic (40 and 50 cm of spatial resolution)
- Multispectral (160 and 200 cm spatial resolution)
- Pan sharpen (40 and 50 cm of spatial resolution)

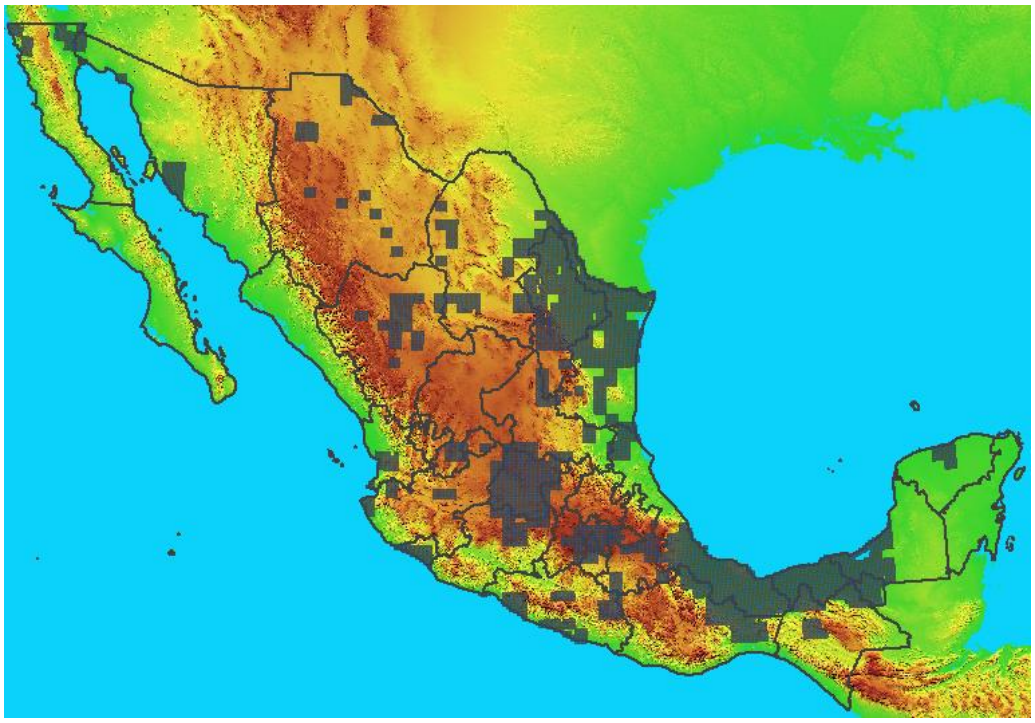
To date there are in the country with 20,640 images with basic level of processing.

GeoEye-1 Coverage images of the national territory captured in 2011 to June 2015

## 6. Ortophotos

An orthophoto is an image of the terrain, obtained from satellite photograph or image, that through the process of orthorectification has been corrected and transformed, and can be used as a map. His pictorial richness shows all the visible features on the Earth's surface, which have not been affected by processes of generalization and representation. It has combined characteristics of photographic image quality with geometric mapping; so they are conducive to making photomaps, and extraction of vector elements for generating urban mapping accuracy.

Currently there are 13,400 orthophotos with a resolution of one meter. This production corresponds to the physiographic region of the northern plains and southern Gulf of Mexico, in the states of Nuevo Leon, Puebla, Guanajuato, Colima, Mexico City, Jalisco, Hidalgo, Coahuila, Sonora, Zacatecas, Mexico and the northern portion of Tamaulipas; and for districts with more than 2,500 people.



Availability of Ortophotos 1:10 000 scale

## CARTOGRAPHIC PRODUCTION

### 7. Topographic Mapping

Topographic mapping represents the main road infrastructure, communications, and hydraulic and electrical supplies; the name and location of urban and rural areas, orographic and hydrographic features, coastal, and urban, among others; compiled by photogrammetric techniques from aerial photographs, geodetic information and field verification.

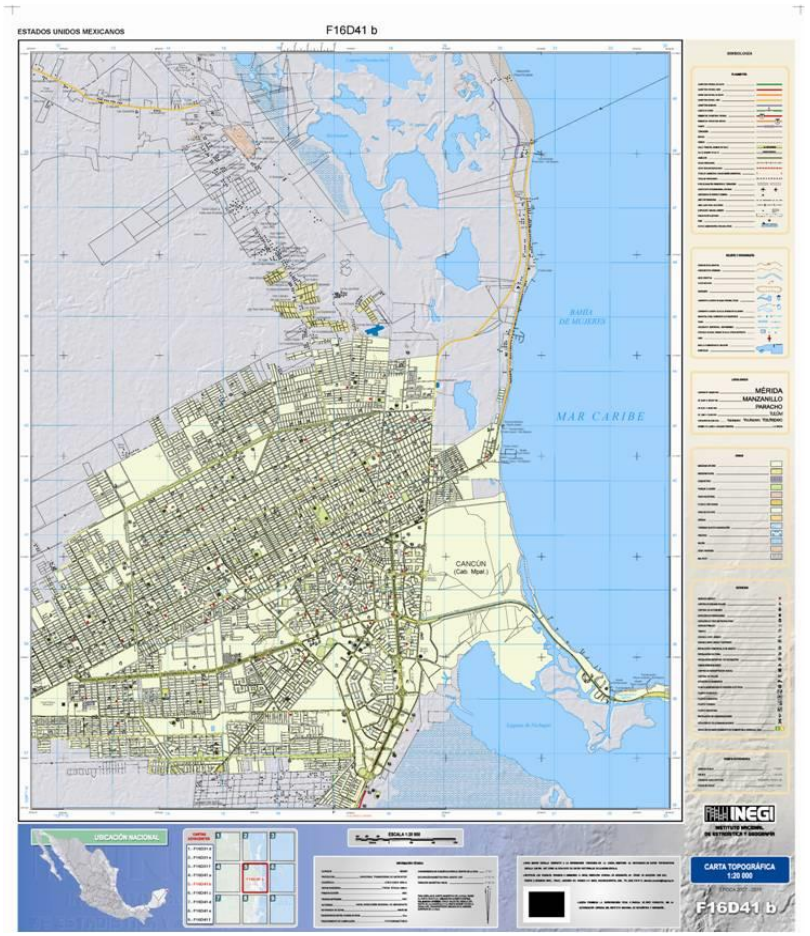
The scales that represented are:

| Scale | Format |
|---|---|
| 1:20 000 | Use a regular format of 7'30 " latitude by 6'40 " in length and covers approximately of 160 km2 |
| 1:50 000 | Use a regular format from 15'00" of latitude by 20'00" in length and covers approximately of 960 km2 |
| 1:250 000 | It has a regular format of a degree of latitude by two degrees of longitude, covering an area of 23,000 km2 |
| 1:1 000 000 | It includes 11 different size formats, covering the national territory |

From 2011 to 2015 they have published a total of 3, 536 letters of agreement with the following scales:

| Scale | Total: |
|---|---|
| 1:20 000 | 3017 |
| 1:50 000 | 507 |
| 1:1 000 000 | 11 |
| Baja California Peninsula | 1 |
| Total: | 3,536 |

From 2009 to date tactile maps for blind and visually impaired is produced by thermoforming technique. INEGI currently plays a fundamental role of vanguard in Mexico, producing tactile maps related to the special needs of blind and sighted, to access and support them in the delivery of geographical knowledge of our territory and the world.




Topographic Map scale 1:20 000

## 8. Geostatistical Framework

It is a unique and national character system to represent statistical information with the corresponding geographic locations under the limits set by the geographical framework itself, which correspond to the determined and provided, where appropriate, by governments, federal and state and which they are recognized by them in the scope of their respective powers.

Divides the country in areas with identifiable field boundaries, called geostatistical areas, with three levels of disaggregation: State (AGEE), Municipal (WEA) and Basic (BGA), the latter can be urban or rural. It is an aid in the delineation between entities and municipalities, especially in places where political administrative limits are undefined.

## Products that integrate the Geostatistical Framework:

### Municipal Geostatistical Framework 8.1

Integrates digital files (vector) representing the AGEM, each level with their names and attributes associated keys geostatistical and spatial representation of polygons urban areas and rural locations. Urban areas are considered those whose population corresponds to 2,500 or more population, or are county seats, even having a smaller population data, the other localities (complimentary) are defined as rural.

In the period, it has 2 versions of this product: 6.0, 6.2 (DENUE).

#### 8.1.1 Geostatistical Framework version 6.0

Product integrates information from 32 state geostatistical areas (AGEE), which includes the Federal District, 2 457 Municipal Geostatistical Areas (AGEM) with the new town of Bacalar Quintana Roo State, considering the 16 delegations of the Federal District, 4547 estates in urban areas and 295 115 points of Territorial Integration with names and passwords as attributes associated geostatistics, 17,461 basic geostatistical areas (AGEB) and 350 Island polygons Territory "Islands" with geostatistical names and passwords associated as attributes.

#### 8.1.2 Geostatistical Framework version 6.2

Product of the closure from the 2014 Economic Census (DENUE), dated August 2014 update, integrates 32 State geostatistical areas (AGEE), which includes the Federal District, 2 457 Municipal Geostatistical Areas (AGEM) are considered the 16 Delegations Federal district and 296 228 points of Territorial Integration with geostatistical names and passwords associated as attributes, 17,465 basic geostatistical areas (AGEB) and 350 polygons Island Territory "Islands" with geostatistical names and passwords associated as attributes.

### 8.2 Urban Geostatistical Cartography (Closing the Economic Census 2014)

4,547 urban localities with cartographic update to close the 2014 Economic Census, organized by state and by urban area inside are included.

It is made up of polygons urban localities, AGEB and blocks (1, 443,708 and 811,844 urban rural) as well as lines of roads, utilities and main roads.

## 8.3 Urban Geostatistical Cartography (Closing of Intercensal Survey 2015)

4,546 urban localities organized by state and by urban area inside are included.

It contains street names, location of the main services and limits urban AGEB, with their identification keys.

## 8.4 Geostatistical Cartography with Delimitation of Urban Human Settlements

Digital graphic representation of the shape of the circle of human settlements in urban areas of the country is considered the group of similar houses built in areas of human settlement with an urban whole idea. Human Settlements types are: neighborhoods, subdivisions and neighborhoods, among others. Currently there are a total of 3,362 urban localities with Delimitation of Human Settlements.

## 8.5 Digital Urban Mapping

It is an ongoing project of the Directorate General of Geography and Environment of INEGI, which will provide an update to the last census event on population and housing cartographic information through georeferenced digital images, showing the location and distribution of urban land, the existing infrastructure, and roads and services of the capitals of the states of the country, including the DF at delegation level, and those urban areas containing more than 100,000. This in order to serve users in general, requiring locating landmarks and public services, or as a guide in the urban centers; and serve as support in the decision-making projects public and private administration, as well as those related to research and teaching.

| Scale | Format |
|---|---|
| 1:10 000 | Use regular format 4'30 '' latitude by 4'45 '' in length and covers approximately 58 km2<br>The number of formats varies according to the size of the locality. |

From December 2011 it will have 31 locations that are state capitals and the Federal District of Cuauhtémoc. It is contemplated a universe to work in about 150 locations.


Urban Digital Cartography

## 9. Limits

### 9.1 Political-Administrative Limits State

Territorially cartographic representations are fundamental to the definition of administrative boundaries. In this context and in compliance with its powers, since 2001 the INEGI has been given the task of collecting legal evidence supporting the marking of boundaries between the entities, to later translate this information in cartographic documents.

Likewise, in 2011 the digital documentation of the vertices of 29 state boundaries was performed. For the boundaries of the municipal level, the assessment of the situation of political and administrative boundaries of municipalities was developed and validated transcription and digitalization of 500 municipal boundaries (adjoining properties) version was obtained, and a first documented version of each vertex that integrates.

In 2012 the Body of Documentary Information was updated with information on records 64 Political-Administrative State and municipal boundaries, as well as 10 international records limits. The report of the current state of political and administrative State and municipal boundaries of each state (64 reports) was prepared seven hemerographic reports were prepared notes on problems of state political and administrative limits on seven issues of municipal boundaries. Documentation of the vertices of the Political-Administrative Limits of the 32 states was held.

In 2013, the Body of Documentary Information was updated with information concerning 32 dossiers State Political-Administrative Limits and 32 municipal boundaries, as well as 10 International Boundary records. Current Situation report of the Political-Administrative State and municipal boundaries of each state (64 reports), likewise updated 10 reports of the Current Situation of International Boundary and 12 reports were updated hemerographic were prepared with notes on problems state and municipal political and administrative boundaries. Documentation of the vertices of 776 municipal boundaries of the country was conducted. Transcription of 23 state limits on legal grounds, issued by the Congress and the proposed International Standard for Describing the state and municipal limits was developed.

In 2014 the Body of Documentary Information was updated with information concerning Political-Administrative Limits State in 32 cases and 32 of municipal boundaries, as well as 10 records International limits. Reports of the Current Situation of the Political-Administrative State and municipal boundaries of each state (64 reports in total) were updated, also 10 reports of the Current Situation of International Boundary were updated and 24 reports were prepared on hemerograpy footnotes problems administrative state and municipal political boundaries. Of the 776 documented municipal boundaries of the country, the review was conducted and approval of 250 of them. Transcription of two state boundaries with legal support, issued by the Congress and the documentation thereof was performed was certified. The proposed procedure to address the political-administrative boundaries, and the proposal of the Technical Standard for Describing the State, municipal and district boundaries and geographic statistical purposes was drafted; and the proposed Technical Regulations for Data Generation Limits of State, Municipal and / or Delegational with statistical and geographical purposes.

## 9.2 International Boundary

As part of an inter-institutional collaboration in 2009 and 2011, INEGI and the Mexican Section of the International Boundary and Water Commission (IBWC), developed in 2009, the aerial photographic mosaic of the international boundary between Mexico and the United States, in the Rio Bravo. Composed of 197 orthophoto 1:25 000 scale, this mosaic captures the international border between Ciudad Juarez, Chihuahua, and the Gulf of Mexico, based on the "Treaty for resolving border disputes". In 2014 creates the basis to generate a new version of the mosaic during 2015.


Map of the international boundary in the Rio Bravo

## 10. Cadastral Information

### 10.1 BANOBRAS[1]

Cadastral Modernization Program is performed together to support municipal land registers. Its main objectives are to promote the development of municipal geographic information systems, generating reliable information for development planning and municipal land use, and increase the generation of income in municipalities. In this sense, we have generated 151 cadastral diagnoses, 100 business projects, 53 supervision of the implementation of the modernization projects were conducted and 32 technical reports issued compliance in 29 of the 32 states of the Mexican Republic.

Under the Program for Modernization and Linking Public Land Registries and cadastral coordinated by SEDESOL year 2010-2012, INEGI participated:

- Development of 28 diagnoses state cadastral *.

[1]Banobras. It is an institution of banking development that makes it a public company with majority state ownership, its purpose is to finance or refinance projects of public or private infrastructure and utilities investment and contribute to the state institutional strengthening of federal, and municipal.

- Hygiene and linking the 31 states and the Federal District.
- Development of executive projects of Colima, Morelos, Guanajuato, Querétaro, Sonora and Yucatan.
- Technical supervision of the implementation of Cadastral Modernization Project of the states of Campeche, Colima and Morelos.
- Measuring Progress on the Modernization of Campeche, Colima and Morelos.
- Integration of information to the National Display of the 31 states and the Federal District.

**Except Diagnostics Baja California, Baja California Sur, Durango and Jalisco.*

The territorial coverage of this work is presented in the following map:


Coverage analysis at the municipal level Cadastral Information

## 10.2 ASERCA2-SIAP3-INEGI

Under the agreement for the "Update Program Data and Records of the Board of PROCAMPO (PADEP)" in 2011 and 2012 are signed with the units referred amendment agreements in order to conclude the PADEP, and by 2013 it signed a Finally agreement to the attention of owners who for various reasons did not come to make the process of renovation in the times programmed by SAGARPA, at this late stage INEGI also performed scanning the land owner / documents.

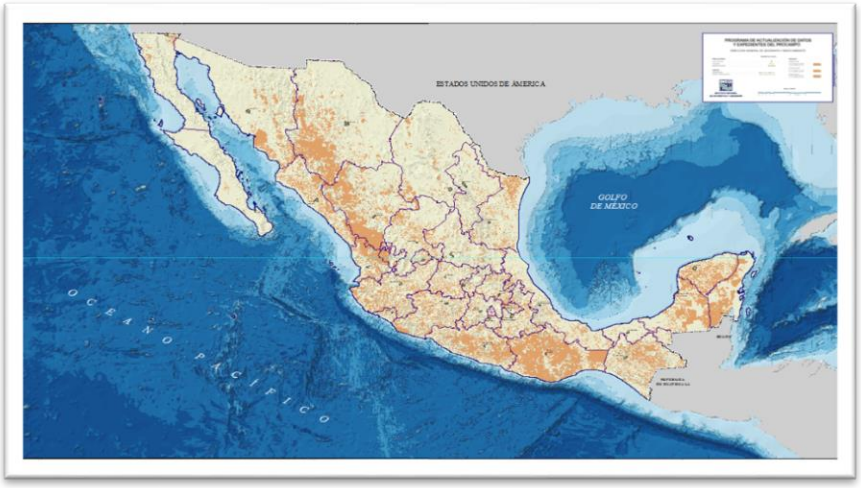
[2]**Support and Services for Agricultural Marketing**. Detached Administrative Office of the Secretariat of Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA), its purpose is to design, implement, monitor and evaluate public policies on support to rural areas are included in the National Development Plan and in the medium-term sectorial program to strengthen the development of the sector, farm profitability and the return to domestic producers.

[3]*Service Agro food and Fisheries Information. It is a decentralized agency of SAGARPA, in charge of designing and coordinating the operation of the National Information System Agro-Food and Fisheries and to promote competition and coordination for the implementation of the National Information System for Sustainable Rural Development.*

The territorial coverage achieved in this program is presented in the following table:

| State | Georeferenced properties | | State | Georeferenced properties |
|---|---|---|---|---|
| Aguascalientes | 20,458 | | Morelos | 28,550 |
| Baja California | 8,241 | | Nayarit | 51,778 |
| Baja California Sur | 1,357 | | Nuevo León | 34,171 |
| Campeche | 39,991 | | Oaxaca | 289,663 |
| Coahuila | 37,203 | | Puebla | 232,575 |
| Colima | 7,447 | | Querétaro | 47,301 |
| Chiapas | 294,542 | | Quintana Roo | 30,892 |
| Chihuahua | 93,305 | | San Luis Potosí | 135,616 |
| Distrito Federal | 2,256 | | Sinaloa | 117,692 |
| Durango | 108,075 | | Sonora | 42,135 |
| Guanajuato | 253,042 | | Tabasco | 34,514 |
| Guerrero | 190,812 | | Tamaulipas | 101,588 |
| Hidalgo | 157,986 | | Tlaxcala | 72,128 |
| Jalisco | 159,930 | | Veracruz | 201,084 |
| Estado de México | 150,262 | | Yucatán | 49,142 |
| Michoacán | 213,015 | | Zacatecas | 181,906 |
| **Total** | | | **3,388,657** | |

As a result of Program Update and Data Files directory PROCAMPO it has a geo-referenced, reliable, modern, and upgradeable standard that enables better decision-making and the link with the programs of SAGARPA and other programs of Federal Public Administration.




Register Update Program Files directory data from PROCAMPO


Update Information from Records PROCAMPO Directory

## 11. Natural Resources

At home he has a great diversity and richness of natural resources. This diversity is due to its complex topography from geology; as well as historical and evolutionary aspects

Currently the Directorate General of Geography and Environment has generated corresponding to the themes of Soil Science, Land Use, Land Use Potential, Hydrology and Climatology cartographic information.

In 2014 and 2015 was begun two important projects, the first with the National Forestry Commission (CONAFOR), where review and validation of forest resources 129 charts 1:50 000 of the State Forest Inventory and will be performed soils; and second, the National Water Commission (CONAGUA) where the National Wetlands of Mexico map will be updated, at 1: 250,000 and the National Cartographic Model Continuous Wetlands, scale 1: 50,000 that make up the National Inventory Wetlands, in the period 2015 to 2018.

Thematic mapping

Information on the country's natural resources was updated in the table below are listed the projects contained in the Regular Program:

| INEGI, Projects Update Information of Natural Resources, 2014 | | |
|---|---|---|
| **Project** | **Scale** | **Quantity and description** |
| Soil erosion information. | 1:250 000. | It has set national Soil Erosion 1 Series. |
| Methodology for updating the information Soil Erosion. | 1:250 000. | |
| Guide for the Interpretation of Soil Erosion Mapping from Data Dictionary Edaphologic. | 1:250 000. | Series II version 2.0 and 3.0. |
| Edaphologic information. | 1:250 000. | Series II and Series III. |
| Information Land Use and Vegetation. | 1:250 000. | Information updating Land Use and Vegetation Series IV and V. concluded |
| Information Land Use and Vegetation. | 1:50 000. | 220 sets (Mangrove)<br><br>10 Sets (cloud forest). |

| INEGI, Updated Information Projects of Natural Resources, 2014 | | |
|---|---|---|
| Project | Scale | Quantity and description |
| Update information about Land cover. | | 1 Technical document with the results of the classification and validation of segments of images (Landsat Rapideye 2011 and 2000). |
| Methodology Land Use and Vegetation | 1:250 000. | Series V. |
| Geological information. | 1:50 000. | Updating the Geological Information Series I and II it was concluded. |
| Geological information. | 1:250 000. | Continuous updating of the National Geological Information was concluded. |
| Geological Model susceptibility danger:<br>Mass Movement.<br>Coastal Erosion.<br>Subsidence collapse. | 1:250 000. | Coastal Erosion, Mass Movement and Subsidence-collapse: 6 datasets phenomena of geological hazard susceptibility concluded. |
| Data Dictionary of National Inventory of geological phenomena. | 1:250 000. | 1 document |
| Data Dictionary of National Geological Continuous INEGI_SGM. | 1:250 000. | 1 document |
| Surface Water. | 1:250 000. | Until now it has 9 integrated information studies in the context of River Basin Series III. |
| Underground water. | 1:250 000. | Until now it has 30 datasets hydrogeological zones Series III. |
| Technical Standard Model for Integration of hydrographic network. | | |
| National Inventory of Water Bodies. | 1:50,000. | It has dataset Inventory of bodies of water. |
| Methodology of surface and groundwater hydrology. | | |
| Potential Land Use Information. | 1:250 000. | 7 datasets generated. |
| Climatological information. | 1:1,000,000. | Cartography that makes up the Series II was updated. |
| Technical Standard of Climatic Data | 1:1,000,000. | |
| Geographic and Statistical Analysis of historical rainfall data from Mexico. | | A document that includes more than 154 477 770 historical records of minimum temperature, maximum and average annual precipitation was generated. This analysis was conducted through GIS to generate models of interpolation of precipitation. |
| Island Territory Information | | It was developed together with other agencies such as SCT, SER, SEMARNAT, INECC UNAM and the Mexican Catalogue Island Territory, document containing information of importance to the islands of Mexico. |
| Dynamic model of Demography of the San Pedro River Basin | | A prototype locally (Cuenca Alta del Rio San Pedro, within the limits of the State of Aguascalientes) on the relationship of the use of water resources with the demographic and economic dynamics of the State of Aguascalientes was developed. |

## 12. Condensed State

Integrated information infrastructure, topography, hydrographic and populations of the country. Made from topographic maps at 1: 250,000.

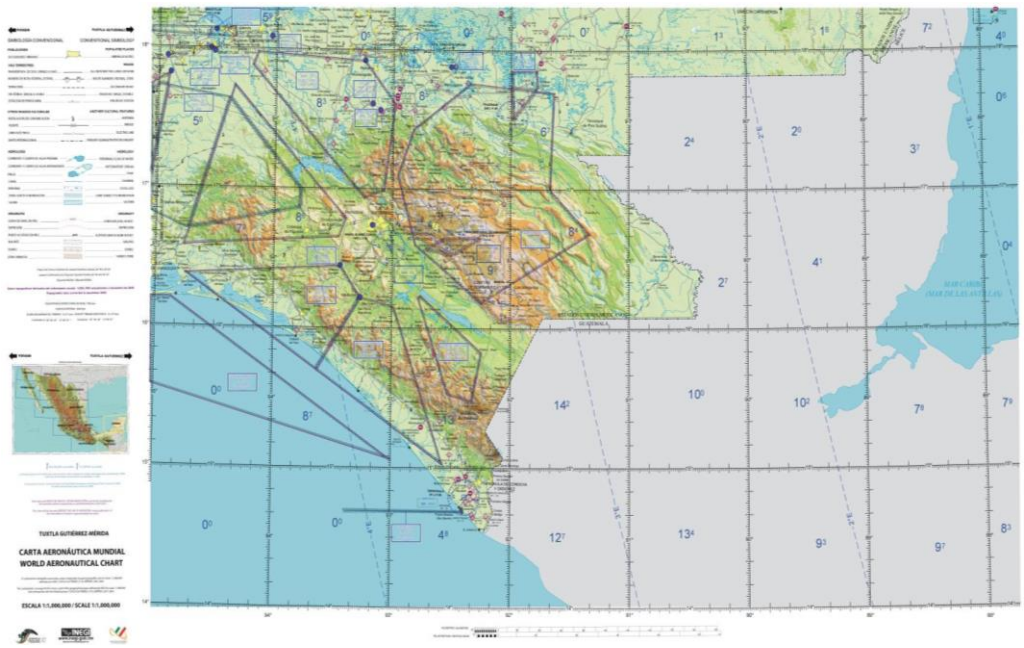
They represent terrain heights by colors and shading by orographic characteristics of the land, including hydrological, civil works, roads, land, air and sea communications, and populations. This product is 100% completed for the 32 states, on scales that vary from state to state in the range of 1:80 000 to 1: 1,250,000. 250,000 in nine states of the nine originally planned fulfilling the goal of 100 percent: In 2014 the State Condensed scale 1 updated.

## 13. Aeronautical Chart

It provides information that meets the requirements of visual air navigation for low speed, short-distance and medium, and low and intermediate altitudes. The aeronautical chart 1:1 000 000 is available in a series of six charts with information on both sides, comprising the entire territory of Mexico.

The information is provided by Navigation Services in Mexican Airspace, by the Directorate General of Civil Aviation, by the Association of Pilots and the Directorate General of Merchant Marine; through the Directorate General of Planning of the Secretariat of Communications and Transportation.

The Secretariat of National Defense provides information of military airfields and restricted areas to commercial flight.




World Aeronautical Chart scale 1: 1 000 000

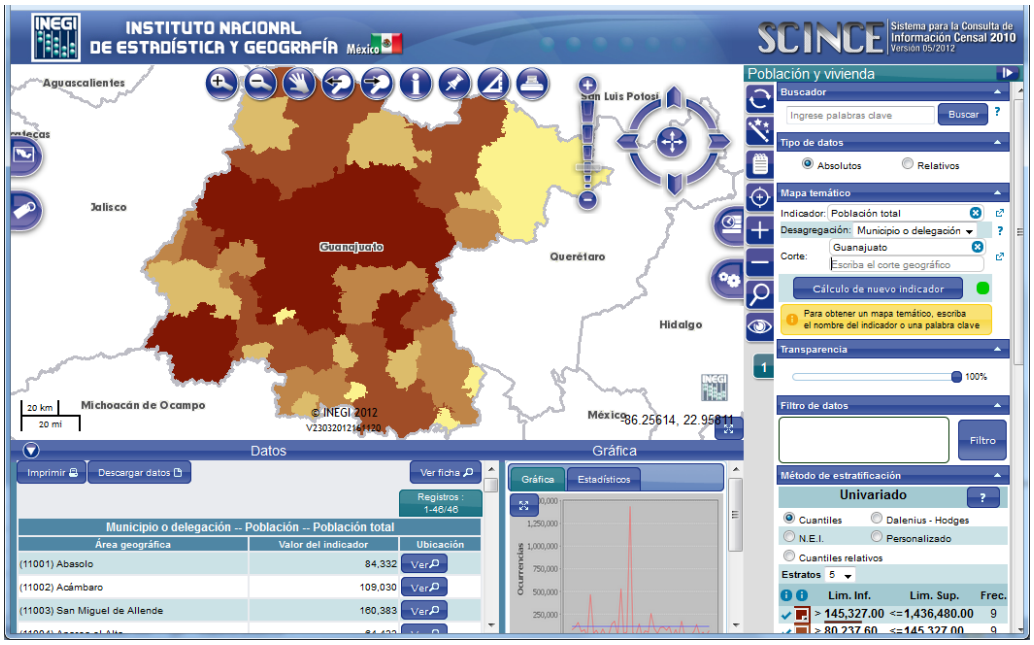
## OTHER PRODUCTS GENERATED

### 14. Geomatics Solutions for censuses and surveys

During the period we have developed applications used for planning, monitoring and publishing collected in the census and survey results.

### 14.1 Consultation System for Census Information

It is an application-based systems Digital Map of Mexico that operates online and desktop, which allows associating the statistical information from the 2010 Census with the geographical area to which it belongs, which provides additional information to aid interpretation of phenomena sociodemographic. Offers a number of socio-demographic indicators in both absolute and relative terms, by state, county, town, basic geostatistical areas (AGEB), city blocks and metropolitan areas. Also integrates the social gap index published by the National Council for the Evaluation of Social Development Policy (CONEVAL) by state and municipality; and the marginalization index to locality level, published by the National Population Council (CONAPO).



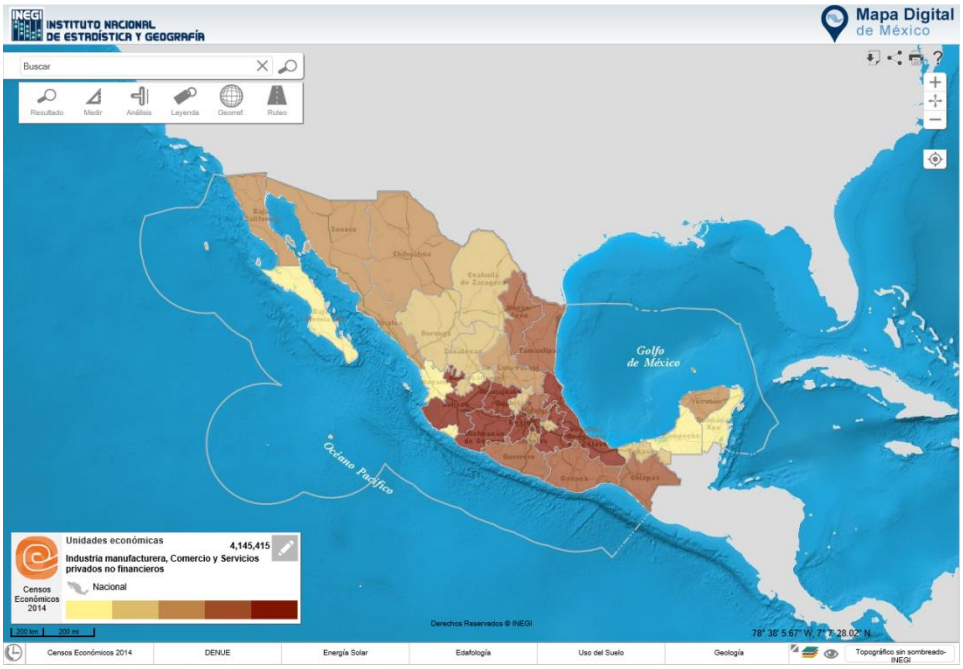

Consultation System for Census Information

### 14.2 National Agricultural Survey 2012 and 2014

Cartographic module that operated on mobile devices and was used to collect the location of the grounds of the informant was implemented. Cartographic Verification System, whose objective was to integrate updates from the Cartographic mapping module and thereby support users in the process of land verification, monitoring and updating was used in this survey.

## 14.3 Economic Census 2014

In this event Geomatics Solution for Censuses and Surveys that integrated the following modules was formalized. These modules were used in the SEG operational, Transport and Construction, Rural Show, Fishing and Mining, and massive.



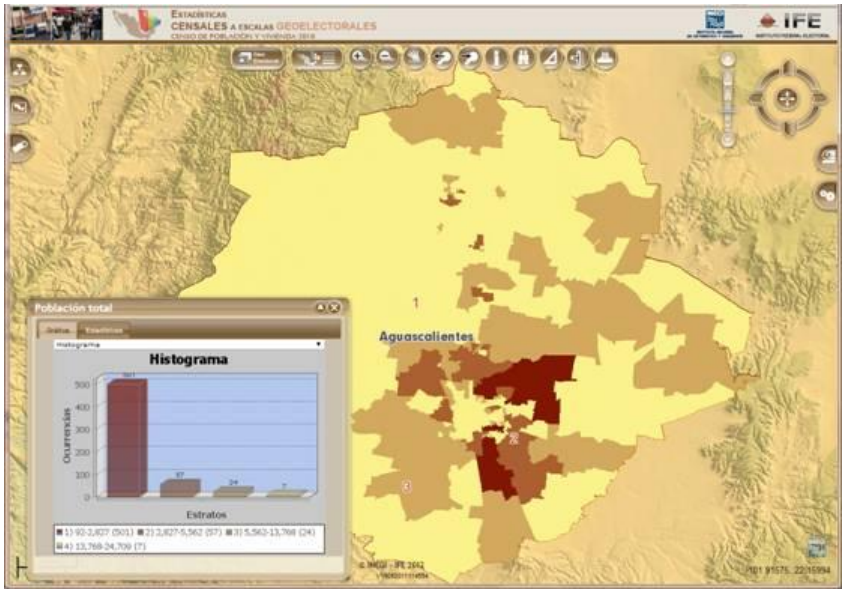

Monitoring progress and coverage - 2014 Economic Census

## 15. Geomatics Solutions for specific users

There are users systems that require querying information from any particular topic, so applications have been developed for consultation or downloading information online for these users.

### 15.1 geo-electoral census statistics scales (ECEG) 2012

The Census Statistics Scales geo-electoral system is a tool for analyzing the Census of Population and Housing 2010 District level election Section. By the information is possible to make diagnoses and territorial planning strategies scales District and electoral section.

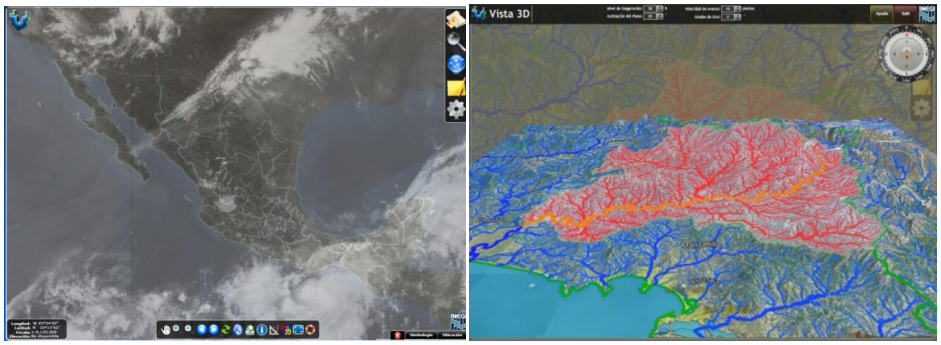



Census statistics geo-electoral Scales

## 15.2 Water Flow Simulator Watershed (SIATL)

Useful for analysis of surface water resources in the basins of Mexico through a spatial data service freely accessible through the Internet, with the potential for climate data analysis, natural resource and environmental enforcement, and in general, any variable related to the water. Take advantage of network analysis for calculating water flows and flows. It contains essential information for the study of watersheds and 3D visualization altimetry.

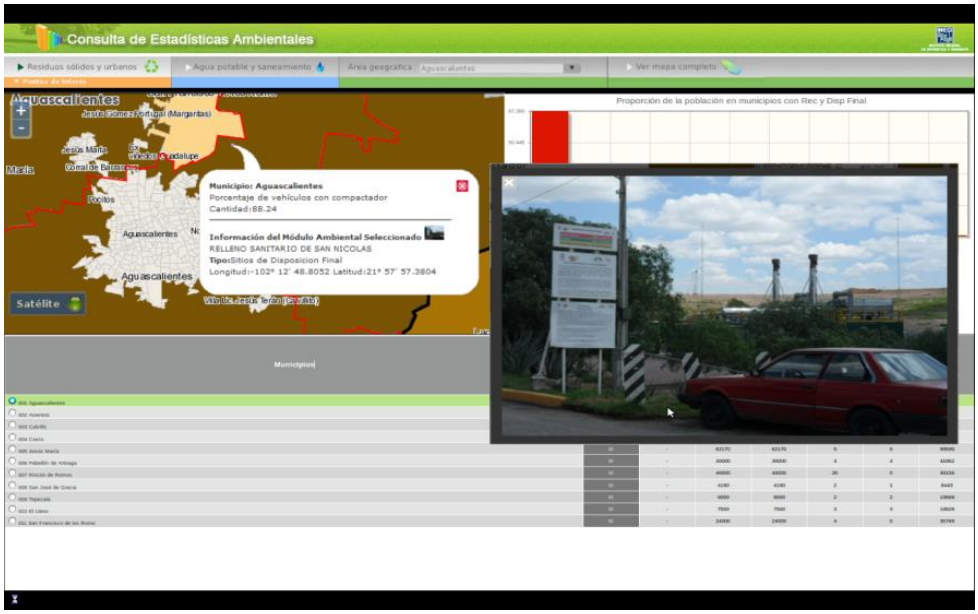
Oriented decisions for various projects such as water quality, water supply, water resource management, disaster prevention, and land use planning, infrastructure construction, watershed sustainability, among others.




Water Flow Simulator Watershed

## 15.3 Consultation System of Environmental Statistics

Internet Information System, which enables graphically, consults the statistical information on environmental modules, through graphic and thematic maps of key indicators at the state and municipal level. The information contained in the system brings elements of analysis that allow address a variety of needs on the topics of drinking water and solid waste derived from the National Census 2011 municipal and district governments as well as geo-referenced information of more than 24 thousand objects of environmental interest.




Consultation System of Environmental Statistics

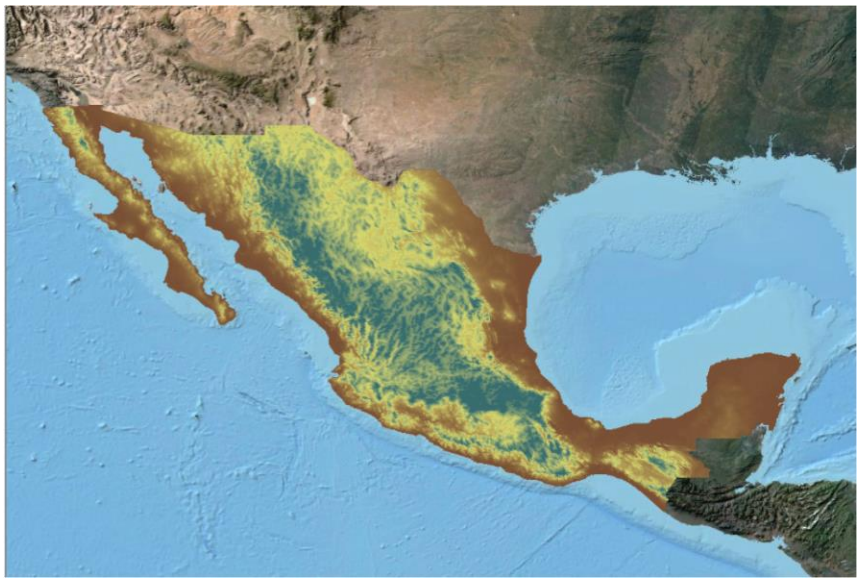
## 15.4 Consultation Information System Agricultural Geostatistics (SCIGA)

Consultation System Geostatistical Information, agricultural (SCIGA) joint statistical information such as the size of the production units and the type of crop or target species (classified according to the Industry Classification System North America NAICS), with the geographical area in which the production units are located, as a complement to traditional tabular results. This is an interactive product by which the user can consult Mexico agricultural information in geographic space with different levels of geographical breakdown, thematic maps and information tables.


Information Consultation System Agricultural Geostatistics

## 15.5 System Continuous discharge Mexican Elevations 3.0 (CEM 3.0)

In fiscal 2013 it was developed under the international standard Web Coverage Service (WCS) Open Geospatial Consortium, a new download service, with the aim of providing a product that allows to provide consistent and timely data from the Mexican mainland highlight the National Information Subsystem geographic and Environment, offering resolutions of 120, 90, 60, 30 and 15 meters above user-defined areas or based on the extension of the topographic map 1:50 000 This system is posted on the official website INEGI.



Continuous Mexican Elevations 3.0

### 15.6 National Cadastral Information System

In early 2015 within the framework of the National Cadastral Information System This system was migrated to platform MDM 6.0, also a breakthrough in the integration of raster image information online Zacatecas was achieved. Another important development this year was the management of access to information of cadastral mapping of States Sonora, Campeche and Mexico City, a result of the implementation of the quality process tabular and vector data, allowing connectivity through WMS and WFS services.

## 16. Several Geomatic solutions

They have also developed applications that allow public participation in general, to contribute to the updating of the mapping generated at the Institute. Furthermore it has developed Digital Map platform serving as a base for various applications previously mentioned.

### 16.1 Participatory Mapping

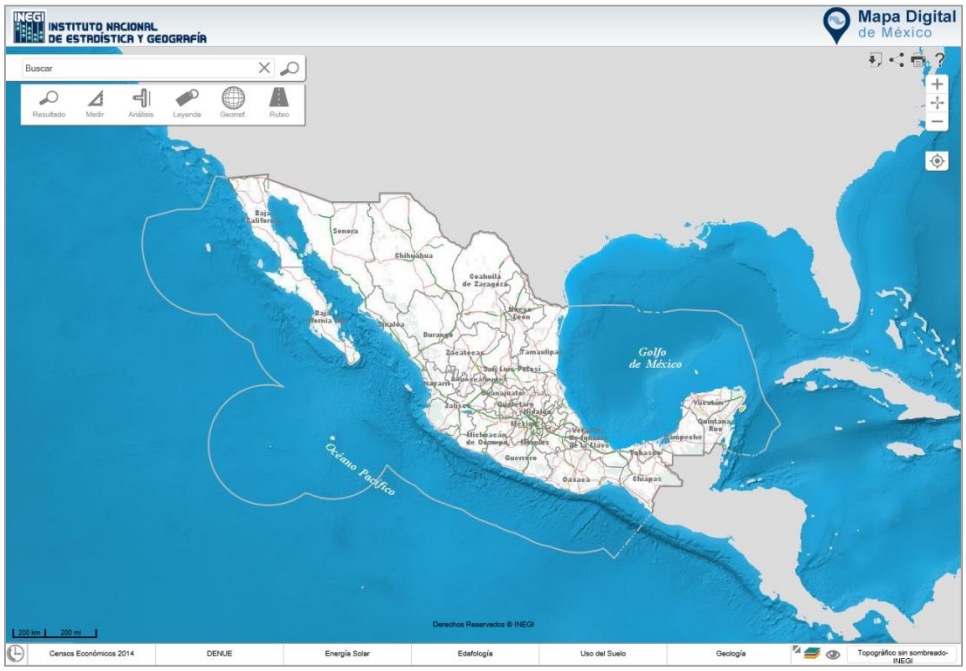
In order to strengthen the process of updating the mapping of the country, the INEGI considers that users of geographic information can actively participate in the identification and notification to the Institute of any changes to the data with which it currently has. For this we have seen the implementation of a national project called "Participatory Mapping", which aims to promote citizen participation to contribute with their knowledge to the continuous improvement of cartographic information, allowing users report the differences detected between reality and mapping generated by the INEGI. With the implementation of participatory mapping project, the INEGI will address the provisions of the Law of the National System of Statistical and Geographical Information, which states that the INEGI geographic coordinates the tasks of the country, in order to provide society and the rule of geographic information quality, accurate and timely information that contributes to national development.

The Participatory Mapping Project is based on a methodology for updating the map data by which invites different sectors of society to collaborate in updating the geographic information generated by the Institute.

### 16.2 Digital Map of Mexico Version 5.0 and 6.0

Web geographic information system with capacities ranging from simple display of geographic layers, to the spatial analysis, in addition to being used as a platform to build solutions that combine geographic data with statistical data. From this application you can access more than 200 layers of information of the country, with topics such as urban mapping, facilities, population and housing, roads, climate, natural resources, among others, besides being able to use tools for your use. In 2011-2014 the development of geomatics solution Digital Map of Mexico (MDM) continued desktop. In that period, versions 5.0, 5.1 and 6.0 are published to improve, enhance and innovate a series of basic, intermediate and specialized as digitizing, spatial analysis, descriptive statistics, linear correlation, database access, view scan tools street level, incorporating layers from WMS services, among others. It is in this period where your download is implemented by Institute website.

From 2011 it is presented as a platform, the Digital Map of Mexico, which is driven and used in various institutional projects; it is also the basis for various projects developed jointly with other agencies of the Federal Public Administration.




Digital map of Mexico

## 17. Geographical Indicators

In response to the commitments established by LSNIEG proposals for indicators were developed, which are aligned to the MDGs, the issues are:

- Mean Sea Level
- Social Property
- Degree of pressure on water resources.
- Population with access to piped water.
- Population with access to sewerage and sanitation.
- Global Water Sustainability Index.
- Index Global access to basic water services.
- Water productivity in irrigation districts.
- Surface natural terrestrial and marine protected areas.
- Area affected by degradation
- Surface conserved through systems of protected areas and other conservation methods.
- Domestic consumption of stratospheric ozone depleting substances.
- National Pollutant emissions criteria.

- Percentage of municipalities with proper disposal of Municipal Solid Waste.
- Proportion of population with access to waste collection.
- Carbon dioxide emissions per gross domestic product.
- Emissions of carbon dioxide from the burning of fossil fuels.
- Emission of greenhouse gases per capita
- Emission of greenhouse gases by gross domestic product.
- National Emission of greenhouse gases.
- Per capita carbon dioxide broadcast.
- Oil production.
- Energetic resources.
- National Energy Balance.
- Energy intensity.
- Energy and environment.
- Infrastructure.
- Participation of hydrocarbons in the public sector revenues.
- Energy Prices.
- Production of gas.
- Margin reserves the interconnected system.
- Participation of renewable and alternative sources of energy production.
- Participation of hydrocarbons in domestic energy production.
- Rate of energy independence.
- Gross domestic supply of energy.
- Gross domestic supply of energy covered by imports.
- Replacement rate of hydrocarbon reserves 1P.
- National Energy intensity.
- Production Ratio 1P-reserves.
- Changes in sales of basic fuels PEMEX.
- Change in electricity sales.

## 18. Regulations

Technical regulations is made by regulations issued or approved by the Governing Board to regulate the design, acquisition, production, updating, organization, processing, integration and compilation of geographical information and environment, to ensure the implementation of principles to help improve quality of information produced by the State units, which is of national interest or can be determined as such.

Have developed ten regulatory provisions for the geographic scope, published in the Official Journal of the Federation (DOF) and two dictionaries of cadastral data national implementation:

- Technical Regulations for the Registration of Geographical Names and insular with statistical and geographical purposes. Published on June 25, 2015

- Guidelines for the exchange of cadastral and geographical information for statistical purposes. Published on June 23, 2015.

- Technical Standard for the Generation of Digital Elevation Models with geographic purposes. Published on December 2, 2014.
- Standard Authorization for Aerial Survey and Geographic Explorations in the country. Published on June 5, 2013.
- Use Agreement Broader Terms Catalog of Undersea. Posted on December 28, 2012.
- Technical Standard for Generation, Acquisition and Integration of Surveying and Registry data wit statistical and geographical purposes. Published on January 16, 2012.
- Delivery Technical Standard on Geographic. Published on November 12, 2010.
- Technical Standards for the Preparation of geographic metadata. Published on December 24, 2010.
- Technical Regulations for the National Geodetic System. Published on December 23, 2010.
- Technical Standard Positional Accuracy Standards. Published on December 23, 2010.
- Cadastral Data Dictionary scale 1: 1 000 urban areas
- Cadastral Data Dictionary scale 1:10 000 rural areas

## 19. National Register of Geographical Information (RNIG)

With the issue of LSNIEG, functions are strengthened to coordinate information generation and consolidate national interest RNIG under the presence of INEGI as element coordinator system and operate national registries.

From 2011 to 2013, considering the provisions of the Law of National Statistics and Geographic Information, it redesigns the RNIG and under this new concept, an inventory of the characteristics of geographic information products based on their metadata and integrates data provided by generating areas; and a directory of geographic information generators.

In 2014 a pilot test was conducted with the capture system provided by DGCSNIEG, 32 incorporating the features of geographic information products generated in the DGGMA. It also features 68 other geographic products are incorporated, whose ballots were pre filled and validated with the support of the producing areas, in order to assist in shaping the RNIG.

## 20. Strategic Alliances

INEGI has strengthened its participation in international forums through to become a member of the following international organizations:

- International Cartographic Association (ICA)
- International Society for Photogrammetric and Remote Sensing (ISPRS)
- Regional Cartographic United Nations Commission for the Americas (CCRNUA)
- International Federation of Surveyors (FIG)
- Conference of European Statisticians UNECE CES-
- UN - Statistics Division
- United Nations Initiative on Global Geospatial Information Management (UN-GGIM)
- Regional Committee of the United Nations Global Geospatial Information Management for the Americas (UN-GGIM: Americas), formerly Permanent Committee for Geospatial Data Infrastructure of the Americas (CP-IDEA)

We also maintain cooperation with the following international organizations:

- European Committee for Responsible Official Mapping Agencies (CERCO)
- Pan American Institute of Geography and History (IPGH)
- United Nations Environment Program (PNUMA)
- International Steering Committee for Global Mapping (ISCGM)

Expert Groups:

- Working Group on Environmental Statistics of the Statistical Conference of the Americas (CEA-CEPAL).
- Panel on Energy Statistics of the United Nations (Oslo Group)
- Group of Experts on Geographical Names United Nations
- Expert Group on Geographic Information Management (in conformation)
- Working Group on Environmental Indicators (GTIA)
- Task Force to draft GEOSS