

# GEOGRAPHIC INFORMATION SYSTEMS AT THE PR OFFICE OF MANAGEMENT AND BUDGET



# Why having GIS @ PROMB?

# Why having GIS at PR OMB



- **Electronic Government Act** – PR OMB is the state agency in charge of coordinating, standards establishments, software and data licencing related to information technologies.
- **GIS** is just one type of Information System. Nearly **30 state agencies** use GIS and its related geospatial technologies. This does not include a dozen of municipalities that have GIS.
- Evaluation of GIS related consultation proposals
- Evaluation of bills, legislative proposals related to geospatial issues

# Why having GIS at PR OMB



- GIS – Geographic information and geospatial technologies can be applied to:
  - Public safety,
  - Planning and permits,
  - Natural resources management and inventory,
  - Infrastructure,
  - Revenues and monitoring granted funds

# Why having GIS at PR OMB



- Geographic information portal –
  - PR OMB stores and publishes geodata of various agencies (also federal geodata) at a portal under the domain “pr.gov”

□ <http://gis.pr.gov>

□ **Note: This portal is in Spanish**

The screenshot shows the homepage of the 'PORTAL DATOS GEOGRAFICOS GUBERNAMENTALES' at [gis.pr.gov](http://gis.pr.gov). The page features a top navigation bar with links for 'Inicio', 'Geografía PR', 'Proyecto Centralización GIS', 'Catálogo de Geodatos', 'Descarga de Geodatos', 'Datos censales', and 'Sección Educativa'. A central map displays a coastal area with various data overlays. Below the map is a sidebar menu with categories like 'Ambientales', 'Cuadrículas', 'Delimitaciones', 'Desarrollo Económico', 'Dotaciones', 'Geografía Censal', 'Infraestructuras', 'Recursos Culturales', 'Reglamentación', and 'Riesgos Naturales'. The main content area includes a welcome message in Spanish, a list of resources, and a section for applications, including a video demonstrating the portal's features. An 'Aviso' (notice) at the bottom right states that the application requires Microsoft Silverlight.

# Por qué tener GIS en OGP



- Geographic information portal –
  - This portal serves geodata and census socio economic data. Some space is dedicated also for maps for students and educational purposes

□ <http://gis.pr.gov>

**PORTAL DATOS GEOGRAFICOS GUBERNAMENTALES** [gis.pr.gov](http://gis.pr.gov)

Inicio Geografía PR Proyecto Centralización GIS Catálogo de Geodatos **Descarga de Geodatos** Datos censales Sección Educativa

Agencias > Sistemas de Información Geográfica (SIG)

- Ambientales
- Cuadrículas
- Delimitaciones
- Desarrollo Económico
- Dotaciones
- Geografía Censal
- Infraestructuras
- Recursos Culturales
- Reglamentación
- Riesgos Naturales

Geografía de Puerto Rico

Mapas para estudiantes

Guías y estándares

Mapas para ver en Google Earth

Datos Censales, 2010

Servicios Open GC

Aplicaciones

**Aplicación web para ver geodatos gubernamentales**

**Aviso:** esta aplicación necesita Microsoft Silverlight

**Video/DEMO:** Para un mejor uso de esta aplicación, vea o descargue el siguiente **video**, el cual demuestra cómo usar la aplicación. Este video le muestra cómo añadir la tabla de contenido y cómo añadir otros geodatos que no estén en la lista y que residen en nuestro servidor de servicios web.

**¡Bienvenidos!**

En este portal encontrará varios recursos referentes a la geografía y datos geográficos de Puerto Rico. Este portal ha sido construido como parte de los esfuerzos para centralizar los datos geográficos digitales producidos por las agencias del gobierno central y sus corporaciones públicas. Los datos recopilados a través de los años 2001-2012 residen en nuestra base de datos geográficos. Gran parte de estos datos se han puesto a la disponibilidad de los ciudadanos a través de servicios web, así como también a través de descargas directas de estos datos.

Entre los temas de mayor importancia están:

- Resumen de Geografía de Puerto Rico
- Recursos educativos
  - para estudiantes
  - sobre tecnologías de información geográfica
- Descarga de geodatos



# Background

# Background (1989-94)



- The first attempt for a GIS centralization was made by the PR Planning Board in the early 90s. A number of agencies shared geodata with the Planning Board.
  - The Planning Board requests data from various agencies for planning, land regulations, and permits.
  - The supply of geographic information from other agencies has been irregular.



# Background (1996-2000)

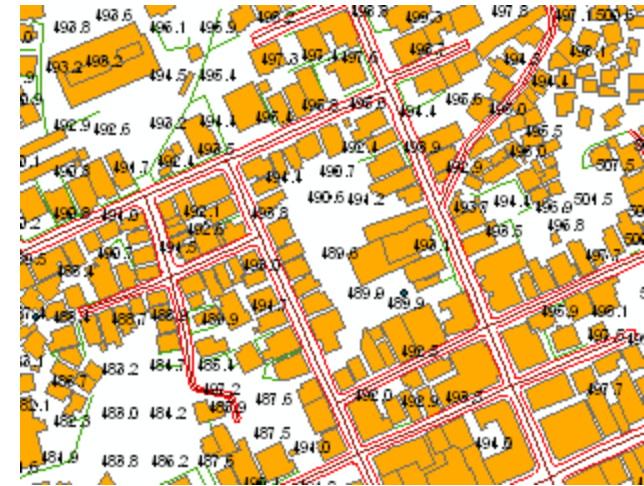


- **Some years later other agencies showed up with important geodata such as:**
  - ▣ **Municipal Revenues Collection Center (CRIM in Spanish) contracted services for the conversion of their paper cadastral map.**
    - High-detailed **basemap** and **orthophoto-mosaic** products were developed to fulfill this project. These two were the foundation of the digitalization of existing paper maps.
    - The **cost** in year 2000, was estimated in **US\$56 MM**, payed by the municipalities.

# Background (1996-2000)



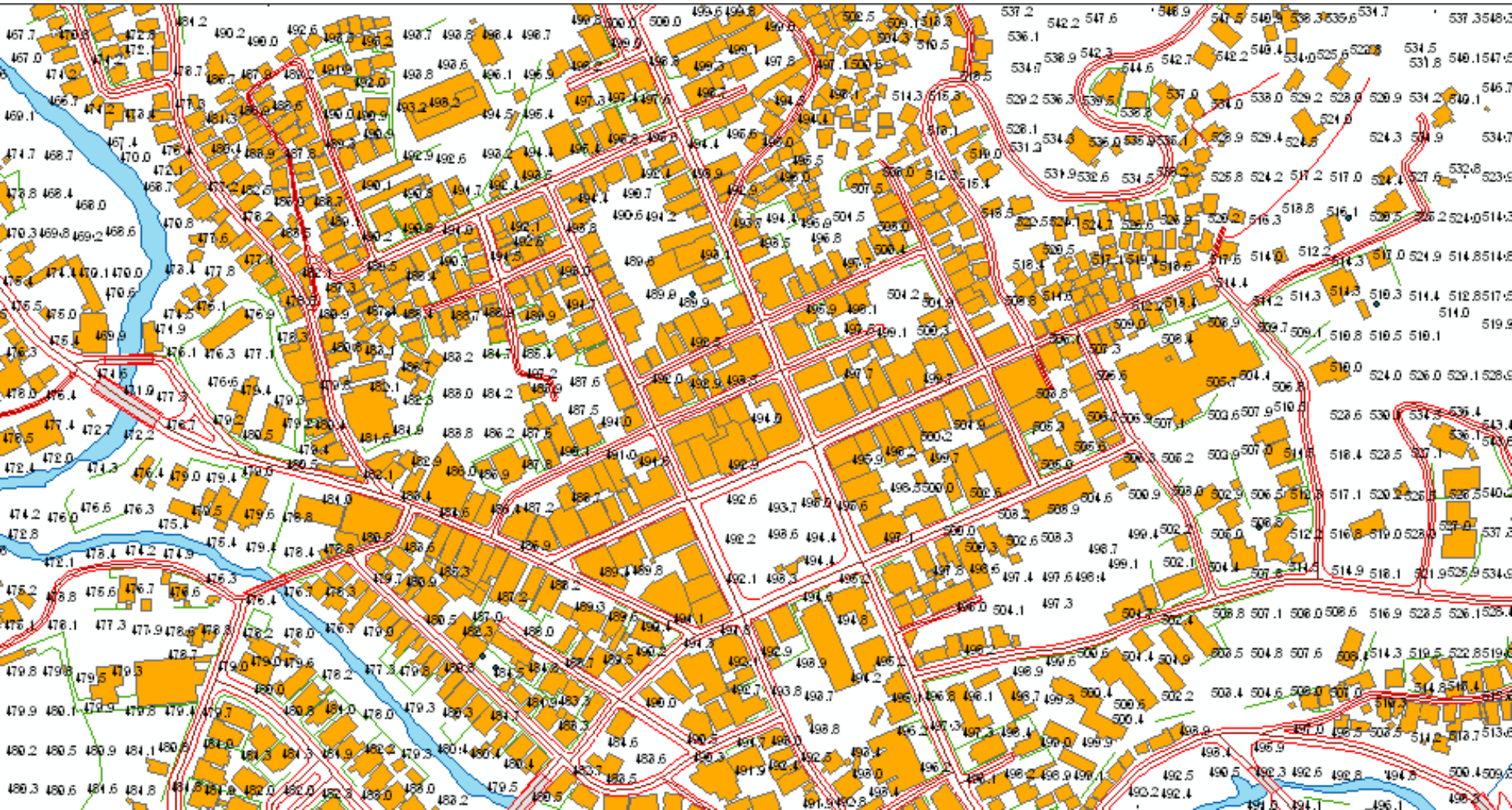
- What are the components of this basemap?
  - **Planimetric map (1996-98)** at a scale of 1:2,000
    - Transportation: edges of pavement, street centerlines
    - Waterbodies: rivers, reservoirs...
    - Building footprints
    - Elevation in meters
    - Visible fences
    - Visible pipelines
    - Electric transmission towers
    - Geodetic control points and miscellaneous layers
  - **Color, high-res Orthophoto-mosaic (1996-98)**
    - 6" per pixel in dense urban areas
    - 9" per pixel in rural areas.



# Background (1996-2000)



## Sample screenshot of CRIM's basemap, Adjuntas, PR



# Background (2001 - present)



- **Some years later other agencies showed up with important geodata such as:**
  - ▣ In 2001, PR OMB added GIS in its new IT program.
    - **2001-02: Satellite Imagery: IKONOS:** PR OMB bought a license of use for a high-res, ortho-rectified, color and IR satellite imagery (**IKONOS, 2001-02**) for Puerto Rico, and its nearby islands. This licensing was extended to all **state agencies** and **public corporations, municipalities,** and the **public university system (UPR).**
    - **2004: CRIM's Basemap:** PR OMB and CRIM signed an agreement for a license of use of CRIM's basemap and cadastral map. This **licensing** was **extended to central government agencies** and the PR Aqueducts and Sewers Public Corporation. Data were available to **UPR** and **fed agencies** using a **degraded version,** at a scale of **1:5,000.**



# Proposed projects

# Proposal:



- **Basemap update:** Needed to come up with more reliable geodata.
  - **Orthophoto-mosaic**
  - **Planimetric basemap.** Should include the following basic layers:
    - **Transportation network** (at least centerlines)
    - **Building footprints**
    - **Hydrography**
- **Synchronize GIS and related data in a centralized database.**

# Standards



## □ Adopting geospatial standards:

### □ Federal geospatial standards, about:

- Metadata, FGDC-STD-001-1998 or ISO 191
- NMAS, Geospatial Positioning Accuracy Standards: FGDC-STD-007.4-2002
- Using US Census codes for geographic areas.

### □ Other standards:

- geodata entry (various states)
- GPS surveys for mapping (EPA SOP)
- Coordinate systems, map projections: PR Public Law 264, year 2002. (State Plane Coordinate System, meters, Lambert Conformal Conic Projection, NAD83 (or more current version))



# Commonwealth's Geodata Centralization



# Geodata centralization



## ▣ Advantages:

- Fostering economic development balanced with natural resources conservation by means of integration and availability of geospatial data to the public.
- Provide the most updated data available.
- Each agency is responsible of their data updating.
- **PR OMB** will store and make these data available to the public (except for sensitive data).

# Geodata centralization

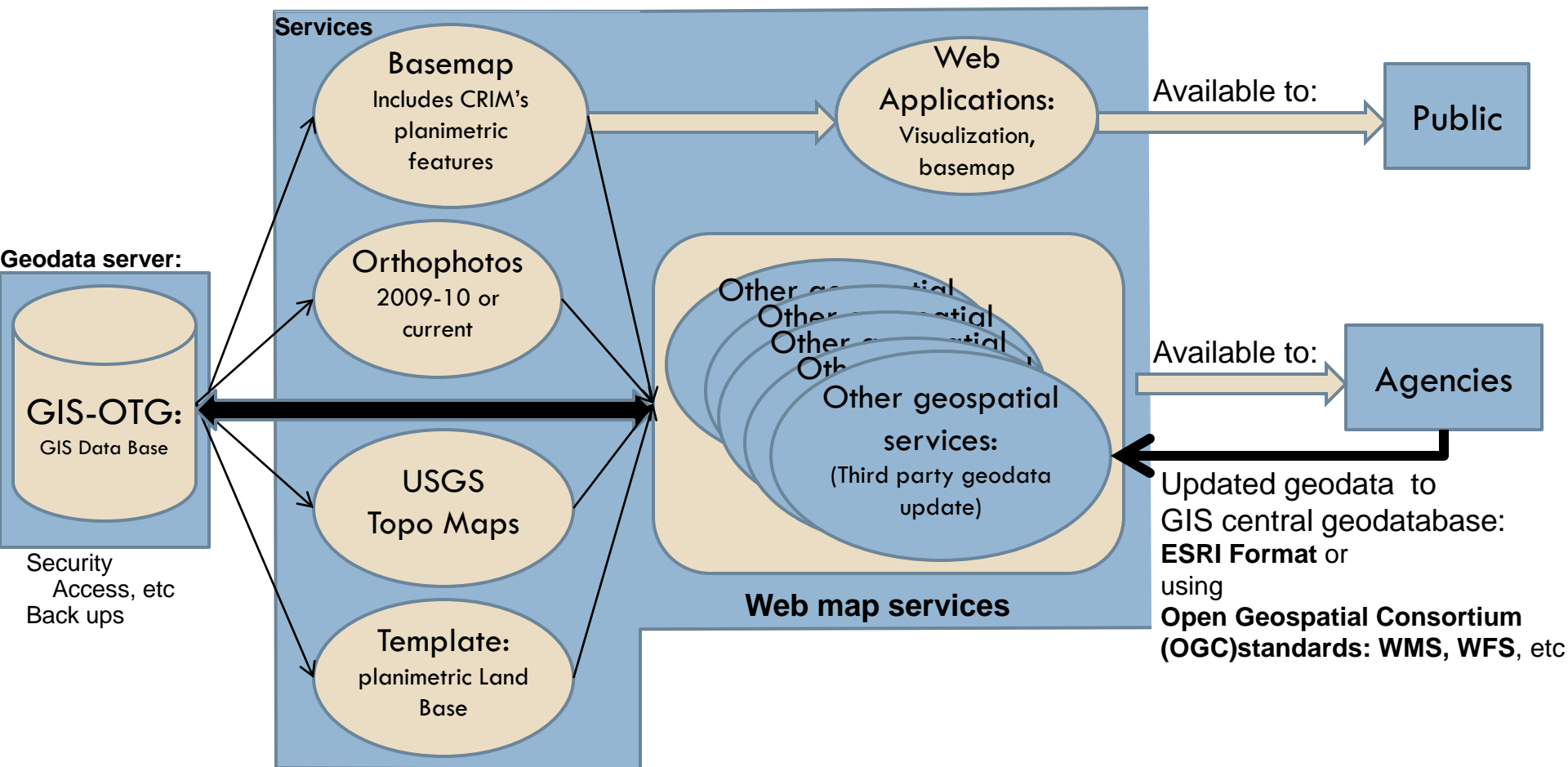


- **Centralization project (2009-present):**
  - Integrated geodata from PR Planning Board and other agencies. (DONE)
  - Building **web map services**: Aerial photography (2007, 2010, IKONOS 2001), and multiple geodata layers. (DONE)
  - Coordination of trainings about ArcGIS Server, replication services, and synchronization. (DONE, 5 agencies)
  - Begin to use open standards for geodata publishing: Web Map Service (WMS), Web Feature Service (WFS), Web Coverage Service (WCS).

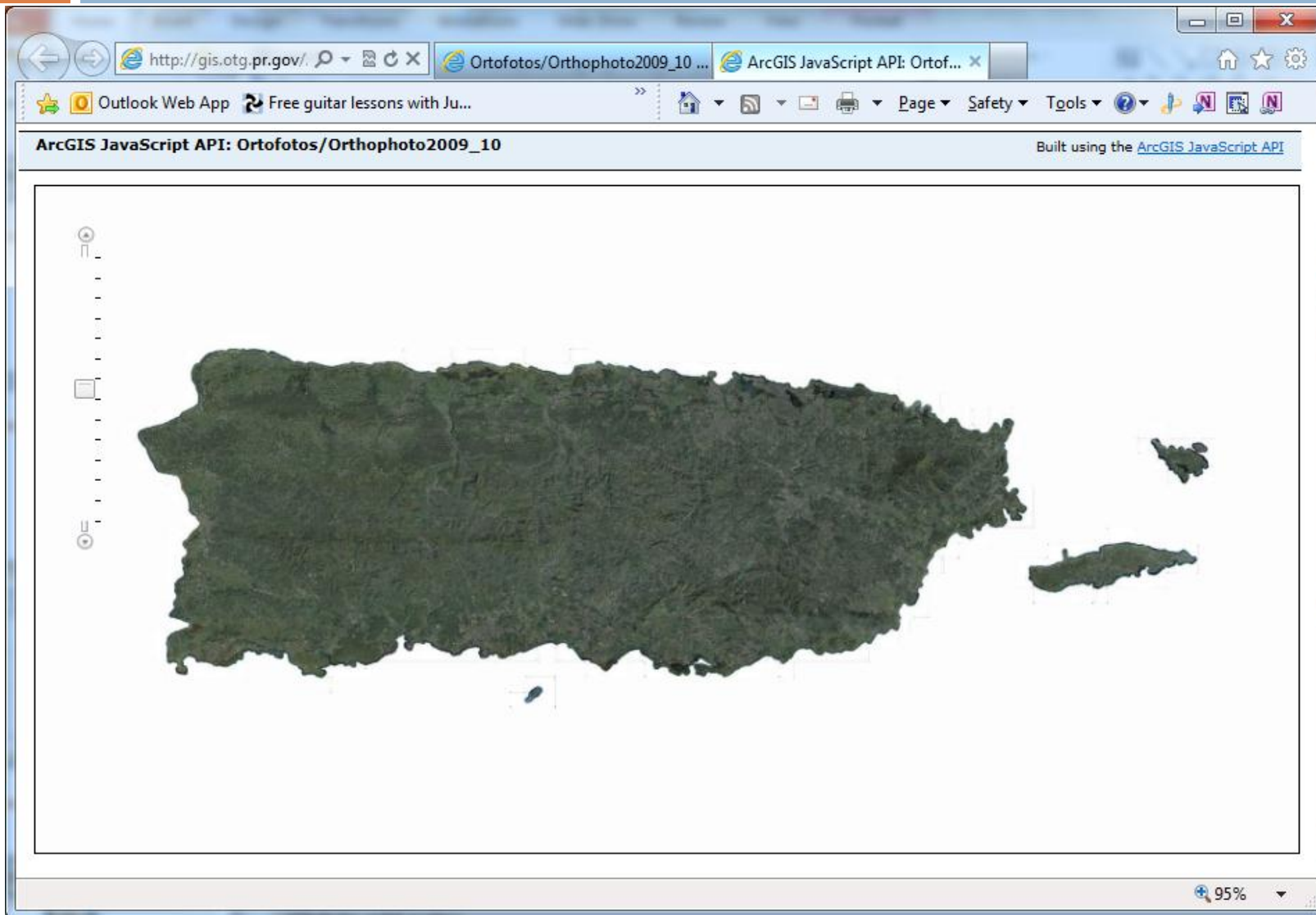
# Geodata centralization



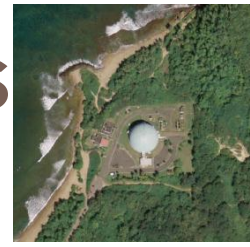
## Geodata centralization:



# Geodata catalog: ArcGIS Server 9.3 REST services



# Examples of Web Map Services (Open Protocols)



Quantum GIS 1.8.0-Lisboa

File Edit View Layer Settings Plugins Vector Raster Database Web Help

Layers

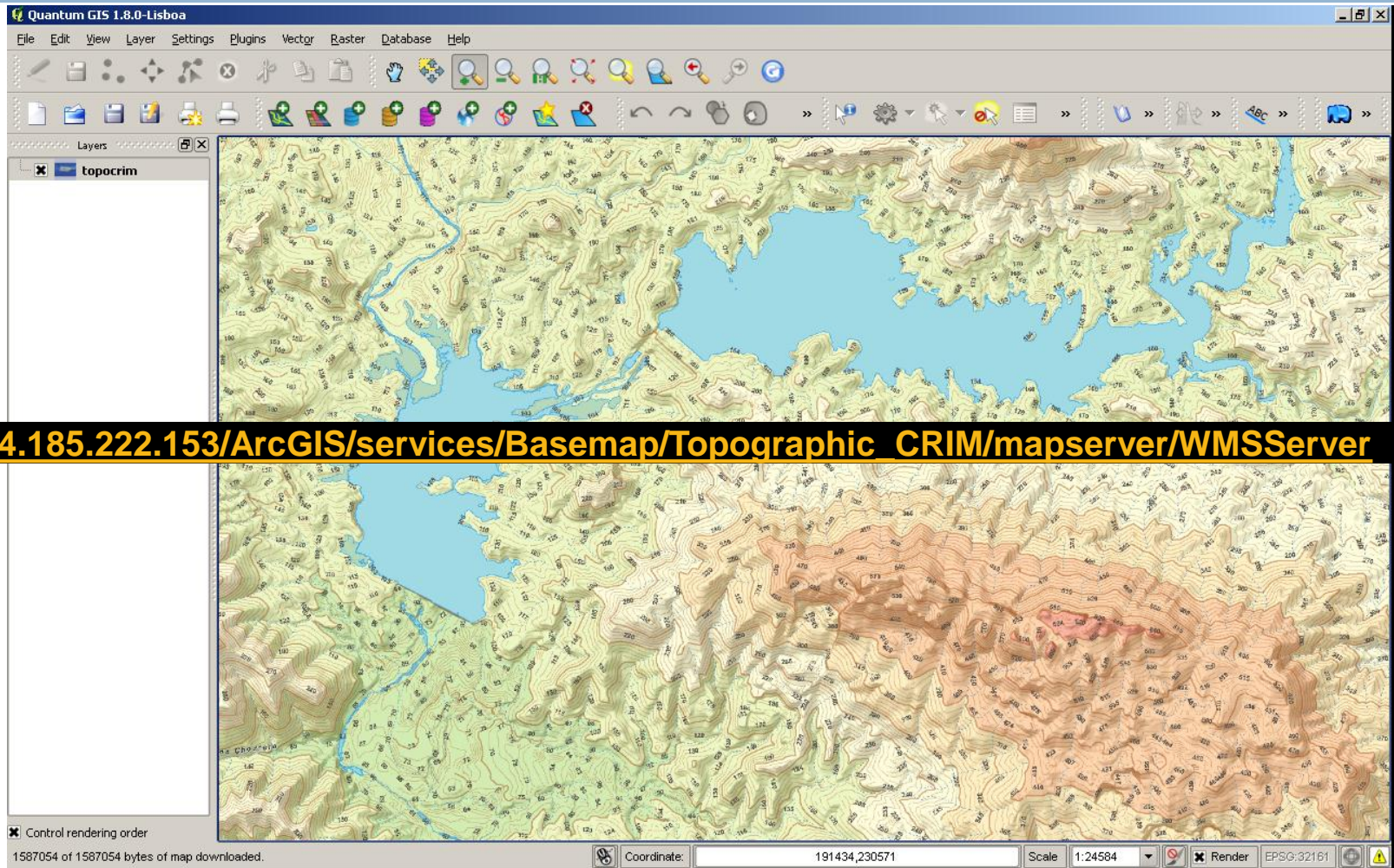
- municipios\_edicion\_marzo2009
- cn\_ele\_dias
- Ortofoto 2009-10**
- Ortofoto 2009-10
- Google Hybrid

[http://gis.otg.gobierno.pr/arcgis/services/Ortofotos/Orthophoto2009\\_10/MapServer/WMSServer](http://gis.otg.gobierno.pr/arcgis/services/Ortofotos/Orthophoto2009_10/MapServer/WMSServer)

Coordinate: 248455,261097 Scale 1:43888 Render EPSG:32161

Ejemplo de servicio de mapas: [http://gis.otg.gobierno.pr/arcgis/services/Ortofotos/Orthophoto2009\\_10/MapServer/WMSServer](http://gis.otg.gobierno.pr/arcgis/services/Ortofotos/Orthophoto2009_10/MapServer/WMSServer)  
Ortofotografía aérea 2009-10 usando estándar WMS. Visualizador: QuantumGIS 1.8

# Examples of Web Map Services (Open Protocols)



Ejemplo de servicio de mapas:  
Mapa base topográfico usando estándar WMS

# How to get geodata?

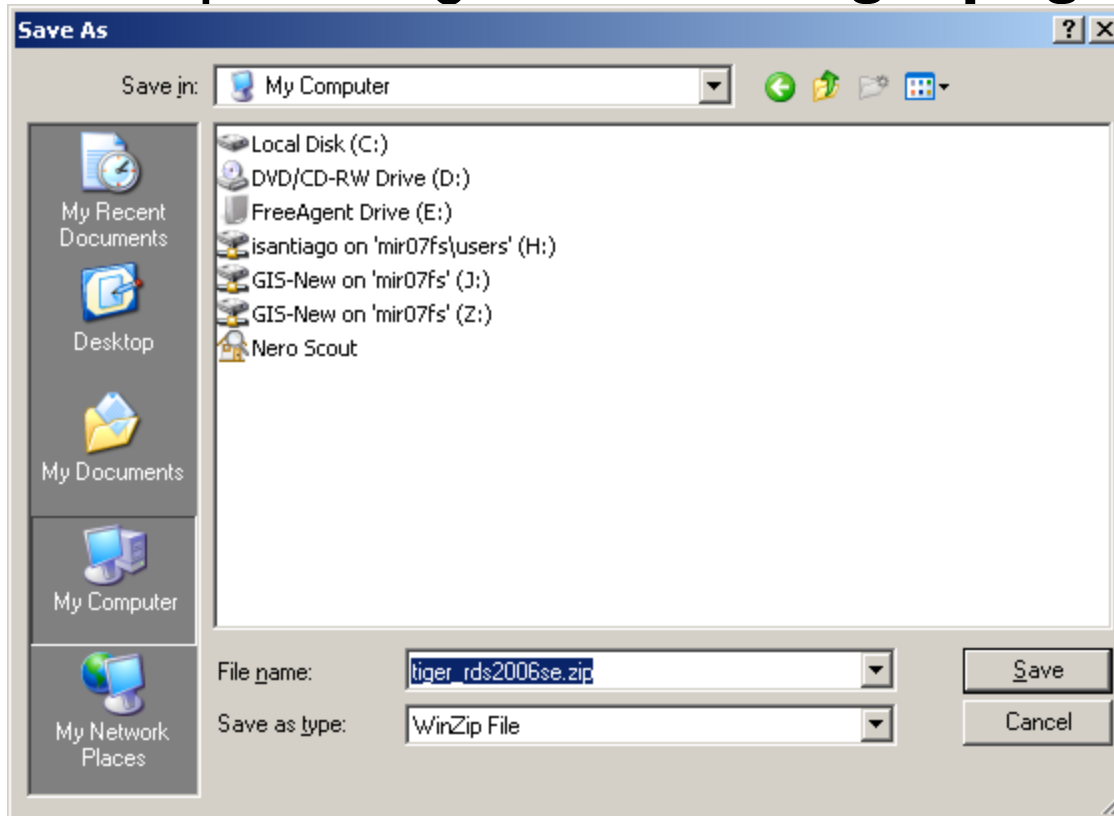


- By the GIS Portal:
- Zipped **Shapefile** format files, grouped by themes.
  - <http://gis.pr.gov>
  - <http://www2.pr.gov/agencias/gis/descargaGeodatos/Pages/default.aspx>
- Using open protocol: **Web Feature Service (WFS)** by means of **FOSS Desktop GIS**: QGIS, Udig, gvSIG.  
**Also** using ArcGIS 9.3 and 10.x.
- ArcGIS Server's REST interface:  
<http://gis.otg.pr.gov/arcgis/rest>

# How to get geodata?



- Example using GIS Portal: [gis.pr.gov](http://gis.pr.gov):



<a href="#">Véalo en Google Earth®</a>		
<a href="#">Sistema vial: calles, carreteras</a> Precisión: Archivo pesado: +40Mb	Negociado del Censo Federal, 2006. La Oficina de Gerencia y Presupuesto (2009-presente) está actualizando municipios del área oeste: Cabo Rojo, Hormigueros, Mayagüez, Añasco, Moca, Aguada, Rincón, Aguadilla, Isabela, Quebradillas(en proceso)	<a href="#">Metadatos</a>



# How to get geodata?



The screenshot displays the 'Add WFS Layer from a Server' dialog box in a GIS application. The dialog is titled 'Modify WFS connection' and is open over a list of geodata layers. The 'Connection details' section contains the following information:

- Name: GIS Central PR
- URL: http://64.185.222.206:8080/geoserver/wfs
- Password: (empty)

The dialog also features 'OK', 'Cancel', and 'Help' buttons. The background shows a list of geodata layers, including 'AMB\_CONSERV\_CRITICAL\_WILDLIFE\_AREAS', 'AMB\_CONSERV\_FINCA\_GABIA', 'AMB\_CONSERV\_GAP\_AREAS\_NATURALES\_PROTE', and 'AMB\_CONSERV\_LAGUNA\_GUANICA'. The coordinate reference system is set to 'EPSG:32161'.

More than 125 geodata layers available.

# How to get geodata?



## □ Using ArcGIS Server's REST interface

Folder: /

gis.otg.pr.gov/ArcGIS/rest/services

New folder Google Analytics | Offi... Google TV5 Le dictionnaire

### ArcGIS Services Directory

- Contornos de elevación gen
- Topónimos marinos
- Contornos batimetría\_m
- Batimetría oceanica\_m
- Elevaciones \_m
- Elevaciones\_Mona\_m
- Sombreado\_topográfico\_Mo
- Sombreado\_oceánico
- Sombreado topográfico

Display Source Selection

Peñón de Ponce 101 m LAGUNA LAS SALINAS

Drawing Arial 10 B I U Topology: 153329.638 225289.683 Meters

# How to get geodata?



- Contacting PR OMB to get CRIM basemap data.
  - ▣ These geodata are available only to government agencies. Original data for third parties must contact CRIM (Digital Cadastre Unit).

- ▣ There are some other 500 geodata layers in our

[http://gis.otg.pr.gov/pres/Listado Geodatos GIS Central 06mar2013.txt](http://gis.otg.pr.gov/pres/Listado_Geodatos_GIS_Central_06mar2013.txt)

elevation models, scanned geologic maps, topographic quadrangles, historic and current.

- ▣ To see a **listing** as per March 6, 2013 go to this address:
- [http://gis.otg.pr.gov/pres/Listado Geodatos GIS Central 06mar2013.txt](http://gis.otg.pr.gov/pres/Listado_Geodatos_GIS_Central_06mar2013.txt)



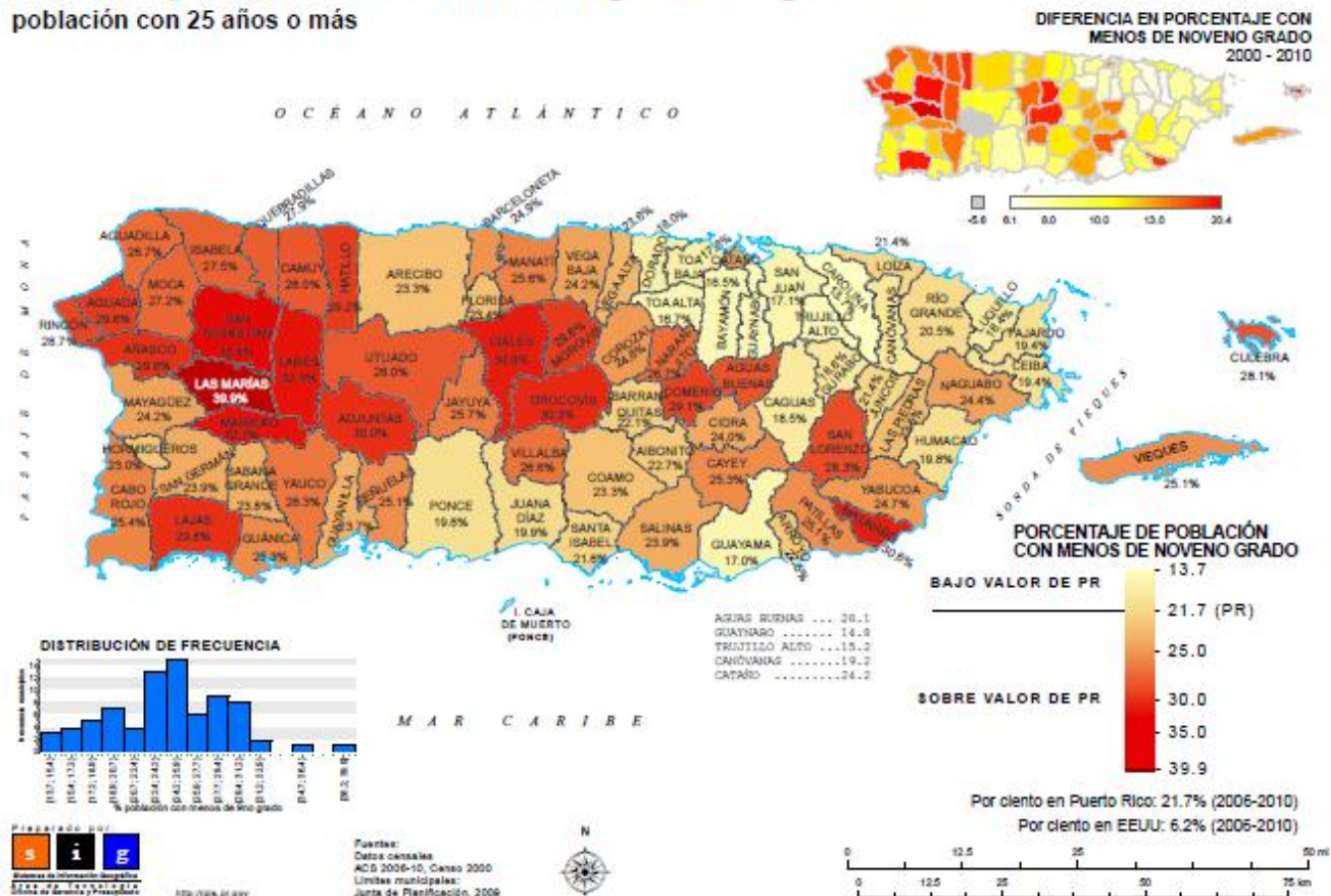
**Other “minor” projects:**

# Student's mini-atlas



## Logros educativos: menos de noveno grado municipios, PR Community Survey, 2006-10

población con 25 años o más



# Use of open source alternatives



- This is a cost-effective alternative that we must explore. Other agencies might need advice on how they (and ourselves) might use these technologies.
  - ▣ PostGIS@Postgresql as RDBMS.
    - Copying SDE/SQL Server 2008 vector data to PostGIS 2.0 is almost done. Still needs to build views and user roles.
    - PostGIS can store rasters since version 2.0 but this option needs more time to develop.
    - Advantages: Zero (\$0) licensing costs. Scalability, customization. Old, stable and powerful RDBMS. Hundreds of spatial SQL statements at PostGIS.
    - Disadvantages: Could be a little bit difficult to learn, though there are various sites with tutorials, books, **(SELF-LEARNING!)**

0 4  
1 km

□ Thanks for your kind attention.

Iván Santiago  
PR Office of Management and Budget  
787.725.9420 x 2378  
[isantiago@ogp.pr.gov](mailto:isantiago@ogp.pr.gov)

This presentation is available in:

[http://gis.otg.pr.gov/pres/geo-tig\\_mar2013\\_en.pptx](http://gis.otg.pr.gov/pres/geo-tig_mar2013_en.pptx)

This presentation is available also in **Spanish**:

[http://gis.otg.pr.gov/pres/geo-tig\\_mar2013.pptx](http://gis.otg.pr.gov/pres/geo-tig_mar2013.pptx)

