



# **2010 Census Mapping Evolution, Potentialities and Integration to the National Spatial Data Infrastructure**

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**LATIN AMERICA GEOSPATIAL FORUM**

**Brazil, Rio de Janeiro, 15-17August 2012**

# BRAZIL

<b>Land area</b>	8,515,692.272 km <sup>2</sup>
<b>Sea area</b>	3,600,000 km <sup>2</sup>
<b>States</b>	27
<b>Municipalities</b>	5,565
<b>Population - 2010 Population Census</b>	190,755,799
<b>2006 Agriculture Census</b>	5,200,000 Farms



# Diversified physical space



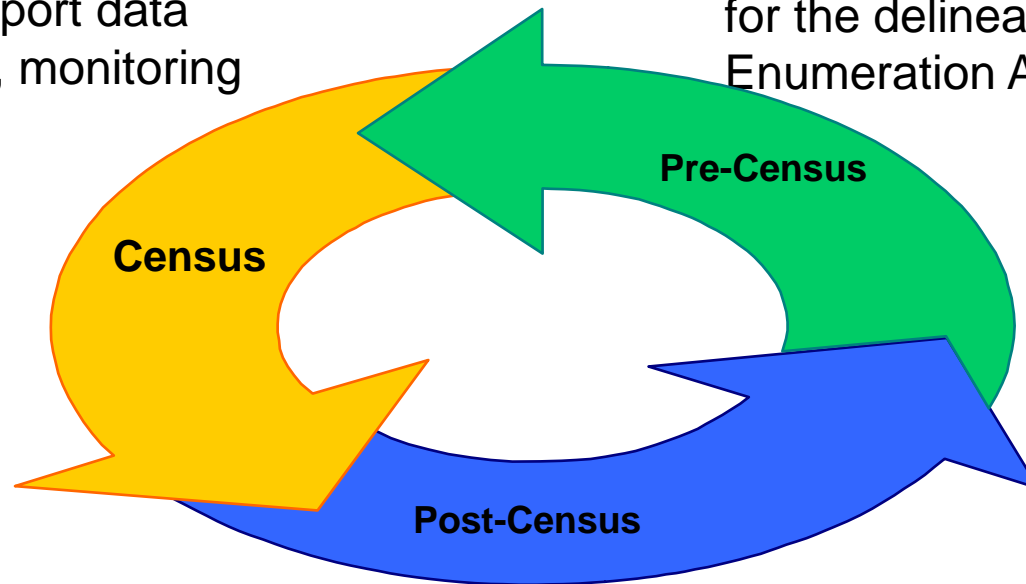
## Census Cycle

### Enumeration

Maps support data collection, monitoring

### Pre-enumeration

Maps provide cartographic basis for the delineation of Enumeration Areas



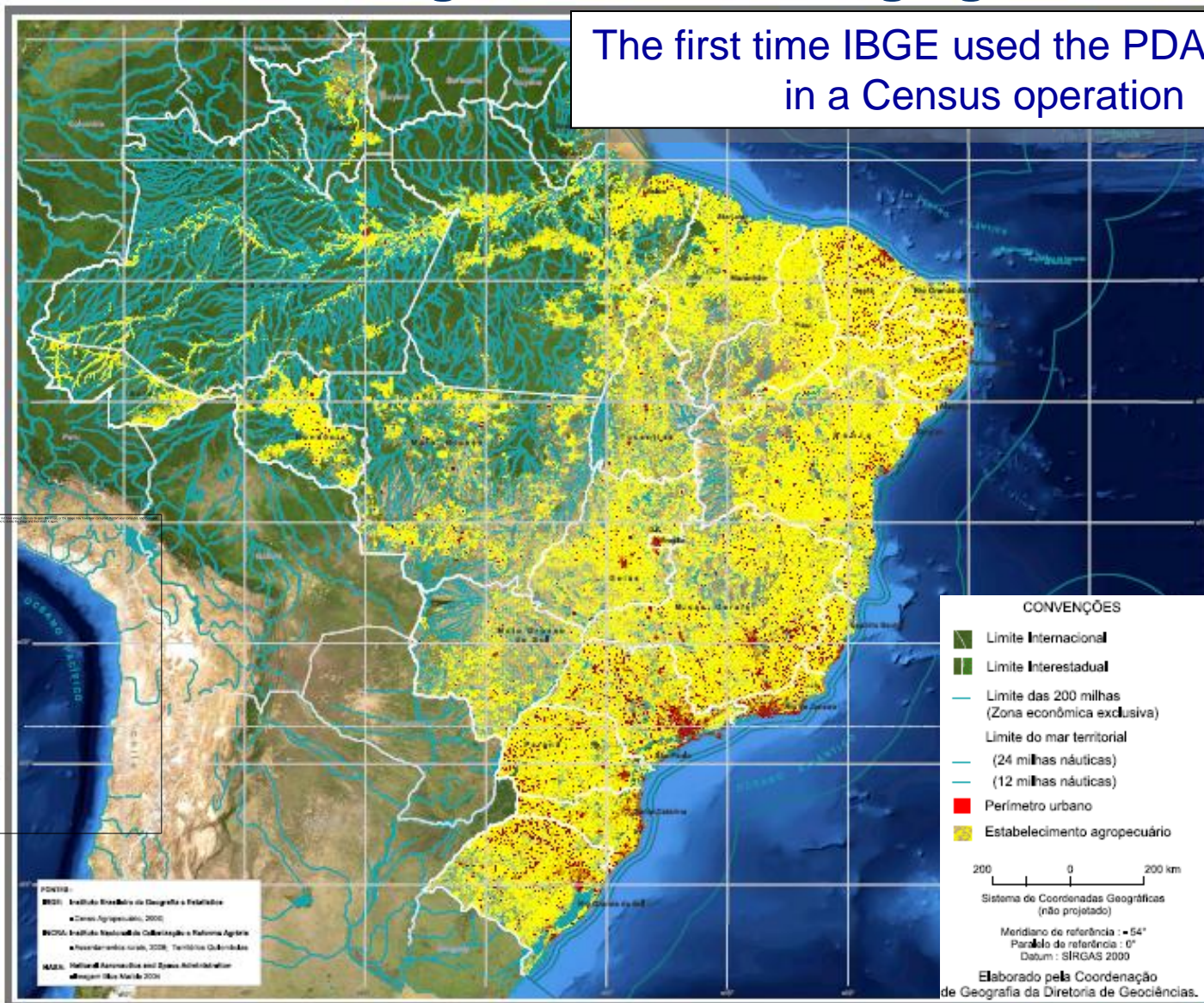
### Post-enumeration

Maps make it easier to analyze, display and disseminate; also will support survey projects during the decade after the Census

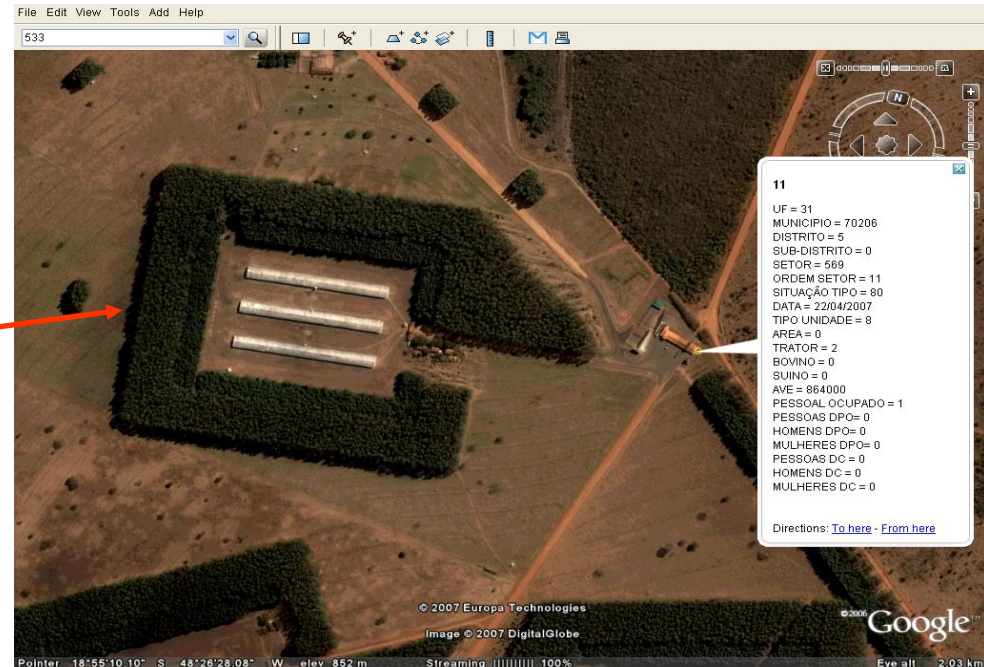
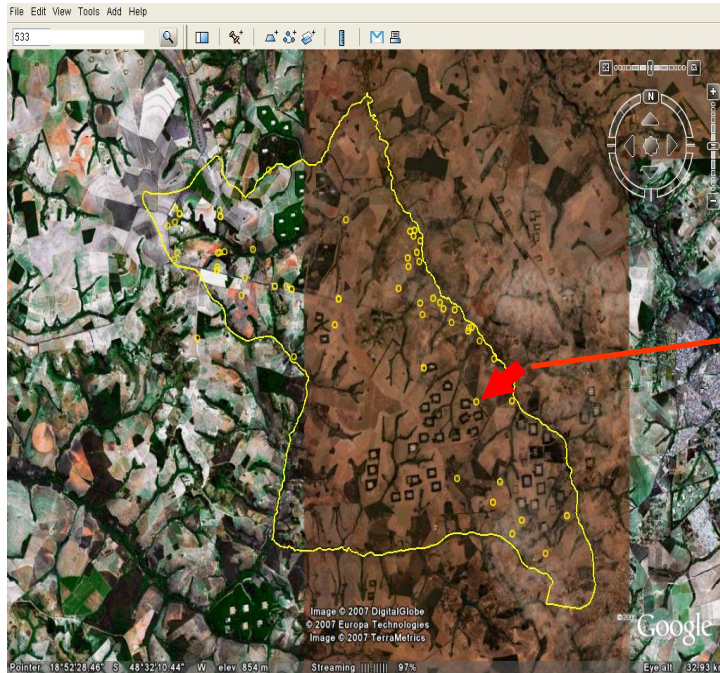
**Regular Surveys  
Continuous Census**

## More than 5 million agricultural holdings georeferenced

The first time IBGE used the PDA resource in a Census operation



## Visually monitoring data collection



Collection seen with Google Earth®: The yellow line represents the enumeration area boundaries. The yellow points represent agricultural establishments georeferenced by GPS.

The red arrow indicates a selected unit for detailed viewing, shown on the right-hand side figure. The corresponding data can be seen by clicking on the point.

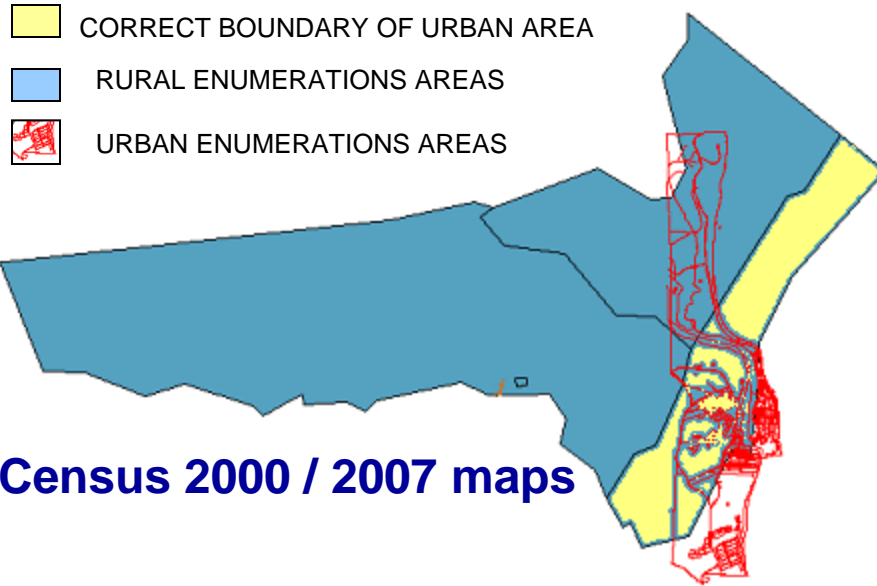
For the 2010 Census, a unique Census Mapping Project that integrates Municipalities' urban and rural areas was developed, changing from the hybrid analog/digital format to a full digital format using modern technological resources (strongly based on imagery)

## **Main Objective**

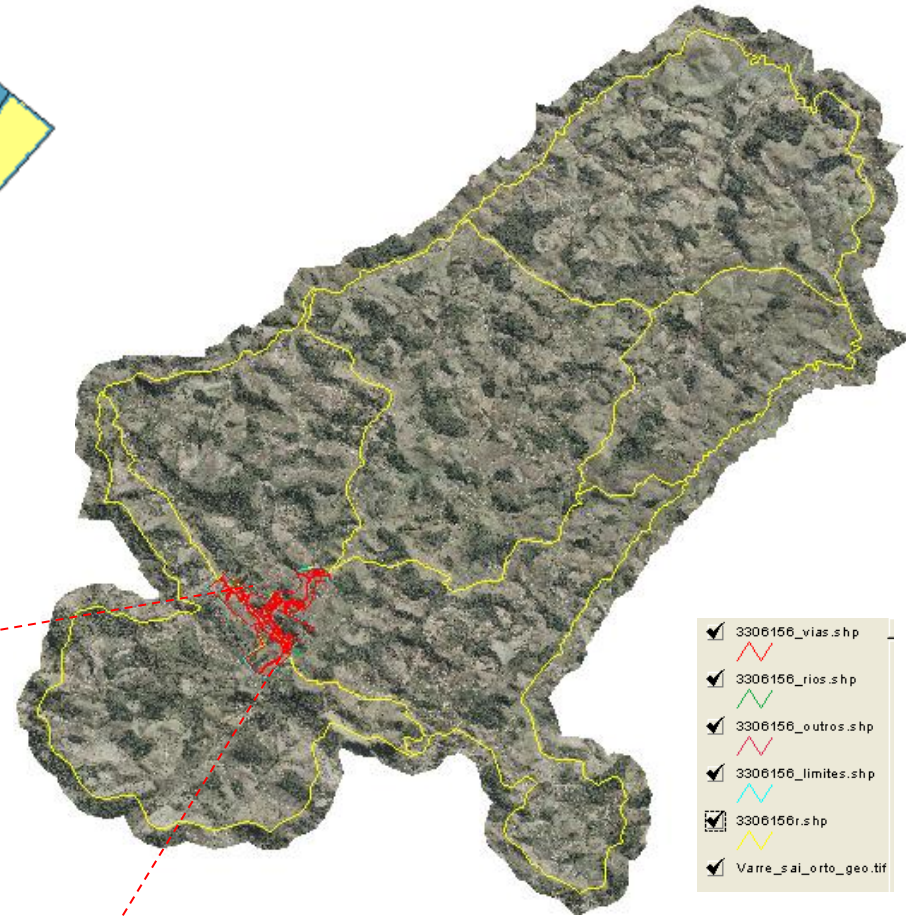
Building of an integrated Territorial Database in support of the 2010 census operations, from the planning to the collection and dissemination phase

## **Specific Objectives**

- Associate the CNEFE file to the blocks and block-face of 2007 urban enumeration areas
- Geometrically adjust the urban and rural limits for each Municipality



**Census 2000 / 2007 maps**

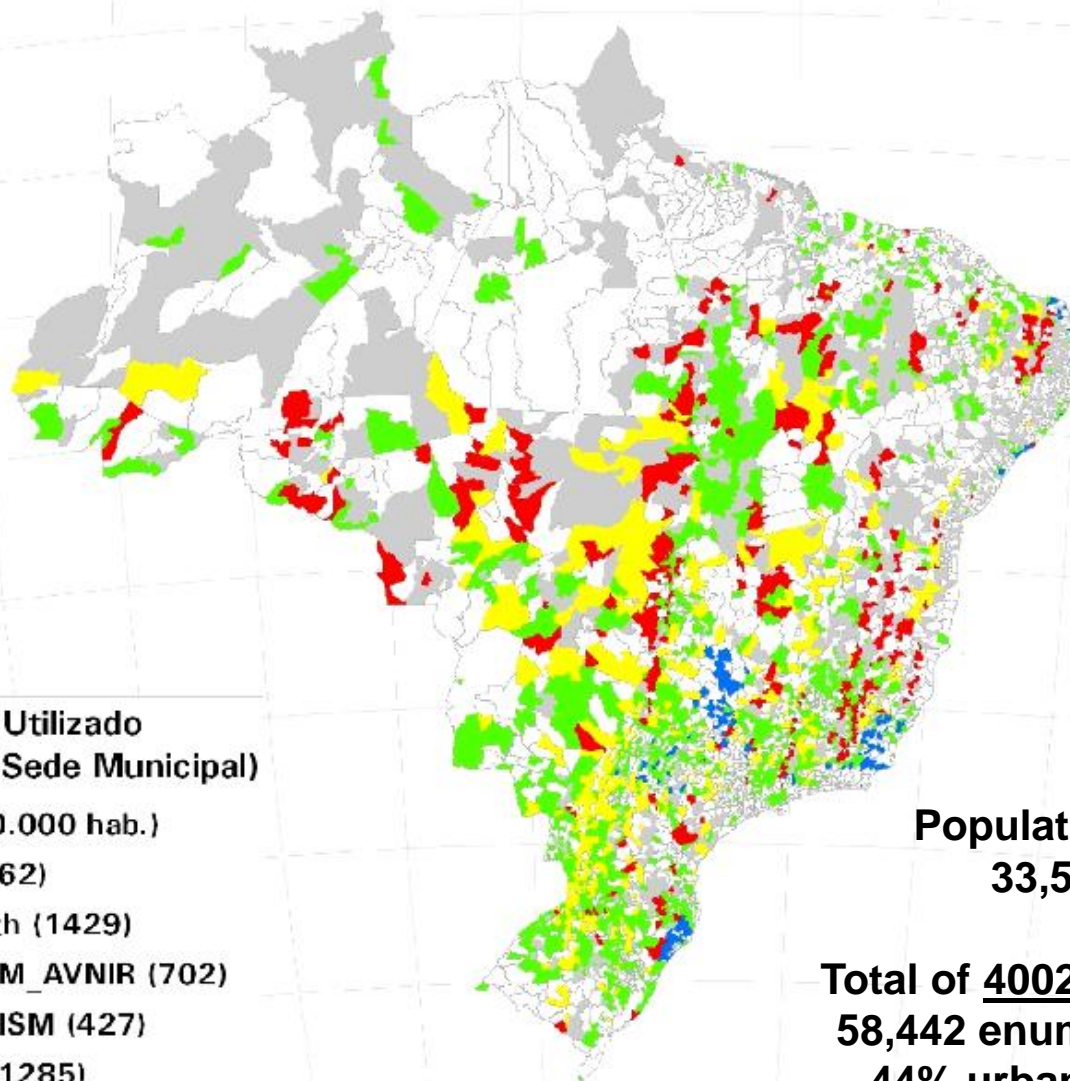


**Integrated 2010 urban and rural census maps**



# Imagens para Base Territorial 2010

Planejamento de Insumos Raster para os Municípios com População Inferior a 20.000 Habitantes



Principal Insumo Utilizado  
(Considerando a Sede Municipal)

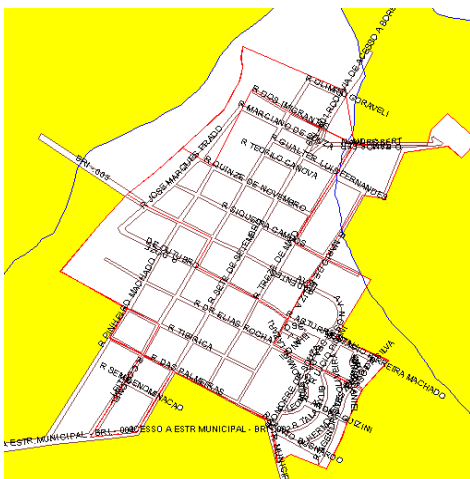
Municípios (< 20.000 hab.)

- Ortofoto (162)
- Google Earth (1429)
- Fusão PRISM\_AVNIR (702)
- Imagem PRISM (427)
- Indefinido (1285)

Population (2007)  
33,546,672

Total of 4002 municipalities  
58,442 enumeration areas  
44% urban – 56% rural

## GEOBASE



- Developed by CDDI in IBGE
- Allows the adjustment of graphic shapefiles to existing features on the images covering the Municipalities
- Geocoding the blocks / faces to the National Addresses File



Detail in ALOS image – Borebi - SP

Mapa Temático - 1

Núm. de feições: 284

ENTID	TXMEMO	COD_SETOR	QUADRA	FACE
75	R SIQUEIRA CAMPOS			777
76	R SIQUEIRA CAMPOS	350745605000004	001	999
83	R GUALTER LUIS FERNANDES	350745605000003	001	999
86	AV ROBERTO RAMOS FERNANDES	350745605000001	005	002
87	AV ROBERTO RAMOS FERNANDES	350745605000003	001	999
88	R ESTACIO FERRERIA MACHADO	350745605000004	003	999
89	R SEM DENOMINAÇÃO	350745605000005	002	999
90	R AGENOR S DE OLIVEIRA	350745605000002		999
91	R SEM DENOMINAÇÃO	350745605000005	001	999
92	R MARCIANO DE SOUZA	350745605000001		999
94	R SARATIMIO DANIEL	350745605000004	004	002

Note: The census maps prepared to the Census 2010, with intensive use of satellite imagery, will be a rich collection for the construction of NSDI

## Municipalities with less than 20,000 inhabitants

### Municipalities WITHOUT images

### Global Positioning System - GPS

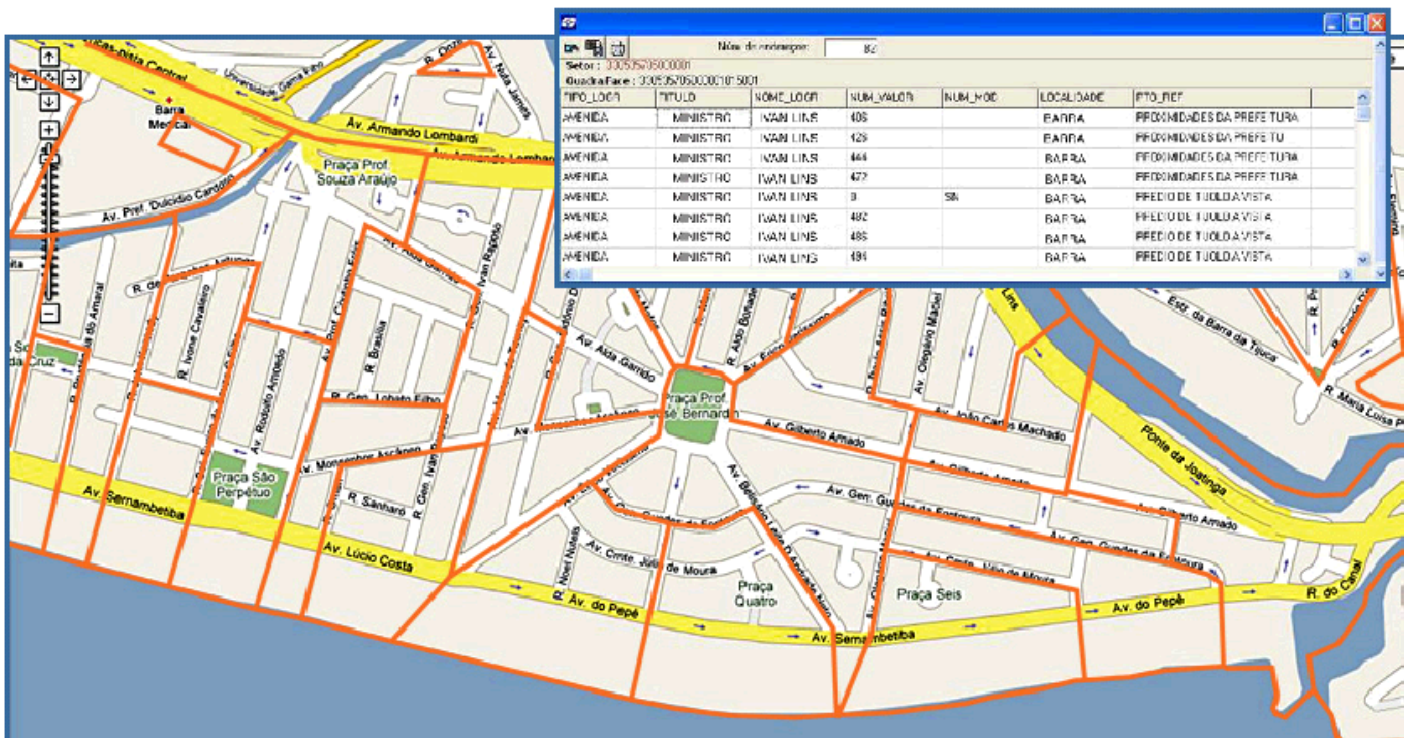
**IBGE - MOBILE GIS** Software acquired by IBGE and customized to fulfill the Censuses 2007 demands. New functionalities implemented to aid the processes of Census Mapping for Census 2010.



- Determines the best **track** for the survey
- Establishes routes and waypoints
- Transfers the saved files on PDA to the computer to be dealt with by GEOBASE

## Municipalities with more than 20,000 inhabitants

1562 Municipalities - acquisition of urban vector bases from Mapping companies



Population  
(2007) 147,239,176

190,626 enumeration areas  
82% urban – 18% rural

## Enumeration Area - EA

### Characteristics

- Working area of one enumerator
- Continuous area
- Located in just one zone, rural or urban
- Follows the legal limits of the municipality, districts and sub-districts
- Average: 150 agricultural holdings – rural or 300/350 houses - urban
- Rural areas with max 500 km<sup>2</sup>

# Enumeration Areas

## Geocodification – 27 States - RJ



3	3												
UF	MUNICIPIO		DISTRITO	SUBDISTRITO		SETOR							

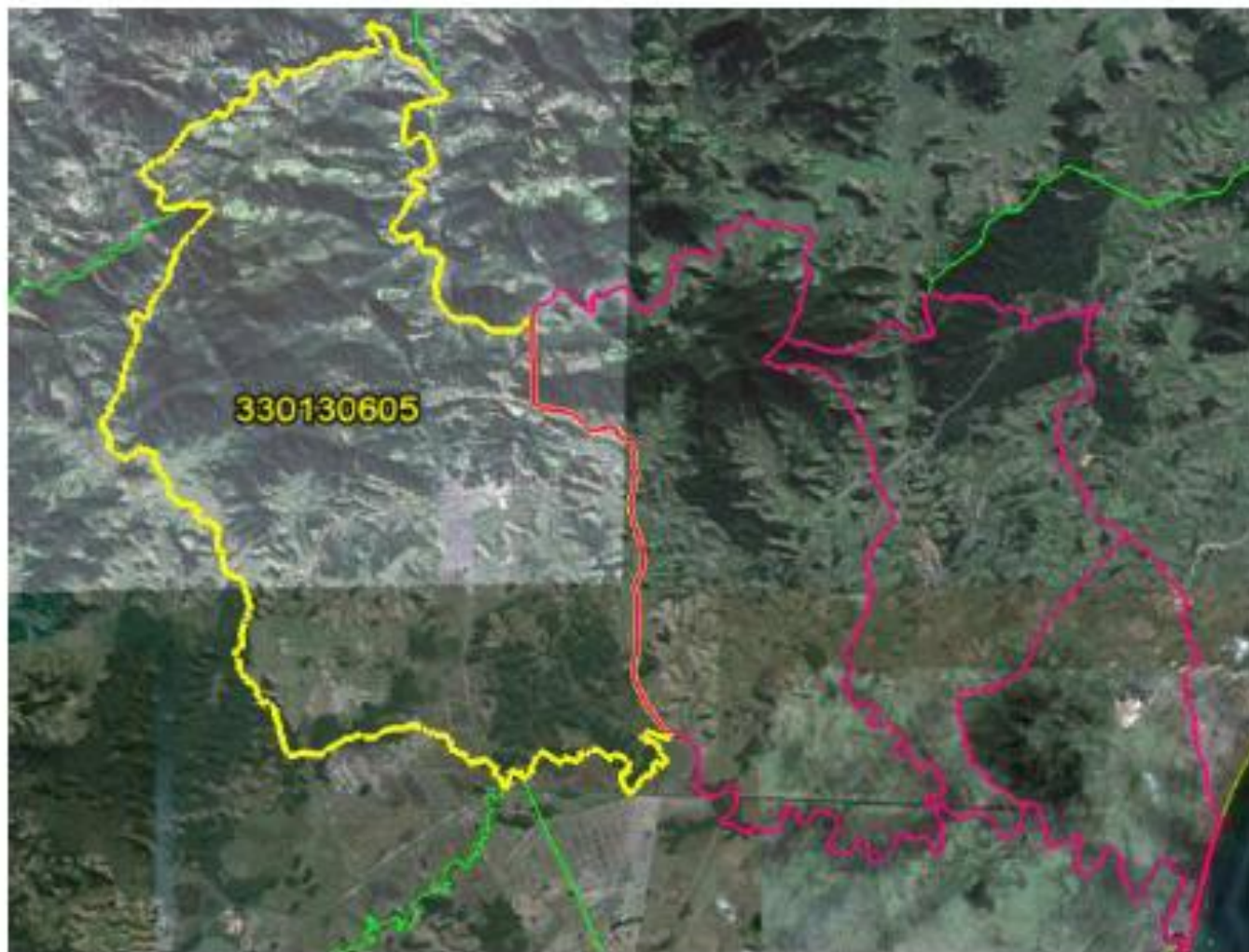


# MUNICÍPIO = CASEMIRO DE ABREU



3	3	0	1	3	0	6							
UF	MUNICÍPIO						DISTRITO	SUBDISTRITO	SETOR				



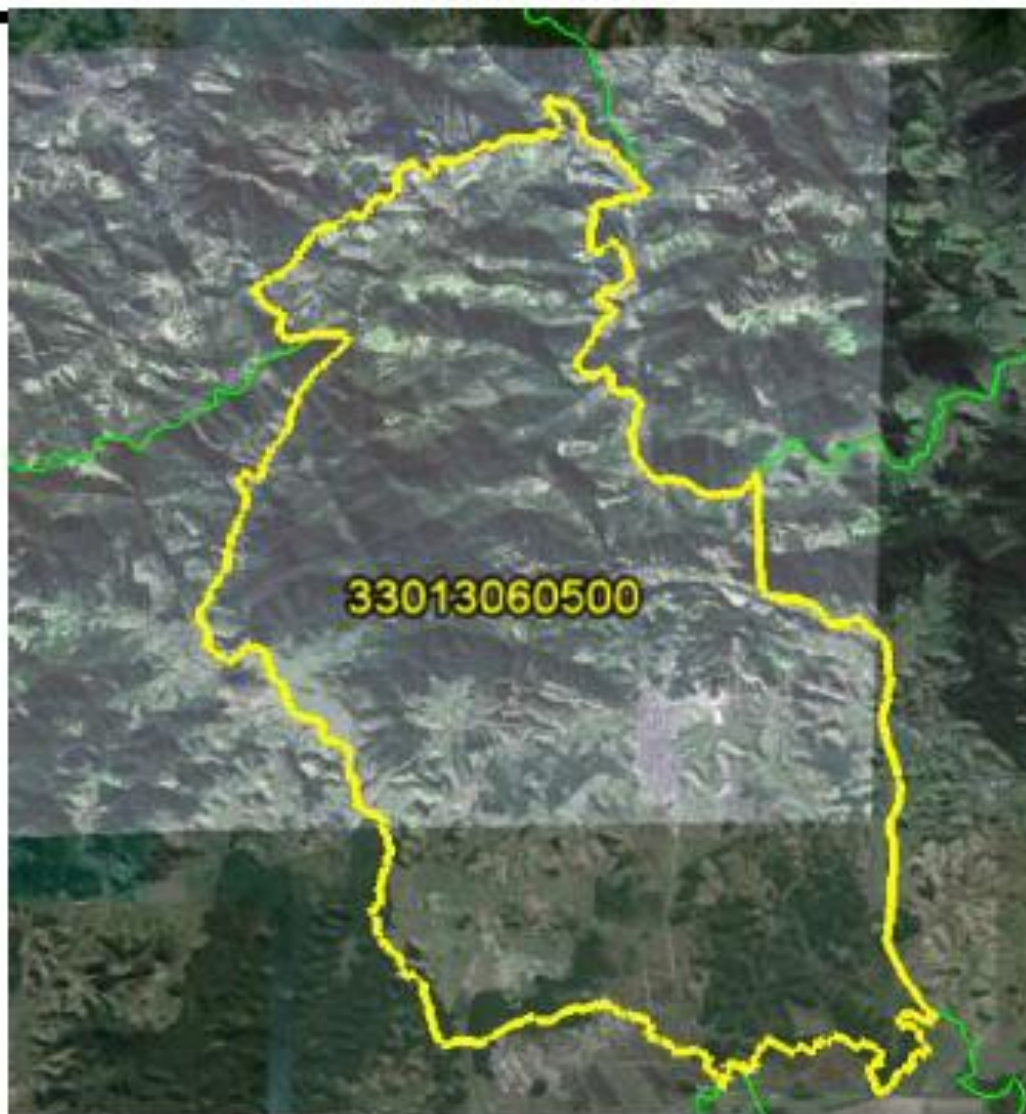


3	3	0	1	3	0	6	0	5					
UF	MUNICIPIO						DISTRITO	SUBDISTRITO	SETOR				



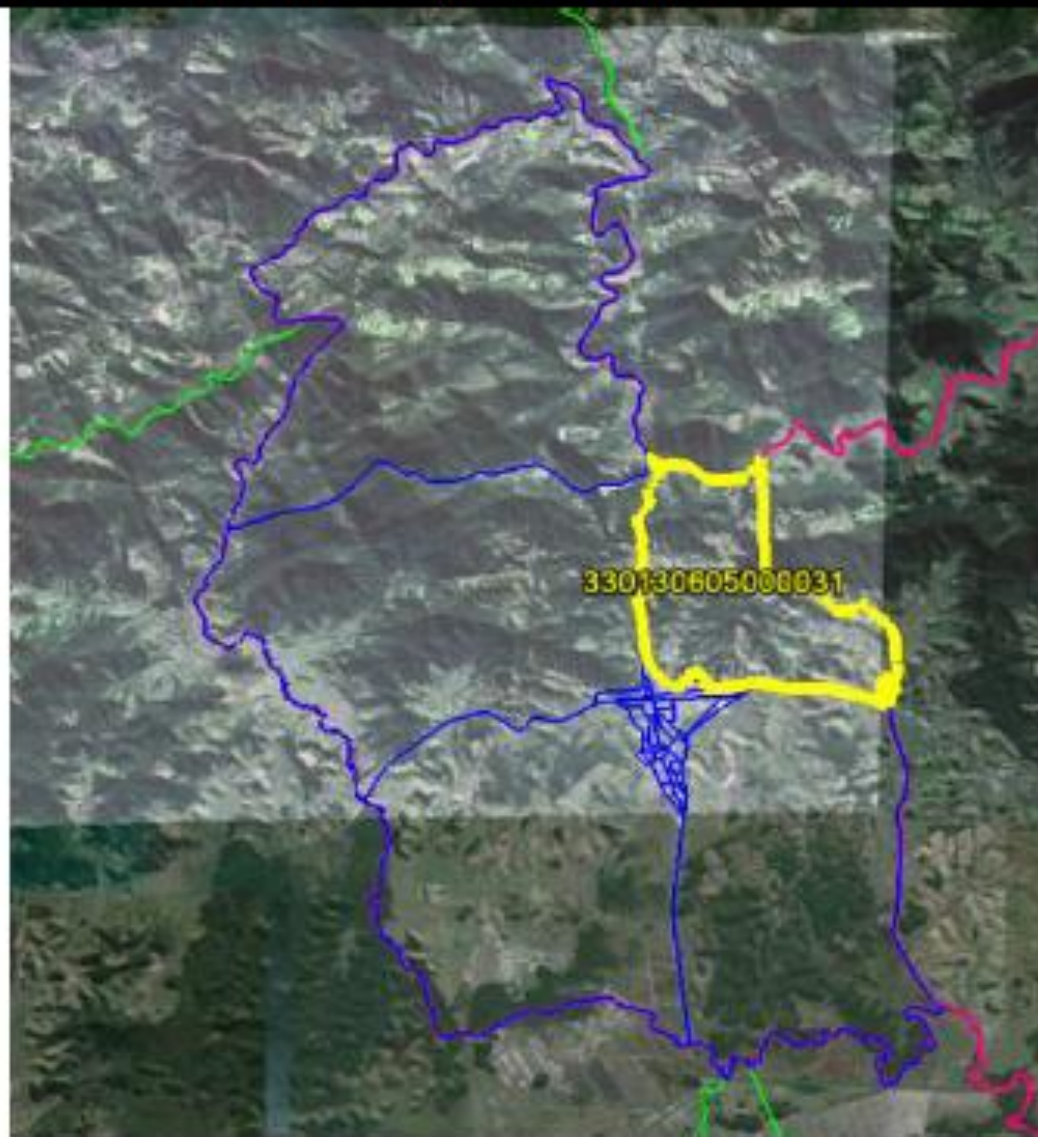


# SUBDISTRITO ÚNICO



3	3	0	1	3	0	6	0	5	0	0				
UF	MUNICIPIO						DISTRITO	SUBDISTRITO	SETOR					





3	3	0	1	3	0	6	0	5	0	0	0	0	3	1
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			





3	3	0	1	3	0	6	0	5	0	0	0	0	3	1
UF	MUNICIPIO					DISTRITO	SUBDISTRITO		SETOR					





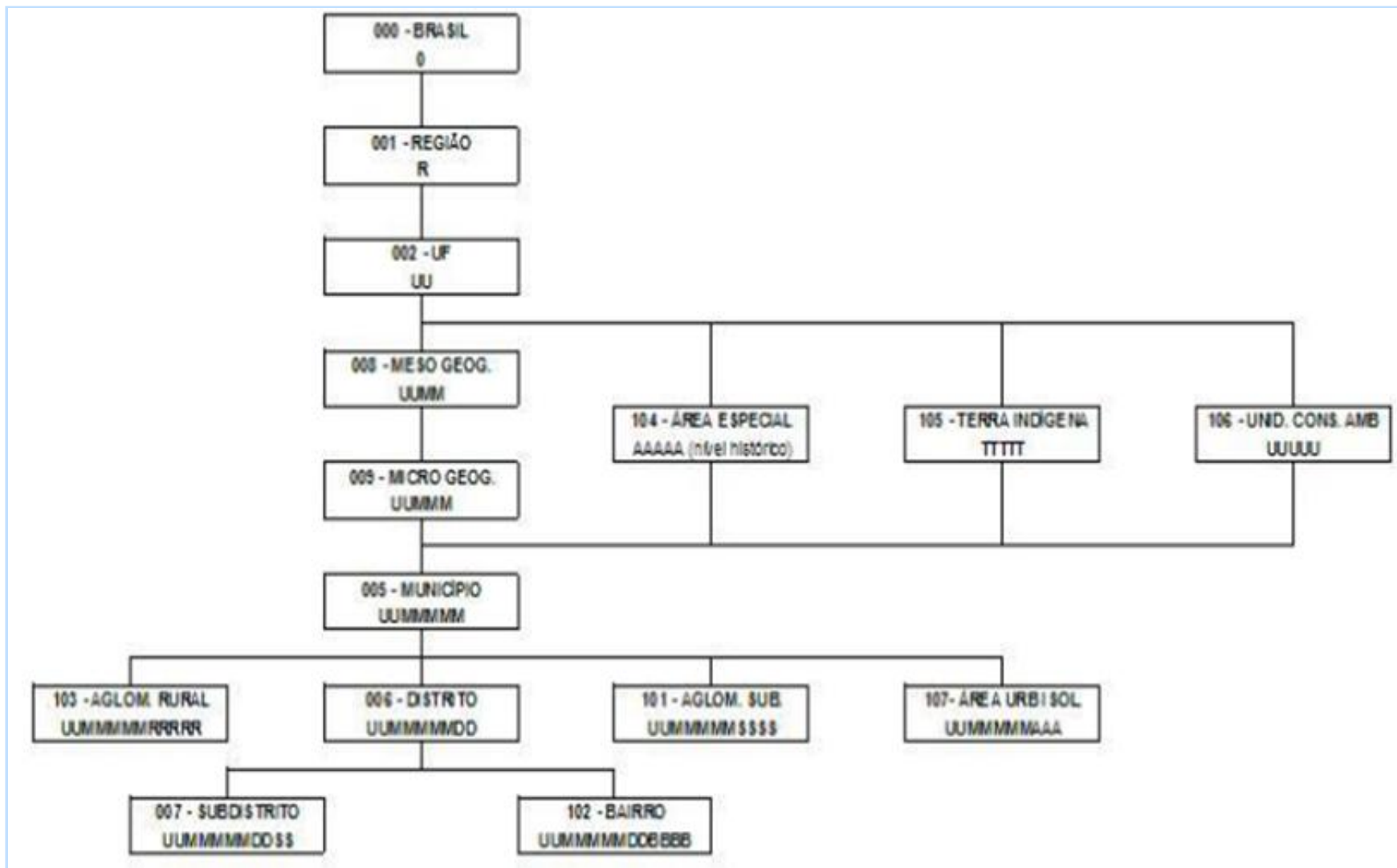
3	3	0	1	3	0	6	0	5	0	0	0	0	0	3
UF		MUNICIPIO					DISTRITO		SUBDISTRITO		SETOR			

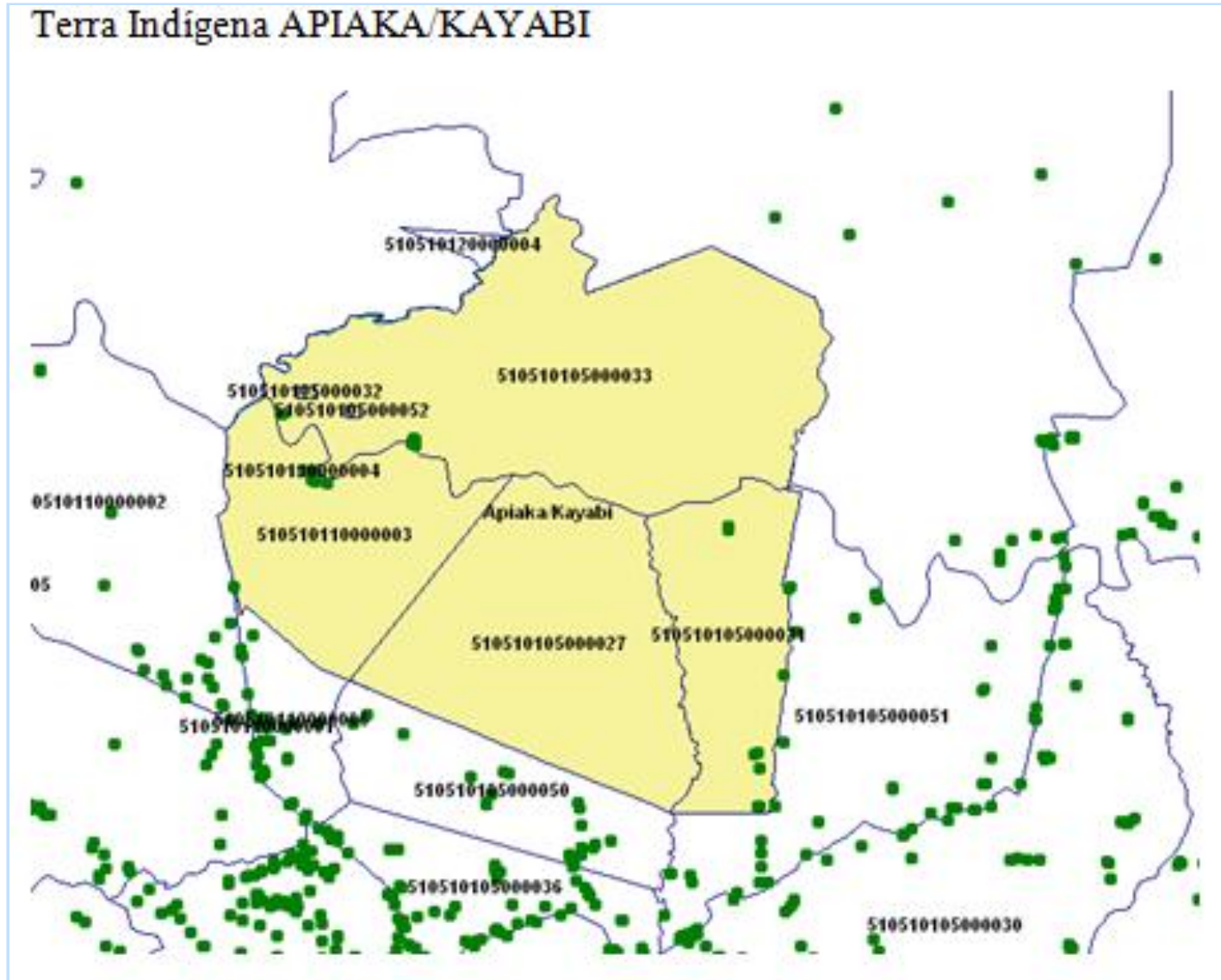
Geocódigo



3	3	0	1	3	0	6	0	5	0	0	0	0	0	3
UF	MUNICIPIO					DISTRITO	SUBDISTRITO		SETOR					

← Geocódigo





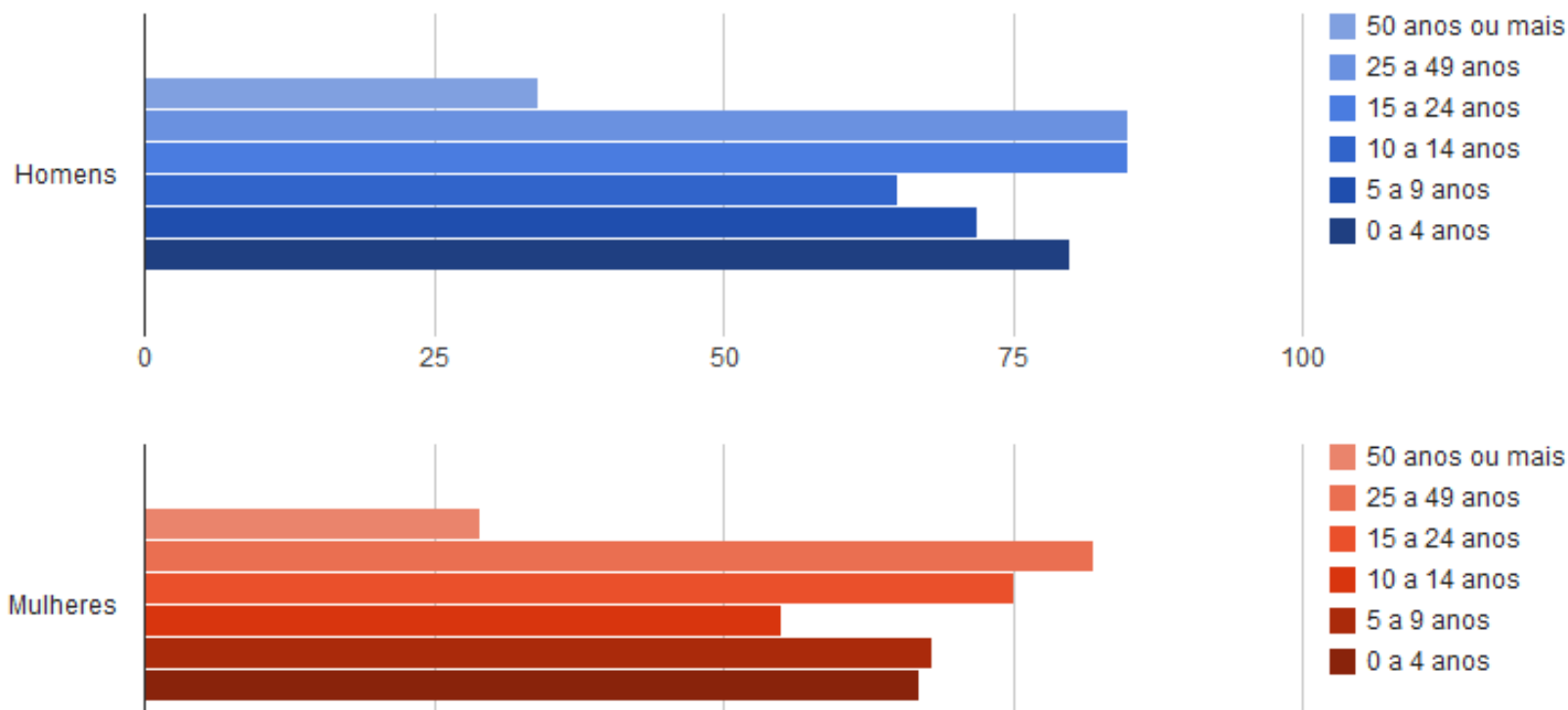
www.censo2010.ibge.gov.br/terrasindigenas/

eb Slice Sites Sugeridos Linha Madeira : Fundação Arte de ... Nova guia https://mail.google...

## Apiaka / Kayabi

Terra indígena **População** Alfabetização Registro de nascimento Rendimento Domicílios

Pessoas residentes em terras indígenas, por e grupos de idade.





# Census 2010 – Web Applications

Ministério do Planejamento, Orçamento e Gestão Destaque do Governo

**B G** Base Operacional Geográfica **IBGE**

Usuário | Consulta | Formulários | Manuais

Croquis, Descrições e Espelhos de Setores | Tabelas | Areas de Apuração | Quantitativos | Geração de Arquivos (acesso restrito) | Críticas

Complementares

:: Croquis, Descrições e Espelhos de Setores

BOG: 2010

UF: 33 - Rio de Janeiro

Município: 4557 - Rio de Janeiro

Distrito: 5 - Rio de Janeiro

Subdistrito: 10 - Copacabana

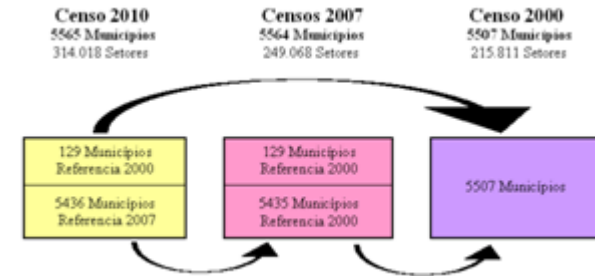
Setor: 10

**Fazer Consulta**

**LISTAGEM DE SETORES DO SETOR 330455705100010**

UF	Município	Distrito	Subdistrito	Setor	Tipo	Croquis	Descrições	Espelhos
33	04557	05	10	0010	10	<a href="#">Croqui</a>	<a href="#">PDF</a>   <a href="#">TXI</a>	<a href="#">Espelho do setor PDF</a>

## Comparability between Censuses



## The evolution of Brazilian's Territorial Structure

- Selecione Nível Territorial**
- 0000 - Brasil
  - 0001 - Região Geográfica
  - 0002 - Unidade Federativa
  - 0003 - Mesorregião Homogenea
  - 0004 - Microrregião Homogenea
  - 0005 - Município
  - 0006 - Distrito
  - 0007 - Sub-Distrito
  - 0008 - Mesoregião Geográfica
  - 0009 - Microregião Geográfica
  - 0012 - Unidade Federativa75
  - 0014 - Microrregião Fisiografica
  - 0015 - Município75
  - 0101 - Aglomerado Subnormal

Ministério do Planejamento, Orçamento e Gestão Destaque do Governo

**BET - Banco de Estruturas Territoriais**

Usuário | Consulta | Formulários | Documentação

Nível: 0002 - Unidade Federativa | Unidade: 33 - Rio de Janeiro

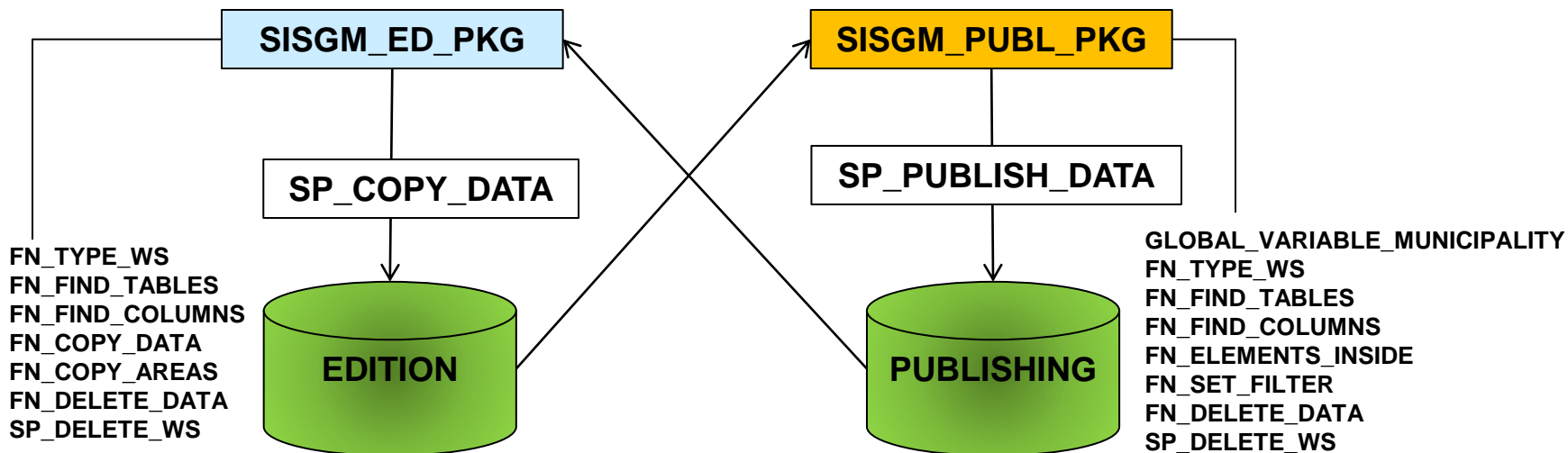
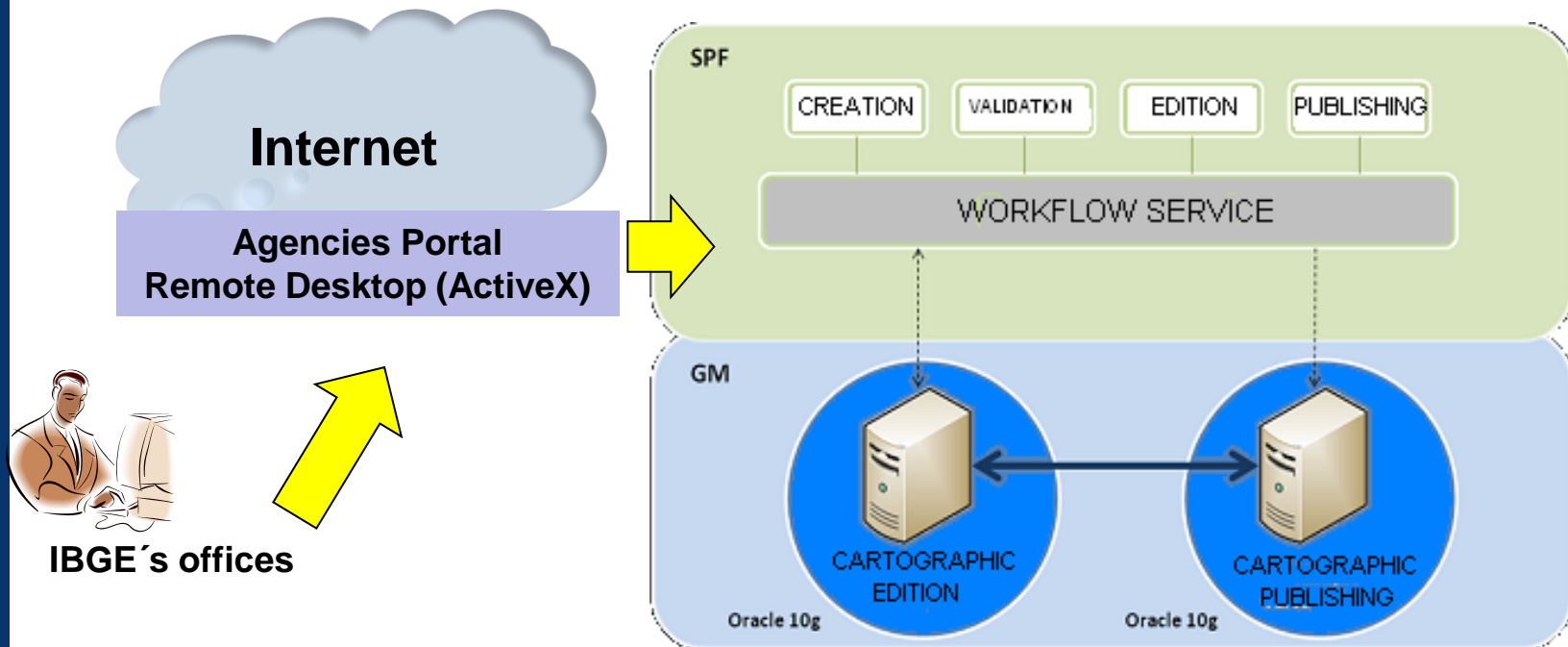
**RESULTADO DA CONSULTA A UNIDADE TERRITORIAL 33**

Código da Unidade	Nome da Unidade	Nome Padrão da Unidade	Data de Criação	Data de Instalação	Data de Extinção	Outras Informações
33	Rio de Janeiro	RIO DE JANEIRO		01/01/75		Un. Inferiores

**UNIDADES E NÍVEIS INFERIORES VINCULADOS**

Código do Nível	Código da Unidade	Nome da Unidade Territorial	Data de Início da Subordinação	Data do Fim da Subordinação
0008	3303	Centro Fluminense	01/06/90	
0008	3304	Baixas	01/06/90	
0008	3305	Sul Fluminense	01/06/90	
0008	3306	Metropolitana do Rio	01/06/90	

# SISMAP - Database Structure



## Detail of Municipality of São Caetano do Sul – SP with Ortophotos

Web SISMAP - Consulta a Publicação - Windows Internet Explorer

EN Inglês (Estados Unidos) Estados Unidos (internacional)

Mapas

- Web-SISMap

Legenda

- Base Cadastral
  - Eixo de Logradouro - Topo
  - Atualização - Pontos Gerais
  - Edificações Ponto
  - Outros
  - Atualização - Linhas Gerais
  - Ferrovia
  - Eixo de Logradouros
  - Vias
  - Hidrografia
  - Edificações
  - Bairros
  - Perimetro Urbano
- Atualização Cartográfica
- Articulação de Imagens
- Imagens

Web-SISMap

1 km

Escala 1 : 14196

GeoMedia WebMap INTERGRAPH

start sismap > Contadores... Base territorialia... Contador\_tab... TS Web Acces... Web SISMAP ... 3:03 PM

## Identification of the special enumeration areas (slums) for 2010 Census

- Preliminary identification (statistical and spatial sources)
  - Survey of Territorial Information: covering the topics of urban patterns, density of occupation and location / characteristic of the area;
  - Survey information from municipalities (legal situation and land tenure);
  - Use of remote sensing images of high spatial resolution

# Example: patterns identified using several sources

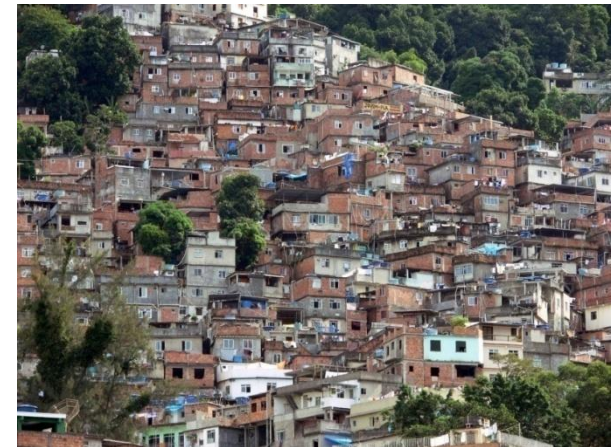
## PALAFITAS



**Macapá – AP**



**Manaus - AM**



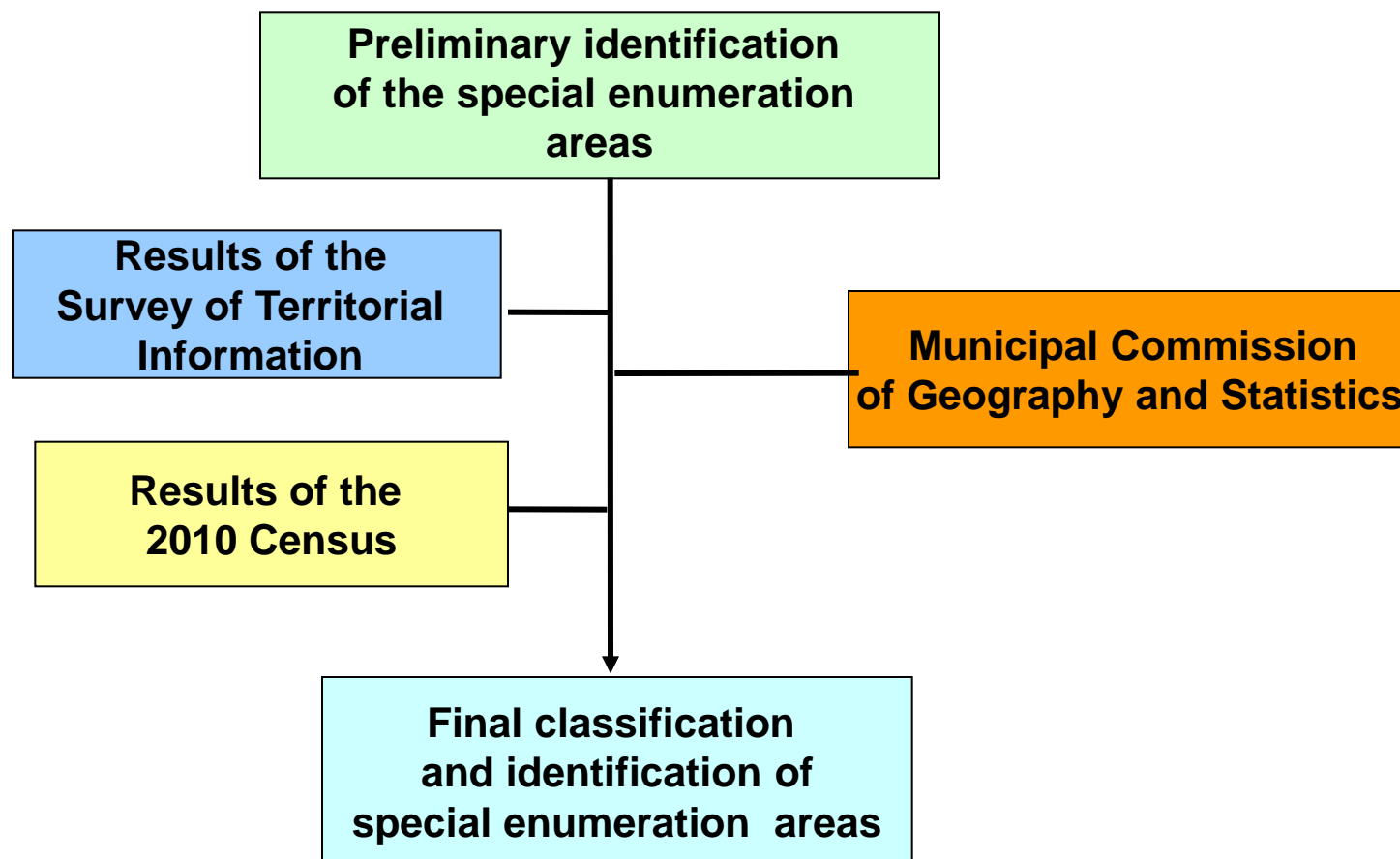
**Rocinha – Rio de Janeiro - RJ**

# AGSN - areas of poor public services

Slums in Rio de Janeiro - Juramento and Vila Primavera Hill



# Special areas for dissemination 2010 Census

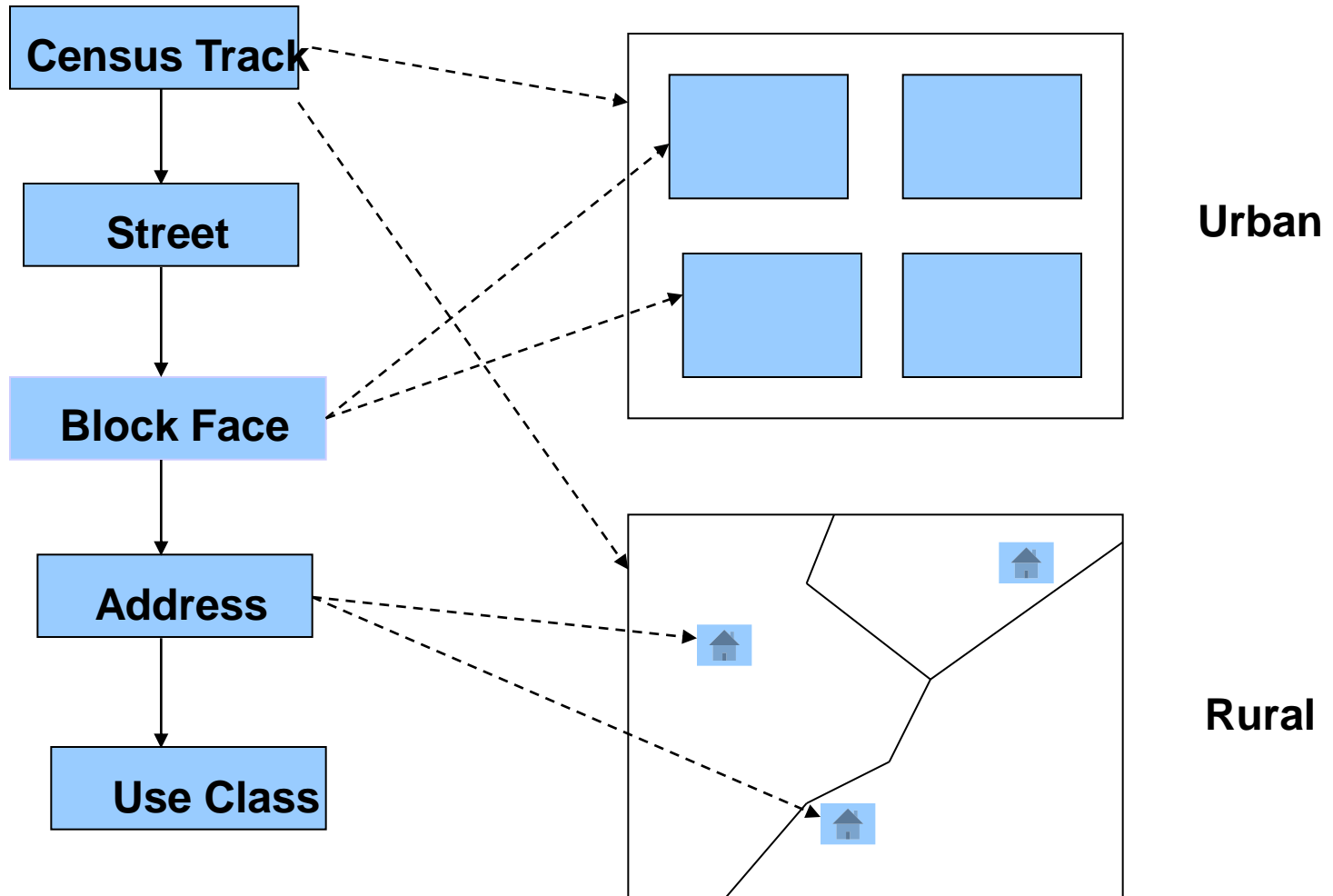


# 2010 Census

- Map – Address Association
- The “Pre-collection” Operation
  - Only urbanized areas (with block) 224.000 of the 314.000 census tracks
  - Map updating
  - Collecting addresses
  - Block Face characteristics - “Entorno”
- Enumerator uses the “Pre-collection” address list

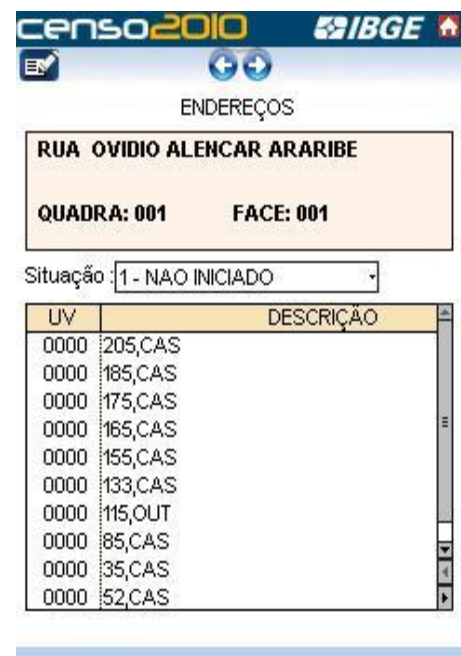


# Address File Structure



# 2010 Census Application

- ✓ Use of maps on PDA with GPS
- ✓ Click on block/block face
- ✓ Open address list
- ✓ Click on address
- ✓ Open questionnaire



# 2010 Census

Caracterização da Face	
Setor: 50-03702-05-00-0002	
Quadra: 1	Face: 2
Logradouro: RUA ONOFRE PEREIRA DE MATOS	
Nesta face ou na sua confrontante existe:	
Identificação do logradouro: (Placa oficial ou outra forma)	<input type="radio"/> Sim <input type="radio"/> Não
Iluminação pública:	<input type="radio"/> Sim <input type="radio"/> Não
Pavimentação: (Asfalto, cimento, paralelepípedos, pedras, etc.)	<input type="radio"/> Sim <input type="radio"/> Não
Entorno I	Entorno II
<input type="button" value="←"/> <input type="button" value="→"/>	



# 2010 Census

- Streets – 3.732.066
- Faces – 10.360.217
- Addresses – 82.996.347
  - SN(No numbering): 19.102.287



# 2010 Population Census



## Territorial Database

**27 Federation Units  
(States)**

**5,565 Municipalities**

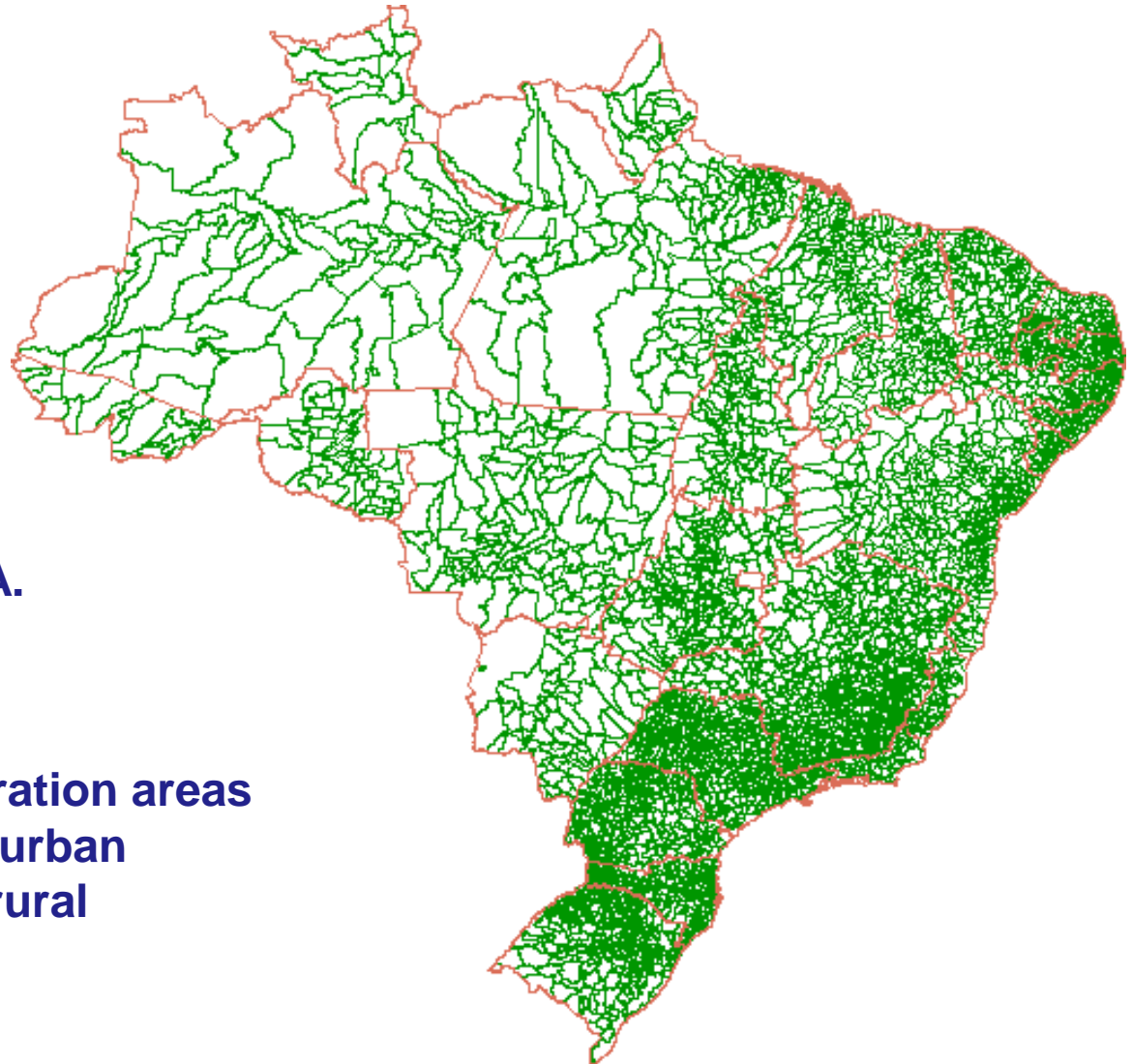
**10,283 Districts**

**662 Subdistricts/R.A.**

**316,574 Enumeration areas**

**240,382 urban**

**76,192 rural**

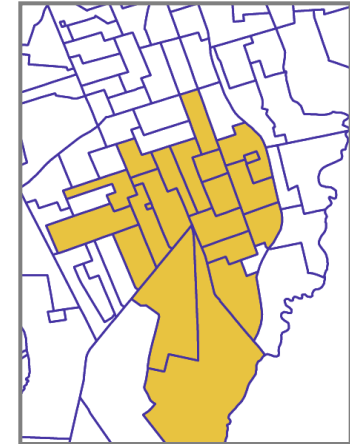


## New ways of dissemination

Up to 2007 Census  
Enumeration areas  
corresponded to the  
minimum area for  
statistical data  
analysis



Area of interest



Selected area

As of 2010 Census  
Block-faces correspond to the  
minimum spatial area for  
statistical data analysis  
Need of dissemination rules to  
fulfill information confidentiality



Selected area

censo 2010

português espanhol

IBGE

2010 CENSUS DATA COLLECTION MATERIALS RESULTS

### CARACTERÍSTICAS GERAIS DOS INDÍGENAS

Visualize através desta ferramenta os dados do censo sobre a população indígena no nosso país, através de mapas temáticos e gráficos.



### GENERAL SAMPLE RESULTS

Navigate through the 2010 Population Census sample results using thematic maps and graphs.



### 2010 CENSUS RELEASES

Seminar on the 2010 Census methodology and technology brings together representatives of 20 countries

29/09/2010  
IBGE holds this week the 2010 Population Census. Assessment of Field Work and International Seminar ...

2010 Census: 48% of the population has been counted

30/08/2010  
At 10 a.m. today (08/30), IBGE will present the second partial assessment of the 2010 Census ongoing data collection...

READ MORE SHARE

### URBAN CHARACTERISTICS OF HOUSEHOLD SURROUNDINGS

Graphs and cartograms show details about the urban infrastructure of our country.



### CMGE



Assista ao vídeo sobre área de ponderação

### PUBLISHING CALENDAR



Click here to see the release dates for the results of the 2010 Census

### RESULTS



See the latest results of the 2010 Census

### LOOK AT THE 'VOU TE CONTAR' MAGAZINE

Vou Te Contar vol. 20 - Jan/Feb 2011 (102p)



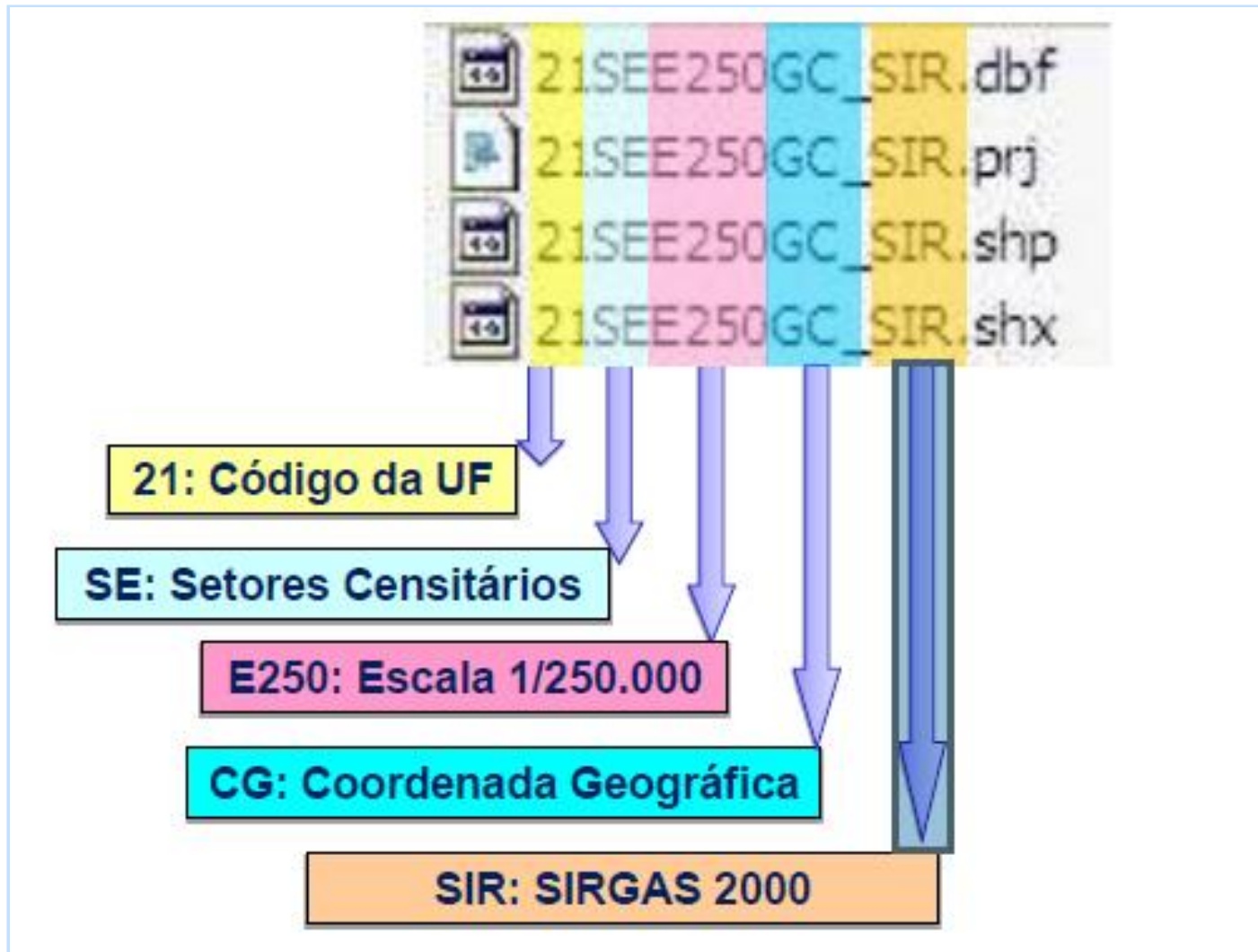
[ftp://geofp.ibge.gov.br/mapas/malhas\\_digitais/Censo\\_2010/Setores\\_Censitarios](ftp://geofp.ibge.gov.br/mapas/malhas_digitais/Censo_2010/Setores_Censitarios)



The screenshot shows the IBGE website interface. At the top, there is a navigation bar with the IBGE logo and the slogan "ORDEN E PROGRESSO". Below the navigation bar, there are several tabs: "Indicadores", "População", "Economia", "Geociências", "Canais", "Download", "Pesquisas", and "Sala de Imprensa". The "Download" tab is highlighted, and a blue arrow points to the "Estatísticas" link within it. The main content area is divided into several sections: "Atualizados" (Updated) with a sub-section "Em maio, desocupação foi de 6,4%" (In May, unemployment was 6.4%), "Últimos Resultados" (Latest Results) with a sub-section "PNE" (National Plan), and "Variação dos Indicadores" (Indicator Variation) with a line graph showing the monthly variation of the Consumer Price Index (CPI) from December to May. The graph shows a slight upward trend in the CPI over the period.

1st - downloading the SHP files

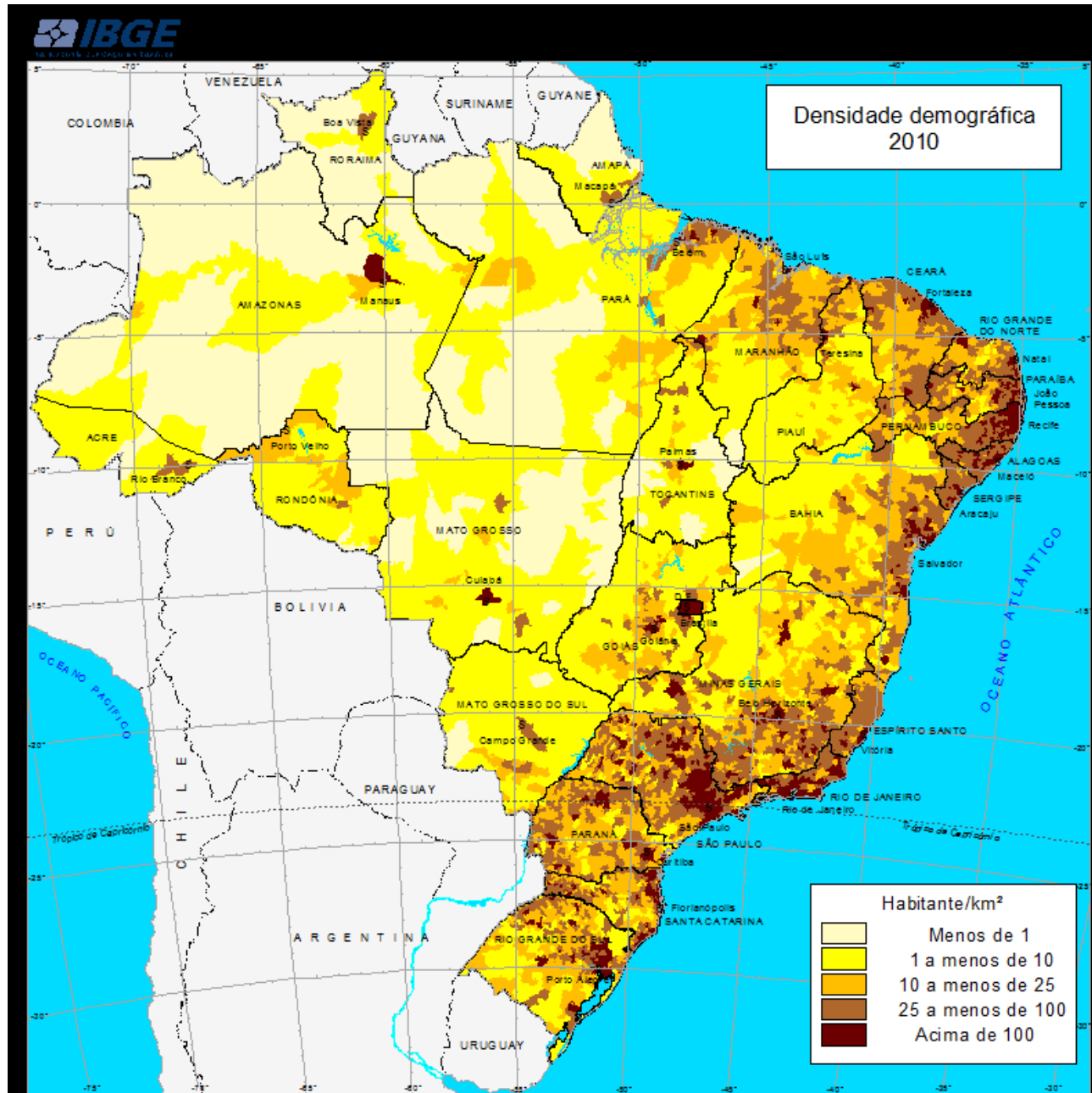




2st - from using the applications in our web site –  
Estatcart or SIDRA

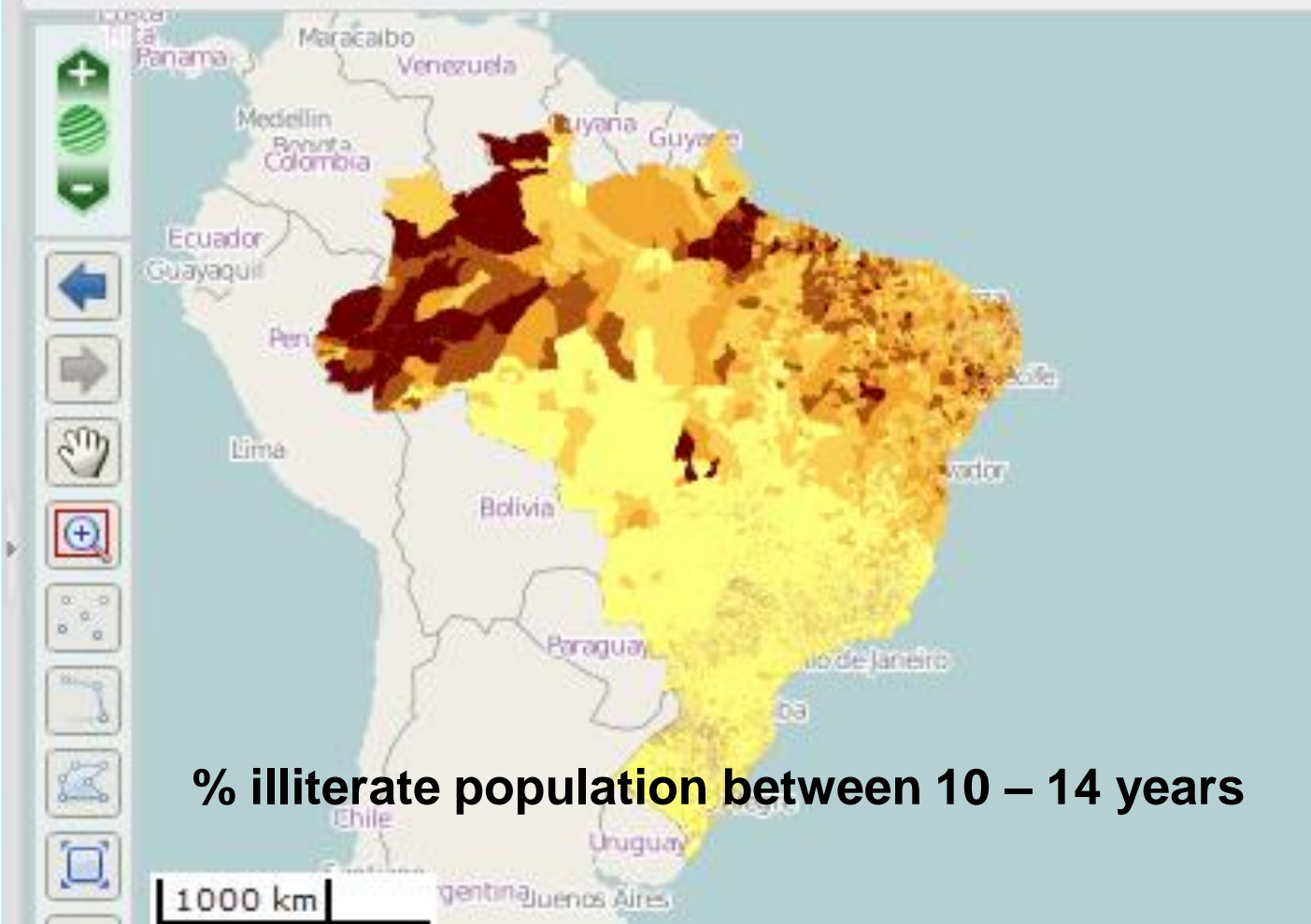


# Demographic Density - 2010



# Visualizador da INDE

<http://www.visualizador.inde.gov.br/>



- The new **web based** technologies allow NSO to produce **Census Mapping** in a full digital way, integrating maps, enumeration areas boundaries, graphic and text files, and addresses register
- The current availability of low cost **high resolution** orbital and aerial imagery can help updating the Census Maps
- A permanently updated register is a basic condition for the good quality of statistical information and the determination of new tasks in the scope of the national statistics system. **A big challenge is how to manage the balance of disclosure risk with dissemination of spatial statistics**
- The statistical infrastructure represented by these registers opens several possibilities for the Brazilian agricultural and statistical surveys
- Integrating statistical data into NSDI opens new horizons, based on the possibility of **correlating** this data with all other **data layers**, like the ones related to natural resources, environment, education, health, etc.

**THANK YOU ! MERCI !**

**Our Mission:**

**To portrait Brazil with information necessary to the knowledge  
of its reality and the exercise of citizenship**

**[www.ibge.gov.br](http://www.ibge.gov.br)**

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