IBGE
Instituto Brasileiro de Geografia e Estatística

CASE STUDY IN BRAZIL:

THE MAIN CHALLEGES FACED BY

LAND ADMINISTRATION

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NATIONAL CONTEXT
Location, Area & Political-Administrative Arrangements

- **Location: it occupies the central and western portion of South America**
- **Area: 8.514.046,79 km²**
- **Political – Administrative Arrangements: Union, Federal District, 26 States and 5,560 Municipalities**
- **Population: 182 million people**

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NATIONAL CONTEXT
The History of Land Settlement

- The country originates in the XVI century, as a Portuguese colony. Land settlement starts with the foundation of cities along the vast Atlantic Ocean coastline. Each city has a number of dependent urban settlements that, gradually, penetrated inland and colonized the vast territory that the country occupies.
- These urban systems, together with the scattered, but somehow dependent, rural population, were separate economic regions. They were not interconnected and gave rise to the so-called 'Archipelago' Economy.
- The national urban network emerged as a result of connecting those separate and diverse regions. As a direct consequence, a nationwide marketplace was born. It was only in the 20th century that all these processes were complete

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NATIONAL CONTEXT
The History of Land Settlement

Urban population in 2000

- Settlement was lured inland influenced by the building of road corridors.
- The building of Brasilia, in 1960, was very significant for the settlement of the Central-West Region.
- Most of the population still resides in highly concentrated areas on a strip of land situated along the coastline, of approximately 450 km wide.

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NATIONAL CONTEXT
The History of Land Settlement: URBANIZATION

- **The current demographic distribution pattern features the great impact of two main corridors:**
  - **North – Central West**: cities developed along two **Road Corridors:** Belém-Brasília and Cuiabá-Porto Velho.
    - River corridors determined the demographic distribution pattern in the Western Amazonia.
    - Northern and Eastern Amazonia: the settlement programs implemented since the 1970's changed the traditional demographic distribution pattern. This pattern also changed under the influence of road corridors.
  - **State of São Paulo:** the largest in the country. Since the early 20th century, the **construction of Railroads** contributed to the expansion of coffee culture inland and north of the State of Paraná.
  - **Northeast:** stable demographic patterns. The coastline concentrates the most dynamic economic activities, most of the population and the largest cities. Cities loose density as you penetrate deeper inland, into the country.
  - **South:** area where the European inmigration in the 20th century settled.

Demographic Density and Road Network

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NATIONAL CONTEXT
The History of Land Settlement

Brazil: 20th Century

Almost 80% of the population live in urban areas.

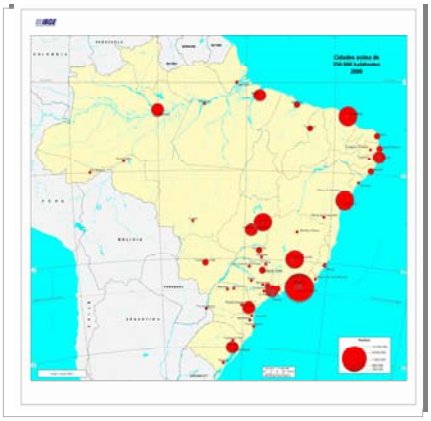
10 large metropolis spread across the contry.

The largest metropolis:

- **São Paulo: almost 18 million people;**
- **Rio de Janeiro: close to 11 million people.**

Cities over 250,000 people in 1950

Cities over 250,000 people in 2000



Municipalities with over 250,000 people

Número de Municípios com população acima de 250.000 habitantes						
Estrato de tamanho populacional	Número de municípios					
	2000	1991	1980	1970	1960	1950
De 250.000 a 500.000	53	40	25	14	5	3
de 500.000 a 1.000.000	18	13	8	6	5	1
de 1.000.000 a 2.000.000	7	8	8	3	0	0
de 2.000.000 a 5.000.000	4	2	0	1	2	2
Acima de 5.000.000	2	2	2	1	0	0

Fonte: IBGE, Censos Demográficos: 1950, 1960, 1970, 1980, 1991 e 2000.

Metropolitan Regions - 2003

NATIONAL CONTEXT
The History of Land Settlement: RURAL POPULATION

Rural population in 2000

- The distribution pattern of rural population is similar to that of urban population in densely populated areas: metropolitan regions in the States of São Paulo, Paraná and Rio Grande do Sul, and along the coastline in the Northeast.
- More traditional farming areas with high rural density: Northeast (wild and semi arid).
- Self-consumpltion agriculture: West of State of Santa Catarina.
- Other high density rural areas: recent settlements in Rondônia; some areas along the Transamazonic Road in the State of Pará; and along the river corridores in the North Region.

NATIONAL CONTEXT
History

- **LAND POLICIES**
  - **Up until the 1930's:** The Brazilian Government works in a centralized fashion**.**
  - **After the 1930's: The nationawide economic and social planning era.** The Government adopts land administration policies to foster the (industrial) development of the country. Agencies related to land administration policies are established.
  - **1934**: the National Institute of Statistics is created
  - **1936**: the National Council of Geography is created
  - **1937**: The National Institute of Statistics and the National Council of Geography are merged
  - **1938:** Creation of the **Instituto de Brasileiro de Geografia e Estatística - IBGE.** *(Brazilian Institute of Geography and Statistics)*

IBGE's Institutional Mission: provide the country with a system of statistical information and with a standardized cartographic system.

NATIONAL CONTEXT
History

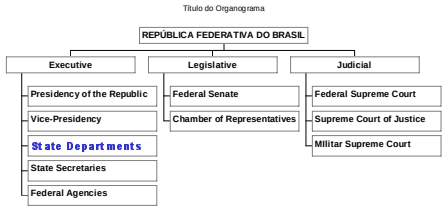
- The improved knowledge of the national territory and the identification of its characteristics and imbalances resulted in two land administration projects designed to achieve national integration and regional development. As an example, we may mention
  - the *Plano de Metas* (Goals Plan) (**1950's**): That Plan included the building of roads and of the country's new capital city, Brasilia
    - Objective: to draw settlement inland to integrate the national territory;
    - Instruments: creation of regional development agencies (the *Superintendência de Desenvolvimento do Nordeste* - SUDENE, in 1959, and the *Superintendência de Desenvolvimento da Amazônia* - SUDAM);
  - The *Plano Nacional de Desenvolvimento Econômico e Social* (PND) and the *Programa de Integração Nacional* (PIN), in the **1970's.**
  - Most recent projects: Multi-Anuual Plan (*Plano Plurianual*, PPA) and the Ecological-Economic Zonning (*Zoneamento Ecológico-Econômico,* ZEE).

Information for Land Administration purposes

Late **1990's.**

- Publishing of information on natural resources (geology, geomorphology, vegetation and soils) of the Amazonia, in digital format.
  - The digitalization of data, use of cartographic bases, in digital format, are an integral part of the standard procedure for the IBGE's production of data.
- Supporting tool for producing land audits used by land administration policies.
- Articulation with other agencies (INPE - *Instituto Nacional de Pesquisas Espaciais* and INCRA - *Instituto Nacional de Colonização e Reforma Agrária*) to standardize spatial data and cartographic bases in digital format.
- The examples of FGDC (*Federal Geograghic Data Committee)* (FGDC,2004) *and of* NSDI (*National Spatial Data Infrastructure)* (NSDI,2004) were taken into account to develop a standard model of spatial data bank in digital format.

BRAZILIAN GOVERNMENT STRUCTURAL CHART



The Executive (**State Departments**) concentrate most of tasks related to Land Administration issues.

STATE DEPARTMENT'S RESPONSIBILITIES

1. Department of Agriculture, Cattle Raising and Supplies (MAPA)

- ***Empresa Brasileira de Pesquisa Agropecuária*, EMBRAPA:** carries out research projects for the sustainable development of agribusiness in Brazil. This is achieved by the production, adaptation or transfer of technologies .
- **Project *Brasil visto do Espaço*:** Countrywide observation. Production of new grids from images taken by Landsat 5 and 7 satellites, by Embrapa Satellite Monitoring.
- ***Monitoramento Orbital das Queimadas*.** Land burnings affect several ecologic systems and types of agriculture, with local and regional environmental impacts. It combines remote sensing, digital mapping and electronic communication. Since 1991, EMBRAPA monitors land burnings across Brazil.

STATE DEPARTMENT'S RESPONSIBILITIES

- **Agriculture Sustainability in the Amazonia:** Research project carried out in Rondônia. Unprecedented experiience in the Amazonia. **Project Rio Demene:** A model of ecological economic zonning..
- ***Instituto Nacional de Meteorologia* (INMET):** This institute is responsible for meteorology in Brazil and represents the country before the WMO, World Meteorology Organization.
- **Agritempo:** the agro-meteorological monitoring system. This system provides its users on-line access to weather and agro meteorology information from several Brazilian municipalities and states.

2. Department of Cities

- ***Secretaria Nacional de Programas Urbanos*:** it arranges for an orderly occupation of the urban space.
  - ***Programa Nacional de Apoio à Regularização Fundiária Sustentável***
  - ***Programa de reabilitação de Áreas Urbanas Centrais***

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STATE DEPARTMENT'S RESPONSIBILITIES

3. Department of Science and Technology

– ***Programa para Proteção das Florestas Tropicais do Brasil***. (Program to Conserve the Brazilian Rain Forest) It was designed to ensure the environmental benefits of Brazilian rain forests. This program is a model of partnership between the Brazilian government, the civil society and the international community. Subprogram and projects:

– ***Agência Espacial Brasileira (AEB):***

- ***Programa Nacional de Atividades Espaciais*****:** (National Program of Space Activities) designed to develop action plans in remote sensing, meteorology, oceanography, communications and navigation, development of spatial systems (especially, satellites and launching vehicles) and allied technologies and space sciences. This program is formed by:

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STATE DEPARTMENT'S RESPONSIBILITIES

– ***Instituto Nacional de Pesquisas Espaciais*** **(INPE):** National Institute of Space Research) It supports the Brazilian Space Program.

- Programa CBERS (China-Brazil Earth Resources Satellite). Manufacturing of satellites for remote sensing purposes;
- Centro de Previsão do Tempo e Estudos Climáticos (CPTEC). Coordinating research activities on climate issues. It allows simultating the performing of the athmosphere across the planet;
- Development of satellties to collect environmental data (SCD); remote sensing satellites (SSR) and scientific application satellites (SACI);
- Development of tracking stations and control centers.

– **Observation of the Earth:** focuses on scientific and technological knowledge on remote sensing and geo-processing, natural resources surveying and environment monitoring.

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STATE DEPARTMENT'S RESPONSIBILITIES

– ***Instituto Nacional de Pesquisas da Amazônia*****:** (National Institute of Research on the Amazonia) is focused on creating scientific and technological knowledge on the Brazilian Amazonia. This knowledge will preserve the environment and will provide for a sustainable development of natural resources.

- **Capacidade de Suporte Humanos, Impactos Ambientais de Desmatamento e Sustentabilidade do Desenvolvimento - AGROECO:** (Human Resources Capacities, Environmental Impacts of Cleaning and Development Sustainability). Database on the impacts derived from converting the Amazon forest into farming land and from giving other uses to the land. It even focuses on impacts related to the global warming.
- **Experimento de Grande Escala da Biosfera-Atmosfera na Amazônia (LBA):** (the Large-scale Biosphere-Atmosphere Experiment in Amazonia). International research effort, coordinated by Brazil and designed to understand the climatological, ecological, biogeochemical and hydrological functioning of Amazonia, its interaction with the Earth system, and its response to land use change. The LBA aims at assessing the impact of land use change not only in the Amazonia as a regional entity but also how land use change will affect the biological, chemical and physical functions of the global climate system.

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STATE DEPARTMENT'S RESPONSIBILITIES

4. Department of Defense.

– ***Diretoria de Serviço Geográfico do Exército*** **(DSG):** (Army Geography Service, an agency from the *Departamento de Engenharia e Comunicações* (Engineering and Communications Department) focusing on issues related to mapping.

– órgão do Departamento de Engenharia e Comunicações para cartografia.

- Centro de Cartografia Automatizada do Exército (CCAuEx) **(Army Automated Mapping Center)**
- Surveying Divisions (4 divisions) to produce cartographic bases.

– O CCAuEx updates charts using satellite images from LANDSAT and SPOT.

- **IT IS RESPONSIBLE FOR THE ARMY BASE MAPPING CHART.**

– **Instituto de Cartografia da Aeronáutica (ICA):** (Aeronautics Mapping Institute) is responsible for aeronautical mapping activities. These activities are performed by means of geodetic and topographic surveys carried out following the needs of the aerial space control infrastructure and of the aeronautical charts production agencies.

- **THIS INSTITUTE IS RESPONSIBLE FOR THE AERONAUTICAL MAPPING**

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STATE DEPARTMENTS' RESPONSIBILITIES

– ***Diretoria de Hidrografia e Navegação da Marinha*** **(Navy Command Hydrographic and Navigation Direction) and *Plano de Levantamento da Plataforma Continental Brasileira* (LEPLAC)**: (Plan for the Surveying of the Brazilian Continental Shelf) Its purpose is to determine the outside boundary of the Brazilian continental shelf, following the United Nations Convention on the Law of the Sea, signed by Brazil in Montego Bay - Jamaica, December 1982, and ratified in December 1988.

- **IT IS RESPONSIBLE FOR THE NAUTICAL CARTOGRAPHIC PLAN**

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STATE DEPARTMENTS' RESPONSIBILITIES

5. Department of Agriculture Development

– **Secretaria de Desenvolvimento Territorial** (State Secretary for Land Development) that provides support to the designing of the *Planos Territoriales de Desenvolvimento Sustentável* (Sustainable Development Land Plans)

– **INCRA:** has jurisdiction on land administration. Programs:

- *Programa de Gerenciamento da Estrutura Fundiária* (Land Plot Management) Land Use Georeferencing and Surveying of Land Use related to rural properties. Geographic location of rural properties and facilities, boundary demarcation and land use. It feeds the Sistema Nacional de Cadastro Rural (SNCR) (Rural Cadastre) with graphic data on geographic information of the properties.

The identification of rural facilities and will provide for their location, area, denomination, data from the descriptive memory, Azimuth distances, and a chart that will be geo-referenced to the ***Sistema Geodésico Brasileiro*** (Brazilian Geodetic System).

STATE DEPARTMENTS' RESPONSIBILITIES

6. Department of National Integration.

- ***Secretaria de Políticas de Desenvolvimento Regional*:** The Secretary of Regional Development Policies guides land administration actions

7. Department of the Environment (MMA)

- Responsibilities:
  - Nationwide policy on the environment and water resources;
  - Policy for the preservation, conservation and sustainable use of eco-systems, biodiversity and rain forest;
  - Definition of strategies and economic and social instruments to improve the quality of the environment and to make a sustainable use of natural resources;
  - Policies focused on the integration of the environment and productive activities ;
  - Environment policies for the Amazônia Legal;
  - the Economic Ecologic Zoning.

STATE DEPARTMENTS' RESPONSIBILITIES

8. Department of Mining and Energy

- **ELETROBRÁS**: (Brazilian Power Utility) performs studies on the emission of greenhouse effect gases in reservoirs; the environmental management of large transmission lines; the standardization of environmental regulations applicable to the energy industry .
- **PETROBRÁS:** has jurisdiction on sustainable development and environmental management system .
- **Departamento Nacional de Produção Mineral:** (National Department of Mineral Production) is responsible for managing the mining resources in Brazil. It coordinates activities towards the mining development, sistematization and integration of geologic data from mining areas.
- **Serviço Geológico do Brasil:** The Brazilian Geologic Service administers land management and studies on the physical environment.

STATE DEPARTMENTS' RESPONSIBILITIES

9. Department of Planning, Budgeting and Management

- **Instituto Brasileiro de Geografia e Estatística - IBGE:**
  - ***Planos Geodésico Fundamental* and *Cartográfico Básico***, Base Geodetic Map and the Base Mapping Chart as provided by Decree-Law 243 of February 28, 1967;
- **CONCAR:** National Mapping Commission (CONCAR), a collectively operated agency that is part of this Department, as provided by Decree number 3,224 of October 28, 1999, Decree n/n from May 10, 2002 and Decree number 4,781 of July 16, 2003.
  - consultancy services to the State Department in matters related to the monitoring of the National Mapping System;
  - coordinate the implementation of the National Mapping Policy.

National Mapping Commission
C O N C A R

- CONCAR President: Executive Secretary to the Department of Planning and Budgeting, to be replaced, if needed, by the President of the Fundação Instituto Brasileiro de Geografia e Estatística - IBGE.
- The IBGE is to provide technical and administrative support to CONCAR and to its Executive Secretariat.
- The Coordination is a three-person body, formed as provided by Decree-law number 243, 28 February 1967, confirmed and amended by Decree of 21 June, 1994.
- This last Decree structures the **Sistema Cartográfico Nacional**, in articles 21 and 22 of the 1988 Constitution of the República Federativa do Brasil. The responsibility belongs to the Department of Planning and Budgeting (Provisional Order number 1.498-19, 9 July, 1996).

NATIONAL MAPPING SYSTEM

- Mapping activities are performed by the **Sistema Cartográfico Nacional - SCN**. The SCN is formed by national, public and private institutions that perform mapping tasks.
- The **Plano Cartográfico Nacional** rules the Systematic Mapping nationwide. It includes the Planos Cartográficos Terrestre Básico, Náutico e Aeronáutico, aimed at guiding the different mapping activities in their respective fields.
  - The Plano Cartográfico Terrestre Básico is formed by the **Planos Geodésico Fundamental**, **Cartográfico Básico do Exército** and **Cartográfico Básico do IBGE**.
- The systematic mapping of the Brazilian land is responsibility of institutions member of the Sistema Cartográfico Nacional.
- The performance of the Plano Cartográfico Nacional and the integration of Plano Cartográfico Terrestre Básico are both under the coordination of CONCAR.
- **Plans that form part of the Plano Cartográfico Nacional** :
  - Plano Geodésico Fundamental e o Plano Cartográfico Básico do IBGE;
  - Plano Cartográfico Básico do Comando do Exército;
  - Plano Cartográfico Náutico do Comando da Marinha;
  - Plano Cartográfico Aeronáutico do Comando da Aeronáutica.

NATIONAL MAPPING SYSTEM

- Institutions member of Sistema Cartográfico Nacional (SCN) are required to deliver the IBGE data that allow the assesment of works performed, outlining those aspects that refer to national securrity issues.
- The Public agencies, Mixed-Capital Societies and Foundations that are not member of SCN are required to deliver the IBGE, for the Cartography Commission to proceed to their evaluation, true copies of agreements, amendments to contracts for the provision of mapping services entered into with third parties.
- Private institutions with agreements for the provision of mapping services should inform the IBGE.

THE IBGE SHOULD DISSEMINATE MAPPING INFORMATION.

NATIONAL PLAN OF LAND ADMINISTRATION

- Brazil does not currently have a national land administration policy that may integrate all the plans, the initiatives and the investments made in infrastructure and development at the different government levels (federal, state and municipal). This Plan would ensure are aimed at guaranteeing a better quality of life in urban, rural and regional environments.
- Steps are being taken to provide Brazil with **a Land Administration National Policy** that will allow the ranking and integration of plans, actions and investments in infrastructure and development at the different levels of government.
- These steps are aimed at streamlining programs so as to ensure the continuity of public actions and interventions on land issues that will result in better urban and regional environment, improved quality of life and enhanced social inclusion.
- Within 2004, the State Secretary of Regional Development Policies, that is part of the Department of National Integration should design the grounds for the National Plan of Land Administration. These grounds will be submitted before the National Congress to be given statutory footing..
- Articulating the União, Estados and Municípios is key to develop land administration.

LAND POLICY

- **1970's:** a decade of big federal plans and policies with a land zest (I and II National Plans for Development, Poloamazônia, Polocentro, etc.). The federal Government created the infrastructure and was active in regional development policies. The economic crisis from late 1970's and early 1980's put a halt to this entrepreneurial model.
- **1980's**: a decade when land policies were absent. The new 1988 Federal Constitution stated that it was the Union's responsibility the '*design and implementation of national and regional plans on land administration issues and on economic and social development matters* . The Constitution also provided some guidelines for urban development.
  - Following the 1998 Constitution, the Union, the States and the Municipalities are responsible for protecting the environment. The Municipalities are responsible for the land administration of the urban land.
  - **The 1988 Constitutions fosters land administration policies passed by the Union, the States and the Municipalities. Therefore, the articulation of these policies is a challenge that Brazil land planning should face.**

LAND POLICY

- **1990's:** Planning based on land issues returns. The Multi-Annual Plan (1996-1999) set forth a framework that provided for a new stage of land planning with spatial references. The Plan introduced national integration and development into the country's agenda. This experience continued in the second Multi-Annual Plan (2000-2003) as well as in the third one (2004-2007).
  - . Thanks to these Plans, land was used once again as a reference for public policies integration. Meanwhile, the State is no longer the largest investor, but an agent that tries to foster and encourage the private sector to make investments..
  - **The Multi-Annual Plan became the main guidance for Brazilian public policies.**

LAND POLICY

Draft for the "Parceria Público - Privada" (PublicPrivatePartnership) Law.

- In 2004, within the scope of the Multi-Annual Plan, the PPP (Public Private Partnership) Law was drafted to appeal to private investors, both national and foreign. The law also aimed at encouraging these potential investors to make investments in the areas the Government sees as priorities.
- The public private partnership agreement is a contract between the Government and private companies that legally binds them to implement or manage services and activities of public interest with funding and investment from the private sector.
- The Government agrees to offer the private partner an additional revenue that would increase any income from the service provided to the public . The agreement is valid for a term of up to 30 years. When the public private partnership term is complete, the property of the asset goes to the State .

LAND MAPPING INFORMATION

'MAPPING is not only a basic tool for economic development, but the main tool to be used before being able to work with other tools' (United Nations)

- In Brazil, systematic topographic mapping is under the responsibility of the IBGE and of the Brazilian Army. They share surveying and mapping production at scales standardized at national, regional and local level.
- The IBGE also produces the International Chart at the Million-User Scale, thematic maps and territorial units
- These activities are performed with the cooperation of national and regional research institutes, universities and in association with other institutions.
- **The main source of data for mapping activities are geodetic and mapping surveying performed by the IBGE.**

LAND INFORMATION AND GEODESY

Geodesy is defined as the scientific discipline that deals with the representation, the measurement of the Earth and with its gravitational field .

The geodesic problem is geometrical and physical in nature and can be treated as the definition of a coordinate system that defines certain points that allow the representation of the physical surface of the Earth (the topographic surface).

The system of coordinates associates with the family of descriptive points that is called the Geodesic System .

- The Brazilian Geodesic System is defined by the set of geodesic stations deployed on the portion of the surface of the Earth delimited by the country's borders. These stations are positioned by strict operational procedures. The coordinates are determined following high-precision geodesic models that are compatible with the objectives they are intended to be used for.
- The last decade witnessed a true revolution driven by the use of GPS (*Global Positioning System*) technology in the fields of navigation and positioning .

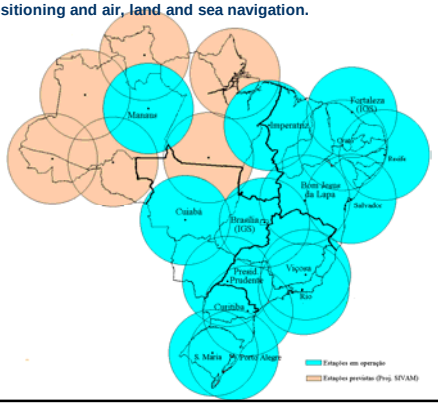
LAND INFORMATION AND GEODESY

Brazilian Network of Continuous Monitoring

- The RBMC is formed by continuous tracking stations of GPS satellites deployed across the country..
- These stations are equipped with high-precision geodesic tracking systems with remote operation by the IBGE so as to obtain data to be processed by scientific applications.
- The RBMC produces data and information needed for the public use of GPS technology in Brazil. The RBMC is the connecting link with international reference systems.
- The *Sistema de Referência Geocêntrico para as Américas,* SIRGAS (Geocentric Reference System for the Americas) (SIRGAS, 2004) is an international initiative under the coordination of the IBGE to develop a new reference system in the continent.

Brazilian Network of Continuous Monitoring - RBMC

Permanent Tracking Stations of GPS Satellites to support the static positioning and air, land and sea navigation.



LAND INFORMATION

- Brazil, as many other developing countries, does not have a full mapping coverage of its territory at the scales and with the precision that require the pace of development and the demand for spatial data. The country is very large; there is difficult access to many regions and the reduced investments of the 1980's impacted negatively on the systematic mapping activities.
- These difficulties were contemporary with the emergence of new technologies that revolutioned mapping production procedures. The initial investments made on equipment, technical training and satellite imaging were offset by the future benefits and added value to data that were traditionally obtained by on-site observation and by flying over the targeted area.

LAND INFORMATION

- Purposes of the mapping, by scale:
  - **Scale 1:1,000,000** – Provides information on general and strategic aspects, across the continent. It has national coverage and so far, has covered 100% of the country. It includes a set of 46 charts. The most recent edition was completed in 1999. In 2003, the corresponding digital product was published; data were vectorial and integrated for the whole of Brazil;
  - **Scale 1:250,000** – It supports regional planning and projects that focus on the environment. It has national coverage and so far, has covered 72% of the country;
  - **Scale 1:100,000** – It represents densely occupied areas, ranked by their need of government investment. It has national coverage and so far, has covered 72% of the country;

LAND INFORMATION

- Purposes of the mapping, by scale:
  - **Scale 1:50,000** – It is a cartographic representation of densely populated areas. It is an appropriate tool for social and economic planning and for the formulation of engineering projects. It has national coverage and so far, has covered 14% of the country with a focus on the Southeast and South Regions. ;
  - **Scale 1:25,000** – It is a cartographic representation of certain specific areas, with high levels of human occupation. It contributes some elements to social and economic planning. It also provides elements for engineering projects. This mapping survey, because of the characteristics that are proper to this scale, is basically used for areas located in the metropolitan regions. So far, only 1% of the country has been covered at this scale.

LAND ADMINISTRATION FUNCTIONS

DECADES	URBAN POPULATION IN THE COUNTRY
60	45,5 %
70	56,8 %
2000	81,3 %

- The 1960's were a turning point: from being basically a rural country, Brazil became urban. This trend remained firm until the end of the century and, in 2000, reached a peak of 81.3%. This made Brazil one of **the most urban countries in the world.**
- The urbanization process lived by the Brazilian society cannot be dissociated from the progress made by industrialization. This started in the 1950's, when large urban conglomerates became attractive to a large number of migrants, since labor was in high demand in urban productive activities.
- In the 1970's, urbanization and rural emigration got a new momentum in virtue of the powerful economic growth lived during that decade. At the same time, agriculture was modernized and labor was no longer required in the same proportion in rural activities. Therefore, metropolis grew, especially cities over one million people got larger and resulted in a new hierarchy of cities in the country. These metropolitan cities are urban spaces that feature the largest offer of assets and services in the country. They also project their influence over large areas.

LAND ADMINISTRATION FUNCTIONS

- Metropolis consolidation was a process that the Government finally acknowledged in the 1970's. Regulations provided for the creation of nine metropolitan regions: San Paulo, Río de Janeiro, Belo Horizonte, Recife, Salvador, Porto Alegre, Fortaleza, Belém and Curitiba.
- However, it is worth outlining that Brazil, unlike most Latin American countries, does not feature the phenomenon called urban macrocephalia, that is, the development of only one huge metropolis, much larger than any other city of the urban network. In Brazil, urbanization was better spread. In 2000, there were 23 officially acknowledged metropolitan regions, including the *Distrito Federal* and its surrounding ring.

ASSESSMENT AND IDENTIFICATION OF PROBLEMS AND BARRIERS

- **Land administration involves each and every planning area that relates with land organization, at federal, state or municipal levels.** As already explained, Brazil does not have an integrated system of land administration that provides for coordinated actions at the different levels of government. This diversity of instruments, programs and actions focusing on land administration resulted in much harm to the country, especially in resource allocation for the social and economic development, mainly when such resources are always scarse.
- In order to properly develop land administration projects, it is necessary to have precise mapping information, updated data, at the proper scale that may feed systems associated to new technologies, such as GIS, a significant tool for planning and decision making.
- It is important that the State should establish cooperation agreements so as to keep a data bank with geographic information at national level that will ensure the consistency of land information until the country achieves the so expected economic development that is so much hoped by ample sectors in Brazil.

TEMAS OU DESAFIOS POTENCIAIS
TOPICS A GOVERNMENT OFFICER SHOULD CONSIDER

- **Defining a modern plan on land administration that is integrated at federal, state and municipal levels, so as to achieve appropriate and sustainable use of land;**
- **Allocating resources to activities related to the production of geodesic and basic mapping infrastructure, in digital format, taking advantage of benefits from new technologies available, especially those associated with GNSS (*Global Navigation Satellite Systems*) and new remote sensing equipment .**