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Abstract

To support the team working with environmental impact assessment of projects, a Scenarios Room Project has been developed at the Sao Paulo State Environmental Agency - CETESB. The project encompasses a GIS solution (in an early stage of implementation), a content management solution and some spatial modeling. The GIS solution comprises the development of a geoportal, using Google Maps API. The geoportal enables the user to visualize, update and make spatial analyzes of the major current and future projects licensed in the State. The polygons of those projects are georeferenced, and linked to database, containing data related to management, project features, and environmental impact indicators, of the various stages of the environmental licensing of a project. The user can overlay these polygons or those of some new proposal in a state territorial base (DataGEO) provided by the Secretariat of the Environment of the State of São Paulo. The analyses that can be performed at the Geoportal include: the previous environmental assessment of a new development; comparison of the significance of impacts of two or more developments; evaluation of cumulative impacts of projects in the surroundings; evaluation of the effectiveness of the licensing procedure (following up impacts of different stages of a project implementation), etc. It has been very useful for defining more environmentally sound alternatives and in the evaluation of the significance of impacts of new developments.

Key Words: EIA Geoportal, licensing process database, significance of impacts, effectiveness of the EIA licensing.

1. Introduction

Environmental impact assessment has been introduced in Brazil since 1981 and is required for the environmental licensing of large projects. Developers are required to obtain preliminary, installation and operation licenses, issued by environmental governmental authorities, in order to build and operate dams, highways, transmission lines, airports, and other large projects (SÁNCHEZ, 2008; CETESB, 2014).

In São Paulo State, the licensing with environmental impact assessment is currently carried out by CETESB (São Paulo Environmental Company) (SÃO PAULO, 2009). The preparation and review of the environmental impact assessment reports demand and generate a lot of information (in the form of field surveys, monitoring, mapping, modeling, etc.) that are currently stored on paper in bulky administrative processes.

In order to facilitate access to such information, enable quicker and comprehensive environmental assessment review and utilize the previous acquired knowledge, it was proposed by the CETESB-Directorate of Environmental Impact Assessment the creation of Scenarios Room Project. The Project consists of a GEO Solution and DOC Solution, and modeling. The GEO Solution is basically a Geoportal that allows georeferencing and promoting the environmental analysis of large enterprises licensed in the State of São Paulo. The DOC Solution consists on a content management tool, to be used to organize, extract and recover easily the environmental data presented in those EIA reports.

This paper presents the functionalities already developed and proposed for Geoportal of the Scenarios Room Project and their potential applications in the impact assessment of large enterprises. As its main feature, this Geoportal has the ability of displaying alphanumeric data collected and organized from environmental impact studies.

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Besides providing easy and quick access to georeferenced environmental information, it allows comparisons and ranking impacts of different projects. It offers an objective basis for evaluation of the significance of impacts, which is a critical issue in the EIA procedure in Brazil. It also allows evaluate the effectiveness of the environmental licensing procedure, following up the intensity of impacts along the various stages of the implementation of a project.

2. Scenarios Room Geoportal

2.1. Architecture

The current architecture of the Scenarios Room Geoportal is composed by the publishing and editing spatial data platform Google Maps Engine (GME) and the application programming interface Google Maps API. The latter is responsible for processing and visualization of environmental licensing spatial information with the same Google Maps performance. The web application and the database with alphanumeric information are hosted on the servers at CETESB. Furthermore, the architecture covers the connection to the information of other existing systems provided by CETESB.

2.2. Layout

To improve the availability, integration and interoperability of spatial data, the Geoportal has a friendly layout, organized to facilitate access to information and tools, and minimizing the need for specialized training.

In the left sidebar is allowed the access to the geographic information, organized in six items: Projects, Environmental Information, Monitoring Data, External Layers, My Project and Upload. The horizontal bar displays a series of tools that permit querying, editing and sharing information, while conducting geographic analysis. (Figure 1)

The main frame displays a high resolution satellite image of the Sao Paulo (year 2014), that can be exchangeable with other geographic data sources (aerial photographic, road base maps, street view, etc.) to facilitate the analysis.

2.3. Geoportal Data Feeding

Today the data is fed in the Geoportal by administrative users through the registration of projects, their respective polygons and other environmental data from old and current EIA reports. In the future, data will be fed electronically by the proponent of a new development at every step of the licensing process (preliminary, installation and operation licenses).

2.4. Types of Data

Each polygon is associated with an alphanumeric attribute table which contains the following information:

- Administrative process management information (process ID, licensing phase, event dates, status, license numbers, etc.);
- Projects features related to project type (highways, ports, hydropower, transmission lines, etc) and based on parameters defined in the “Manual para Elaboração de Estudos para o Licenciamento com Avaliação de Impacto Ambiental.”(CETESB, 2014),
- Environmental Impacts Indicators (intervention area, soil movement, vegetation removal, quantity of rivers affected, etc.), to be gathered for all types of project in all phases of the development;
- Monitoring data.

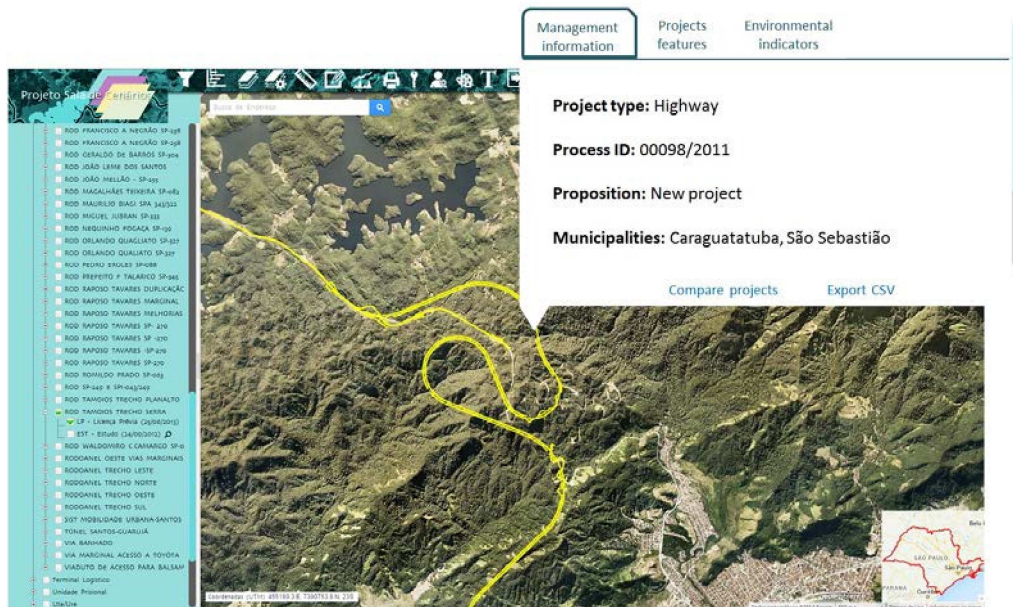


Figure 1 – Scenarios Room Geoportal layout

2.5. Functionalities for analysis and reports elaboration

2.5.1. General tools

General tools available at the Geoportal includes: search and comparison; measurements (distance, area); drawing / sketch (line, polygon, point, string); buffer; terrain profile; legend and printing.

2.5.2. Overlap with official maps of the State of Sao Paulo

The Geoportal Scenarios Room Project was developed with the premise of standardization and sharing spatial data. Thus, in order to enrich the analysis of licensing, it allows overlying the project layer with layers from Unified Territorial and Environmental Base of the São Paulo State, available through the DataGEO Project (Environmental Spatial Data Infrastructure of São State Paulo). This access is entirely via web, which optimize the analysis allowing access to multiple platforms in a single window.

2.5.3. My Project

The My Project functionality allows every registered Geoportal user to save on their own account the results of their analysis (such as sketch, combination of active layers, imported data, viewing scale, etc.). The user can also generate a print layout of their analysis, which are composed by title, legend and scale.

3. Applications in EIA

3.1. Performing the Environmental assessment of a new venture

This functionality is performed by overlaying on the base map the proposed new enterprise feature and the layers relating to potential restrictions and environmental characterizations of the project site, such as water supply; topography; vegetation; environmental protected areas; monitoring data (water quality, wildlife, contaminated areas, etc.).

Such simple and expeditious evaluation can provide valuable information for the technical staff responsible for the future EIS review.

3.2. Comparing the Significance of the Impacts of two or more projects

This assessment can be made by comparing the environmental indicators (simple or relative) of two or more projects of the same type (highways, airports, dams, etc.).

This is done using directly data of environmental attribute tables that are associated with the projects polygons. Data from the attribute tables of the projects under review are exported to Excel® file or compatible, allowing the generation of the comparison graphs. Figure 3 displays the values of an environment indicator (vegetation removal per km) of two roads projects, indicating the higher environmental pressure of the first project.

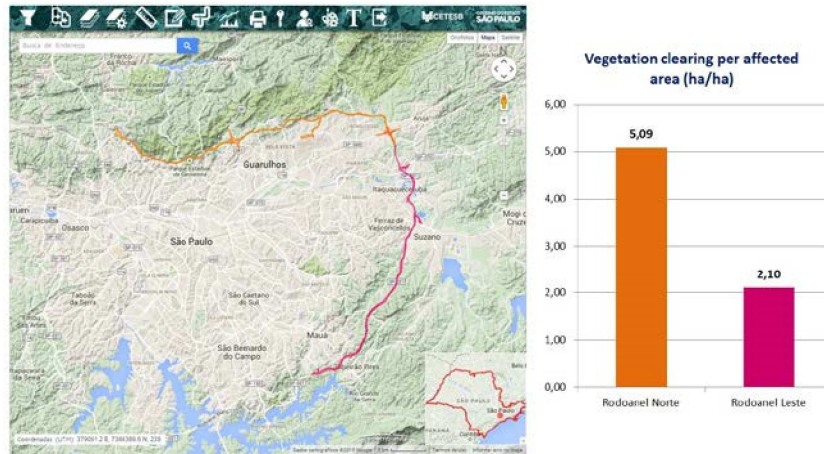


Figure 2 – Comparing the significance of environmental impacts

3.3. Evaluating the Cumulative Impacts in the Surroundings

This assessment can be performed in a similar manner to the previous, comparing the environmental indicators (single or relative) of two or more projects. In this case, comparison is done using indicators of different types of projects, but located in the same region. Figure 4 shows comparison of an environmental indicator - labor employed during construction - for various types of projects (roads and power transmission lines) located in the same region. Such analysis allows the evaluation of the potential population migration and consequently pressure on public services of the region.

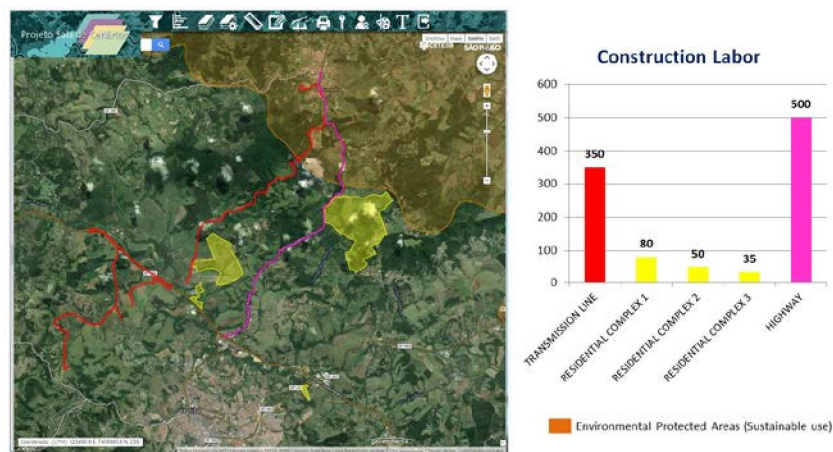


Figure 3 – Evaluating cumulative impacts in the surroundings

3.4. Evaluating the Effectiveness of the environmental licensing

This evaluation may also be performed in a similar manner to the previous, comparing the environmental indicators (simple or relative) of the same project, but throughout the various licensing stages (study,

preliminary, installation and operation licenses). Figure 5 shows the predicted and actual values of an environmental indicator – for example, affected properties and vegetation removed – in different stages of a project environmental licensing.

Therefore, it allows in a fast and objective manner to evaluate the effectiveness of the licensing process. It also can provide feedback for future licensing of similar projects. It is a good tool for following up the impacts of the projects, allowing comparisons between before and after the construction of a new project.

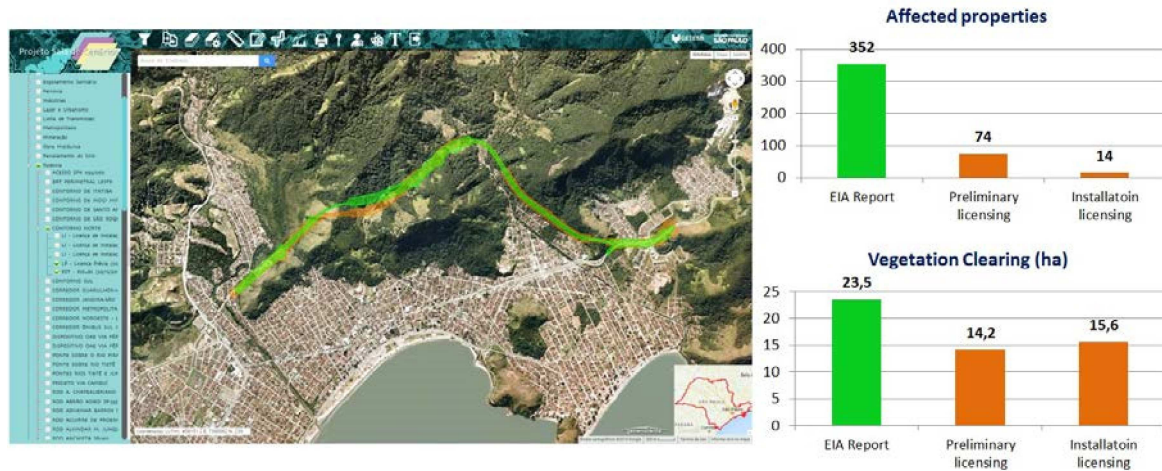


Figure 4 – Evaluation the effectiveness of the environmental licensing process.

3.5. Providing Tools of Process Management

The simple presentation of the projects polygons in the Geoportal provides relevant information to the management of the licensing process. The colors of the projects reflect the stages of licensing and the construction in which they are. The management balloons bring relevant information about numbers and dates of licenses, name of developers, etc., that allow easy connection to other process data. Also any changes or variants of the originally approved project polygon can be easily verified.

4. Conclusions

The Geoportal has been operating since October / 2014 in the CETESB intranet, being used by technicians of EIA Department. Until now, about 500 projects and 150 users are registered.

It has been very useful for previous evaluation of impacts of new developments, giving opportunity for more environmentally sound alternatives. Also, it has been very helpful in the definition of the significance of impacts of new developments, which a critical issue in the Brazilian licensing procedure.

In near future, Geoportal will be improved, with the inclusion of new functionalities and tools, such as:

- automatic data feed in Geoportal, allowing especially that the environmental information can be loaded by the developers themselves or consultants;
- interactions with other computerized systems of licensing, in particular the CETESB Environmental Licensing System;
- development of more sophisticated environmental analysis tools, such as the use of space dynamic models for enrichment of the potential environmental evaluation of the portal (e.g., evaluation of dispersion chimney pollutants or effluents dump sources, etc.);
- integration with the DOC solution, allowing access to the documents relating to licensing procedures with EIA, to facilitate the organization, storage, retrieval and sharing of such information.

5. Acknowledgements

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6. References

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