International Journal of **Human Sciences Research**

USING REMOTE SENSING IN THE CLASSROOM TO INTERPRET CHANGES IN THE RURAL LANDSCAPE

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Abstract: The geography taught in the classroom requires the teacher's preparation and ability to bring the content closer to the reality of the students, making it meaningful to them. Thus, this paper seeks to present a proposal that aims to bring into the classroom, the rural landscape, contextualized to the reality of the student and enabling him to realize the changes that rural landscapes have undergone over the years. For this, remote sensing will be used, using images extracted from Google Earth. It is hoped that, because it is an experience that does not involve additional costs and does not require technical depth, this possibility will become a possible practice in Geography classes in Basic Education, being pointed out here, only an assumption applied to the rural environment, but that can be extrapolated to other geographic practices in the classroom, such as in the urban and environmental areas.

Keywords: Pedagogical Practice, Google Earth, Rural Landscape, Geography Teaching.

INTRODUCTION

The socio-spatial transformations in the Brazilian countryside is a historical phenomenon, but still ongoing. Such changes express how ephemeral agricultural landscapes are and that these are dynamized with certain ease from the action of economic agents linked, in their majority, to productive systems of global order. It is in the countryside that many of the economic cycles that have existed in Brasil have materialized and left their marks. (FURTADO, 2003).

The current socio-environmental and landscape configuration of the rural area of Northwest Paraná is characterized as the result of combinations and also of the actions of many agents. These agents used the landscape potentialities - for the expansion of the coffee economy in São Paulo, land parcelling for colonization, "cattle raising", and expansion of the sugarcane culture - to establish a regional development model whose design was modified - with greater or lesser intensity - when this model is dismantled due to the changes in the world economy.

There is abundant documentation registering the dynamism of the rural area in Brazil and its social, economic and environmental consequences. In the northwest of Paraná, it is possible to identify a historical agent, notably in its pioneer period of occupation, which is the coffee culture.

Within the current rural landscape of this area, it was identified as dynamizing and modifying agents of this space, those linked to the Southcoal sector (PASSOS et al, 2012).

Such changes, although they are within the geographical reality of our students, sometimes escape their perception, precisely because it is a gradual process that, being materialized in the rural area, escapes the view of students located in the urban area.

The change in the rural landscape of Northwest Paraná refers to the spatial transformation, in an unequal and differentiated way. This kind of change is amplified when it becomes possible to observe this landscape in operation - and in transformation - from another perspective,

> (...) on aerial photos or satellite images, individual clippings of landscapes: certain structures appear in more and more detail and the landscape looks like a patchwork pattern. (LANG E BLASCHKE, 2009, p. 14).

One of the ways to bring this perception of the changes that have occurred in the rural area to our students and work such transformations within the approach of a broader content - the Agricultural and Agrarian Geography of Brasil - is through the use of Remote Sensing tools.

According to Florenzano (2002), remote sensing is the technology that makes it possible to obtain images and other types of

data from the Earth's surface, by capturing and recording the energy reflected or emitted by it. The term sensing refers to the acquisition of data, and remote, which means distant, is used because the acquisition is done at a distance, i.e. without physical contact between the sensor and the Earth's surface.

Data acquisition by remote sensing is, in general, the way to obtain information from an object or target, at a distance, without contact with it. For Oliveira (2003) "the information is obtained using electromagnetic radiation, generated by natural sources (sun), or by artificial sources in the case of radar" (p.81).

We intend to present the use of the Sensing tool, which is of utmost importance in the teaching and learning process, to present a proposal for the use of a Remote Sensing tool - Google Earth, applied in the classroom for the study of the dynamics of the rural area, focused on the application to the rural area of Northwest Paraná.

It is intended to make the content of the agricultural and agrarian geography of Brazil more meaningful to students of Basic Education. It is then proposed a look at the rural area of the region where the student is inserted, without necessarily visiting in loco, but with the use of remote sensing. Finally, to introduce the concept of Remote Sensing in the classroom and mainly to facilitate the pedagogical use of Google Earth in Geography classes.

The approach and problematization of the Brazilian countryside within the teaching of geography for basic education must highlight the spatial, social, economic and environmental implications inherent to the use and occupation of this space, aligned to the reproduction of capital based on the Brazilian agro-export model. On the other hand, such an approach seems to be out of touch with the reality of the students, who, mostly located in urban areas, are unable to perceive such changes in the rural environment.

This distance to the student's reality allied to generic approaches to the problematization of the Brazilian countryside makes this content not very meaningful to students, thus compromising the real meaning within the understanding of their reality (MENDES, 2012). Therefore, remote sensing would be a viable tool to take the spatial reality of the rural area into the classroom.

METHODOLOGY

By understanding that the acquisition of images of good spatial resolution is unfeasible within the reality of public educational institutions of basic education, besides understanding that the processing of such images requires a technical knowledge that is not feasible within basic education, we realized in the software (or website) Google Earth, the necessary tool for our study proposal.

In addition to being a tool that has satellite images from around the world, already aimed at the end user - no processing or adjustments are required - Google Earth is free and very easy to use because it uses intuitive tools.

Nowadays, it is possible to use the Google Earth software, even for smartphones, but also its "Web" version. We have chosen to use its software version because, so far, it is the only one that allows the visualization of a scenario from images with different timeframes. This makes it possible to follow the changes in the rural landscape over time.

We will now present the step-by-step process for the realization of this proposal to be applied in geography classes. It is worth mentioning that the geographic cutout worked on here will be the northwest of Paraná and that the comparison of the images will be of utmost importance for the students to understand how the advance of sugar cane in the rural area occurred, because it is the

reality and the conjuncture of the authors of this work, and this proposal can be applied in any region and approaching any form of dynamics of the rural area.

First, download Google Earth, and then install it. When it opens, use the mouse cursor to find the area that will be your geographic clipping and zoom in to get closer to the area to be investigated.

In the top toolbar, there is the option "Show Historical Imagery" (Image 1). Click on it and scroll - moving laterally - the time bar to remote times.

Be aware that the images that will appear are older and therefore may have elements in the rural landscape that no longer exist in the current image. Make a few attempts until you find a temporal image that is different from the reality found in the current image. It is important at this stage to note the geographic coordinates of this location and the date of the historical image.

Next, the framing of the image is performed. Once this is done, just go to the "save image" option that can also be found in the upper toolbar (Image 2).

The most current image and a historical image must be saved so that we can observe the differences and also the modifications that that particular location went through, in a short period of time.

Finally, a layout was assembled where the two images were inserted containing information such as the municipality to which the rural area belongs, the years corresponding to the images, and the geographic coordinates (Image 3). The layout can be assembled using some vectorization software, such as CorelDraw, Paintbrush, or even be assembled on a slide. This material will serve as a basis for class discussions.

For addressing multiple geographic knowledge, such as cartography, remote sensing, agricultural and agrarian geography, it is recommended to make this material together with the students and discuss the results afterwards.

RESULTS AND DISCUSSIONS

To enable the discussions about the result/ product generated from the procedures mentioned in the previous item, the same was applied taking as reference the capture of recent and historical images of the rural area of municipalities in the Northwest of Paraná, thus being possible to compare the rural landscape in two different moments.

The first image registers a fragment of the rural area of the city of Paranavaí - PR (Image 4). Google Earth images were extracted for the years 2002, 2006, 2010, and 2013. The area in question drew much attention when made the changes of years in the "historical images" function of Google Earth.

In the 2002 image it is possible to see that the land use is for livestock, with the presence of degraded pastures. It is also observed the headquarters of the rural property with orchard formed in its surroundings as well as other structures (sheds, stables, dams) and two areas with vegetation that seem to form the Legal Reserve of the property.

For the year 2010 we see the advance of sugarcane in the areas adjacent to this property (south and west), but it still maintains the land use with pasture. This use has changed, as seen in the 2013 image, and it is possible to observe the cutout with land use predominantly with sugarcane. One can also notice the insertion of a tree crop, probably the planting of orange trees in the northern portion of the image, as of 2010.

Another point of note is the distance between the contour terraces, much more sparse for the area with sugarcane in comparison to the area with pasture. Such characteristic has a direct impact on land use management, especially with respect to
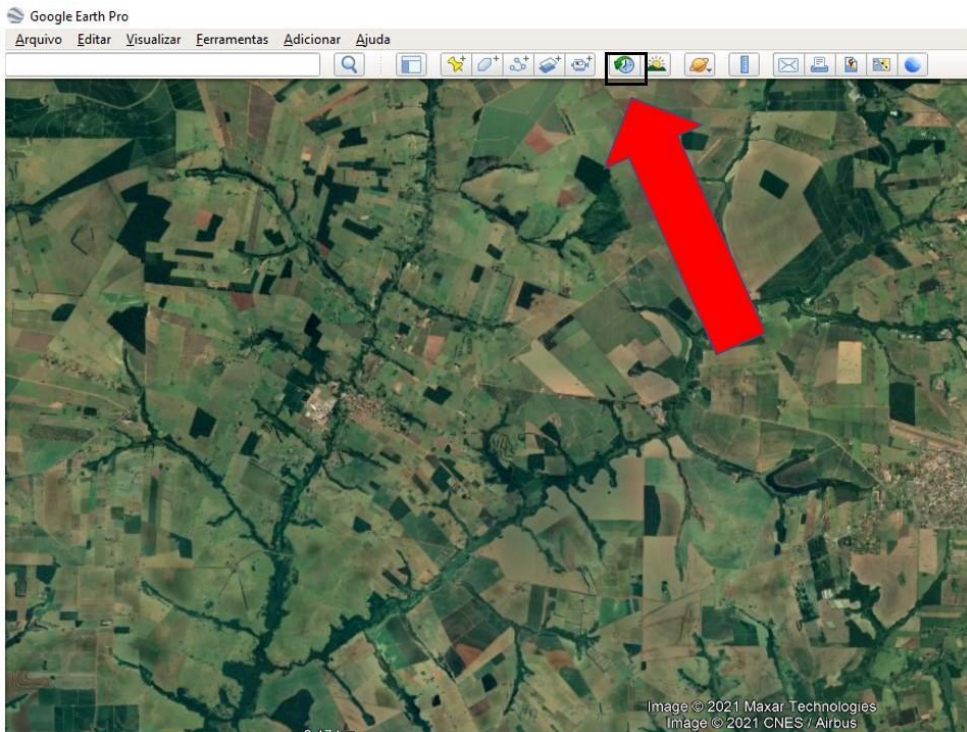
Image 1 - Using the 'Historical Imagery' Tool in Google Earth.

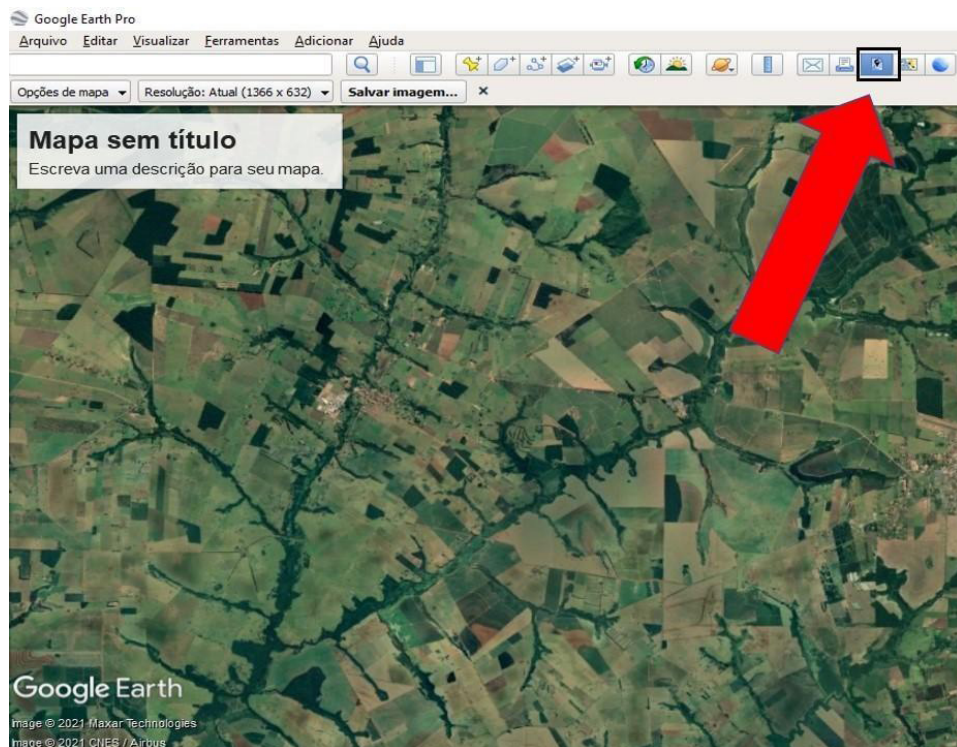Source: Google Earth. Adaptation: Authors.

Image 2 - Using the "Save Image" tool from Google Earth.
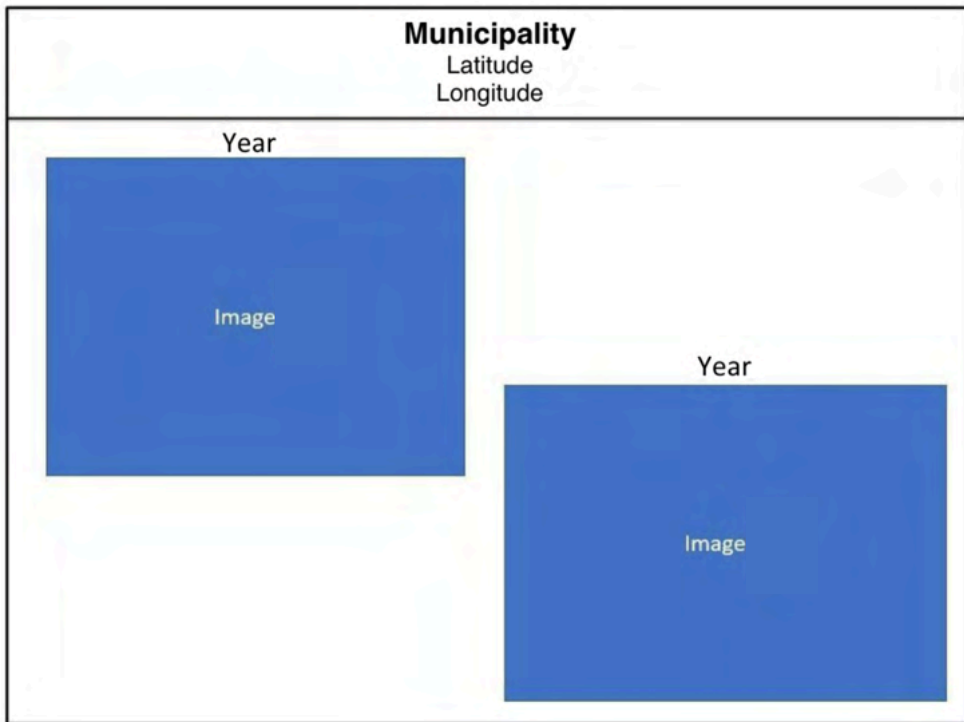
Source: Google Earth. Adaptation: Authors.

Image 3 - Proposed layout template for the composition of the two images with different dates.
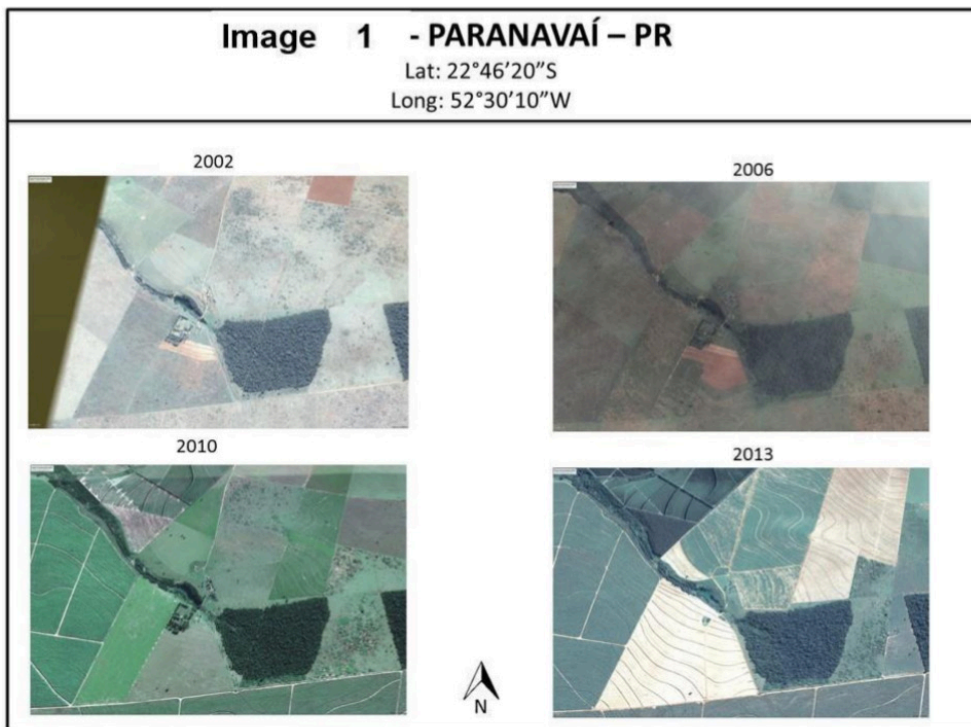Source: Authoral.

Image 4 - Composition with images of the rural area of Paranavaí - PR in different years.
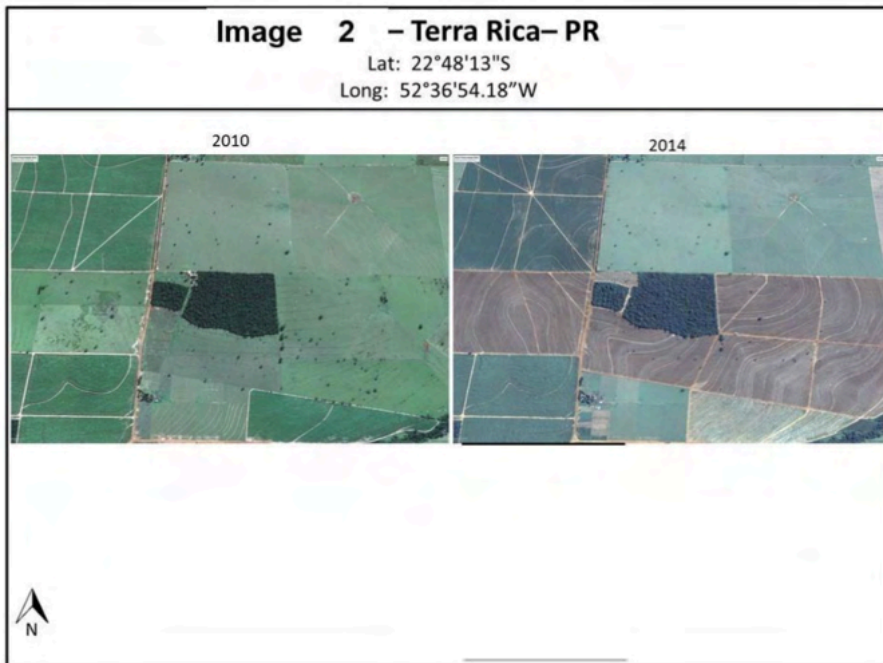Source: Google Earth. Composition: Authors.

Image 5 - Composition with images of the rural area of Terra Rica - PR in different years.

Source: Google Earth. Composition: Authors.

erosion prevention and control.

Finally, perhaps one of the most striking aspects of this land use transformation from a landscape perspective is the suppression of structures that used to compose the rural property, as in this specific case, the substitution by sugar cane doesn't occur only in the agricultural land use area itself, but also over any structure that could serve as a barrier to this expansion, such as the stable (north of the property's headquarters) and the orchard that used to surround the headquarters.

Below is a second example of the application of this activity, now for the municipality of Terra Rica - PR (Image 5). Google Earth images for the years 2010 and 2014 were extracted because for these it is possible to see significant changes in the organization of the rural landscape.

The spatial cutout registered in the images is located in the southeast portion in the municipality of Terra Rica, near the Três Morrinhos Municipal Park. This area is under the influence of Usina Santa Terezinha/Usacucar (Terra Rica unit).

We can notice that in the 2010 image the presence of sugarcane plantations in the western portion of the image. In the central portion there is a fragment of vegetation, probably functioning as a Legal Reserve - RL. In the rest of the image there is a predominance of pastures.

The most notable dynamic for these two images is the one that occurs in the central portion of these images, on a rural property that was once used as pasture land, and that in 2014 has already been converted into an area for sugarcane production. The satellite image depicts the suppression of the property structure, the headquarters, the stable, and the orchard, indicating again, not only the human emptying of the rural area, but also the suppression of the stories materialized in this space.

FINAL CONSIDERATIONS

The teaching of the agrarian and agricultural geography of Brasil in Basic Education reveals the degree of dynamism that reaches and remodels the rural landscape. On the other hand, there is a risk of not bringing the reality of our students into the Basic Education, thus losing the significance of this content.

The use of remote sensing, precisely based on Google Earth, shows to be viable and capable of bringing to the classroom, the discussions about the Brazilian countryside, and the main thing - trying to discuss the reality in which our students are inserted, comparing for the same spatial clipping, two different moments, thus enabling the visualization of these transformations in the countryside.

It is, therefore, a proposal that demands accessible technical handling, without financial costs and that makes it possible to work with multiple geographic knowledge, and can be applied not only to the studies of agricultural and agricultural geography, as demonstrated here, but there are numerous possibilities for use in the teaching of geography, depending on the demand and the interest of the educator.

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