
Mapping Media Influence on the Electoral Process in Peru

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Abstract

The Mapping the Media in the Americas Project is a three-year collaboration between the Carter Center in Atlanta and the Ottawa-based Canadian Foundation for the Americas (FOCAL). In Canada and in eleven South and Central American countries we are mapping socio-economic data, electoral results and the locations of the media (TV and Radio Stations and newspapers). This information is entered into an ArcIMS website that is eventually transferred to a University in the country concerned. The aim is to allow political parties and non-governmental organizations involved in monitoring the democratic process to determine the influence of the media on the electoral process. This influence is demonstrated by visualization and the modelling of electoral results using geographically weighted regression. This paper describes our work in Peru.

Introduction

The Mapping the Media in the Americas Project is a three-year collaboration between the Latin American Research Centre at the University of Calgary, the Carter Center in Atlanta and the Ottawa-based, Canadian Foundation for the Americas (FOCAL). The project was initiated in September 2004 and will be completed by the end of August 2007. The goal is to build interactive, web-based Geographic Information Systems (GIS) that include data on socio-economic variables for the highest resolution geographic divisions. In addition, within the GIS, data on the location of the broadcast and print media are recorded. These data include the location of TV and radio station antenna and the offices of leading newspapers. Where available, data on campaign contributions are included. Finally, the results of the most recent federal or national elections are added. The intermediate goal is to build models that visualize and predict the influence of the media on the electoral process. The ultimate aim is for transparency in the electoral process so that those campaigning for elected office can use their financial resources in the most effective manner.

The research process involves a number of distinct steps including gathering spatially explicit data, building the GIS, migrating the GIS layers to a user-friendly, interactive, GIS-based website, launching the product in the country of origin and then providing training and on-going support so that the website remains up-to-date and an effective resource for enhancing the electoral process. The aim is to complete the research process in Canada and eleven Latin American countries.

Gathering the Data

To-date we have worked in Canada, Peru, Guatemala and the Dominican Republic. In each of these countries the interactive website has been built and “launched.” We are now working on a website for Mexico and the remaining seven Latin American countries are in various stages of production.

The research process has usually begun with a week-long visit to the capital city of the country in question. Before visiting the country we have often scheduled up to four or five visits per day with government organizations such as the national census taking organization, with government and non-government organizations that oversee the electoral process and with media organizations including TV, radio and newspaper companies. We are interested in socio-economic data, recent electoral results for national elections, the location of the media and information that will affect their reach (namely data on the power of their transmitters and the height and location of their antennae, in the case of broadcast media, and circulation figures for newspapers) and campaign contributions. The data must all be spatially explicit so that we can use it to populate the GIS.

Building the GIS

Once the data has been acquired it is brought back to the University of Calgary where the technical work of building the GIS is performed. The platform that we use is ArcGIS 9.2. The data gathering process proceeds on an on-going and continuous basis through Internet Searches and the use of resources such as MediaGuia. Never are all the data gathered on our first visit to the country in question.

	C	D	F	G	H	I	J
1	ONPE						
2							
3							
4							
5	DISTRITO	VOTOS BLANCOS	VOTOS NULOS	VOTOS VALIDOS	AGRUPACION POLITICA	VOTOS	%
6	CHACHAPOYAS	978	281	8378	ALIANZA ELECTORAL UNIDAD NACIONAL	1564	18.66
7	CHACHAPOYAS	978	281	8378	FRENTE INDEPENDIENTE MORALIZADOR	481	5.74
8	CHACHAPOYAS	978	281	8378	PARTIDO RENACIMIENTO ANDINO	41	0.48
9	CHACHAPOYAS	978	281	8378	PARTIDO ARRIETA PERUANO	2817	33.62
10	CHACHAPOYAS	978	281	8378	TODOS POR LA VICTORIA	29	0.34
11	CHACHAPOYAS	978	281	8378	ALIANZA ELECTORAL SOLUCION POPULAR	103	1.22
12	CHACHAPOYAS	978	281	8378	PARTIDO PERU POSIBLE	3321	39.63
13	CHACHAPOYAS	978	281	8378	PARTIDO PROYECTO PAIS	22	0.26
14	ASUNCION	41	6	92	ALIANZA ELECTORAL UNIDAD NACIONAL	13	13.97
15	ASUNCION	41	6	92	PARTIDO ARRIETA PERUANO	3	3.15
16	ASUNCION	41	6	92	TODOS POR LA VICTORIA	3	3.22
17	ASUNCION	41	6	92	PARTIDO PERU POSIBLE	71	80.64
18	BALSAS	110	11	247	ALIANZA ELECTORAL UNIDAD NACIONAL	98	39.85
19	BALSAS	110	11	247	FRENTE INDEPENDIENTE MORALIZADOR	9	3.64
20	BALSAS	110	11	247	PARTIDO RENACIMIENTO ANDINO	4	1.61
21	BALSAS	110	11	247	PARTIDO ARRIETA PERUANO	37	14.97
22	BALSAS	110	11	247	TODOS POR LA VICTORIA	1	0.40
23	BALSAS	110	11	247	ALIANZA ELECTORAL SOLUCION POPULAR	2	0.80
24	BALSAS	110	11	247	PARTIDO PERU POSIBLE	50	20.24
25	BALSAS	110	11	247	PARTIDO PROYECTO PAIS	48	19.43
26	CHETO	49	24	248	ALIANZA ELECTORAL UNIDAD NACIONAL	82	33.06
27	CHETO	49	24	248	FRENTE INDEPENDIENTE MORALIZADOR	7	2.82
28	CHETO	49	24	248	PARTIDO RENACIMIENTO ANDINO	2	0.80
29	CHETO	49	24	248	PARTIDO ARRIETA PERUANO	37	14.91

Figure 1: An example of the database obtained from the Oficina Nacional de Procesos Electorales (ONPE)

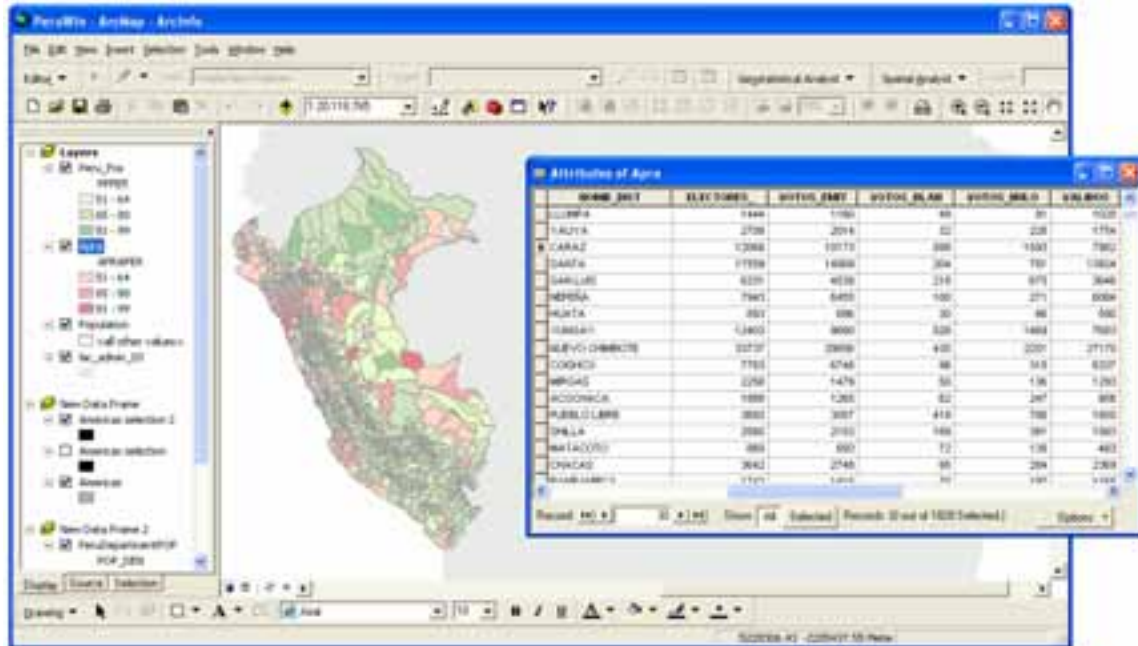


Figure 2: Visualization of the Oficina Nacional de Procesos Electorales (ONPE) database: Second Round Presidential Election Results

Constructing the Website

The websites are built using ArcIMS. ArcIMS is a server-based product that provides a scalable framework for distributing GIS services and data over the Web, and allows instant access to the GIS maps, data, and metadata for the many users of the World Wide Web: a true tool for transparency.

The website has a “splash screen” that introduces the user to the project and describes the three organizations that are involved in the research process: namely, the University of Calgary, the Carter Center and FOCAL. There is also a section on links that relate to research and resources on political finance. Figure 3 shows an image of the splash screen. Each website is available in both English and Spanish (although Canada’s is available in French and English – the two official languages of that country).



Figure 3: Splash Screen for the Mapping the Media in the Americas
Website: www.mediamap.info

Figure 4 shows a “clickable” map of the countries that have been completed and those in progress. While Figure 5 shows the large number of GIS layers that are available in the website including the layer displayed: the 2001 Peruvian Presidential runoff electoral results.



Figure 4: Screen Shot of Clickable Maps Showing Countries

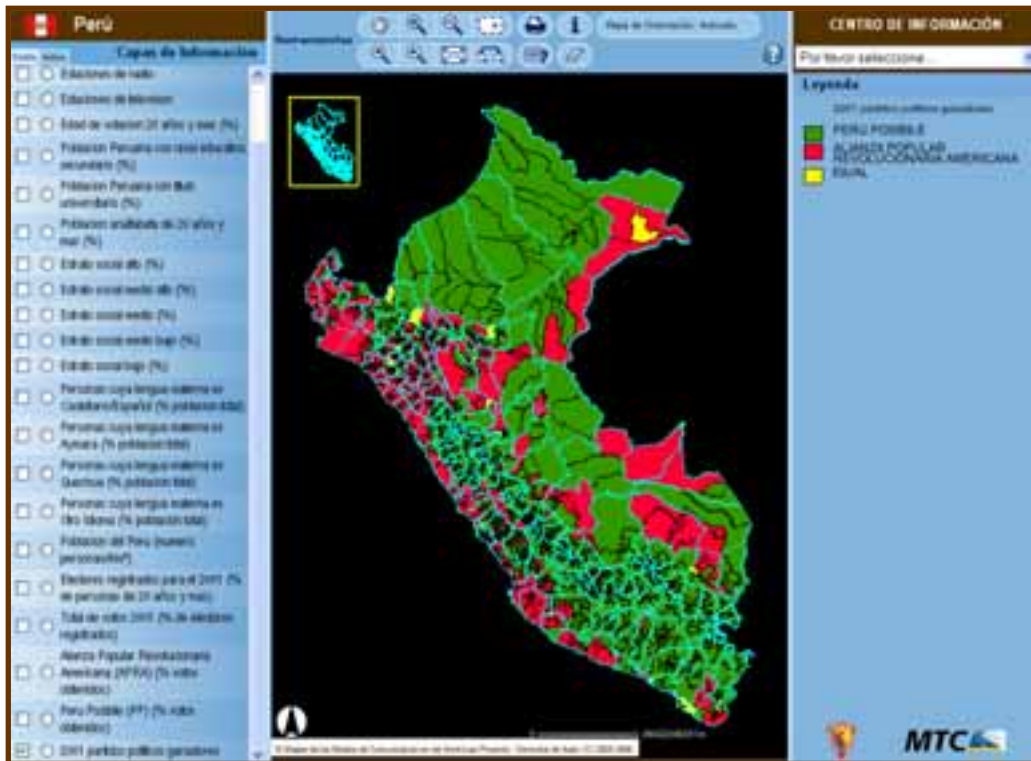


Figure 5: A Map of the Peruvian 2001 Presidential Runoff Electoral Results

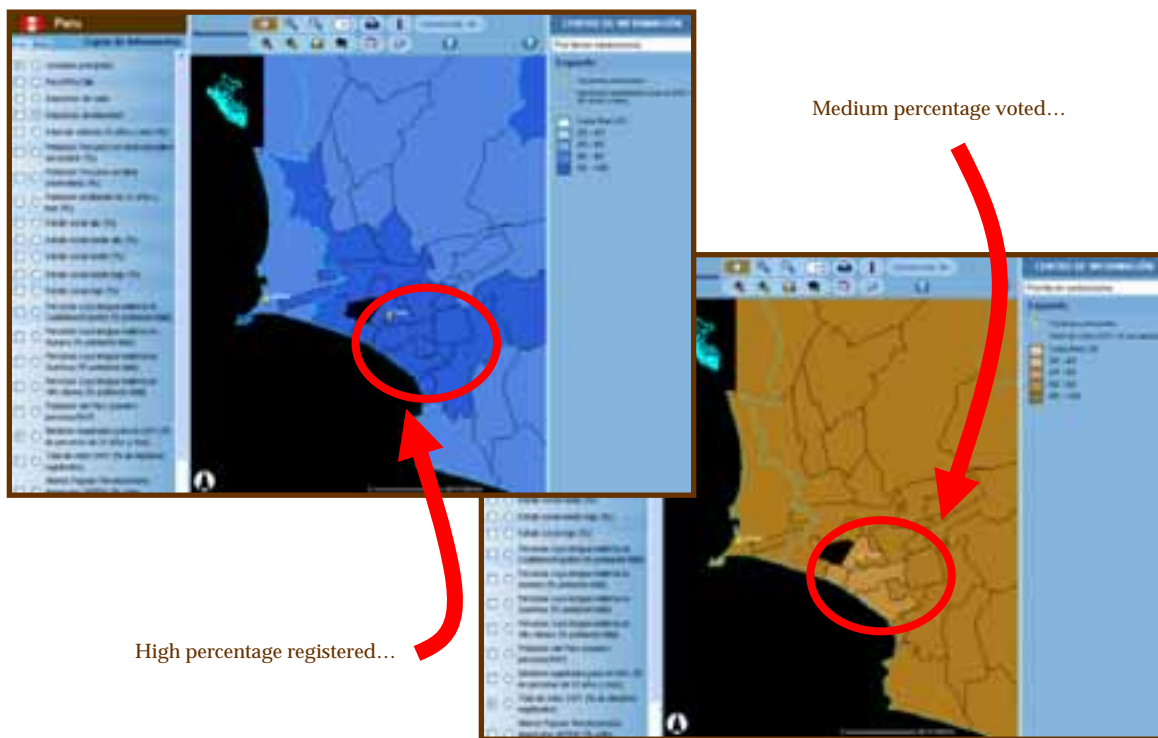


Figure 6: A Spatial Comparison of Voters Registered Versus the Percentage that Actually Voted

One of the difficulties in mapping the results of elections is the huge variation in the size of electoral districts. This is due to the large variations that frequently occur in population densities since most countries try to keep the number of voters per electoral district approximately constant. In the case of Peru the geographical size of electoral districts within Lima that has a population of about 9 million (approximately one third of the national population) is tiny when compared to electoral districts in the thinly populated Amazonian interior. The website supports a number of standard mapping tools including the ability to zoom in and zoom out. Figure 6 demonstrates this capability and also the ability to visualize those areas where there are a high number of registered voters but a relatively modest turnout. In Peru voters are legally required to vote. Those campaigning for electoral office might see such areas as opportunities to increase their support and thus to invest advertising dollars.

The question then remains where should they concentrate their efforts? Figure 7 shows the location of TV station antenna. The website is also able to produce similar maps for radio station antenna and to show the distribution points for newspapers. In order to estimate the reach of the broadcast media we are building wave propagation models (ReMartinez, 2006) and combining these with viewshed analysis and digital elevation models (see Figure 8). These models when combined with the population distribution layer in the GIS will provide an estimate of just how many people a radio broadcast will reach. Furthermore GIS layers than include the voters' language of first choice will suggest the most effective language for political broadcasting.

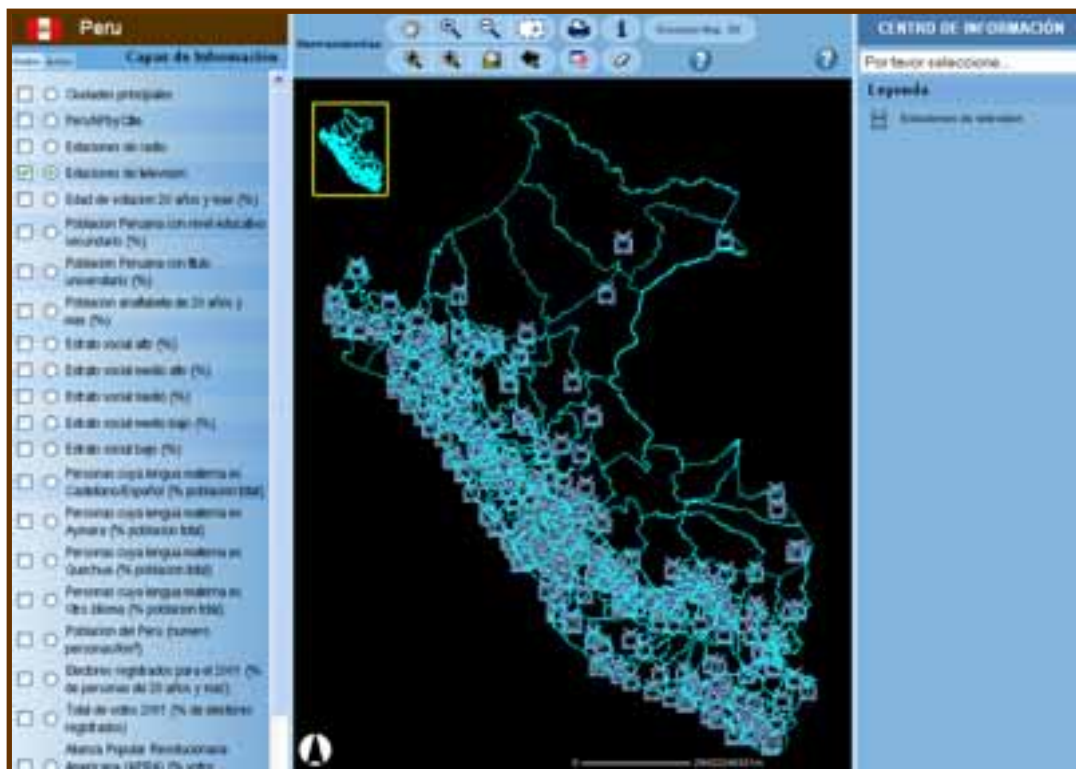


Figure 7: Location of Television Stations

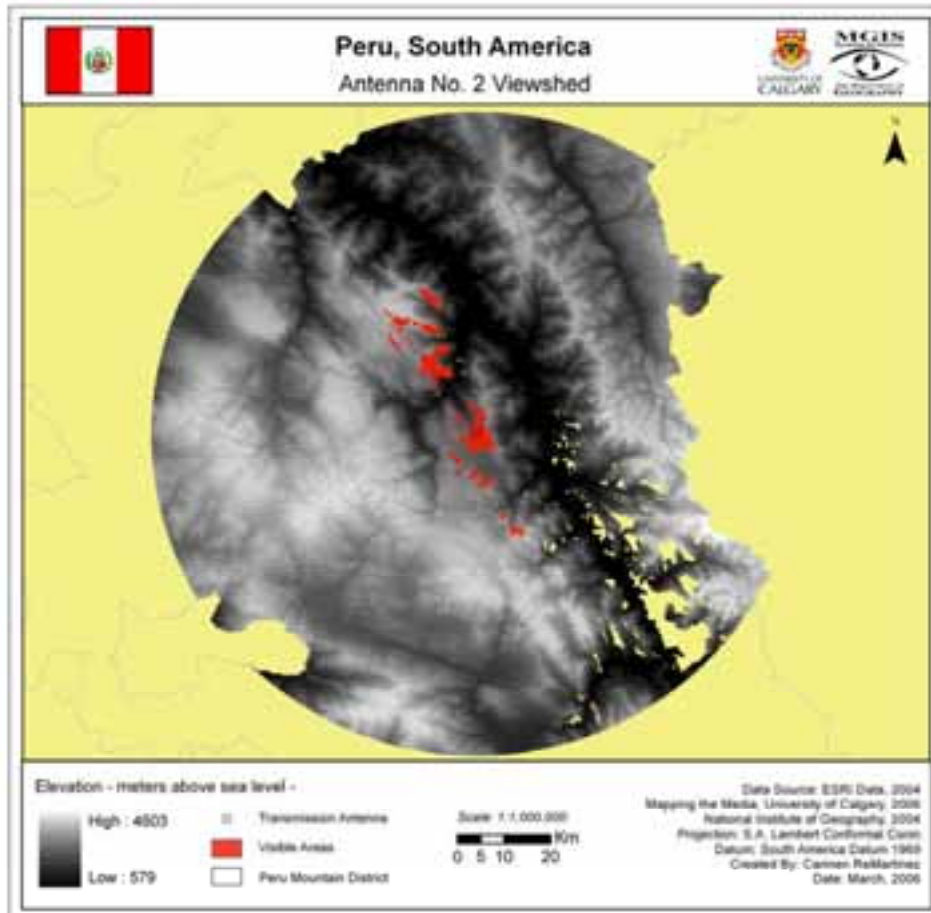


Figure 8: Wave Propagation Model Combined with a Viewshed Analysis for the No. 2 Radio Antenna of the Pan Americana Radio Station

The Inquiry Tool incorporated into the ArcIMS server can be used to conduct SQL queries to the databases that are available in the web-based GIS. Figure 9 shows one such query. In this example there is an inset map to show the geographical location of the region being queried. The region itself is shown in the main map. The area in question is the Cusco region of Peru where the Quechua speaking indigenous population predominate. The percentage of Quechua speakers is shown for each region on the map and for the circled area we can query the database to provide information on the two radio antenna located there and the exact percentage of Quechua speakers, as indicated on Figure 9. Again, this is useful information for research into public finance and for the most effective use of campaign advertising dollars – or soles.

Using the Research Tool

The website for Peru, and indeed for all the other countries in which we are working, remains a work in progress. In each country the challenges vary. The availability of the data that we need is highly variable. Information on campaign spending is one of the

more elusive variables. Equally difficult has been the prediction of the reach of newspapers. Newspaper circulation figures are hard to acquire and it is even more difficult to obtain circulation and market share data that are geographically distributed. For competitive reasons newspapers remain secretive. We hope to build models that incorporate distance and socio-economic variables that are already incorporated in our databases to distribute our gross circulation figures geographically. Again, this will allow political candidates to make more informed decisions regarding the use of their advertising dollars in the print media.

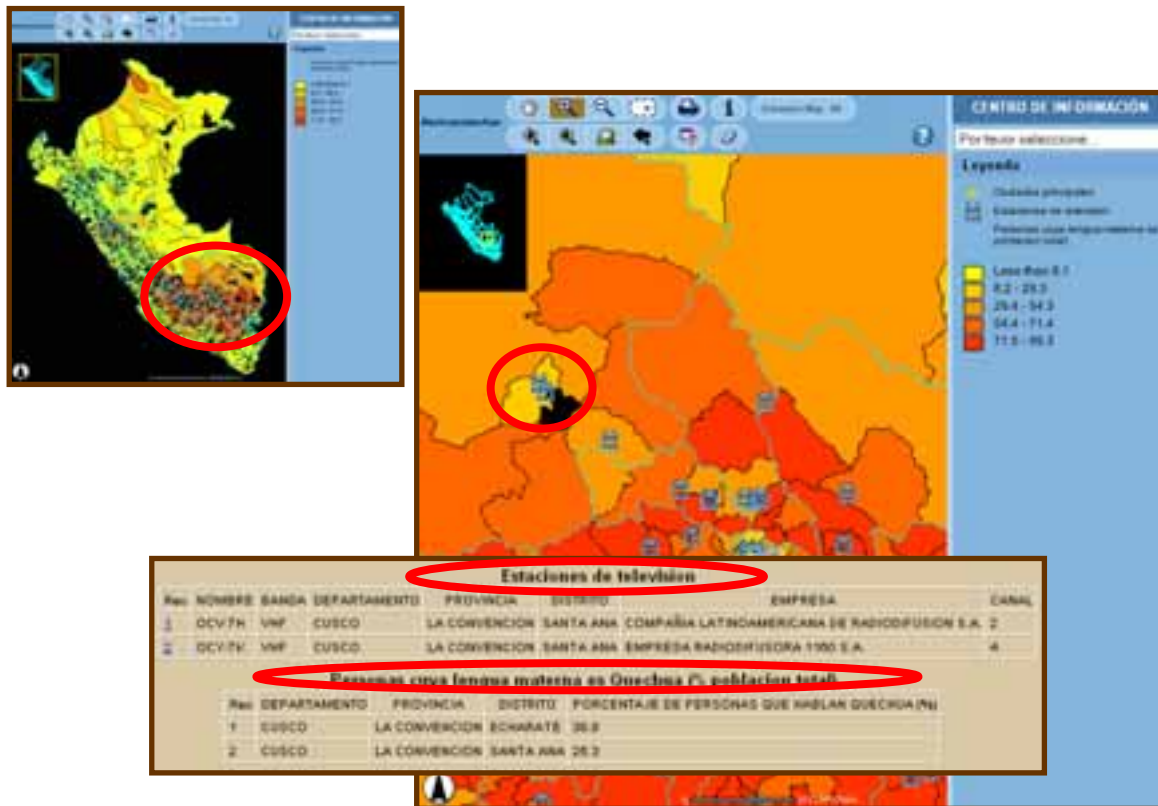


Figure 9: An SQL Database Query Showing the Percentage of Quechua Speakers and Information Relating to the Local TV Stations

In addition, we are building new geographically weighted regression models to “predict” and explain the outcome of past elections (Fotheringham et al., 2002). These models indicate those variables that provide the most effective and informative correlations with the electoral behaviour of the population. They can then be used as a guide to future voting behaviour. Political campaign managers can study where they performed unexpectedly well or poorly in past elections. This information when combined with data on where they won or lost by small margins can be used to direct future advertising resources. The variables that are shown to be important in the analysis provide information on what segments of the population should be targeted. This can be used in conjunction with listening and viewing demographic profiles of those radio and TV stations, respectively, that provide broadcast coverage in the region.

Our initial efforts at regression modelling showed that traditional Ordinary Least Squares models provide very low goodness-of-fit measures for the 2001 Peruvian Presidential election. Using five independent variables that related to language spoken, educational attainment, literacy and socio-economic class the percentage goodness-of-fit statistic (R-squared) was only 35% for the approximately 1,780 electoral districts. When a geographically weighted regression was used with a kernel of 100 points R-squared values ranged from 27% to 83% across the map (see Figure 10).

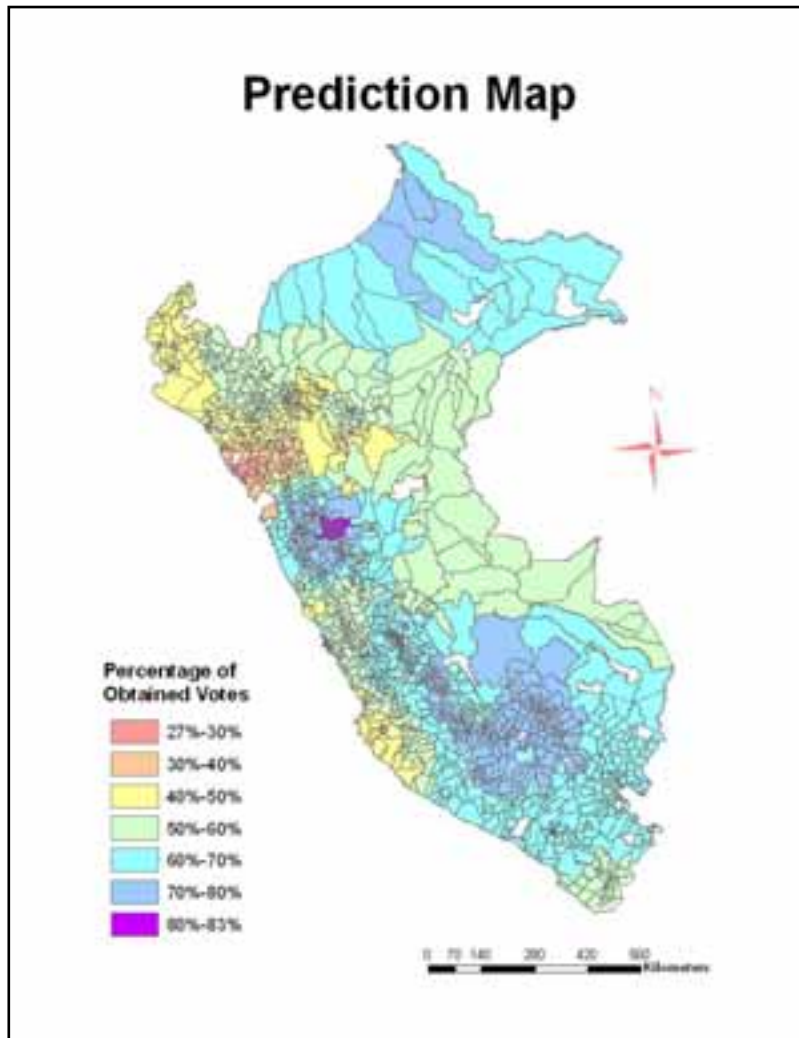


Figure 10: R-Squared Statistics for a GWR Model for the Percentage of Votes Obtained for the Peru Possible Party in the 2001 Peruvian Presidential Runoff Election.

To date all of our data is areally aggregated. Although we are basing our research on almost 1800 electoral districts there is still the possibility for variation within these districts. Future research within the project will concentrate on the so-called Modifiable Areal Unit Problem and the effects of scale and data aggregation. This research will depend on the availability of electoral results by polling booth. We are already exploring these possibilities in the case of the Canadian 2006 federal election.

Training for Sustainability

When the research team judges that the interactive, GIS-based website is sufficiently complete we return to the capital city of the country in question and “launch” the website at a media event that seeks to explain and advertise the value of the website in the electoral process. At that point the website becomes accessible to the public. The launch of the Peru website took place February 8th and 9th, 2006, in Lima. Subsequent to this launch we have continued to improve the website. While in Lima the University of Calgary and the Catholic University of Peru (Pontificia Universidad Catolica del Peru -- PUCP) signed a Convenio. The purpose of the Convenio is to allow for the sustainability of the website which will now be handed over to PUCP.

Training of faculty, students and ESRI software distributors in the use and development of the website will take place at the ESRI Users’ Conference in San Diego in August 2006.

Future Research

By the end of August 2007 we will have completed the development of websites for 12 countries in the Americas. The University of Calgary’s Latin American Research Centre and the Department of Geography will serve as coordinating bodies that house all 12 websites. We anticipate that the websites for each individual country will evolve as new elections are held, as new socio-economic data become available and as the locations of the broadcast and print media and other data change.

One organization in each country will sustain their website and will maintain and evolve the information. Thus we expect the website to enhance the effectiveness of campaign finance, to aid electoral transparency, and to become a useful research tool for geographical analysis. Even though we expect the national websites to evolve independently we hope to maintain close contact with the organizations housing the websites and we expect to exchange ideas, methodologies and analytical results.

Conclusion

The Mapping the Media in the Americas Project is now almost 50% complete. It has been a fruitful and innovative collaboration between the University of Calgary, the Carter Center in Atlanta and FOCAL in Ottawa. Although data gathering and research challenges remain we believe that our goals of providing an interactive, GIS-based website that will be useful in aiding electoral transparency and enhancing the effectiveness of campaign finance have been largely achieved.

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