A comparison of the open environmental data diffusion in Argentina, Bolivia and Brazil

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Some preliminary results from the Baguala project for methodological discussion.

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N.b.: figures and tables are presented at the end of the text.

1. Objectives and methods to describe "national environmental webs"

The ideas developed here constitute some intermediary results of the Baguala project (uses of open environmental data in Latin America and France), which aims at understanding how Internet changes the ways the Society represents and manages its environment, through the supply of information and data online. In this short presentation, we will focus on the analysis of an inventory of websites that provide information or data about the environment in Argentina, Bolivia and Brazil. The main issue to be discussed here is whether we can characterize the structure of the "environmental web" at a national level, and with which methods. Who takes the initiative to share online data: institutions, individuals, etc.? What are the main problems and questions addressed by the authors of the sites which compose this "environmental web"? Can we detect groups among this group of websites, specialized subject? This perspective will allow us to understand the main patterns of the use of the web for environmental purpose, that means the strategies adopted by some social actors to play a role in the environmental debate or management through the creation of a website. This analysis will be developed here in an aggregated manner, comparing the structures of three environmental webs, the Argentinean, the Bolivian and the Brazilian one. Studying these three very different countries allows examining how social, geographical and technological factors affect the mains uses of Internet for environmental purpose.

The inventory of websites with environmental content was made through the formulation of 275 requests to the Google search engine, for each of the three countries. For each country, the list of requests was established combining the name of an administrative unit, an environmental key-word (environment, nature, environmental education, biodiversity, pollution, water, climatic change, environnemental risk, waste, soil, forest), and one of the following extension: .org, .blog, .gov. We searched for websites of national scope (offering data about the entire country), and of sub-national scope: the last were searched only in 8 Brazilian States, and 8 Argentinean provinces, and for all the Departments of Bolivia, in order to create a corpus representative of the geographical variation of the environmental web within the countries. For each request, the first 50 answers were examined, and the pertinent websites were included to our corpus. The main criterion used was the identification of a clear purpose from the author to speak about an environmental issue, and of course the existence of data or information about one of the three countries. We reached by this mean a total of 1637 websites (see table 1, column 1). Each site was

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then visited and described through 30 categories, aiming to characterize its author, the author of its content (frequently not the same one as the site's author), the objectives of the site, its main theme, and the kind of data it supplied. Lastly, we searched for the hyperlinks between these sites through a "webcrawling", and represented the graph they formed (see figures 1, 2 and 3)[2]. For a correct evaluation of the results that will be discussed, it is important to remember that this inventory is only a picture of the web of the period when it was performed (the mid-2012 year), that will be quickly outdated due to the rapid changes of the environmental sites.

We will mainly expose here some salient hypotheses from these results, that need to be debated, and refined by further analysis.

2. The main features of three South American environmental webs

The statistical and graphical analysis of the inventory (figures 1 to 3 and tables 1 to 3) shows clear differences according to the country: and we make the hypothesis that these differences reflect global patterns of problematization of the environmental question. The Brazilian environmental web (figure 1) is characterized by a high internal interconnection, a very strong organization around public sites with a very high indegree[3] (mma.gov.br, the environment ministry; brasil.gov.br, the government portal; ibama.gov.br, the environmental control agency; ana.gov.br, the water agency), a network organized around few sites with high indegree, and the majority of the other sites with a low indegree. The absence of non-public sites with high indegree, excepted for wwf.org.br and socioambiental.org (two NGOs), is also striking. In comparison, the Argentinean environmental web is characterized by a lower cohesion than the Brazilian one, due to the existence of an important subgroup of non-public sites (figure 2, upper-right part of the graph), weekly connected to the public ones. Public sites have generally a low indegree, similar or inferior to non-public sites: this is a strong difference with Brazil. The most striking difference is maybe the presence in Argentina of a dense subgroup of sites specialized in environmental conflicts and claims, based on local and national activism (red circles in figure 3)[4]. These sites are densely connected to similar websites from other countries, taking part to a clearly identified international network that deals globally with social claims, and incorporates environmental questions, like alimentary sovereignty and peasant livelihood defense, fights against the "extractivist model" (viacampesina.org, grain.org, wrm.org.uy…). The Bolivian web differs dramatically from the two others, showing a strong interconnection with USA or international institutions sites, specialized in aid for development and environmental actions (UNEP, FAO, IUCN, Inter-american development bank). Bolivian sites show a very low interconnection among them, preferring to link to foreign or international sites. Finally, public entities are notably not central in the graph and have a low indegree. For example, several NGO sites (cedib.org, bolpress, redesma.org, fan-bo.org, …) have a similar indegree than the Environment Ministry (mmaya.gob.bo).

Crossing these results with the thematic specialization of the websites (figure 3), we can define three great types of environmental webs. In Brazil, the exchange and diffusion of environmental information in Internet are organized around public institutions with a high legitimacy in the field, which diffuse information seen as a reference. These public institutions are specialized in environmental questions, mainly in conservation. This specialization and centrality of public administration is absent in Argentina, where the public sites of our corpus are generally agencies not specialized in environment, but which incorporate in their missions environmental objectives (for example, the agronomical agency, INTA). This pattern is representative of the Argentinean

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[2] The crawl was performed with issuecrawler, inter-actor algorirthm, depth : 2, on April 2012. The authors thank the GovCom Foundation for the help in performing the crawl. The graph was drawn with the Gephi software.
[3] The indegree is the measure of the number of links received by a website. The higher is the indegree, the higher is the authority or legitimacy of this site within the corpus of sites.
[4] These sites are from "asambleist" movements (asambleasciudadanas.org.ar, noalamina.org, …) or from journalism activists (indymedia.org, grr.org.ar, ecoportal.net, …).

situation, where environmental questions are not well institutionalized. But the high presence of non public sites in the Argentinean sub-corpus also shows that in this country, the social actors that use Internet to share information are more diversified than in Brazil. The factors that explain this great difference need to be discussed during the seminar.

Two other indicators allow a deeper discussion about how are organized these national environmental webs. The percentage of foreign sites within the group of sites that give information about a country (figure 1, column 2) may be an indicator of the dependency of this country from the outside to know its own environment: This is clearly the Bolivian case, where most of the information about its environment comes from Cooperation agencies and NGOs. The percentage of sites not connected to the central graph can indicate how structured is the public environmental arena in the country: in the Bolivian case, where 45% of the sites are not connected to the central graph, the sites with environmental content are clearly weakly connected together, indicating maybe the inexistence of a common debate and exchange of information about environmental issue. The interest and limits of this kind of indicators need, of course, to be more rigorously discussed.

3. Can we study the geography of the open environmental data diffusion? A spatial justice and territorial mobilization perspective.

Social movements and public institutions generally claim for a wide accessibility to environmental information, as an instrument for democratization and/or optimization of environmental management (a position expressed for example in the Principle 10 of Rio 1992). If we adopt a spatial justice perspective, the realization of this project would suppose that information is homogeneous (in quantity and quality) over all the territories, giving to all citizens the same possibilities to be informed about the potentials and risks of their environment. We can take this lens to analyze at a sub-national level the inventory of websites, to know if online environmental information covers homogeneously the countries. A first and very simple indicator is the variation of the number of environmental websites by sub-national units, Argentinean provinces, Brazilian States and Bolivian Departments. In figure 4 (black circles), we can see that in Brazil the number of environmental websites by State decreases from the centre of the country –São Paulo- to the periphery, mainly toward the North and West with lower social and economical development levels. In Argentina, the contrast between Buenos Aires and the provinces is not so conspicuous, indicating a better coverage of environmental information over the country[5]. In Bolivia, sub-national sites are almost absent, indicating enormous lacks of information at this level.

In Argentina, the profile of the information available at a provincial level (figure 5) seems more homogeneous than in Brazil, particularly for conservation information (almost all the provinces have 20% of their sites dealing with conservation questions). All the provinces have sites with naturalist inventories data (yellow) or about socio-environmental protest (red), when in Brazil, these topics are only present in two or three states. This result is not sufficient yet to explore the consequences of this spatial heterogeneity for society in both countries, but offers some insights to start to discuss it.

A last method to evaluate the heterogeneity of the environmental webs at a sub-national level is to eliminate from the graph (figures 1 to 3) the sites of national level, and to observe if local networks exist. For example (figure 6), we took all the Argentinean sites, and we erased from the graph all the sites that offered data for all the country (i.e. the sites of national level). The only subsisting network is formed around sites form the Buenos Aires province. This means that all the other sites, those with no links to others in the figure 6, were only connected to the central graph through

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[5] We need to remember that it is a very raw indicator, as we don't analyze the composition of these websites, that may supply a very heterogeneous information from one province to other.

national sites. This may indicate that in Argentina, the exchange of information by the Web is mainly organized at a national level, and not at a provincial one. For Brazil, the situation is almost similar, but slightly different as little states' graphs remain, for Minas Gerais, Rio Grande do Sul, São Paulo or Rondônia. Oppositely to Argentina, it may be the sign of a more dynamic exchange of information at a State level, mainly around public administration sites. These results contrast deeply with what was observed for biodiversity websites in France[6], strongly organized in regional networks, and not only linked to national sites.

4. Is open environmental data supply about South America abundant and complex? Making the difference between information and data

One of the main difficulties to characterize the environmental webs is to develop some indicators and methods to qualify their content, particularly to detect differences between informative sites and sites with "data" (datasets that can be re-used and manipulated by the user of the Web), and between "poor" and "rich" sites. These indicators are very important in order to understand what can the web users really do with an environmental website: simply to keep informed of a problem, or to develop its own analysis thanks to databases and/or complex information freely available? We are still far from the development of such indicators, but let's observe some results from the inventory analysis. The environmental web is globally constituted, in the three countries, by sites that deal with few topics (figure 8): 73% of the sites do not deal with more than 4 topics. This reveals an environmental web constituted mainly by sites specialized in a central question, but does not furnish complex information about this question. As an example, very few sites give complex information about society-biophysical environment interactions. In the same way, sites with databases are not frequent at all in the three countries (table 1, columns 4 and 5), and the situation is even clearer if we take into consideration the spatial datasets (layers of geographical information), almost absent in Argentina an Bolivia, slightly more present in Brazil. Then, we can say that the environmental webs of these three countries are still poor in "data", and dominated by informative sites with a reduced "content" both in complexity and quantity.

Conclusion

This quantitative and exploratory approach of the open environmental data diffusion in Argentina, Bolivia and Brazil is only a first step to develop deeper analysis about the factors that explain the diversity of strategies adopted in each country to share environmental information. Even if the methods and their bias need to be improved, we defend the idea that this approach give rich perspectives for a larger discussion about what really change the sharing of environmental information online for the South American society, and how social groups and institutions are today using information strategies to have in impact in environmental matters.

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[6] Studied by Delphine Montagne, 2011.
http://f.hypotheses.org/wp-content/blogs.dir/390/files/2012/07/M%C3%A9moire-M1-Delphine-Montagne-2011.pdf

Figures

	1	2	3	4	5
	Nb of sites from the country	% of foreign websites that give information about the country	% of sites from the country disconnected from the main graph	% of sites from the country that supply databases*	% of sites from the country that supply spatial data*
Argentina	695	23.6	23.2	10.8	2.5
Bolivia	129	65.4	45	8.5	5.4
Brazil	590	30.0	28.3	11.9	7.8

Table 1. Some characteristics of the Argentinean, Bolivian and Brazilian environmental webs.
The global corpus of sites is composed by 1414 sites from one of the three countries, and by 223 foreign sites that supply data about them.
* We considerate as « databases » statistic datasets (like Excel or Access files), and spatial data (layers of information to be analyzed through Geographical Information Systems).
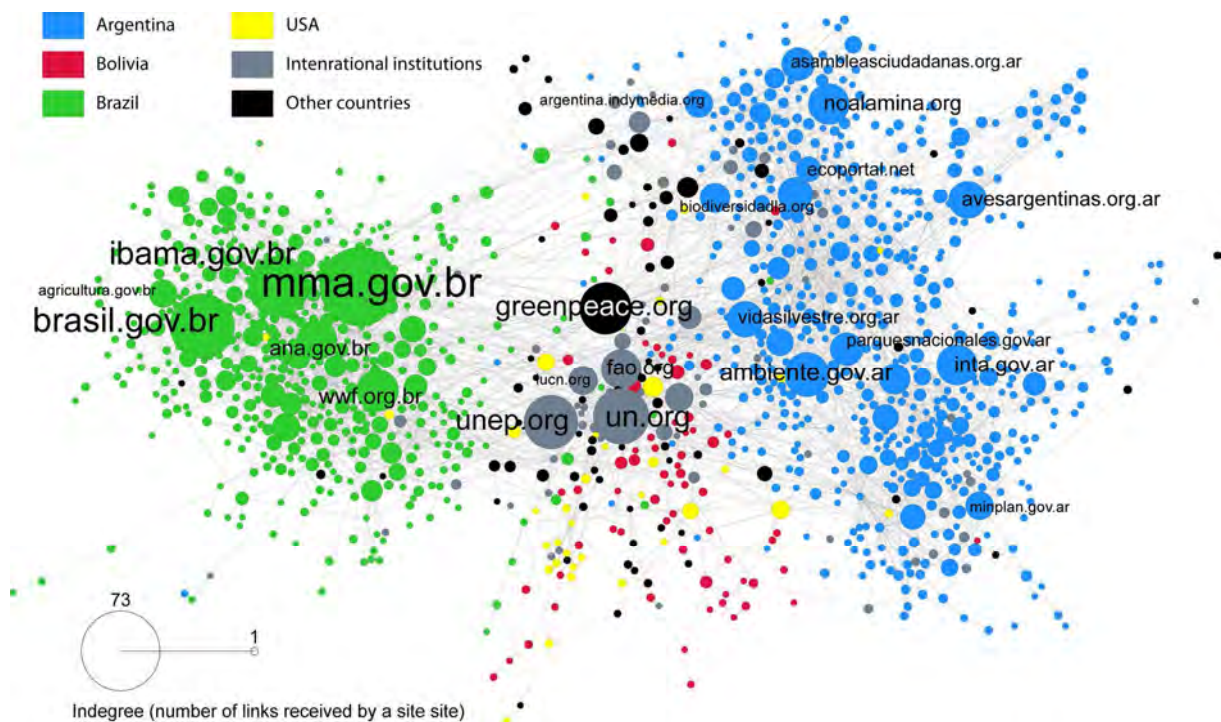

Figure 1. Graph of the Argentinean, Bolivian and Brazilian environmental webs: national origin of the sites.
Each circle is a website. The size of the circle is proportional to the number of links (or "indegree") pointing to this site from the other sites of the corpus.
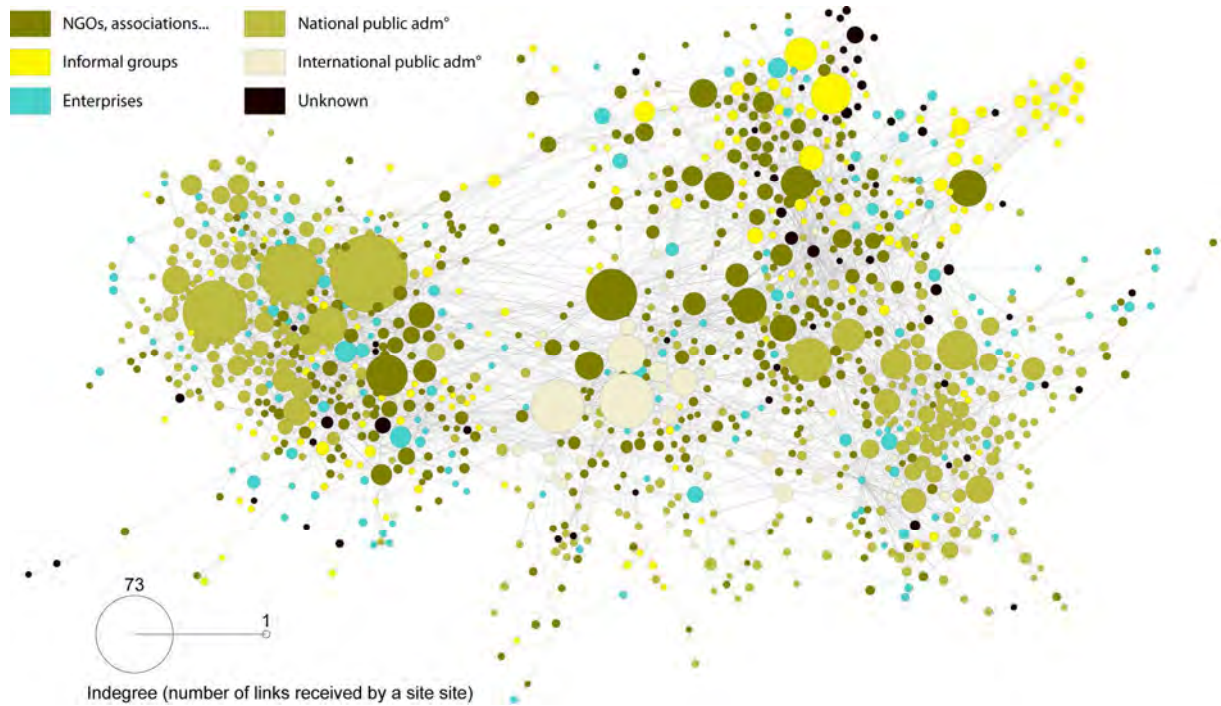
Figure 2. Graph of the Argentinean, Bolivian and Brazilian environmental webs: author of the sites.
Each circle is a website. The size of the circle is proportional to the number of links (or "indegree") pointing to this site from the other sites of the corpus.
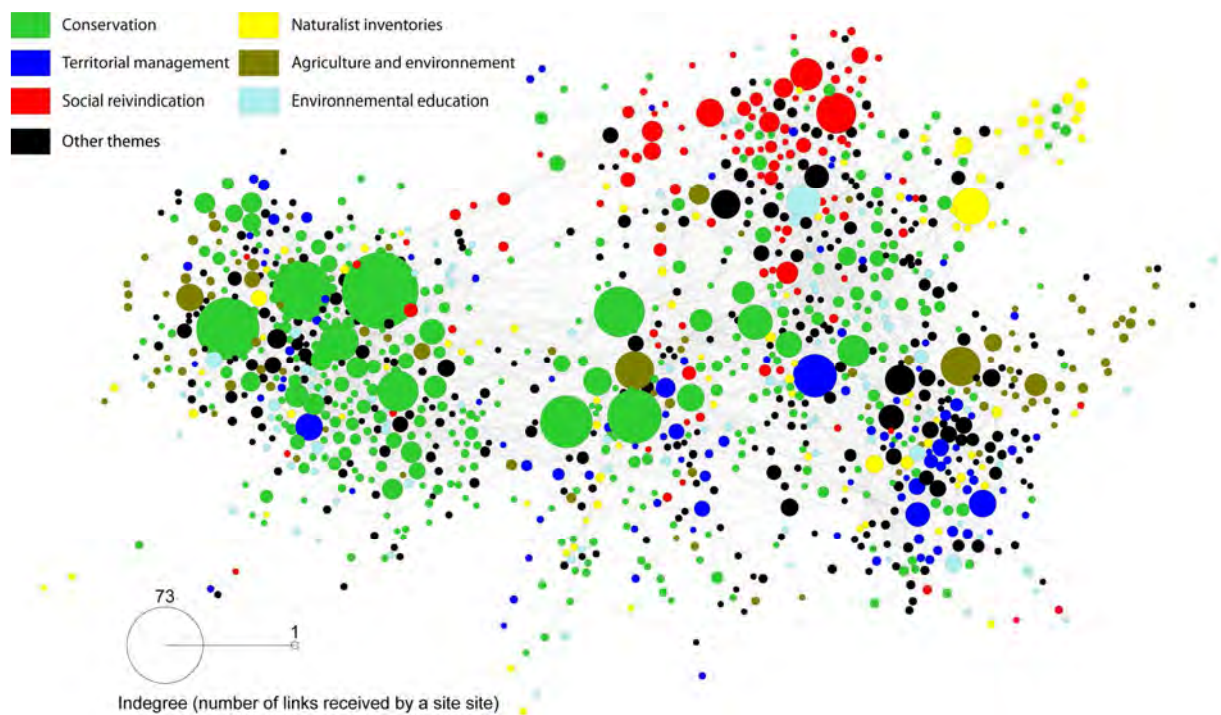

Figure 3. Graph of the Argentinean, Bolivian and Brazilian environmental webs: main thematic of the site.
Each circle is a website. The size of the circle is proportional to the number of links (or "indegree") pointing to this site from the other sites of the corpus.

Type of author	Civil society	Enterprise	Informal group, individual	Public administration	others
Argentina	29	13	18	31	9
Bolivia	49	4	5	36	7
Brazil	29	19	15	31	7

Table 2. Repartition of websites in each country according to their author (in %).

	Civil society		Public administration	
	Main thematic	**Secondary thematic**	**Main thematic**	**Secondary thematic**
Argentina	conservation (34%)	social protest (17%)	territorial management (21%)	conservation (14%)
Bolivia	conservation (37%)	agriculture (11%), social protest (11%)	territorial management (17%)	conservation (14%)
Brazil	conservation (46%)	environmental education (20%)	conservation (29%)	agriculture (13%), territorial management (13%)

Table 3. Main thematic addressed by websites from civil society or from public administration (in %).
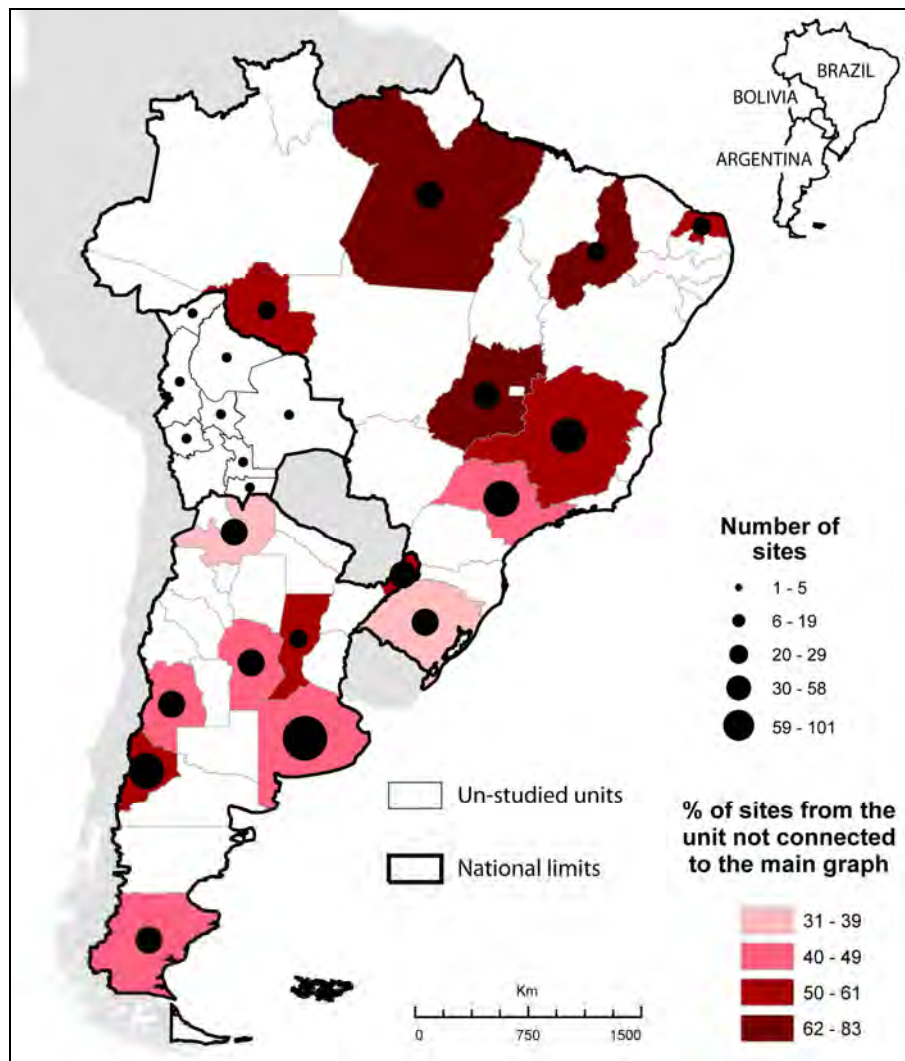

Figure 4. Number of sub-national environmental websites, and percentage of these sites not connected to the main graph.
Nb : the very low number of sites in Bolivian departments (less than 5 by unit) does not allow to calculate the percentage of unconnected sites.
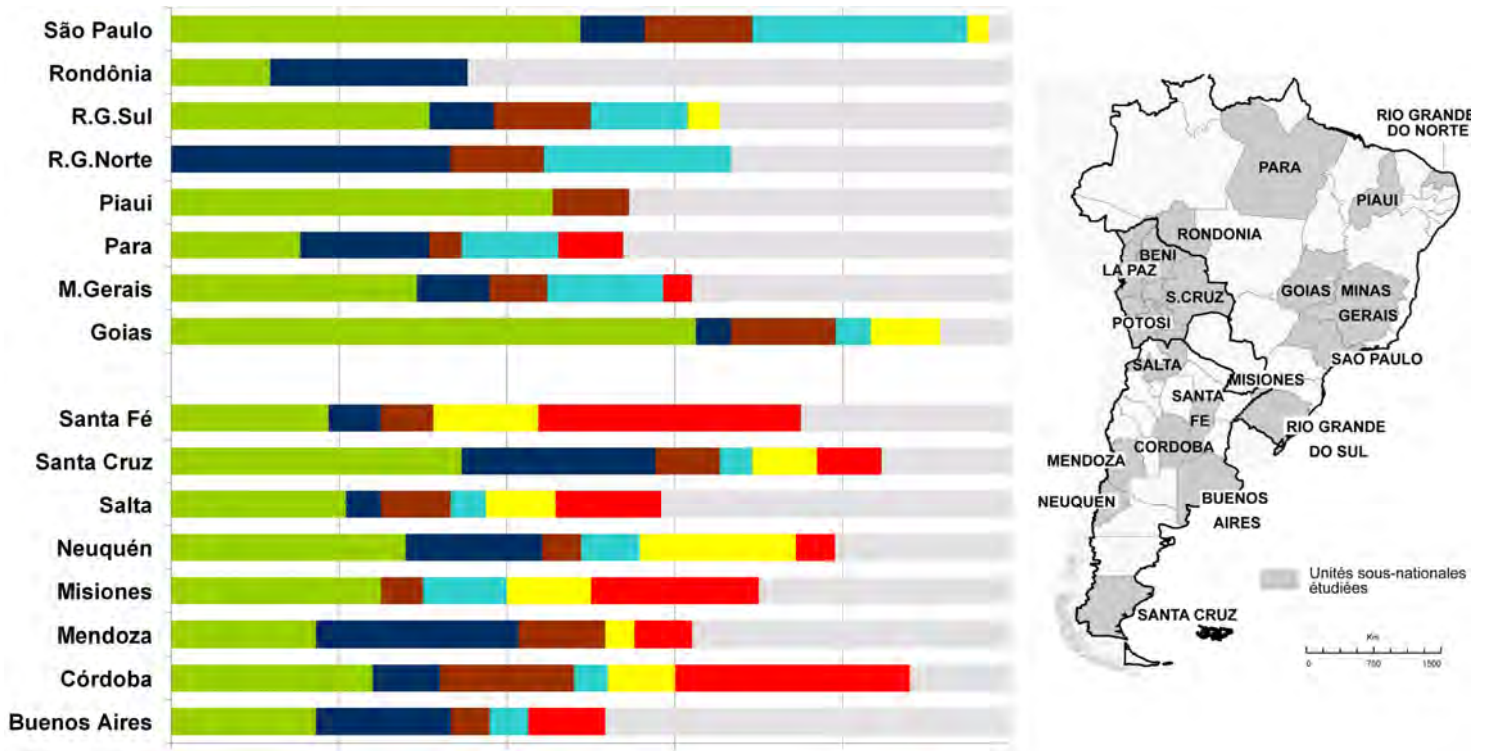
Figure 5. Repartition of the sites from sub-national units, according to their main thematic (Brazil and Argentina).
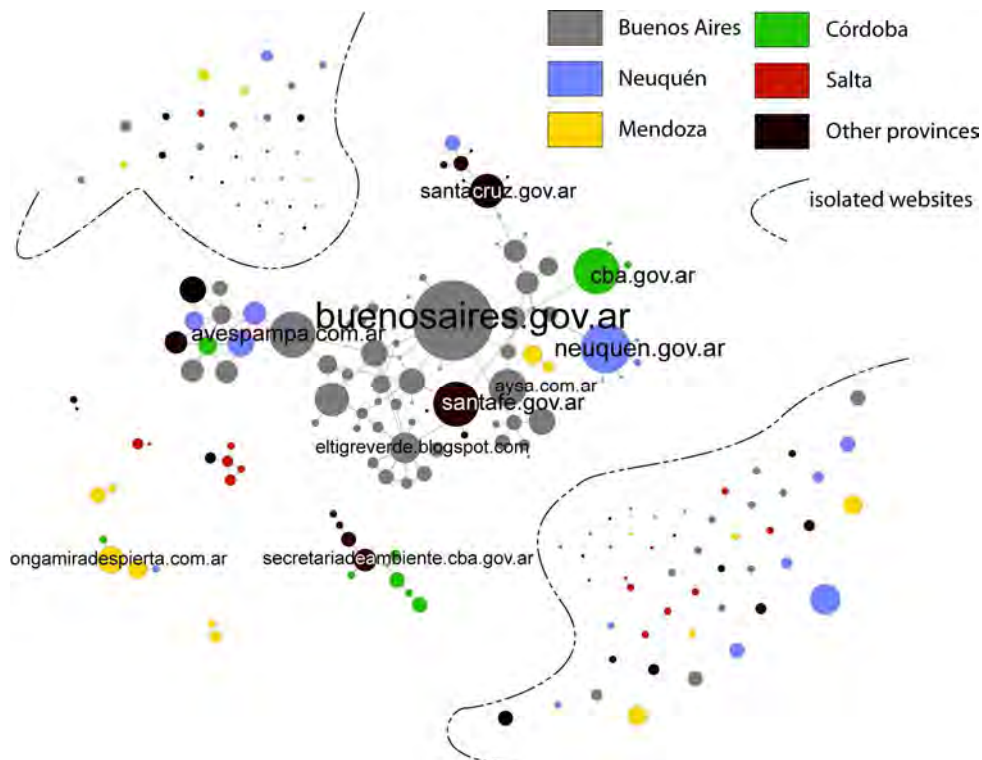

Figure 6. Sites from Argentinean provinces: sub-networks and isolated sites.
Size is proportional to the number of links pointing toward the site (from 0 to 10 links).
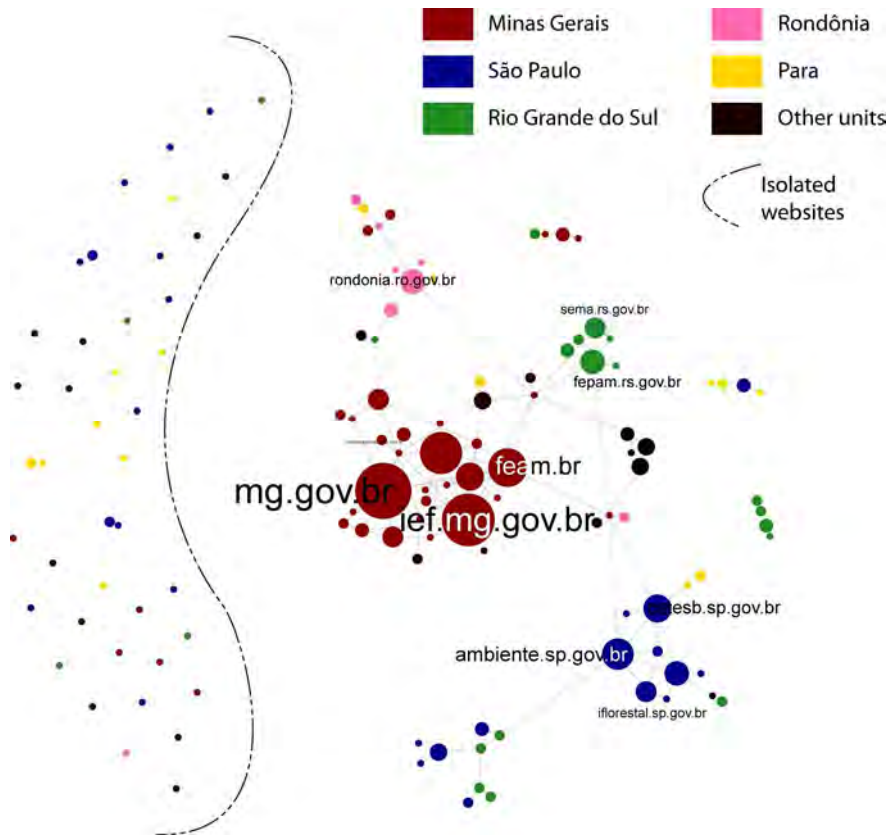
Figure 7. Sites from Brazilian states: sub-networks and isolated sites.
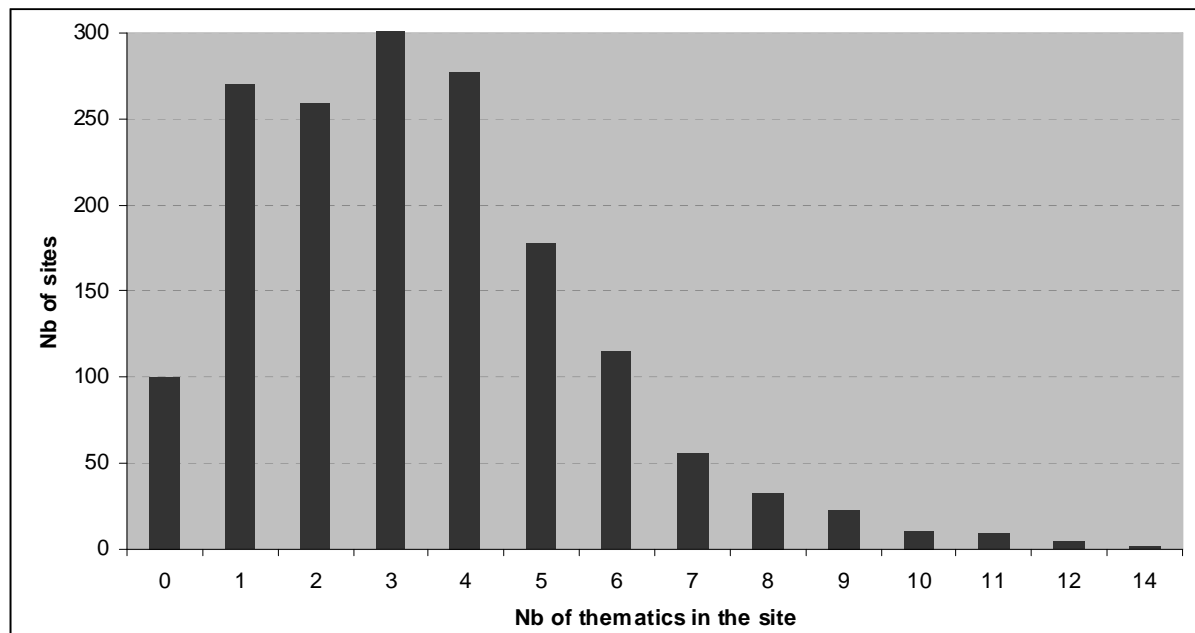Size is proportional to the number of links pointing toward the site (from 0 to 14 links).

Figure 8. Repartition of all the websites of the inventory (1637) according to the number of secondary thematics addressed in the site.
The secondary thematics were pre-defined as follow : agriculture and environment, climate change, conservation and environmental management, Deforestation, energy and environment, entreprises/industries and environment, environmental education, environmental hazard, environmental risk (social vulnerabilty), health, territorial management, mining, naturalist inventories, penal aspects (trials, debates, jurisprudence), photography of nature, pollution, social protest in environmental questions, traditional use of natural ressources, urban spread, waste problems and management.