University of Turku Department of Geography

Faculty of Mathematics and Natural Sciences

Lizardo Fachín Malaverri

CARTOGRAPHY OF TOURIST MAPS: GENERAL OVERVIEW AND THE CASE OF PERUVIAN AMAZONIA

Master's thesis

Keywords: Cartography, tourism, maps, Peruvian Amazonia

Turku 2008

UNIVERSITY OF TURKU

Department of Geography

Lizardo Fachín: Cartography of tourist maps: General overview and the case of Peruvian Amazonia

Master's thesis, 72 pp., 1 appendix
Environmental Science
June, 2008

ABSTRACT

Traveling through Peru, in particular inside the Peruvian Amazonian territory and along with my experience in map making, I recognized that the lack of activity associated with tourism is largely blamed due to insufficient or in certain cases no information regarding such activity, added to this reality is the poor knowledge of appropriate techniques to map making and the necessity for local people to understand how to read a map before such maps can become a tool to supply tourists with information. Nevertheless, there is little effort from public and private institutions trying to improve tourism communications mechanism in order to compete with other region in Peru as well as with other countries. Often the case we hear our visitors, once they have decided to visit Peru and the Amazonia in particular, that they experienced a frustration with searches of weak to useless tourist information. To such regards, this work tries to provide the means to establish along with the tourism community a base with supported information to supply better standards of quality in the analysis of world printed maps into four different scales or levels of information, utilizing geoinformatics such as the Geographical Information Systems (GIS).

The use of printed maps and lately maps on the Internet are ways to offer not just information of location but all kind of services in the tourist industry. However reality sometimes is frustrating finding information on maps are inadequate or poor in content. To emphasize it is necessary to acquire certain skills and tools for the design of proper maps in order to provide society a clear understanding of our goal, which is to provide precise information. Thus, map making requires understanding these of (spatial) visualization as a tool and as part of the process of map making in order to facilitate the information to the end users.

For my analysis I have used applied qualitative statistics to design tables as part of the evaluation of different kind of printed maps from around the world. Representative elements I considered relevant in the observation were included in the analysis. The indications of my results demonstrate that different elements should to be considered and included in maps as important ways to communicate different messages for tourists. With these results we will also suggest ways to improve printed tourist maps in the Peruvian Amazonian territory.

Table of contents

1. Introduction

In a world of information at the beginning of a new millennium, currents of globalization are introduced. Recognizing local diversity and, the consideration for the environment is emerging. In that sense, there is the need of re-thinking the physical medium as the fundamental support of human activities. The ways of soil occupation, the use of the natural resources, the search of models for new sustainable development, parallel to a greater advance of earth sciences, all together are demonstrations that the territory is a multidimensional space. The environment has to be handled like a unique assembly, interdependent, harmonic, conserving the equilibrium among the natural processes and the demands of production. The landscape is found at center of this new vision.

The geographical phenomena are so extensive that we must, in some way, have to reduce them to be able to bring them all into sight. Then, the cartography becomes the technique that treats, fundamentally, by reducing the spatial characteristics of an extensive area –a portion of it, the whole earth, or another heavenly body– and put it in a form that can be observable. In turn, maps are the primary mechanisms by which the geographers store the geographical information. Map, in its most extensive sense of the word is a representation of the space.
Relatively little research has been undertaken with regards to the tourism maps in Peruvian Amazonia and much of that has been done just with limited to relatively simple representational maps.

There are tourists with ability to use maps. Those usually come from a foreign country. They prefer to travel and visit places with their own information or with information collected in tourist information agencies. Consequently, maps must be elaborated considering type of information required for this type of visitors. Using maps they can easily understand our culture, visit tourist places, enjoy our cook, share our traditions, and seeking much other type of services which are included in maps as part of information and services offered.

The medium and long term goal of this research is to improve the maps available to tourists industry by studying the design and efficiency of the elements used. In order to reach this goal a set of world printed maps were analysed. Although, this research will increase our understanding and map making, and will help us to propose new ways to improve the role of maps play in tourism industry.

The resultant product of this research should be four different scales or levels of information (tourism maps), utilizing the Geographical Information Systems (GIS), as source to achieve goals and represent the reality of the area as precise as it is possible in a understandable way for all kind of users emphasizing tourists visitors.

2. Literature survey

2.1. Tourism definition: background

Tourism has been defined in many ways, and as of yet there is not one universal definition accepted, However, Richmond (2002) refers that tourism is essentially "an activity Tourism has been defined in many ways, and as yet there is no universally accepted definition. However, Richmond (2002) refers that tourism is essentially "an activity – people (tourists) visiting other people and places". Specifically, "tourism covers all movement of people outside their own community for all purposes except migration or regular daily work".

By definition, tourism involves travel to a place where the tourist normally does not work or live. Therefore, the traveller has limited spatial knowledge of the visited environment and maps perform an essential function in the acquisition of spatial information by tourists.

Through literature surveying we noticed that many other definitions have been given. In each of them, differences of content and conceptual intent to describe tourism industry, in accordance to circumstances and epoch. Academic and professional background of authors should be emphasized because this detail strongly influence on its formulation (Villena 2006).

CONAM (National Council for Environmental) which is the institution in charge of Environmental policies in Peru organized many workshops related to tourism industry. Results are presented as strategies to develop sustainable tourism. Ten general actions were proposed. The seventh relates to management of tourism information.

This action has as main goal the collection and process tourism of tourism information related to sustainable tourism and ecotourism in a national and international level in order to implement a reliable data base to develop tourism industry and its use to promote tourist places (CONAM 2001). What is most important to point out in this document, is the strategy to develop studies to

contribute in generating information to manage adequately our resources, promoting naturals places for tourism industry.

2.2. What is a map?

Krygier & Wood (2005) conceptualized the map as a ***graphic statement that locates*** facts. *Graphic:* A visual display of marks which stand for something else. e.g. an airplane shape on a map implies an airport. *Statement:* to put forth information, a formal embodiment of facts or assertions and *Locating facts:* Tangible and intangible phenomena located in geographic space: what we can see (roads, rivers) and what we cannot see (temperature, radiation), varying in amount (populations) and kind (vegetation types).

On the other hand Jones (1999) says that all of the tasks faced in computer cartography and GIS, few are so fundamental to the process of map making and so difficult to automate as that of generalisation. Because a map is an assemblage of graphic symbols that present a view of some aspects of our understanding of the world, it is necessarily an abstraction of knowledge. It is not simply a collection of facts; rather it is a caricature of these facts which, in their transformation to map symbols, assist the map reader to understand spatial form and structure and to distinguish important characteristics of the phenomena that are represented.

2.3. Tourism and maps

Maps and tourism are inseparable (Richmond 2002). From early adventurers who used rudimentary maps and charts to explore "new" worlds, to the modern-day tourist who uses a travel map to navigate within a chosen destination, maps play a significant role in how we discover, learn, and communicate information about the world around us. "Maps are indispensable to strangers orienting themselves to new places as sightseeing rarely starts without a map. Maps direct seeing, visualization serving to validate expectations predicated on map use."

2.4. Cartographic visualization and cartographic communication

The terms "cartographic visualization" and "cartographic communication" are being used nowadays when discussing with cartography and map making concepts. Shawn (1996) refers to maps as a kind of argument, although many cartographers are in disagreement or are unsure what cartographic visualization entails, this seems to be a popular research direction. MacEachren (1994) of The Pennsylvania State University wrote a book entitled Visualization in Modern Cartography. In chapter one, *Setting the Agenda*, he discusses visualization as "a renewed way of looking at one application of cartography (as a research tool) that balances attention between visual communication (where cartographers have put much of their energy during the past two or three decades) and visual thinking (to which cartographers of the first half of the century devoted considerable attention)." It is difficult to separate cartographic communication and cartographic visualization. It seems visualization would be created with effective communication. Often visualization involves the x, y, and z coordinates. Essentially, a computer program creates a three dimensional model of an area. A cartographer must decide what he wants to communicate in his visualization. Although visualization could not occur without communication, cartographic communication could occur without visualization. Visualization is important, however, because it eliminates the problem of putting a three dimensional area onto a two dimensional surface. Visualization "has been interpreted broadly as a method of computing that incorporates data collection, organization, modelling, and representation. Visualization is based on the human ability to impose order and identify patterns".

Some articles emphasise alarming news, indicating people nowadays don’t fully recognize geographical contexts of their surroundings position and a poor knowledge of their geography. This reality is also very common also in the context of the Amazonian territory as well as in some areas of the Peruvian territory. There is a lack of knowledge how to use maps. Many individuals cannot locate or point out the city that they live in on a map.

In Peru, the concept of a map differs from that in developed countries as paper maps have already become boring to many students. With today's emphasis on virtual reality, computer games, and other technological advances, people do not want to use paper maps. People may use an atlas to travel from one place to another, but will not use paper maps for any other purpose. In addition, it may be easier to access a map by using a search engine and keywords on the web, than by trying to find a paper map at a store or library (Shawn 1996).

Web based maps offer more excitement and flexibility. The user can zoom in and manipulate the maps, even change colors and other details. With the advent of GPS technology and Informatics, a quantity of persons might think that maps have become obsolete. Just the opposite, they have become even more useful (Garmin 2005).

Mäki & Kalliola (2001) mention that modern computer-aided cartography has significantly improved the possibilities for handling, analysing, and representing spatial information by allowing for the production of digital map layers describing different spatial themes. They say that this technology also provides some interesting interactive options for the final output, but digital products have some serious restrictions from the user's perspective. The point is that an interactive digital map may not be as easy for non-experienced users to adopt as a carefully designed static map, which is able to serve users at any time and in any location. Consequently, the focus of exploring new cartographic visualization and communication techniques should not be shifted to the digital realm.

2.5. Using maps: visual perception and map interpretation

A hypothetical example for understanding purpose of maps is presented by Keates (1996): e.g. a map user wants to find the location of a small river. His intention is to visit it for fishing. His first problem is to decide what map to look at, or to find what he believes to be a suitable one. He wants relevant information for his adventure. He picks up a road atlas and a general atlas. The river he is seeking for does not appear in the general atlas map and is impossible to find river names in

the road map. His reaction is “the maps are not good”. Nevertheless, he continues with his search discovering a lot of details in both maps extending his knowledge of the real world in a matter which is important to him. This process is an aspect of cognition. Keates also cites concept given by Neisser (1976) who says “cognition is the activity of knowing: the acquisition, organization and use of knowledge”.

Applying this experience, we can say that one advantage of using a map is of course that it is a store of information, and therefore it can be consulted without actually visiting the place.

2.6. Elements of maps

There is one problem in cartography which has not yet been solved: the depiction of the scenery of large areas on small-scale maps.

Maps have three basic attributes: scale, projection, and symbolization each element is a source of distortion. As a group, they describe the essence of the map’s possibilities and limitations. No one can use maps or make maps safely and effectively without understanding map scales, map projections, and map symbols (Monmonier 1996).

2.7. Orientation

Urrutia (2005) gives emphasis to utility of maps. With maps we can locate and follow a route in a zone that is unknown for us because we never have been in that area. All routes have two components of a starting point and a finish point (both points can be the same) and also intermediate points. The fact consists in knowing our position all the time with the purpose to move from one point to another one at the time. e.g. If a tourist who does not know the place pretend to make a trail without external help he would need a map in order to examine all routes and intermediate points which could serve as referenced points to move ahead and reach the destiny.

Means of orientation are based in certain natural phenomena such as the apparent movement of the Sun, stars positions, or earth magnetism. All of them provide some kind of geographical direction with more or less precision. e.g. The North face. If we know true north on our compass, we can then easily determine the other directions and thus orientate ourselves on a map. It is important to mention the fact that if we do not have a map; any method of orientation could be weak or useless.

2.8. Symbols

Interpretation of a map depends on understanding the meaning of the signs on the map, how these relate to the phenomena they represent, and the graphic structure in which they appear (Keates 1996). All human communication, in this sense, involves the use of signs.

Most writers on the topic emphasize the distinction between two main groups: signals and symbols. Signals requires as single, predetermined response. It is not open to various interpretations, and does not represent the characteristics of an object. In the other set, anything exposed on a map is presented as a symbol. A map symbol is a visual mark that is systematically linked to the data and concepts shown on a map. Consciously and critically chosen symbols that help your map do what you want it to do (Krygier & Wood 2005).

In cartography, symbols are usually graphical signs that can be understood by a large number of people. During the functioning on the map, they are apprehended easily and quickly, because they are previously known and they have the ability, unconditionally by association to orientate the reader's mind toward its objects or toward their characteristics (Vasilev 2006).

2.9. Resolution

Resolution is the smallest distinguishable difference between two measurable values (Jones 1999). Resolution seems to be a variable depending on whether it is related to raster data or vector data. Raster images are formed by individual pixels

and vector data comes in the form of points and lines that are geometrically and mathematically associated (SIC 2008).

2.10. Colours in maps

Colours have a direct influence over the human being's nerve system. Cold colours (green, blue) tranquilize and decrease stress, and warm colours (yellow, red) lead to increasing activity and efficiency (Vasilev 2006). So, usually colors are loaded in maps with a symbolic meaning, affected by cultural, religious, communities etc, concepts. This reality is distinguished in many different parts of the world. Outside of the subconscious symbolism of the color, there is a traditional cartographic symbolism. Usually, we designate the rivers in blue, the vegetation in green and the relief in brown.

2.11. Geographical Information Systems – GIS and Remote Sensing: Tools to collect spatial data for maps

An incredible amount of *in situ* spatial information will continue to be collected to address important urban and environmental issues. Much of this information is nowadays stored in the form of GIS (geographical Information System), which is defined as computer-based system that provides capabilities to manipulate geo-referenced spatial data. Remote Sensing techniques are also used to collect a significant amount of data that is turned into information, sometimes even applying multi-temporal data. Each form of technique in which to collect data have some limitation but therefore, many scientists feel that the full potential of both GIS and Remote Sensing can best be achieved in Integrated Geographical Information Systems – IGIS – (Jensen 1996).

Burnett (2002) refers that Geographical Information artefact change our relationship to the environment. Mapping artefacts constitute a powerful representation of reality with the double-sided nature of efficient technology: we use them to manipulate the way we relate to our worlds and they become the lens through which we see our world.

It is possible to make tourism maps and print them edifying tourism resources and attractions, evaluate the tourism potential associated to certain area, analyze resources and facilities, such as trails, routes, services station, hotels, etc (Espinosa *et all* 2005).

3. Material and methods

3.1. Tourist map analysis:

The approximation to the analysis of maps was done through the use of qualitative techniques. Qualitative methods are adequate in the analysis of cartographic presentation.

Admitting the complexity of the reality studied and the fact that absolute truth is not accessible, research techniques and validation of the study tried to be as adequate as possible in order to reach the goal of present study. Regardless of this reality the author is convinced that the results are not more than possible toward the lecture of reality in this complex world of cartography.

A set of ten printed tourism maps and five web based tourism maps on Internet were analyzed both in four different levels of presentation: Country, Regional, City and Specific maps. Tourism printed maps locations were chosen randomly. Table 1 list the classification and quantity of analyzed printed maps.

Table 1. Scheme of classification about analyzed maps.

Map classification	***Amount of map / Analyzed map types***
M1	10 Country maps
M2	10 Regional maps
M3	10 City maps
M4	10 Specific maps
4 groups of maps	***40 Analyzed maps***

Country printed maps and web based tourism maps refer to those kinds of maps that area of influence cover the territory of a country. Maps offer good introduction to the countries in which they are made. They also offer a variety of services (links or advertising) of hotels, restaurants, night life, where to go, what to visit, and other features of interest to visitors. Some offer guided tours.

Regional maps are referred to those types of maps which involve big areas but not covering a complete country. Depending of policy boundaries a county, department, region, province or district could be a regional map level. Services at this level are almost the same with those in the country level. In some cases regional maps are extracted from country maps and details are amplified.

City maps occupy boundaries of cities and neighbors. Offering services are more concentrated to museums, places to eat, toilets, places to shopping, parks, churches, taxi service, post office, tourism information office, etc. All related to first hand service are included in this level of maps.

Area of specific maps could be associated to huge areas as chain of mountains, archipelagos, lakes, national parks, protected areas, etc. Not necessarily boundaries are within a country, more than one could be contained by the geographic feature. This type of maps are more specialized due to tourism services are more focused on certain type of tourism activities such as trekking, biking, fishing, etc.

3.1.1. Variables to be analyzed:

Twelve aspects were analyzed for four set of maps. List of variables are describe in the table below.

Table 2. Description of variables analyzed in the study.

1) Title of maps	Refers to the main title which express distinctive of the map. Concurrence and/or relation with the main topic of the maps is important. Clarity and understanding of title is essential to identify type of map and related information.
2) Map Scales	Scales constitute the relationship of reduction of terrain in respect to its printed format; therefore this information should be in visible places and, well evident of order for the representation of the data available for all possible movements, whether terrestrial or aerial measurement, etc. within the areas of interest in such maps. Availability of this aspect within the map is significant for map users to understand and calculate distances. Occurrence of scales as graphic bar, numeric scales were incorporated in the analysis.
3) Map Resolution	Described as the smallest distinguishable difference between two measurable values.
4) Map Symbols	Symbols in a map are often created to focus attention and represent objects of the real world. Analysis considered were done with variables such as ease of understanding, kind of

	graphics stiles (icons, pictorial, pictures), etc. Explanation of icons, details, orientation or simple icons were also included.
5) Map Legend	The legend format in maps is presented as a way of annotation about the meaning of symbols, labels, etc. For analysis of legends legible (readable) or specific legend (in accordance to the category of the object, place, phenomenal represented), were incorporated.
6) Color	Color in tourism maps is a subjective aspect to be evaluated but is important to enclose in analysis. Variables such as adequate, varied, specific and simple type of colors were considered.
7) Index	Specific data which illustrates extra information with detail that is not included in legend. Mode of presenting index in a adequate way, confused or organized index were analyzed as variables.
8) Publicity / Sponsors	This aspect refers to a group of institutions private or public showing through advertising their products and services throughout the maps.
9) Orientation System	Indicates information of location and navigation. Presence of orientation tools were analyzed, such as north arrow, coordinates system, or grid of quadrants of information.
10) Language	Mean in order to communicate information in accordance to native or foreign tongue.
11) Map Presentation	Refers to hand-use availability. Versatility, size, ease to use, extra details (information) are variables to evaluation.

3.1.2. Analysis Technique used:

While quantitative research method expresses its objectives as descriptions and relationships among variables; qualitative research method study quality of activities, relationships, facts, means, materials or instruments in certain situation or problem. Qualitative method is more interested in knowing how the dynamic is or how is the process in which the features (variables) are involved.

To represent and quantify aspect with its variables, tables (Excel format) were built. Then, simple statistical percentage operations by group of maps, was calculated.

3.2. Tourist maps of Iquitos area

Tourist maps process about Amazonian region was a challenge due to the lack or in certain cases poor spatial (georreferenced) information.

Process of map making meant working with other professional such as graphical designer, tourism industry specialists, and others involved in tourism industry.

No country maps were done due to the area of influence of institutions I was working cover just the Amazonia territory. Consequently, just regional maps, city maps and specific maps were made.

3.2.1 Regional maps:

Almost all Amazon Departments (Policy boundaries) are running their processes of Ecological and Economical Zoning (EEZ). As part of socioeconomic information to develop these processes, two types of tourism maps are part of basic information. Potential tourist circuits maps and present tourist circuit maps. First one is about places which are not using for tourist industry nowadays, but due to its particular characteristic related with landscapes, nature, people, historical event, etc, are probable to use in tourist industry. The other type of tourist map is referred to those that are being used in tourism industry at present times. As part of elaborating maps in both cases, I had to work in close coordination with specialist in tourist industry of the area. They collected data from other institutions and I had to georreference places with GPS units. Some data were used directly from institutions such as SINAMPE (Sistama Nacional de Area Protegidas del Perú) which is the institutions in charge of the information about protected areas in Peruvian territory. The San Martin Department was chosen to perform this work. All GIS layers were integrated in a project in order to create map compositions. ArcView GIS software was used to carry out the project. The design of tourist maps had to follow the model of all thematic maps done for zoning project. It means that cartographic consideration were essential. In order to establish tourist circuits, different colors lines were used. For legend box simple and understandable icons were used. Figure 45.

Same procedure was taken to represent maps of Tocache which is a province of San Martin Department. In this particular case, pictures of most important touristic places were included all around the map displayed area in order to indicate landscape tourist attractions of the province. Figure 46.

3.2.2 City maps:

Municipality of Maynas which is a province of Loreto Department is promoting tourist industry throughout marketing of Iquitos most attractive places, culture behaviour, gastronomy, music, etc. Municipality and Caretur (Camara de turismo

de Loreto) which is the institution dedicated to impulse tourist industry are partnerships to improve present and future policies of tourist industry in the region. In this sense, I was part of the team (Tabano Publicity Agency) involved in the production of tourist information as the map maker. Using GIS techniques with shape files data of streets and block streets provided by the cadastral office of municipality, a city map of Iquitos was made using graphical-interface software (Corel Draw). Basic tourist information such as consulates, hospitals, clinics, tourism information offices, police departments, post office, migrations office, etc. were included. Description about location of places also was written with capital letters. Furthermore, pictures of main cultural building were included (rubber boom epoch). To identify location and description of buildings numbers were used.

As part of additional information a little map showing places where is possible to bike was included. This printed city map was included as part of tourist brochure with more information about Iquitos city and surrounding areas. Figure 47.

3.2.3 Specific maps:

Since this type of maps is more common in the area, its elaboration was very important. In general term, image processing and GIS techniques were used to draw lines (trails and streams), polygons (rivers), and points (villages). Icons, pictures and drawings were included to illustrate places, animals, people's activities, etc.

Scheming distances, was part of Amazon River map which pretended to indicate in a simple mode relevant location of main river villages along the Amazon River and tributaries until the border with Brazil and Colombia. This map was included in a tourist information brochure of municipality of Maynas. Figure 48.

The Spain Cooperation (Agencia Española para la Cooperación Internacional – AECI) continue working in protected areas such as Pacaya Samiria National Reserve. As part of a study related to cartography topic, I was in charge of designing and elaborating a tourist map of the Yanayacu and Pucate rivers basin.
Using buffer polygons the area of study was delineated. To locate shelters, control points, camping areas, and tourism most used places field work was done. GPS

units were used to register locations and attributes of graphical data. The map was done following cartographic parameters such as coordinates systems and graphical scale bars. Quit few colors were used to classify tourist sectors all named in accordance with its particularity of landscapes and natural resources. Figure 49.

The BIODAMAZ (Biodiversity of Peruvian Amazonia) project was implementing a project in an experimental and particular environment. The study covered 8 200 ha in a flooding ecosystem nearby Iquitos city. The area of influence of the study involved two river towns San Miguel and Dos de Mayo. During that period of time I was working for the project, as a GIS specialist. For that reason I was involve in collecting data and creating information of the study area. With Landsat images and GPS (Geographical Positioning Systems) a network of trails as well as location of river villages was traced in field work. Pictures of people's behaviours, landscapes beauty, amount of villages, soil description, forest cover, hydrological characteristics, and climate were collected to include as part of map information. In order to improve and provide extra information for local people an almanac, indicating moon phases, was included. Local villagers considered this information very interesting for their cultivation activities. I tried using satellite information to elaborate the tourist map. Figure 50.

The Allpahuayo – Mishana National Reserve is just twenty five kilometres southward Iquitos city. A tourism map of this are was made including an almanac and point out tourist attractions and routes inside the area. My task to construct this map was conducted to represent flora and fauna with a set of icons using cartographic software like Arcview GIS. Drawing icons to describe most important features inside the reserve, such as Varillales (White sand ecosystems) was a challenge. Some representatives' pictures of landscapes, animals and people's behaviours were included, also to describe diversity of alternatives to watch. Both, more cartographic map and pictorial map were done of this area. The first one served as a base for the second one. Figure 51.

As part of a proposal to enhance and impulse new tourist circuits a technical paper was done. It was sponsored by BIODAMAZ project. The name of this paper is "Tourist circuits along the Iquitos – Nauta Road". Maps were presented in touris

brochures. Figures 53, 54. Authors of this work were Nelida Valencia and Lizardo Fachin. I worked the part of map making.

A set of seven maps distributes in two categories were elaborated. Potential tourist circuits offering options or alternatives to visit three natural tourism units as first category. Present tourist circuits with information of tourist attractions which are being used at present time by private tourism sector. Both categories of maps are nowadays being used and promoted by the municipality of Maynas. Table 3. Tourist maps were done using GIS software. Figure 55.

Table 3. Categories of maps.

Potential tourist circuits	El Huayo orgullo de los bosques	"El Huayo" pride of forest.
	Allpahuayo – Mishana muy cerca de ti	Allpahuayo – Mishana very close to you.
	La riqueza que abrazan los ríos Pacaya – Samiria	Richness hanging Pacaya – Samria rivers.
Present tourist circuits	Iquitos cultural y monumental	Iquitos cultural and monumental.
	Iquitos y el Río Amazonas: La unión Perfecta	Iquitos and Amazon river: The perfect union.
	La esencia cultural de Iquitos	The cultural essence of Iquitos city.
	Full recreación	Full entertainment.

4. Results

4.1. Evaluation of printed tourist maps

4.1.1. General observations about the variable "Title of maps":

A good number of analyzed maps present concurrence and/or relationship about Title, representing 82,5% of total (40 maps). Just 17,1% does not apply for this variable. The variable "Clarity" is the most important one representing 90,0% of occurrence in analysis. It must be noted that almost all maps, in this sense, expresses directly a good communication through specific and suggestive titles. A reduced amount (5,0%) of analyzed maps do not apply for this variable. (Table 4).

Table 4. Variable evaluated in printed map

Title of maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Concurrence and/or relationship	9	6	8	10	33	**82,5**	**17,5**	**100,0**
Clarity (Understandable)	10	7	9	10	36	**90, 0**	**10,0**	**100,0**
Not specify title	0	1	1	0	2	**5,0**	**95,0**	**100,0**

Usually, tourism maps are folding maps, due to its dimensions for travel purposes. Titles for these kinds of maps, as such as this sample, would be presented on the main page or in the front view (Figure 1). Title also can be located inside the area of the map (Figures 2, 3 and 4).

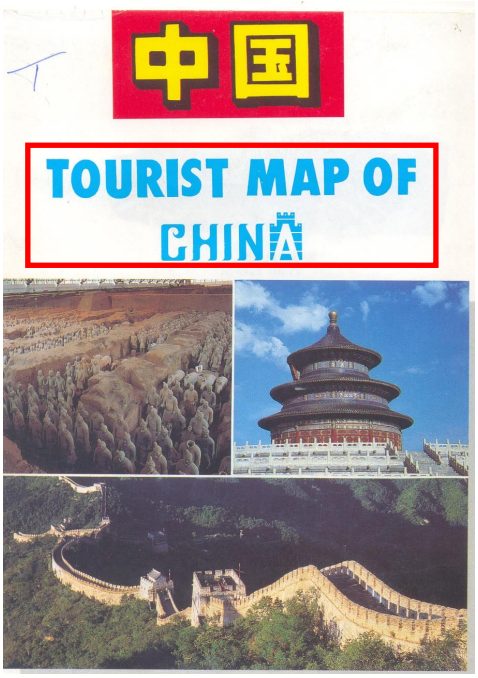

Figure 1. Cover page of the folded Tourist map of China. It describes the main attractions of one country.

Figure 2. Title inside the map displayed area. Community of Andalucia. Spain.

Figure 3. Title map displayed in the area covered by the information of city map.

Figure 4. Also title of a map could be placed inside the legend area as in this regional map.

4.1.2 General observations about the variable "Scale of tourism maps"

Data presented in Table 5 registers results of observation about the "Scale"variable analyzed in a set of 40 maps. Scale presentation could be in many ways such as graphical scale bars or numeric scales. Some maps do not present scale information. Scale will determine the minimal cartographical unit. From analyzed maps 57,5% apply for scales bars and an amount almost similar for those with numeric scale (50,0%). A minimum number of maps do not have scale information (25,0%). Country and specific maps apply more to this variable. Results suggests that criteria of map makers is productive, considering that scale information facilitates map users to measure distances. Important point to consider is the type of unit systems used in maps. It ought to be suitable and understandable for map users, in that sense universal system must be used.

Table 5. Variable evaluated in printed map

Scale of maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Graphical scale bar	5	4	4	10	23	**57,50**	**42,5**	**100,0**
Numeric scale	8	4	3	5	20	**50,00**	**50,0**	**100,0**
No scale	1	5	4	0	10	**25,00**	**75,0**	**100,0**

Scale bars are presented in maps with a variety of numerical systems. According the origin of the map and could be in a metric systems, mile systems, nautical systems, etc. Figures 5, 6, 7 and 8 present illustration how scale variable is presented in country, regional, city and specific maps analyzed.

Figure 5. Graphical scale bar inside area of country map.

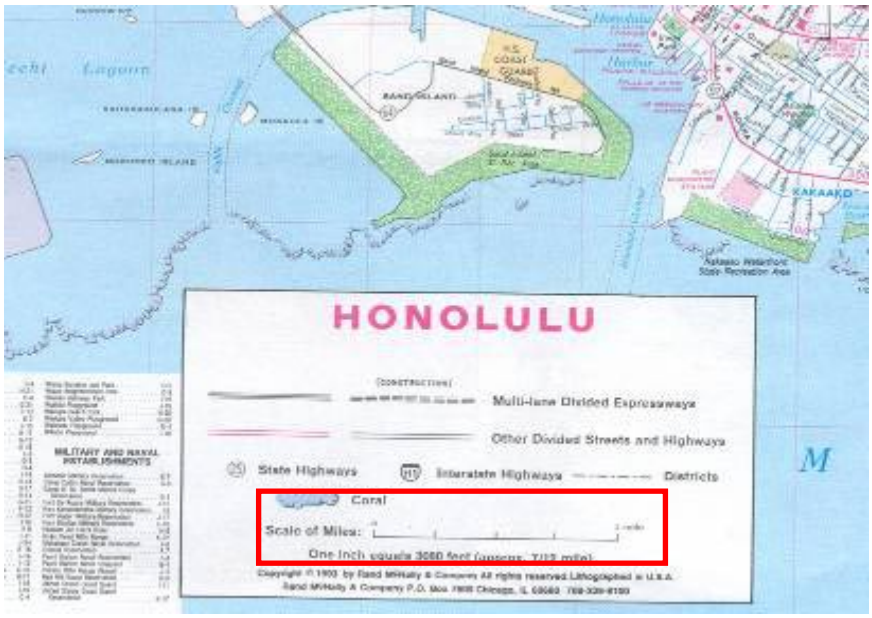

Figure 6. Graphical scale bar inside the area of map and inside table of additional information in a country map.

Figure 7. Hamburg with scale bar in miles numeric system inside the displayed area of the city map.

Figure 8. Scale bar with two measurement system (kilometres and miles).

4.1.3 General observations about the variable "Resolution of tourism maps"

For the study purpose, the high and low resolutions were assumed. High resolution represent a low percentage (32,5%) of total maps analyzed. 67,5% apply for low resolution. Results imply that most printed maps describe data with poor and distinguishable resolution, meaning reduced precision in details and information (Table 6).

Table 6. Variable evaluated in printed map

Resolution of maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
High	4	2	4	3	13	**32,50**	**67,5**	**100,0**
Low	6	8	6	7	27	**67,50**	**32,5**	**100,0**

Portions of maps presented in this text were scanned trying to conserve original aspect of resolution. Examples are presented in figures 9, 10, 11 and 12.

Figure 9. Display area shows a low resolution in a country map. Names and icons information is not clear to observe.

Figure 10. Resolution of places names is very poor in this regional map.

Figure 11. Paper quality provides high resolution to this city map. Names of streets and tourism buildings are well distinguished.

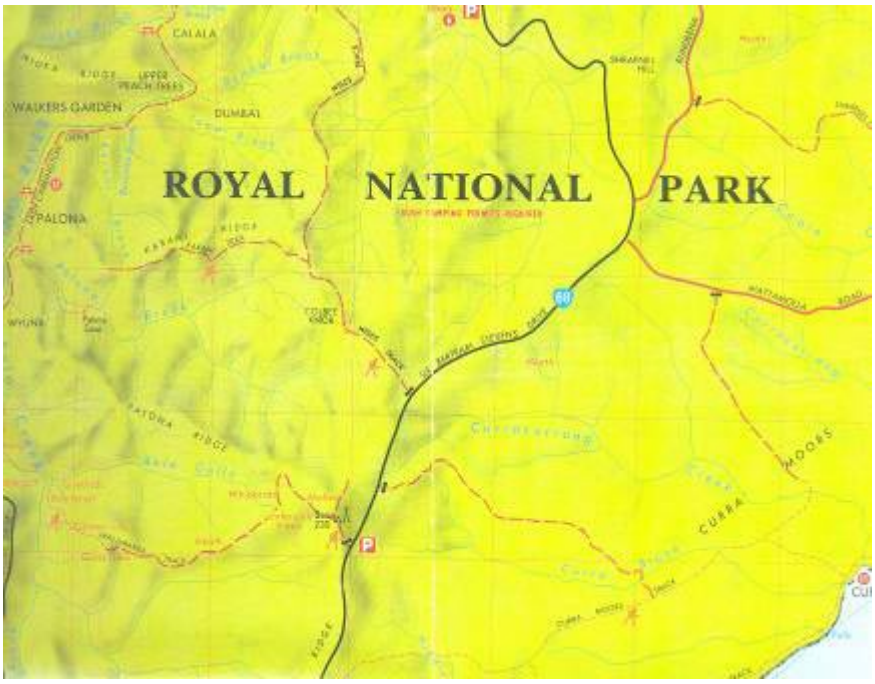

Figure 12. Plastic paper in this specific map of a National Park permits having a high resolution in tourism information.

4.1.4 General observations about the variable "Symbols in tourism maps"

What is most important to point out about Symbols in tourism maps are that they are created map users focus their attention on them. In analysis, representing the highest amount (90,0%) is the fact that accessibility (suitable for map users) and explicative are aspects more relevant for users (Table 7).

Table 7. Variable evaluated in printed map.

Symbols in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Accessible to see	7	3	5	8	23	**57,5**	**42,5**	**100,0**
Graphical / Pictorial	7	3	4	3	17	**42,5**	**57,5**	**100,0**
Photographs	1	3	0	1	5	**12,5**	**87,5**	**100,0**
Explicative and/or demonstrative	5	6	4	5	20	**50,0**	**50,0**	**100,0**
Details	1	0	1	2	4	**10,0**	**90,0**	**100,0**
Orientation	4	0	0	3	7	**17,5**	**82,5**	**100,0**
Simple icons	3	6	6	4	19	**47,5**	**52,5**	**100,0**

Graphical / Pictorial symbols used coincide with symbols designed to look real (houses, railways, entertainment places, etc). The explicative symbols could be related with accessible symbols since these can be represented as the profile of an

object or by the meaning or action that certain symbol symbolize. Figures 13, 14, 15 and 16 represent symbols in tourism maps.

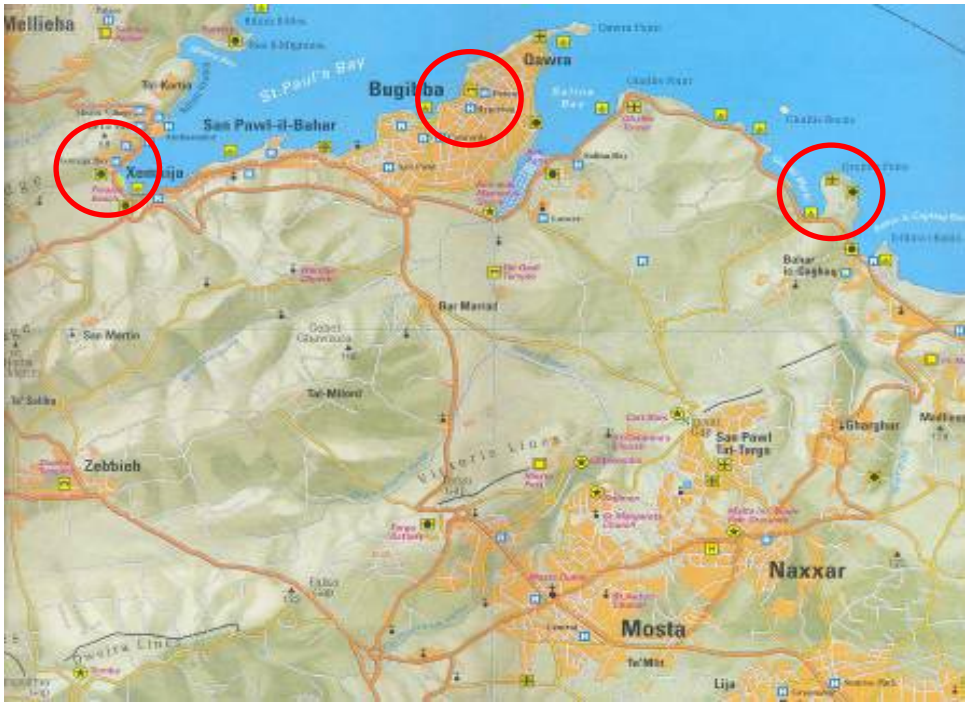

Figure 13. Standard icons used in tourist maps as presentation to describe places and services.

Figure 14. Pictorial symbols representing man activities, places and tourism nature attractive in a regional map.

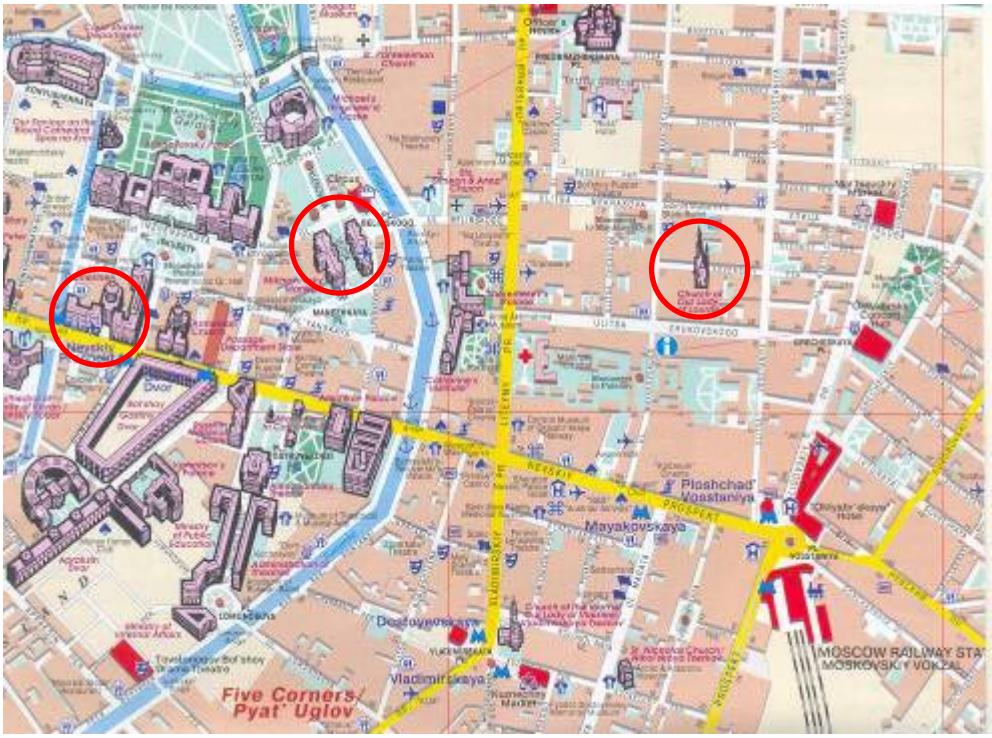

Figure 15. Saint Pertersburg city tourism map with pictorial symbols of monument historical buildings. Three dimensional pictures.

Figure 16. Pacaya Samiria Peruvian National Reserve with icons as symbols.

4.1.5 General observations about the variable "Legend in tourism maps"

Samples M1 and M2 representing country maps and regional maps respectively, include legend with symbols, colors and line stiles easy to identify and recognize in the map. A 75% of the maps analyzed shown this type of information in a legible (readable) and practical to understand; 52,5% of map analyzed have specific legends exactly as places offering, thus historical monuments, ruins, etc;are presented graphically. (Table 8).

Table 8. Variable evaluated in printed map

Legend in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Understandable (Readable)	10	4	6	10	30	**75,0**	**25,0**	**100,0**
Specific feature	6	6	1	8	21	**52,5**	**47,5**	**100,0**
No legend	0	4	4	0	8	**20,0**	**80,0**	**100,0**

Frequently, symbols in a legend should come into sight exactly the same size and color drawn in the map display area. Figures 17, 18, 19 and 20 illustrate legend in tourism maps.

Figure 17. Understandable icons representing features of map information in a country map.

Figure 18. First level of legend shows policy boundaries. Second level describe tourism activities in a regional map.

Figure 19. Simple icons used to describe tourist information in a city map.

Figure 20. Simple and two colourful legend format. Notice that two languages are used to describe icons.

4.1.6. General observations about the variable "Color in tourist maps"

Results of analysis about color variable in tourism maps represents the 37,5% and 35,0% for various and adequate respectively in accordance with the map presentation following some advices related to colors. A very small sum is represented by specific colors with 7,5% meaning that generally color in maps are not so specific. This feature make easier to be read by map users. (Table 9)

Table 9. Variable evaluated in printed map

Colors in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Adequate	3	2	4	5	14	**35,0**	**65,0**	**100,0**
Various	5	6	2	2	15	**37,5**	**62,5**	**100,0**
Specific	1	0	0	2	3	**7,5**	**92,5**	**100,0**
Simple	2	3	4	1	10	**25,0**	**75,0**	**100,0**

Figures 21, 22, 23 and 24 show colors in tourism maps.

Figure 21. Gradient color of mountains supplies information of levels of elevation in a country map of Malta.

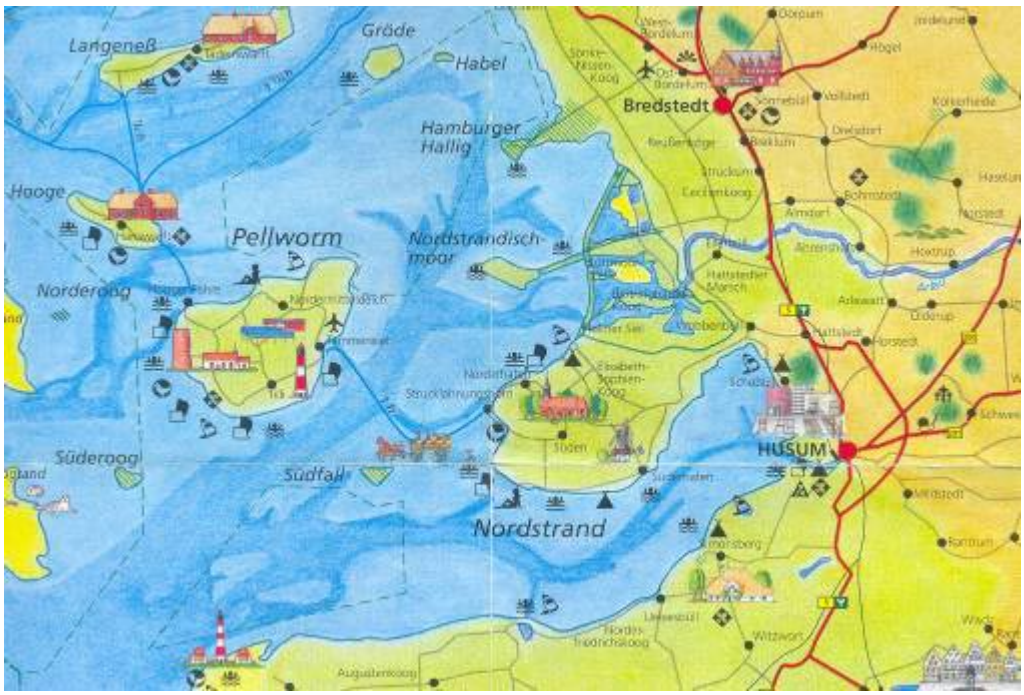

Figure 22. Sweaden archipelago with full color, represent sea channel.

Figure 23. City map of Central Tokio with simple colors.

Figure 24. White Cordillera in Peru representing different types of mountains with different gradient of colors.

4.1.7. General observations about the variable "Index in maps"

37,5% of evaluated maps present organized index but in the other hand with an amount of 35,0% no index occurrence in maps. Additional tourist information representing just 25,0% of the maps (40 maps); therefore we imply that maps synthesize detailed scaled information of areas in a country, region, city or specific zone, etc. and expresses a close information regarding the image for symbolizing just by looking at the image. (Table 10).

Table 10. Variable evaluated in printed map

Index in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Presentation	3	0	5	1	9	**22,5**	**77,5**	**100,0**
Adequate	5	0	1	0	6	**15,0**	**85,0**	**100,0**
Confused	0	1	0	0	1	**2,5**	**97,5**	**100,0**
Organized	7	2	3	3	15	**37,5**	**62,5**	**100,0**
Additional tourism information	3	1	2	4	10	**25,0**	**75,0**	**100,0**
No index	0	6	3	5	14	**35,0**	**65,0**	**100,0**

Figures 25, 26, 27 and 28 illustrate the way indexes are included in tourism maps.

Figure 25. Country maps with index of sites and population.

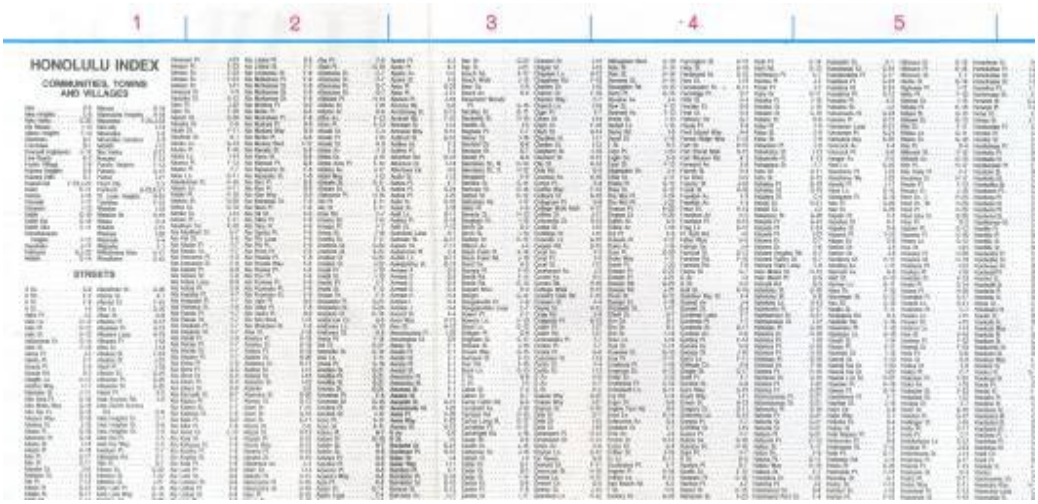

Figure 26. City map with index of sites and population. Quadrants described with letters and numbers are also listed.

Figure 27. List of streets, parks, and places of interest are part of index in a regional map. of sites and population

Figure 28. Specific map indicating place for shopping.

4.1.8. General observations about the variable "Advertising and sponsors in tourism maps":

From the set of 40 maps analyzed the proportion of private advertising or publicity is the highest with 35,0% and just 5,0% for government advertising, usually community service. Representing 50,0% which is a high percentage there are map with any kind of advertising or information about sponsors. (Table 11).

Table 11. Variable evaluated in printed map

Publicity / Sponsors in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Private	2	6	6	0	14	**35,0**	**65,0**	**100,0**
Public	0	1	1	0	2	**5,0**	**95,0**	**100,0**
Other (NGO's, Universities, etc)	0	0	0	0	0	**0,0**	**100,0**	**100,0**
No advertising / Sponsors	8	2	2	8	20	**50,0**	**50,0**	**100,0**

Figures 29, 30, 31 and 32 illustrate incidence of advisement and sponsors in tourism maps.

Figure 29. Country map with advertising around the area of map. Most advertisement are related to services within the country boundaries.

Figure 30. Regional map with advertising around the area of map.

Figure 31. City map of Turku with private advertising of services around the area of map.

Figure 32. Specific map of Archipelago with advertising not around the map but in other pages of it.

4.1.9. General observations about the variable "Orientation system in tourism maps":

47,5% of the samples had an orientation system based on location quadrants, using UTM coordinates and written in legends of the maps. 35% of map samples include on its composition the magnetic north arrow as orientation symbol and 7,5% identify UTM coordinates only.

With geo-referencing it is not fundamental just to know the position of objects in the terrestrial surface, it is fundamental also to arrange special operations using different thematic layers about the same geographic area. (Table 12).

Table 12. Variable evaluated in printed map

Orientation system in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
North arrow	4	3	3	4	14	**35,0**	**65,0**	**100,0**
Geographical coordinates	4	2	0	7	13	**32,5**	**67,5**	**100,0**
UTM coordinates	0	1	0	2	3	**7,5**	**92,5**	**100,0**
Quadrants	5	4	8	2	19	**47,5**	**52,5**	**100,0**
no orientation information	2	3	2	0	7	**17,5**	**82,5**	**100,0**

Figures 33, 34, 35 and 36 illustrate orientation system in four categories of tourism maps.

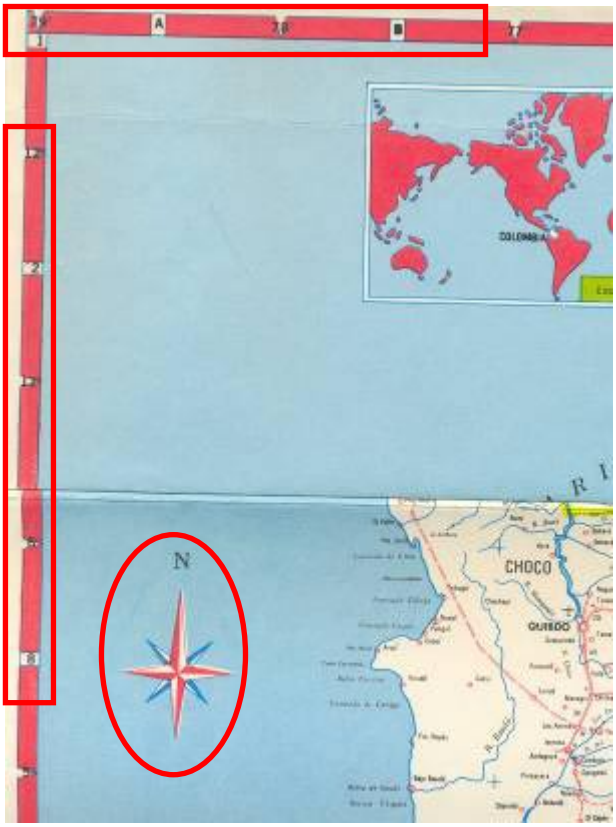

Figure 33. Country map showing geographic coordinates as well as letters and numbers to identify quadrants. North arrow is important.

Figures 34. Regional map with box of letters and numbers. No north arrow anywhere.

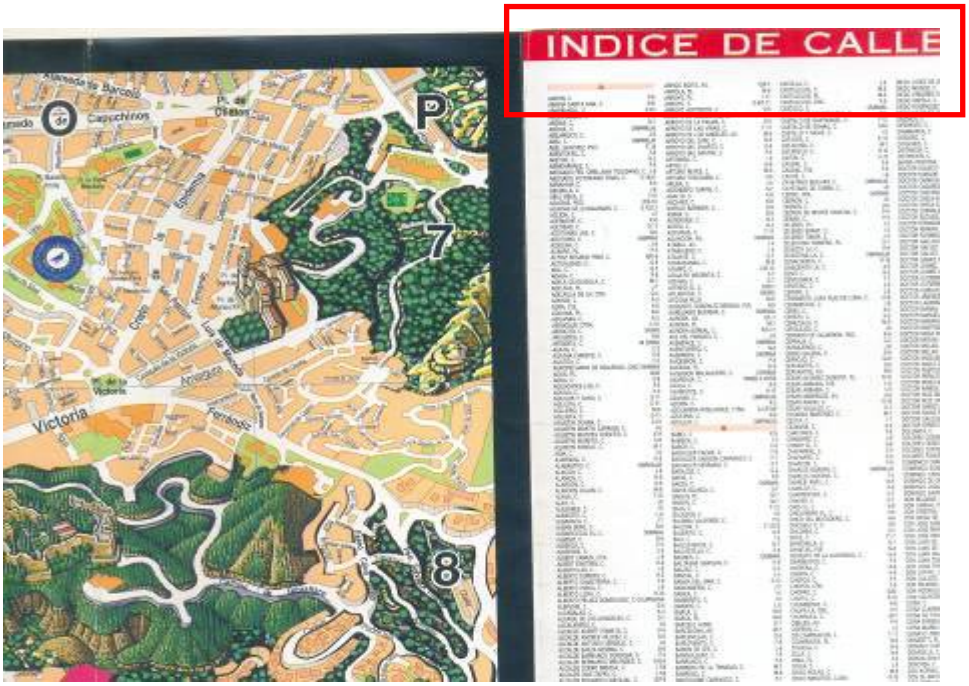

Figure 35. City map with quadrants identified with letters and numbers. Index of streets is located by the displayed area of map.

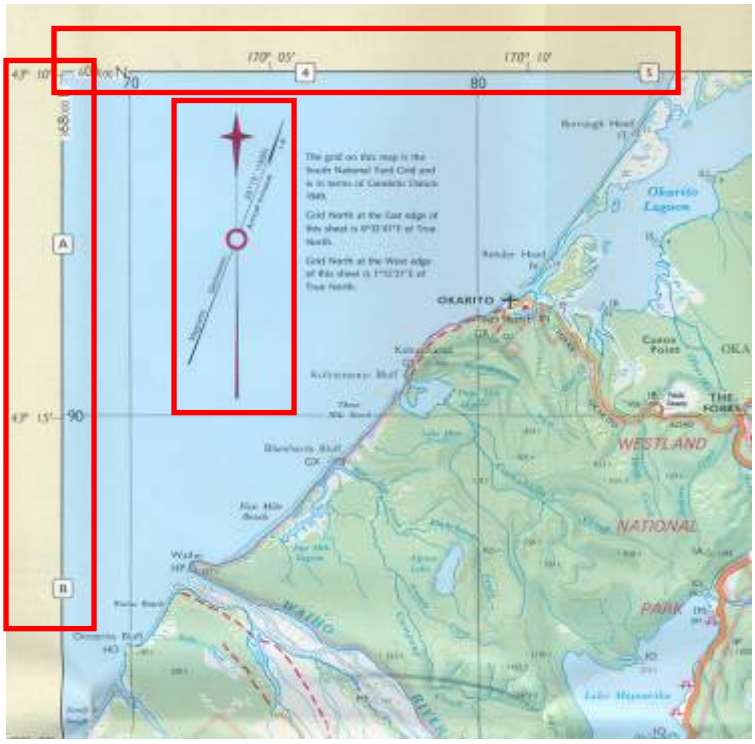

Figure 36. North arrow (magnetic and geographic). Quadrants of letters and numbers as well as geographical coordinates as tools or orientation.

4.1.10. General observations about the variable "Language in tourism maps":

The official national language in a country, as logical to suppose, takes the first place in the qualification with 100%, besides this fact English is the second one in importance, with 60%. This is due to the fact that this language is the most commercial and common used world wide, specially in tourisms activity.

Just a 10% are relegated to other types of language according to the observation. It is just in regional and specifics maps where native dialect are taken into consideration with a 7,5% like alternative language of communication. Generally this particular way of communication is presented for tourist places referred to ethnic areas. (Table 13).

Table 13. Variable evaluated in printed map

Language in maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
National (Original)	10	10	10	10	40	**100,00**	**0,0**	**100,0**
Dialects	0	2	0	1	3	**7,50**	**92,5**	**100,0**
English	6	6	6	6	24	**60,00**	**40,0**	**100,0**
more than one language	3	1	0	0	4	**10,00**	**90,0**	**100,0**

Figures 37, 38, 39 and 40 illustrate language variable applied in tourism maps.

Figure 37. Names of cities are totally written in its native language.

Figure 38. Regional map in native language just quit few advertising outside the map are written in English.

Figure 39. Two languages are expressed to design names of places (Russian and English language).

Figure 40. Specific map present description in three languages (Island, English and Dutch). Just the legend and other parts of map, not the names of cities which are described with local names.

4.1.11. General observations about the variable "Presentation of tourism maps":

Versatility and size observed in the study maps (100%) is the most common way of presentation, due to the area of interest for user can be represented in just one sheet or in a set of adjacent sheets. In some cases the detailed area is connected to the rest referring to the natural features in surface or in other cases referring to manmade infrastructure. The complete information item is referred just with 10% and means that map presentation contains almost the entire cartographic features and explanation, manageability, symbols, legend, north arrow and other are presence in the map.

In order to evaluate this variable, the interpreter or map user usually need to have certain knowledge of the area in study.

It is important to make certain movements with map sheets overlapping properly the adjacent ones in order to perform a well use of maps and getting the information of interest in the right way. (Table 14).

Table 14. Variable evaluated in printed map

Presentation of maps	M1	M2	M3	M4	TOTAL	Apply %	Not apply %	Total analyzed maps %
Versatility	10	10	10	10	40	**100,0**	**0,0**	**100,0**
Size, manageable	10	10	10	10	40	**100,0**	**0,0**	**100,0**
Details	0	0	0	0	0	**0,0**	**100,0**	**100,0**
Complete information	4	0	0	0	4	**10,0**	**90,0**	**100,0**

The cartography of a country, region, city or a specific area is normally available as a collection of individual maps or sheets which divide the area of interest into rectangles pieces adjacent without overlap areas, this manner of presentation allow the arrangement of auxiliary item in the map configuration, like index, size and position of cartographic symbols, details of alternative information. Figures 41, 42, 43 and 44

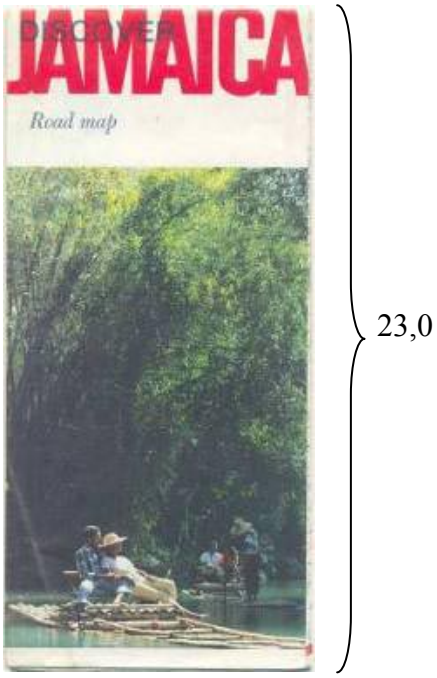

Figure 41. Presentation of country map with dimensions in centimetres to show the size of it.

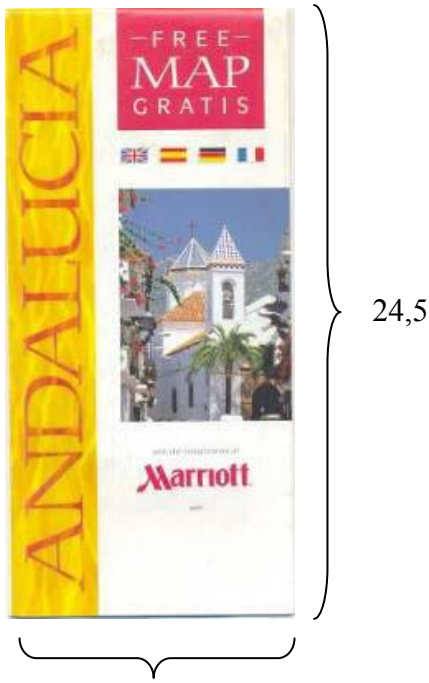

Figure 43. Presentation of regional map with dimensions. Folding map.

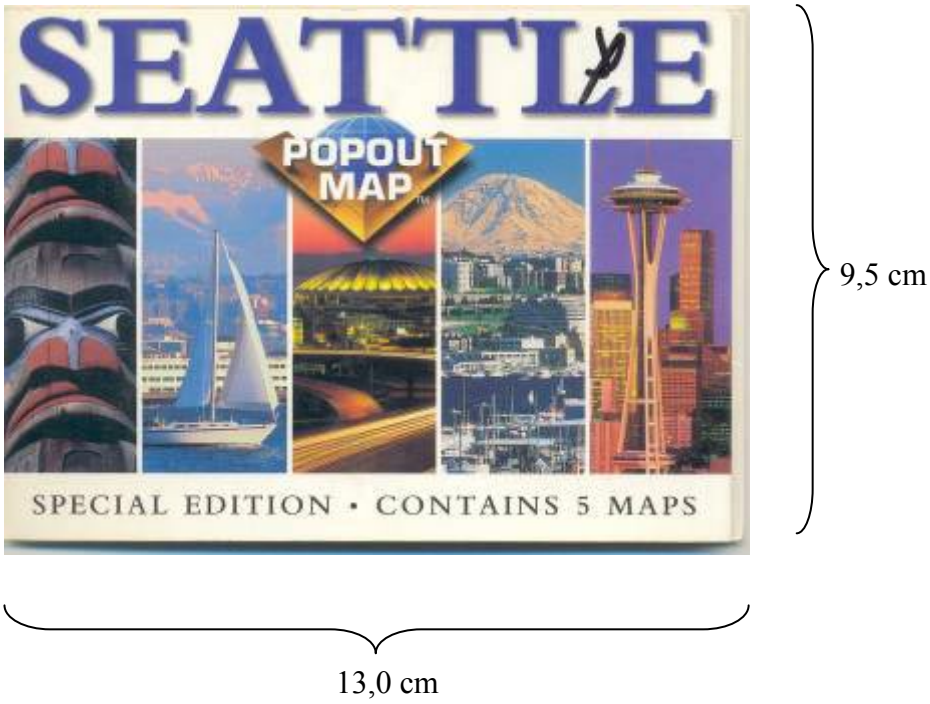

Figure 44. Presentation of a city map with pocket dimensions to easily carry on.

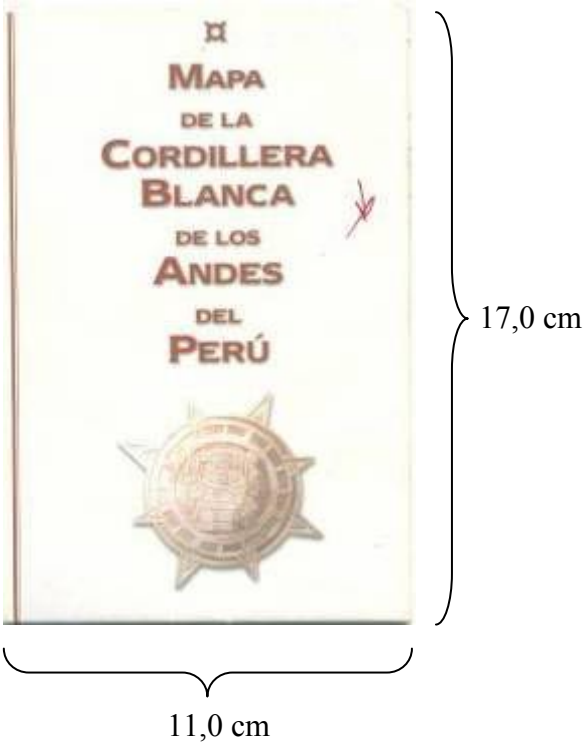

Figure 44. Presentation of a specific map with dimensions to easy carry on.

4.2. Tourist maps from the Amazonian region with emphasis on Iquitos and surrounding areas

Regional maps:

Both potential and actual tourist maps of San Martin department and Tocache Province within San Martin department were done. Maps were done as part of a social project in which main goal is supplying information to policy decision makers in different levels. “Macro” scale and “Meso” scale. Macro is considered a large-scale level and is most for implementing regional projects. Meso scale could be defined as middle-scale and is put into practice for smaller areas such as provinces or districts.

For both cases data was collected by professionals involved in tourist activity. Data was gerreferenced with Geographical Positioning System such as natural’s sites (landscapes, geological-interest places, mountains, streams, rivers, etc) and cultural manifestations spaces (historical places, museums, ethnic places, native communities, archaeological places, etc). With data in shape format (points) it was located in maps using GIS. It was in this part where the use of symbols throughout simple icons, colours lines was implemented. Also some pictures illustrating places of natural landscapes beauty was included. Figures 45 and 46.

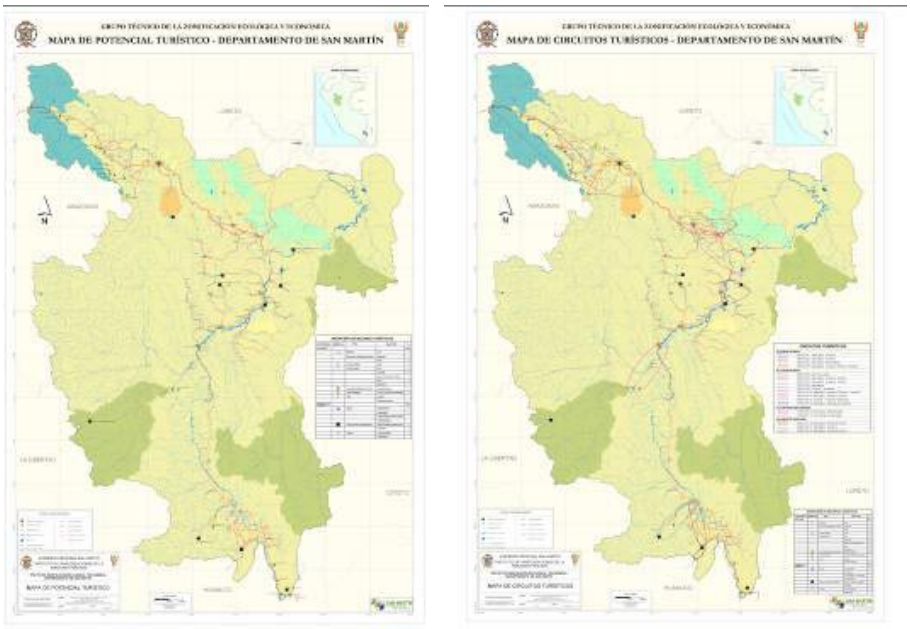

Figure 45. Potential and actual tourist maps of San Martin Department of Peru.

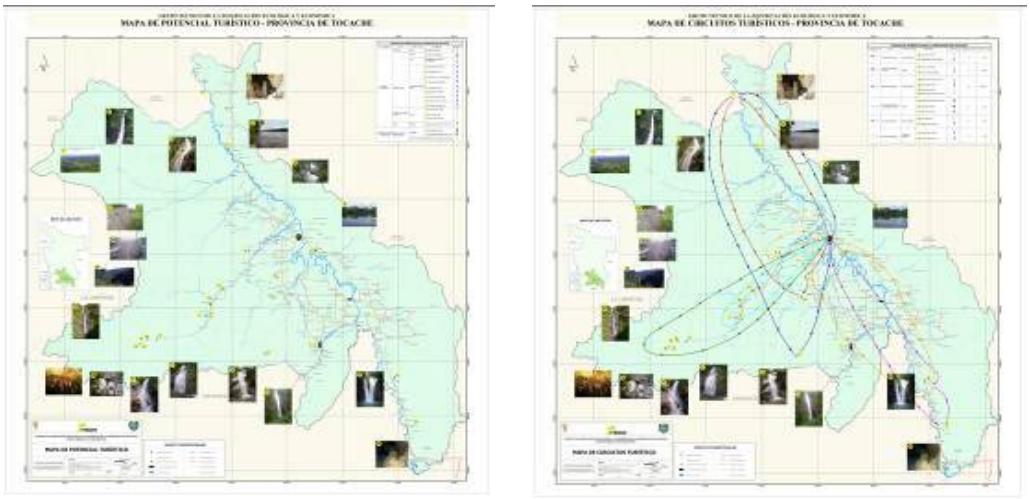

Figure 46. Potential and actual tourist maps of Tocache Province in San Martin Department of Peru.

City maps:

Municipality of Maynas and the institution in charge about tourist industry in Iquitos, were organizing tourist activities to celebrate the "Tourist week" as part of festivity of Iquitos Found Anniversary. In that sense, a tourist brochure was required. This graphical document should let visitors have and idea of our culture, gastronomy, geography, history, natural reserve, etc. Furthermore, information should be exposed on a map. We decided to include in the area of the city map location of buildings constructed in last ninetieth century in order to manifest, in certain way, our past. We called this section "Monumental Iquitos". Basic services in downtown and surrounding areas for tourist activities also were included. Pictures of old building to illustrate their beauty were added. For locating general information letters and numbers were included. Figure 47.

Figure 47. City map of "Monumental Iquitos".

Specific maps:

Information about mains of transportation toward and outwards Iquitos were proposed in a brochure with visual information referred on a map. Map specifies main tributaries of Amazon River, airport service, main local villages down the streams until reaching the border with Colombia and Brazil. Due to the information contained in map it was called map of "Routes of River Communication". No pictorial icons or pictures where included. Notices that north arrow is important to add to present direction perception. Figure 48.

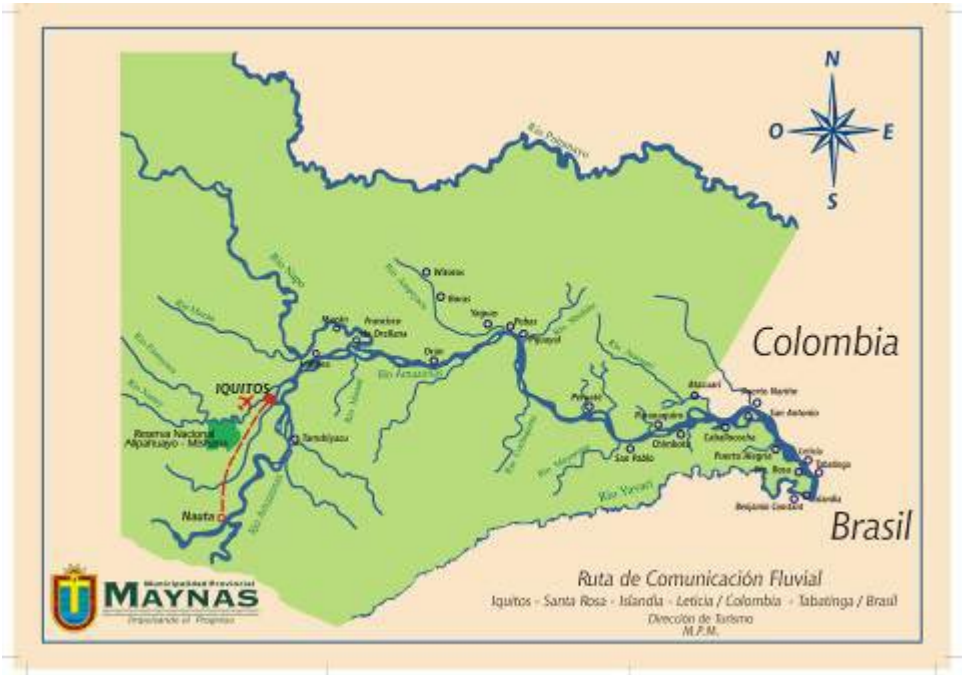

Figure 48. Map of river and local villages along the route of Amazon river from Iquitos to the border with Colombia and Brazil.

Protected Areas in Peru have their own strategy plan for tourist use. Pacaya Samiria the biggest natural reserve in Peruvian Amazonian since 2001 has a document to implement tourist and recreational activities inside the reserve. On 2005 they updated information about the "Yanayacu – Pucate" river basin with georreferenced information of local villages, trails, control points, camping areas, shelters for tourists, etc. To have a decision what areas to use and how to use them a map was elaborated. In this map four areas or sectors were recognized as potential appropriated for tourist activities. Spatial data were collected with field work and analyzed with GIS procedures (Buffering process) resulting a thematic map. Figure 49.

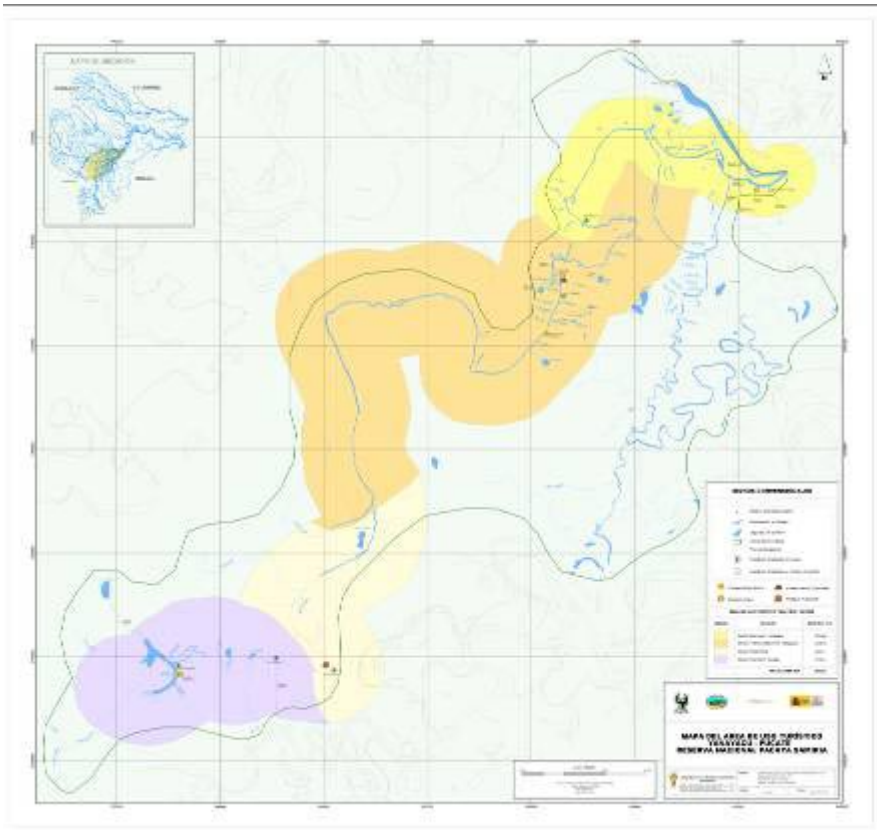

Figure 49. Yanayacu Pucate river basin. Tourist use map.

The new municipality of Belen district next to the Iquitos city, currently is implementing programs, plans and projects in its area of influence. San Miguel – Dos de Mayo are two little river villages involved in plans to develop an area of 8 274 hectares. Within this area most potential alternative to develop are land cultivation and tourist activity. Due to its geographical characteristic this area floods periodically, reducing time for agriculture. Consequently, tourist activity is an alternative to use the area the whole year. With field work and using satellite images, characterization of area was made. To spread information about potentialities of flooding ecosystems same as creating consciousness in local river people two types of maps were elaborated. A satellite image map of tourist circuits with pictures of most interesting places and activities included on it were made. A thematic map with a calendar incorporated within it focusing tourist places was also elaborated.

Figure 50. Network of trails shows potential tourist circuits which are illustrated with a satellite image (left). Thematic map: "Flooding Ecosystems" of San Miguel – Dos de Mayo (right).

As a protected area the Allpahuyo – Mishana National Reserve provides not just products but services to all kind of people (local and visitors). In that sense identifying alternatives to manage the reserve was studied and recognized in the managing planning project ruled by BIODAMAZ-IIAP project. A potential alternative to manage the area is tourist industry. A map of attractions and routes for tourist was elaborated. A network of trails, names of little streams, names of local towns as well as locating Varillales (white sand areas), were done using GPS and automated using GIS. Pictures and icons were also included to illustrated flora, fauna, people and daily labour of people. Also, a calendar was included to achieve most amount of users inside the reserve. Figure 51.

Figure 51. Allpahuayo Mishana National Reseve. Routes and tourist attractions.

Inside the Allpahuayo Mishana National Reserve the Peruvian Amazon Reserarch Institute has an area of 2 467 hectares which is most in the sector designed for tourist actions. In that area IIAP-BIODAMAZ project implemented an Interpretation Thematic Centre (ITC) which is into the Research Area of IIAP, to present information about this particular place and appreciating particular flora, fauna, and ecosystem within it. A network of trail was traced with GPS. White sand areas, as well as rivers, towns, boundaries, main road shape, and others, were mapped using basic cartographic information, and GIS tools. This map is included in a self-guided booklet about the ITC. Figure 52.

Figure 52. Research Area: IIAP. Eco-tourist circuits map.

Next set of maps was elaborated taking into consideration the necessity of BIODAMAZ Project to collaborate with development and conservation of biodiversity in the Amazonia region. Various scale maps were prepared. Most of maps identify resources and tourist attraction to be included in a proposal of potential and present tourist circuits. Offered tourist circuits complement with demand of local and foreign visitors. Maps were included in three different promotional leaflets. Figure 53.

Figure 53. Potential circuits. Presentation in leaflets.

Potential circuits offer three natural tourist units which are considered as protected areas. Maps are illustrated in Figure 54.

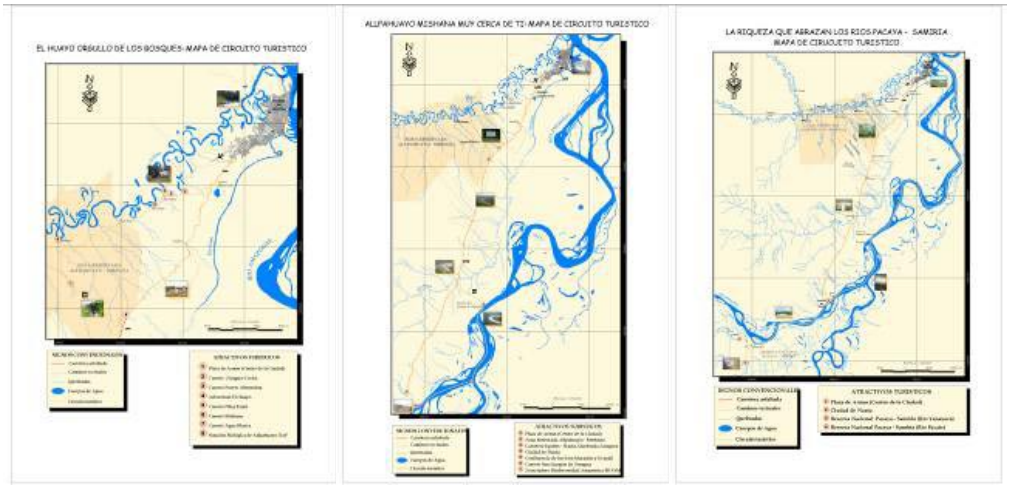

Figure 54. Potential circuits. Three different natural units next to Iquitos city and surrounding areas.

Present circuits are offered at the present time by certain private tourist companies and promoted by the municipality. Maps were also included in leaflet as illustrated in Figure 55.

Figure 55. Leaflets of for different present circuits which include maps to illustrate places to visit.

Present circuits are most referred to Iquitos city and surrounding areas. Tourist maps identifies most cultural aspects of the city, cultural manifestation of people living in villages next to city, recreation, and some natural landscapes as the union of Marañon and Ucayali rivers where the Amazon Great River starts. Figure 56.

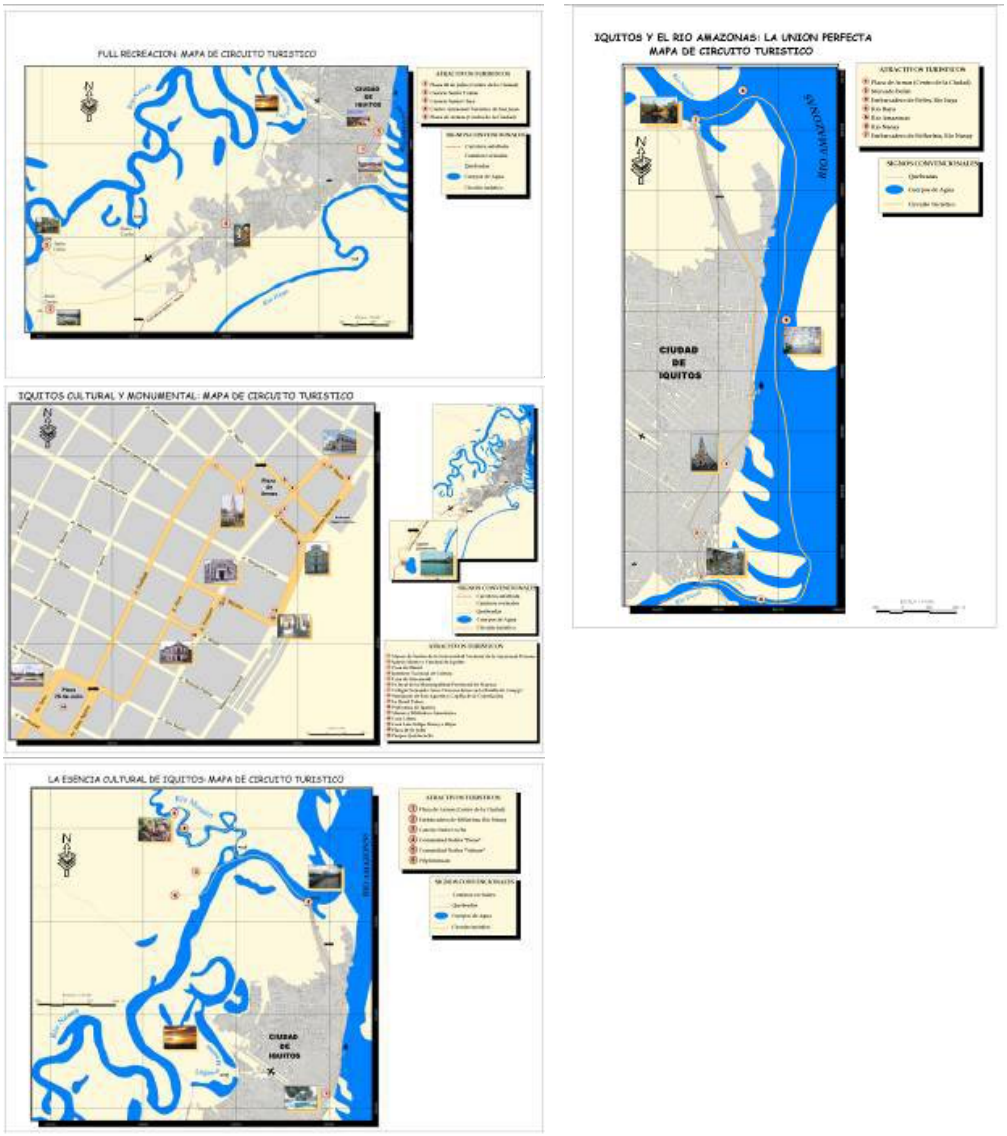

Figure 56. Present circuits. Four different maps showing cultural manifestation, recreation and naturals landscapes to visit.

5. Discussion

Some tourist maps of Amazonian region are already being used by tourists. However, tourist maps are already poor in terms of map making. As objective of this thesis was to analyze and suggest ways to improve printed tourist maps, in that sense results were presented since a personal appreciation and experience in map making.

5.1 Evaluation of printed tourist maps

Analysis about variable "Title in tourist maps" has a direct relation with the thematic of the map, meaning 82,5% for relationship title with content of the map and 90,0% for clarity in communication. It means that most map makers considered cartographic communication characteristics in terms of identifying with a name or a title the type of information regarding in the map.

The variable "Scale" represents the level of information of the map. High incidence (57,5% graphical scale bar and 50,0% for numeric scale information) confirm that scale is a basic attribute in a map, Monmonier (1996). In these particular research scale presentation by a graphical symbol (bar) is the most frequently used in scale representation. Scale in a map is usually presented like a simple proportion or fraction called a representative fraction, when we represent a scale with the use of a scale bar, which is a graphical annotation showing distance in the paper representing the geographic distance in the map. In many cases the map presents more than one scale bar with the purpose to indicate various measurements systems like kilometers and miles.

The variable "Resolution indicates the grade of precision in details of the image or the map. In this particular case representing 67,5% low resolution is most applied to set of maps. Jones (1999) explicates that resolution is the smallest distinguishable difference between two measurable values. When this affirmation is emphasized raster format occupy more importance than vector format. The

resolution of maps is related with the scale. We assume that tourist maps analyzed were done using vector formats. In that sense, it means that we have to find the better or adequate proportion according to the level (scale) of detail desired in the map when trying to elaborate maps to communicates something.

When we analyze symbols on tourist maps we considered those as anything exposed on a map display area and visually recognized and its relation with the description displayed in legend variable. In both cases (Symbols 57,5% - Legend 75,0%) reflect the accessibility and understandable communication they represent. Creating real-world symbols (typical to the area or activity) is essential when represent places, customs or phenomena in tropical zones. Consequently, when elaborating maps these two variables were important to achieve. Variables Symbol and Legend correspond to the item of "annotations" inside the map. These normally contain various types of descriptive annotations making the map easier to understand. Frequently, a set of symbols are created to teach or guide the users of objects or places which they are trying to find in the real world.

Color could be considered as a subjective variable since it has a direct influence over the human being's nerve system, Vasilev (2006). In analysis of colors we observed that they follow certain tendencies, for example the color blue is used to graphic water, or green for forest. There are some studies which report that the majority of people are more sensible to red, followed by green, yellow, blue and purple. Variability of colors in maps got a range of 37,5% and it is a significant amount due to the perception of colors that play a significant roll in the presentation of tourist maps.

What we observed about Index variable is that they symbolize, in certain order, detailed information about the displayed map area. In our study 37,5% represent Index well organized and understandable. Therefore there were a great amount of maps without any kind of index presentation. Usually, indexes constitute the adequate preparation of data in a map and this is related basically with the elaboration of legend and presentation guides that are incorporated afterwards.

Additional tourist information (25,0%) displayed on index variable has a low range, meant that maps beside the basic presentation should present more information in order to reach its service to its clients.

Variable “Advertising and sponsors” is not so common on analyzed maps representing 50,0%. On the other hand, on maps where advertising and sponsors are presented is the private sector (35,0%) which presents more information related to their products and services offering. Often, the private organizations are of great scale production enterprises, like lubricants, cloth, fast food, cigars, etc. They use this massive way to promote their products as a marketing strategy inducing users to consume their products when they visit certain country, region, city or specific area.

When we refer to orientation systems, in general terms, the use of quadrants to place and order the area for better searching is necessary (47,5%,). The most significant is where a grid of quadrants is associated with a grid of UTM and geographic coordinates. Representing the 35,0% of analyzed samples is the presence of the magnetic north arrow. A coordinate system is a reference system which is used to determine spatial location of certain objects or phenomenon. Certainly one of the most important characteristics of information is the positional component or also well known as the location or a system of georeferencing. Georeferenced feature is not just fundamental to know your position of objects of phenomena in the terrestrial surface but to be able to do special operations with the use of layers with different thematic information about the same geographical area.

The language constitutes another presentation variable in maps where logic takes advantage. In study samples it is represented with 100,0% leading to the national or native language and the English language represents 60,0% as the alternative language. This could be due as the English language becomes more widespread around the world. Nowadays, the English language constitutes as a language which is necessary to know, since it is used extensively in the world of

cartography. In several countries the English language has become so commercial that it is sometimes considered as the official language, especially in developed countries, Finland.

Usefulness of tourist map is essential. Maps can be presented in a single sheet or in a series of contiguous sheets (folding map); in the later case, there are no guarantees to getting a perfect contiguousness among the parts of objects represented. When these sheets are joined in the edges (edges-matching) they sometimes cause problems with interpretation for users when they are not familiar with the use of such maps. In our study maps "Presentation" variable represents a very important point with 100,0% of versatility and size to be manageable. Consequently, we can conclude that this variable communicate an agreeable balance for perceiving elements on the map.

It is more attractive to see maps with not too many cartographic characteristics than a map made with drawing software and pictorial elements describing places and phenomena. This is so because tools for representing icons are very limited in GIS software.

An important fact with map making is the concept of the map. It is essential to consider that with map making relationships between concept through words-links which permit to make up a "true value" about the studied topic; into simple words; if we are, e.g. building a map in tourism topic, the structure and relationships of such map should take us to what is represented in this concept and not another. In order to make maps it is fundamental to dominate the information and concepts related to the concerned topic (tourism) which means if we don't have previous knowledge about it, the results could be disastrous.

Paper maps are useful when traveling to places where technology is poor or an Internet source is hard to locate. On exploration trips, topographic (tourism) maps are most useful due to the facility to apply measurement with a compass or GPS. I agree with Shawn (1996) when he hypothesizes that web based maps can help

people become more geographically literate than paper maps, but we don't have to lose the perception of the environment that we are all involved in as well as the activities we are developing along side with such vision.

5.2. Map making of tourist maps in Amazonian region with emphasis on Iquitos and surrounding areas

It has been demonstrated that Amazonian region is very diverse and maps must focus the topic when presented information in different levels. Data required for a great level as "Macro" scale is more general that those data required for detailed maps. In that sense map making processes according to the experience in map variables analysis represent a challenge due to the diverse data available but not validated. Field work is important in this procedure.

Modern tools has enhanced map making in digital formats since informatics experiment a great advance Mäki & Kalliola (2000). The use of GIS, computer cartography, and graphical-design programs can assist to improve design and map making beside the fact that using them like alternatives tools provide better results.

Acknowledgements

The study was carried out at the Department of Geography, in the University of Turku. The analysis and evaluation of maps was made in Iquitos, Peru.

I am grateful to all the numerous of people who supported me in many ways during this work. First of all, I want to thanks professor Risto Kalliola who worked as an advisor and who gave me the opportunity to do this study. Most of the printed maps were facilitated also by Risto Kalliola y Touli Toivonen. Also thanks to Augusto Murillo who helped with syntaxes and grammatical of text.

I also would like to express my appreciation to the Peruvian Amazon Research Institute and the BIODAMAZ project for they gave me the opportunity to travel to Finland and sponsored my stay along with grants during my year. I also wish to thank to Angel Pinedo who helped me with edition of this document.

Bibliography

Burnett, C. (2002). Maps in the information society. Fennia. 178:1, 81 – 96. Helsinki. Finland.

Carton, L. (2007). Map making and map use in a multi-actor context. Spatial visualization and frame conflicts in regional policymaking in the Netherlands. 1 ed. 369 s: 6, 17, 25, 39. JB&A grafische communicatie. Holland.

CONAM (2001). Aportes para una Estrategia Nacional de Turismo. Con énfasis en el desarrollo sostenible. 1 ed. 63 s: 12 - 17. Didi de Arteta S.A. Lima, Peru.

Espinosa, V. E. *et all* (2005). Guía de SIG para su administración "Lineamientos para la implantación y uso de los Sistemas de Información Geográfia (SIG) en gobiernos e instituciones sociales". Capitulo 2: ¿Por qué utilizar SIG Ens. Administración?. 1 ed. 110 s: 52 – 53. ADES – Yakira Tobar. Quito, Ecuador.

Garmin (2005). An introduction to… Using a Garmin GPS with paper maps for land navigation. 39 s: 4 – 10. Garmin International, Inc. USA.

Jensen, J. R. (1996). Introductory Digital Image Proccessing. A remote Sensing Perspective. 2 ed. 318 s: 17 – 25. Prentice-Hall, Inc. USA.

Jones, C. B. (1999). Geographical Information Systems and Computer Cartography. 3 ed. 319 s: 3 17. Pearson Education Limited. England.

Kates, J, S. (1996). Understanding Maps. 2 ed. 334 s: 72 -74. Addison Wesley Longman Limited, England.

Krygier, J & Wood, D. (2005). Making Maps: A Visual Guide to Map Design for GIS. 303 s. Guilford Publications. 2.5.2008. http://makingmaps.owu.edu

MacEachren, A. M., Fraser T. D. R. (1994). Visualization in modern cartography. Modern cartography. 1 ed. 345 s: 49 -59. Elsevier Science Inc., New York. USA.

Mäki, S. & Kalliola, R. (2001). Visualization and Communication in map making: A case study of mapping a complex rainforest environmental in Peruvian Amazonia. Cartographic 37(2): 27 – 42.

McDonnell, R. & Kemp, K. (1995). International GIS Dictionary. 75 s. Bell and Bain. United Kingdom.

Monmonier, M. (1996). How to Lie with Maps. 2 ed. 207 s: 5 – 8, 18 – 21. The University Chicago Press, Chicago. USA.

Richmond, E. R. (2002). Map and Tourism on the Web: An Online Survey. Department of Geography. University of Victoria. 13.3.2008. http://www.geog.uvic.ca/mapsandtourism/chapter2-1.html

Satellite Image Corporation - SIC (2008). About raster-to-vector convertions. 11.4.2008. http://www.satimagingcorp.com/svc/raster-vector.html

Shawn, M. (1996). Research Directions in Cartography: Web based maps versus paper maps. University of Nebraska at Omaha. 18.4.2008. http://maps.unomaha.edu/Peterson/methods/Research/Vehe.html

Urrutia, M. (2006). Curso de Cartografía, Orientación y GPS. 300 s: 56 – 60. Revisión: 1.1. 25.1.2008. http://www.mendikat.net/modules.php?name=descargas&category=3

Vasilev, S. (2006). Cartographical Symbolic. International Conference of Cartography and GIS. Borovets, Bulgaria. 6.6.2008. http://www.datamap-bg.com/conference%5Fcd/pdf/P15_306_Vasilev_Bg.pdf

Villena, L. C. (2006). Introducción al Turismo. Teoría y Realidad Peruana. 7 ed. 362 s: 93 – 115. Lima, Peru.

Appendix

Appendix 1: List of categories of tourist maps

List of Country maps used in the analysis

Nro.	COUNTRY MAPS (M1)
1	Latvija 1:500000
2	Tourist map of China
3	Jamaica road map
4	Map of Germany
5	Malta and Gozo 1:40000 Comprehensive maps
6	Lithuanian road map
7	Tunisia. The country of hospitality
8	Cuba. Mapa turístico
9	Colombia vial y turístico
10	Malta and Gozo Traveller's map

List of Regional maps used in the analysis

	REGIONAL MAPS (M2)
1	Andalucia
2	Kevo. Outdoor map 1:100000
3	Tarapoto. Un lugar diferente
4	Perú. Mapa y rutas
5	Hawaii and Honolulu. Stata map
6	Rio Roditi. Tourist guide
7	Service Aland
8	Bison Futé - Carte - Conseil et itinéraires Bis 1995-1996
9	Ferinenkarte. Urlanb im Salzlufland
10	Oulu. Tourist map. 1:15000

List of City maps used in the analysis

	CITY MAPS (M3)
1	Seattle popout map
2	Moscow
3	Plano turístico de la ciudad de Albacete
4	Hamburg
5	Tourist map of Tokio
6	Museums in Stockhom 2002
7	Plano-Guía. Málaga/Callejero.Acceso
8	Opaskartta. Turku. ABO
9	Plan de París. Map of Paris
10	City plan. St. Pertersburg. Centre 1:13000

List of Specific maps used in the analysis

	SPECIFIC MAPS (M4)
1	Mapa de la Cordillera Blanca de los Andes del Perú
2	Callejón de Huaylas. Cordillera Blanca y Hayhuash
3	Koillis - Kaira 1:100000. Outdoor map
4	Skargardashavet Saaristomeri
5	Archipelago travel map
6	Tongariro Nantional Park 1:800000
7	Mount Cook and Westland National Parks 1:100000
8	Myvatn. Another Wolrd. Andere Welt. Iceland Island
9	Map of Royal National Park
10	Mapa turístico de la Reserva Nacional Pacaya Samiria