

The Jungle Book

Guide to the Roble, La Cienaguita en the MonoTiti



Final Report for Research in Panama

Rafael Samudio
ENVR-451 PFSS
April 27, 2007

Rudi Markgraf
rudi@markgraf.ca

Eli Naud
lizbeth_12@hotmail.com



McGill University
845 Sherbrooke Street W
Montreal, Québec
H3A 2T5
Canada
Phone: 514-398-4455
Website: www.mcgill.ca
E-mail: info@mcgill.ca



Parque Natural Metropolitano
Avenida Juan Pablo Segundo
Apartado 5499
Balboa, Ancon, Panama
Republica de Panama
Phone: 232-5552 / 6713
Fax: 232-5615
E-mail: pnmetrop@sinfo.net

Table of Contents

<u>Executive summary</u>	<u>Page3</u>
<u>Resumen ejecutivo</u>	<u>Page4</u>
<u>Acknowledgements</u>	<u>Page5</u>
<u>Number of full days spent on project</u>	<u>Page5</u>
Introduction	
<u>Parque Natural Metropolitano</u>	<u>Page6</u>
<u>Ecotourism</u>	<u>Page7</u>
<u>Literature review</u>	<u>Page8</u>
<u>Relevance</u>	<u>Page9</u>
<u>Purpose of the project</u>	<u>Page11</u>
<u>Trails – the study site</u>	<u>Page12</u>
<u>Methodology</u>	<u>Page13</u>
<u>Results</u>	<u>Page18</u>
<u>Discussion</u>	<u>Page19</u>
References	
<u>Mcgill project</u>	<u>Page21</u>
<u>Guidebook</u>	<u>Page22</u>
Appendix 1	
<u>Guidebook</u>	<u>Page23</u>
Appendix 2	
<u>Letters of consent for photo use</u>	<u>Page23</u>
Appendix 3	
<u>Guide on how to write a guide book</u>	<u>Page25</u>

The Jungle Book
Guide to the Roble, La Cienagueta en the MonoTiti
Executive Summary

Elisabeth Naud y Rudi Markgraf

Host institution: Parque Natural Metropolitano

The Metropolitan Natural Park exists to serve ecosystem functions such as erosion control, water regulation, carbon sequestration, biodiversity and air purification. As well the park serves the vital function of attracting tourists. The park needs to establish a line of communication between the common citizen and the complex workings of the tropical forest. This mandate is increasingly relevant within the context of climate change and increasing populations. As well ecological illiteracy results in poor consumer choices regarding the environment. Understanding our environment is one of the first steps in our attempt to live sustainably.

This project involved the interpretation of three trails. The three trails were interpreted in one guidebook that had information on ecosystem occurrences and tree identification. Ecosystem occurrences included the feeding habits of some animals, birds and insects. It also included general ecological concepts. The main goal was environmental education, but as well there was the necessity to create a product that would be economically viable. The role of foreign biologists was to see the tropical forest for the first time and elaborate on what fascinated us. But this was also a weakness, our project relied heavily on the aid of local biologists.

This guidebook was put together after extensive surveys of the trails with three of the parks guides. The process briefly included selecting locations for elaboration, researching information, writing the text, finding illustrations, translating the guidebook and formatting the guidebook. We received significant help translating the guidebook. We also relied on cooperation with various people for the illustrations, the proofreading, the formatting and suggestions to improve the guidebook.

The result of our project is a successfully completed guidebook that is available in two languages. After finishing the guidebook we found that indeed the guidebook is never really finished! We believe that such a type of work should be written to appeal to the reader. Problems that we encountered during the process included difficulties formatting, the copyrights of illustrations and above all time constraints. There are initial costs of putting tree signs on the identified trees in our guidebook and printing the book in color. We believe that extra tree signs in the park would be an incredible asset for students in the area and visitors alike. The color photographs will greatly increase the value of the book, although it might be desirable for the park to rent the guidebook out.

Guidebooks at the very least force the authors to learn a great deal about the natural environment. If the text is sufficiently enjoyable then they may make sense of the jumbled greenery to a common citizen. Guidebooks contribute in a comprehensible manner to the decoding of nature's wonders. For future projects regarding guidebooks we recommend foresight in formatting, photo copyright and translation. We strongly support environment education initiatives.

El libro de la selva
Un auto-guía interpretativo por el Roble, La cienaguita y el MonoTiti
Resumen Ejecutivo

Elisabeth Naud y Rudi Markgraf
Antifrion: Parque Natural Metropolitano

El parque natural metropolitana existe para servir funciones del ecosistema tales como control de la erosión, regulación del agua, secuestro del carbón, biodiversidad y purificación del aire. También el parque sirve la función vital de atraer a turistas y establece una línea de comunicación entre el ciudadano común y los funcionamientos complejos del bosque tropical. Este mandato es cada vez más relevante dentro del contexto del cambio climático y del aumento de la población mundial. También el analfabetismo ecológico da lugar a consumación excesiva y sin respecto con el ambiente. Entender nuestro ambiente es uno de los primeros pasos en nuestra tentativa de convivir con nuestro ambiente de manera sostenible.

Este proyecto implicó la interpretación de tres senderos. Los tres senderos fueron interpretados en una auto-guía turística que tienen informaciones sobre árboles, áreas de usos comunes, introducciones a los conceptos ecológicos básicos y hechos especiales sobre animales. La meta principal era educación ambiental, pero también había la necesidad para crear un producto que sería económicamente viable y que da ingreso al Parque. Nuestro trabajo como estudiantes extranjeros era considerar el bosque tropical por primera vez y elaborar en qué nos fascinó.

Nuestra perspectiva exterior era un ventaja pero también una debilidad, porque dependamos de la ayuda de biólogos locales. El libro fue confeccionado después de los exámenes extensos de los senderos con tres de las guías del Parque. El proceso incluyó brevemente seleccionar las localizaciones para parada interpretativa, investigar la información, escribir el texto, encontrar ilustraciones, traducir el libro y ajustar a formato. Recibimos ayuda significativa para traducir. También confiamos en la cooperación con la varia gente para que las ilustraciones, el corregir, el formato y las sugerencias mejoren el producto final. El resultado de nuestro proyecto es una auto-guía turística disponible en dos idiomas. ¡Después de acabar el libro realizamos que un proyecto como eso nunca realmente se acabado, siempre hay cambio que podrían ser hecho!

Problemas que encontramos durante el proceso incluyen: ajustar a formato, copyright de ilustraciones y sobretodo falta de tiempo. Hay costes asociados a la instalación de identificaciones en los árboles y la impresión del libro en color. Creemos que las identificaciones adicionales de árboles en el parque van a ayudar los estudiantes haciendo estudio en el área además de instruir los visitantes. Las fotografías en color aumentarán grandemente el valor del libro, aunque puede ser que sea deseable alquilar el libro. La elaboración de un guía por lo menos fuerza autores a aprender mucho sobre el ambiente natural. Si el texto es suficientemente agradable y interactivo, puede dar sentido al misterio mundo verde que es el bosque tropical por un ciudadano común. Las guías turísticas contribuyen de una manera comprensible a descifrar las maravillas de las naturalezas. Para los proyectos futuros con respecto a la elaboración de un auto-guía recomendamos de organizar adelante por el formato, el copyright de las fotos y la traducción del texto. Apoyamos fuertemente iniciativas en educación del ambiente.

Acknowledgements

This project would not have been possible without the help of many people, Muchos Gracias a todos!

Field Guide; Sixto Mequizama, Rafael Gómez, Amelia Muñoz

Traduction and text review (Spanish); Ricardo Coccio, Yarabi Vegas, Yovana Núñez, Dionora Viquez, Rafael Gómez

Text review (English); Sarah Davidson, Marie-Audrey Ouellet, Andrew McKinley, Sky Oestreicher, Rafael Gómez, Rafael Samudio, Jarissa Reina

Bird identification; Dian Luo and Siobhan McPherson

Drawings; Dian Luo

Formating; Elva Denvers,

Illustrations; Steve Paton (web site), Mike Danzenbaker

(www.avesphotos.com), Centre for tropical Forest Science of the Smithsonian Tropical Institute (CTFS, STRI)/Rolando Perez, Parque Natural Metropolitano (PNM), Siobhan McPherson.

Full days in field: 13/student

Full days researching: 26/student

Introduction

Parque Natural Metropolitano

The Metropolitan Natural Park (PNM) is one of the few parks located near a city boarder. Officially established by the Law no. 8 of Panama in July 5, 1985, the PNM was inaugurated on June 5, 1988 on the worldwide day of the environment. A board of trustees composed of governmental and non-governmental organizations manage the Park. This includes the Panama mayor, La Autoridad Nacional del Ambiente (ANAM), La Autoridad de la Región Interocéánica (ARI), La Asociación para la Investigación y Propagación de las Especies Panameñas (AIPEP), the Panama Audubon Society, the Smithsonian Tropical Research Institute (STRI) and the Club Soroptimista Panamá-PacíficoAsociaciones Cívicas Unidas. (Foundation Natura, 1999)

The parks main goals are; to preserve a natural area that reduces contamination originating from the urban areas, the provision of an area accessible for outdoor recreation, environmental education and research, the protection of the biological integrity of the Curundú River, conservation of native biodiversity and the protection of the Panama Canal watershed. The park is already a reliable tourist destination accessible from Panama City, often frequented by bird watchers. It is as well a non-profit organisation.

The 232 hectares and 1,159.43 mt² of the park consist mainly of relatively young tropical forests. These forests are taking over the last traces of human settlement in pre-Columbian time and during the occupation by the US military at the beginning of the 20th century. Nevertheless, the PNM protects one of the few areas left of Pacific Dry forest in Central America, which cover 75% of the total park area. It is also the refuge for more than 284 species of plants and 322 animals' species of which 23 are considered as endangered in the country. The PNM, together with Soberania National Park and

Camino de Cruces form a biological corridor that extends along the east part of the canal. This corridor insures that animals that require large habitats are able to survive. (Foundation Natura, 1999)

The park consists of five nature trails, a conference room, an environmental library, an ecological store, a rehabilitation centre for wild animals and a bus that is unmistakable. Some of the initiatives of the park include guided tours, reforestation programs, wildlife rescue programs, scientific investigation, wildfire control and prevention, a green iguana conservation program and protection of natural resources. There is also a partnership with STRI regarding forest canopy studies. Remarkable innovation resulted in the use of the first construction crane for canopy research. In the future the park is interested in a variety of new projects including the production of a calendar about the Panama canal watershed, the construction of a sports trail and camping site, a multifunctional visitor centre, the construction of a restaurant and the facilities for the boarding of scientists and others visitors.

Its existence is threatened by projects of housing development in the region and other economic interests. The construction of the Corridor del Norte for instance was completed after the law of protection of the park was changed. Car accidents with fauna are a major concern and the exact impact on the ecosystem health is still unclear.

Ecotourism

Travel and tourism is the world's largest industry and creator of jobs. Approximately 250 million jobs are expected to be created in this industry by year 2010 (WTTO, 1999). This sector is highlighted as a critical area where sustainable development can be seriously affected.

Ecotourism refers to responsible travel to natural areas. This may include conservation of the environment or the improved welfare of local people. However this

term is highly overused and in some instances may result in the deterioration of natural phenomena that allow for its survival. A synergy may exist between tourism, conservation and research. This would involve the cooperation of various sectors such as local communities, the non profit sector, government agencies and the private sector. Ecotourism at the local level can start to make sense when the community sees that wildlife can generate income. The wildlife then becomes valued and protected. An interesting example of this may be former hunters that proceed to make excellent guides and guards of the natural resource.

The PNM exists within a slightly different context than this, as it is implemented within an urban environment. But essentially it is the people of Panama that have chosen an economic alternative which may generate income for the park and for locals while protecting the natural environment and the ecosystem services that it provides. Good interpretation of these protected areas may help bring more tourism and increase the value of the park in the eyes of the population. Therefore, the elaboration of a self-guided booklet together with other initiatives to improve quality of service and education would surely benefit the park's good reputation and help preserve this natural ecosystem against exterior economical forces.

Literature Review on Trail Interpretation

Not all interpretations are useful and the elaboration of educative products should be studied carefully. The literature on nature trail interpretation highlights a few important details to consider. First, the length of the trail should not exceed one hour and a half and should be relatively flat. Second, there should be an average of 15 to 18 points of interest for 800m, with more stops at the beginning than at the end of the trail (GACN, 2001). Also, the text on each stop should not exceed 65 words and the use of short sentences and common vocabulary should be favoured (Ham 1992). Third, to

make the guide more dynamic and interactive, Domroese (1999) recommends using questions and proposes activities that would use all the visitors senses (touch, smell, hearing). Fourth, in order to link information and to facilitate memorization and understanding by the visitor, Ham (1992) advises the use of specific themes and sub-themes for each trail and points of interest.

Looking at self-guided booklet already done for the PNM (Caobos, and Cienagüita) or other sites (Barro Colorado Island and Volcan Arenal), we had some critiques. Our major criticism regarding the Caobos booklet (Dudemaine and Lapointe 2004 for the PNM) was that there was too much text and not enough separation on how the information was presented. Also, some of the trees they were talking about were not easy to identify in the field since there was no sign on the tree itself and the picture or leaf or the bark was not always present. The quality of illustration is hard to insure, a large factor in this is whether or not color is used. The use of 14 stations for 0.9km however and the space between each station seemed reasonable.

The quality of the information in the Barro Colorado Island text, Wong and Ventocilla (1995) was concise. However, there were too many stations for a short distance and a common thread for all the ideas was lacking. The format of the self-guide on Volcan Arenal made by Valerio (2004), was interesting since it used colour pictures and an attracting title. Yet, the use of two languages in the same booklet, would for our purpose, be too much.

Relevance

The problems that inspired us correlated with countries that are increasingly industrializing and urbanizing with gradually more people living in cities. These people have less and less contact with nature and become disconnected with the roots and basic resources of their lifestyles. This ecological illiteracy along with the endless pursuit of

wealth allows for over consumption and misuse of the natural environment and results in serious ecological degradation such as soil erosion, habitat degradation, species extinction and water contamination as well as global warming and deforestation (Robbins, 2002). In order to solve these critical issues, the general apathy and ignorance that exist at all levels of the society needs to be overcome. Environmental education and awareness, through outdoor experience, modified academic curriculum and wildlife interpretation may be a key process to recover the lost gratitude toward planet earth and move forward toward a more sustainable development.

With these factors in mind, the creation of a good network of protected areas, recreational parks and efficient programs of interpretation need to be developed. The creation of parks near cities has the advantage of being accessible to all types of people. Only a few parks in the world are located strategically near urban areas (Foundation Natura, 1999).

Interpretation of these parks has a great value since it may be the first or only contact these people have with the ecosystems, it is particularly important that the visitor has a positive and rewarding experience. With suitable explanation of natural processes, people can slowly start to appreciate the beauty and complexity of the many ecosystems that preceded the human conceived one. Trail interpretation can transform the perception of the reader; a casual walk through the forest could reveal a blur of green shades and bird sounds, such a walk with a guide book would pull certain plants out of the forest and into the imagination of the hiker.

The Metropolitan Nature Park already has two interpreted trails. As well there is the opportunity for guided tours with biologists. Our guidebook will contribute to this knowledge base, as the park seeks to fulfill its mandate for public education.

A good nature interpretation would give the reader a more wholesome outlook on natural processes. It would give satisfaction to the visitor and may increase attendance of visitors. This would further legitimize its use as a protected area rather than any other land use, as long as the park remains compliant with its carrying capacity.

The Purpose of our Project

The main goals of our effort were to create a book that would serve as a tool for environmental education, as well as maintaining economic viability. More specifically how can we make our product most desirable? We felt that it was important to produce a guidebook that contains interesting information about the flora and fauna that was seen along the trail. This involved the use of some scientific facts, but also the idea that each organism has an incredible story and we were interested in telling it. This was done in a comprehensible writing style. The use of scientific terms was not appropriate for this work since one of our main targets, tourism in the park, does not necessarily have significant ecologic knowledge.

One strategy that was used was an interactive text that opens a dialogue with the reader and asks questions. We also included a wide variety of knowledge about the natural world. As well we wanted to put a focus on information that is relevant to day to day life. It became increasingly obvious that the text needed to be concise. The readers are hiking and so it is inconvenient to have to stop and read for large periods of time. However we often had so much to say about a certain organism that this became a focus point for some frustration. The abundance of illustrations helps with identification and furthermore increases the value of such a work. Illustrations help connect the reader to the physical environment. Finally our interest lied in creating a book that would appeal to a large and varied public.

The Trails

El Roble:

This trail was created recently in order to link the main office to the guard cabin and the entrance of the Cienagüita and MonoTiti. The goal was to reduce security issues associated with visitors walking along the road Avenida Juan Pablo II. The path passes by the little lagoon and by the vivero where efforts of reforestation with native plants are implemented. The name was given after the abundance of Roble trees (*Tabebuia rosea*) notably at the entrance and behind the bonsai garden. It takes approximately 25 minutes to walk one way.

La Cienagüita:

Named after the marsh (*ciénega*) that forms during the rainy season at the entrance, this trail extends for 1,1km, about 102 meters above sea level and takes approximately 1h30 to walk. It was the first trail to be established in the park, in 1987. It starts from the guard cabin and meets with the MonoTiti trail a few meters before the mirador. Archaeological evidence of pre-colonial presence is exhibited by trail erosion but since it is a really fragile site, the park management plan suggests that no special attention should be brought on this topic. Along the trail some signs are already installed to identify the flora but many of them are not in really good condition and would require substitution.

El MonoTiti:

The widest trail in the park, MonoTiti was shaped by the U.S Army presence during World War II. The 1,7km long paved path starts with the “castle”, used by the U.S as a shop to repair airplanes, and ends at the Cedar’s Hill, 150 meters above sea level from where the visitor have a panoramic view of panama city. It would take just over one hour to walk this trail. In dry season, the difference between dry and humid

forest can easily be observed since the two zones are really well delimited along the trail. At half way to the mirador, the look out point called “los trinos” is a good place to rest and observe a variety of birds and insects. The name MonoTiti was given in honour of the small Geoffroyis's tamarin (*Saguinus geoffroyi*), which is often seen in the trail.

Methodology

- The McGill Ethic Code was applied throughout the duration of this project. This was particularly relevant for the use of pictures. We asked permission to the author and got a written authorization from most of them. All informations used in the booklet are properly referenced at the end of the document.

- The main choices regarded that of different plants, animals, insects, fungi and ecosystem processes to include in our guide book. This was done gradually, throughout the first two months of work by repeatedly walking the trails.

*The first stage of our trail surveys involved a general walk through the park to see the main sources of interest as chosen by us and our guide Rafael Gómez.

**After this first introductory stage the three trails were visited to highlight areas that we thought would attract attention.

***The trails were surveyed again with the guides Sixto Mequizama and then Amelia Muñoz. The guides were the source of many of our identification abilities and as well gave us a lot of interesting information about the different organisms. The presence of three guides has helped us see varying views of the tropical forest. After three different interpretations of the trails had been given to us, we were able to seriously start our own interpretation.

- The factors involved in choosing a site were not quantifiable; they were listed and considered in light of our project as a whole. Organisms were selected if; they were exceptionally abundant on a trail, if they were rare, if they exhibited some special

characteristic (spines, beautiful flowers, toxicity, etc.) and if they were useful to humans. We were interested as well in ecosystem processes. We were looking for evidence of ecological concept such as symbiosis, gap dynamics, competition, mutualism, etc.

- The information on what animals are present in the park was given special consideration. Information given by the park guides was considered foremost. We also conducted multiple unofficial animal censuses' to once again familiarize ourselves with what animals are common. We choose a list of animals that the visitors had a high probability of seeing.

- The information on the birds was exclusively collected by Siobhan McPherson and Dian Luo. These two McGill students had been studying migratory birds at the time and were able to inform us as to which birds were the most common, where they were seen and in what trees.

- We decided that the guide book would be an easier read if we were to incorporate the points of interest into themes. The themes were chosen based on the ability to link various organisms together.

*The theme of the Roble trail is the relationship between humans and nature.

This could involve the plants on the trail in a variety of ways including invasive and introduced plants, reforestation, succession and human footprints in nature.

**The theme of the Cienaguïta trail is the interrelationship between organisms.

This includes gap dynamics, seed dispersal, competition, mutualism, co-evolution and the relationships between plants, fungi, insects and animals.

***The theme of the MonoTiti trail is spatial and temporal concepts applied to nature. This includes biological corridors, natural bridges or lianas, animal territories and size, habitats and history.

- The points of interest were established, and as well various trees of interest were established. We walked the three trails twice to select the specific points of interest and number them with tape, we also labelled the trees of interest with tape.
- Research of information on the selected concepts and specific species of interest. This was done by a review of scientific literature as well as some articles of vulgarization on the subject to give us idea on what to present it.
- The text of the guide book was written.
- The appropriate color images were sought out. As well drawings were made by Dian Luo to make the guidebook more interactive.
- The guidebook was formatted.
- Once the first draft was done we tested the guidebook on various audiences and reformatted the book accordingly. Main comments and changes at this step were;
 - Order of trail; The MonoTiti interpretation was first designed to start at the bottom but since most of visitors start with the Roble, do the Cienaguita and then go down on the MonoTiti, we decided to start the interpretation from the MonoTiti at the summit.
 - Still too long; Although we made the effort to be as concise as possible, the text was still too long, we had to cut quite a bit of text before the final version.
 - Quality of picture; Some photos were said to be blurry or hard to identify, colour pictures were favoured.
 - Numbering or Identifying; Some trees that could bare a name identification were first interpreted as station numbers. It was suggested to reduce station numbers and put tree identifications instead. This was changed.

- Continuous trail; At first we numbered each trail from 1 to 9 or 10. Since we do the three trails in the same booklet, it was suggested to number them from one to 30. This was changed.
- Tree selection; Some of the trees we selected at first were not the best specimens of their species in the park. For instance the tronador on the roble was hard to see because it was behind the other trees, we selected instead a site on the MonoTiti instead where there were 5 Tronadors and they were easily accessible. Also, our guide, Rafael Gómez, pointed out that the Espave we first selected was sick and would probably die in about 5 years. We reselected a younger and healthier tree.
- Supplement on tree Identification; We first planned to include supplementary information to facilitate tree identification, but due to the already voluminous booklet we had with only the three trails and the animal supplement, we chose not to.
- Details on species name and informations; We corrected the spelling, format and general structure of the text.
- Encouragement; After all, we received more positive comments about the quality of our work than negative comments or dramatic modifications. It encouraged us to continue.

- The translation of the guidebook from English to Spanish was done with the help of Yarabi Vegas at the park and Ricardo Cossio, a student from McGill.

- Unfortunately time restraints did allow us to receive station numbers and Latin tree name signs in time to hang them up ourselves. Our book is designed so that signs on trees identify their Latin names. The reason we felt this was important is that even if

some visitors chose not to use the book they could still identify trees throughout the park.

- The trails were reviewed a last time with Rafael Gómez, to make sure that the tree identifications are correct, and that it is clear where the signs should be placed.

Limitations

Time was the main limiting factor in this process. Efficiency is a key concept when writing a guidebook in four months. We were not able to observe firsthand the changing forest throughout the year, or the varieties of flowers and seeds produced by the trees. For these events we had to rely on various forms of information, literature and guides. The main step that we didn't have time to complete was hanging the tree and station signs out in the field.

As we do not have formal training in formatting this was the source of some frustration. We used Microsoft Word for the formatting steps. Our enthusiasm to have an illustrated guidebook with color photographs was slightly jaded by the realisation as to what size the documents would become. One of our main obstacles was to manipulate the documents into manageable sizes. We met with Elva Denvers to straighten out some of the problems that we'd been having.

The search for truthful information was not always easily realized. Contradictory information is always a problem. As well often the scientific literature is incredibly specific and it takes another kind of resource to answer species information questions. Furthermore it was not always possible to identify organism to the species level. This was because we are students and not specialists in tropical biology, as a result of this we did learn a tremendous amount about the tropical rainforest.

The interpretation of three trails leads to a significant amount of accumulated information. It was difficult to create a book that would be brief enough for the casual hiker, but at the same time sufficiently cover the three trails.

Finding appropriate pictures to use for the guidebook was difficult. This was because of copyright laws. We received consent to use the images of Steve Paton (STRI), from the Centre for Tropical Forest Science (STRI) and Mike Danzenbaker (Avesphoto) that can be reviewed in Appendix 2. We were also able to take some photographs ourselves.

Communication with park experts was not a problem as we are both sufficient in Spanish. Translating the guidebook however was a different story. The translation effort was a time consuming undertaking, but we felt that it was central to our work. It required the help of several park workers for review and editing.

Results

Our guidebook is provided in the Appendix 1, our guidebook consists of:

- A brief introduction to the PNM
- A section on what the guidebook contains
- A section on recommendations for visitors

El Roble

- An introduction to this trail
- Six informative stations and nine additional tree identifications
- A total of nine tree species, four animal species, three plant species, two insect species and four birds species are mentioned in the interpretation of this trail

La Cienagüita

- An introduction to this trail
- Seven informative stations and eight additional tree identifications
- A total of eleven tree species, three animal species, one plant species, two insect species and two bird species are mentioned in the interpretation of this trail

MonoTiti

- An introduction to this trail
- Eight informative stations and ten additional tree identifications
- A total of ten tree species, one animal species, three plant species, one insect specie and three bird species

In total we identified or discussed twenty five trees species, seventeen animal species, six plant species, six insect species and thirteen bird species

Note that the exact specie was sometimes not always identifiable

Concepts that we incorporated into the text include:

- Aquatic ecosystems
- Invasive species
- Forest regeneration
- Gap dynamics
- Competition
- Symbiosis and mutualism
- Co-evolution
- Seed dispersal and survival
- Past uses of the park
- Uses of trees or plants that may include food, construction, medicine or crafts

Information on various animals that can be frequently seen in the park are described at the end of the guide book.

Discussion

We are convinced that the guidebook is an appropriate way to go about environmental education. In a global context, as well as a local context, information on our natural environment is indispensable. We are proud of the product that we have written, and we are thankful for the opportunity to work with the PNM and its associated experts. It is our hope that the guidebook will serve many inquisitive visitors and contribute to ongoing attempts to uncover the natural environment from whence we came.

As discussed earlier, we encountered many limitations for time, formatting, translation, and copyright. Some of the issues are limited to this specific project, especially what is related to working in the different country and a foreign setting with another language. We were discovering a new environment, at the same time we needed to teach people about it. We were not yet the experts in the subject. Nevertheless, we benefited from an exterior point of view. Just as the majority of the tourist who visits the park, we come from a temperal forest and it is our first time in the tropical forests. The differences are obvious to our eyes and what stikes us might be different from what a local panamanien sees in their tropical forest. Our perception of what is interesting is influenced by our cultural background and our education. Beeing aware of that we thought it was important to have the insight of the park staff on our work and other local panamanien, especially for the Spanish version.

In the best of situations, with full time dedicated to the project, we would test the book for a longer time, with a more representative sample of park visitors. We could monitor the effects of our guide on visitor experience and park attendance. We would then modify our product or find other alternatives to reach the goal of increased environmental education and economic viability. From Canada, we hope that we will receive some feedback from the park staff on how the guide book is beeing used and how it is appreciated by visitors.

In the Appendix 3, we included a summarized handbook with suggestions on how to write an interpretative booklet. We hope it can help the people that would like to undertake a similar project in avoiding some of the problems we faced and guide them in their work.

References for McGill Project

- Adiodun, Ayoya (2006) Sedative, antiepileptic and antipsychotic effects of *Spondias mombin* L. (Anacardiaceae) in mice and rats, *Journal of Ethnopharmacology*, 103:2, 166-175
- Carrasquilla R., Luis G. (2005), *Arboles y arbustos de Panama*, Panama: Editora Novo Art
- Condit, Richard, 2006, Smithsonian Tropical Research Institute, Center for Tropical Forest Science, <http://ctfs.si.edu/webatlas/mainframesp.html>, February 8th 2006
- Domroese, Margret C. and Sterling, Eleanor J. (1999) *Interpretación de la Biodiversidad: manual para educadores ambientales en los trópicos*, American museum of Natural history, New-York, United States
- Dudemaine, Anne-Julie and Lapointe Marie (2004), *Entering the world of los caobos*, self-guided booklet, Parque Natural Metropolitano
- Foundation Nature (1999) *Plan de manejo del parque natural metropolitano*, PNM, Panama
- Grupo Aprender con la naturaleza – GACN- (2001), *Un día de aventura en el bosque: actividades ambientales para áreas protegidas*.
- Ham, Sam H (1992), *Interpretación ambiental: una guía practica para la gente con grande ideas y presupuestos pequeños*, Golden: North American Press
- Jiménez, Yolanda (1995), *La cienaguita Trail*, Self-guided booklet, Parque Natural Metropolitano
- Robbins, Kelly (2002) *Environmental Awareness: Overcoming Ignorance and Apathy by Getting People 'Outside'*, *Macalester Environmental Review*, [OnLine] http://www.macalester.edu/environmentalstudies/MacEnvReview/environmental_awareness.htm, Posted on May 22,
- Valerio E. Carlos, and Valerio Silvia (2004), *Self-guided booklet to Arenal hanging bridges*, [OnLine] Juan.choriticos.net/~maryanne/download/translation.pdf
- Taylor, Leslie, 2006, *Raintree Nutrition*, <http://www.rain-tree.com/plist.htm>, February 7th 2007
- Wong, Marilla and Ventocilla, Jorge (2002) *A day in Barro Colorado Island*, third edition, Smithsonian Tropical Research Institute, Panama, 198p.

References for Guidebook

- Carrasquilla R., Luis G. 2005. Arboles y arbustos de Panama , Panama: Editora Novo Art
- Taylor, L. 2006. Raintree Nutrition, Tropical Plant Database. <http://www.rain-tree.com/plist.htm>. Date accessed; February 2007
- Condit, R. 2006. Smithsonian Tropical Research Institute, Center for Tropical Forest Science, <http://ctfs.si.edu/webatlas/mainframesp.html>. Date accessed; February 2006
- Dugand, J. 2005. Trees of Costa Rica's Pacific Slope. <http://www.cds.ed.cr/teachers/harmon/page1.html>. Date accessed; March 2007
- Janzen, D. 1966. Coevolution of Mutualism Between Ants and Acacias in Central America. *Evolution*, 20: 3, 249-275
- Young, A., Myers, P., Byrne, A. 1999, 2001, 2004. *Bradypus variegatus*, *Megalonychidae*, *Atta sexdens*, Animal Diversity Web. http://animaldiversity.ummz.umich.edu/site/accounts/information/Bradypus_variegatus.html. Date accessed March 2007
- Robinson, T., et al. 2000. Breeding ecology and nest-site selection of Son Wrens in Central Panama. *The Auk*, 117:2, 345-354
- Brokaw, N. & Bursing, R. 2000. Niche versus chance and tree diversity in forests gaps. *Tree*, 15;5
- Sork, V. 1987. Effects of Predation and Light on Seedling Establishment in *Gustavia Superba*. *Ecology*, 68:5, 1341-1350
- Paz, H., & Martinez, M. 2003. Seed mass and seedling performance within eight species of *Psychotria*. *Ecology*, 84:2, 439-450
- Janzen, D. 1972. Escape in Space by *Sterculia Apetala* Seeds from the Bug *Dysdercus Fasciatus* in a Costa Rican Deciduous Forest. *Ecology*, 53:2, 350-362
- Sedative, antiepileptic and antipsychotic effects of *Spondias mombin* L. (*Anacardiaceae*) in mice and rats. Abiodun, A. 2006. *Journal of Ethnopharmacology*, 103:2, 166-175
- National Geographic Society. Text by WWF. 2001. Ecoregion Profile; Neotropical, Tropical and Subtropical Dry Broadleaf Forests, Panamanian Dry Forests. <http://www.nationalgeographic.com/wildworld/profiles/terrestrial/nt/nt0224.html>. Date accessed March 2007
- Foundation Nature (1999) Plan de manejo del parque natural metropolitano, PNM, Panama

Morton, J. 1987. Papaya. Fruits of warm climates. 336–346
http://www.hort.purdue.edu/newcrop/morton/papaya_ars.html, Date accessed March 2007

Thomson, L., & Evans, B. 2006. *Terminalia catappa* (tropical almond), Species Profiles for Pacific Island Agroforestry. Permanent Agriculture Resources (PAR), Elevitch, C.R. (ed.). <http://www.traditionaltreeorg>. Date accessed March 2007-04-23

Appendix 1

The guidebook

Appendix 2

Letters of consent for photo use

Dear Rudi,

You may use any of my plant photos for the purpose that you have described. Of course you should include proper accreditation for all photos. Please send me 2-3 copies of the guidebook for my files, and 2 copies to the STRI Library as well.

Thank you and good luck with the project

Steve

Steven Paton
Director
Office of Bioinformatics
Smithsonian Tropical Research Institute
Republic of Panama
507 212 8097

Elisabeth,

If the website versions are sufficient, it's ok for you to use them, as long as the booklets aren't sold commercially and "©Mike Danzenbaker / www.avesphoto.com" is printed adjacent to each photo.

thx,
Mike
Mike Danzenbaker

Smithsonian Tropical Research Institute
Center for Tropical Forest Science

Panamá, April 25, 2007

TO WHOM IT MAY CONCERN

The Center for Tropical Forest Science (CTFS) gives consent to Elisabeth Naud and Rudi Markgraf, students of the Tropical Field Semester of the McGill University under the direction of Catherine Potvin, to use photos published in our website (<http://www.ctfs.si.edu/>) under the title of "Trees, shrubs and Palms of Panama" uniquely with the purpose of incorporate them in the Guidebooks for the trails of Parque Natural Metropolitan. Permission is given with the condition that the source is cited in each photo as follows: "CTFS/Rolando Pérez", and we will agree to give the Parque Natural Metropolitan higher quality photos if the Guidebooks happen to be printed.

A QUIEN CONCIERNA

EL Centro de ciencias Forestales del Trópico (CTFS) da su consentimiento para que Elisabeth Naud y Rudi Markgraf, estudiantes del Semestre de Estudios Tropicales de la Universidad de McGill bajo la supevisión de la Dra. Catherine Potvin, para que utilicen las fotos publicadas en nuestro sitio de Internet (<http://www.ctfs.si.edu>) bajo el título "Arboled, arbustos y palmas de Panamá" con el único porpósito de incorporaralas en las Guías de campo para los senderos del Parque Natural Metropolitan.

El perimiso es otorgado con la condición de que citen la fuente en cada de la siguiente manera: "CTFS/Rolando Pérez", y facilitaremos al Parque Natural Metropolitan archivosdigitales de alata calidad en caso de que las guías sean impresas.



Adriana Sautu
CTFS Program Assistant

Apartado 0843 -03092. Balboa, Ancón. Unit 0948. APO AA 34002-0948.
República de Panamá USA
507.212.8144 Telephone
507.212.8148 Fax

How to write a nature interpretation booklet?

- 1. Identify your target audience;** Age, nationality.
- 2. Review the interpretative tools available at your study site;** Consider also hiring guides or having interpretive panels along the trail. Ask yourself; is an auto interpretative booklet really the best alternative? Which trail is the most suitable for interpretation? If no trails are built yet, additional time should be spent on finding the right path.
- 3. Identify your constraints;** Time, budget, site policies, language, etc.
- 4. Determine the resources available;** Experts naturalist, funds, photographs, graphic designers, translators, etc.
- 5. State your objectives;** What do you want people to learn? Is your interpretation specific to a particular subject? (ex; forest, aquatic environment, birds or insects). How many stations, stops or identifications would you ideally want? How long should your interpretation be? Do you want to add pictures, drawings, graphs or tables? If so, do you want them to be in color and at what resolution.
- 6. Choose criteria's for selection;** Abundance, rarity, originality, threat of extinction, aesthetics, availability and accessibility from the trail etc.
- 7. Familiarize yourselves with the site environment;** Walk the trail with the selected criterias in mind, note what you see. Depending of your time constraint and objectives, you might want to expand this step to different seasons or various time of the day.
- 8. Select points of interest and do a preliminary research;** Do not restrain yourselves at this point, research on the points you find interesting or for those you have questions.
- 9. Keep or reject;** Meticulously select which points of interest have the more pertinent information or correspond more closely to your objectives and criterias. Eliminate the ones that are less significant. In selecting stations, think about the person that will be reading your book in the field. Preferably select sites in the shade, on flat slopes or where there is a bench or a log to sit on.
- 10. Further research;** Investigate further on the specie or site you selected, try to find the relation it has with the rest of ecosystem or the rest of the trail. Consider the use of theme or subtheme, it may help making links between stations or species. Ensure that the site or species is easily identifiable in the field. Do not try to explain everything on one site, ensure that there is a reasonable distance between each stop.
- 11. Write the text;** Try to be as concise as possible, you may choose to use common language or defined scientific terms if your guide is addressed to the public without background on the topic. To make your interpretation more interactive, ask questions that stimulate reflections, explore senses of touch, smell and taste if possible.
- 12. Supplement with pictures, drawings, graphs or tables;** Be sure that you cite your source, copyright might be hard to get so plan in advance what you need. Consider taking your own photos or hiring a photographer. Do a printing test to see how the images look like on paper, sometimes it is clear on the computer but blurry when printed. Ensure that the figures are readable.
- 13. Review, edit and print;** Ask other people to review the text since after writing and working on the same paper for too long, you won't see the mistakes anymore.

If you are not comfortable with informatics, ask for some help, especially with formatting picture since it can be a frustrating part of a project for the uninitiated. Compress your picture before inserting them into the document, consider using Microsoft PDF writer if it is available to you.

- 14. Identify sites in the field ;** When choosing material for your site or station identification; it has to be resistant to rain, snow, sun and time. You can use names of species, symbols, numbers or letters for your identification but make sure you are consistent.
- 15. Test on target audience;** Give sample of your booklet to visitors and ask for comments. They might question elements that you did not think about.
- 16. Monitor and modify;** Since nature is changing and so is public knowledge and interest, re-test the booklet yourself or with visitors at least once a year and perform the required changes.
- 17. Enjoy;** If you are bored by the interpretation you are giving in your guide, the visitor will be bored too!