

Tapir Conservation

The Newsletter of the IUCN/SSC Tapir Specialist Group

www.tapirspecialistgroup.org

Edited by Leonardo Salas and Stefan Seitz



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- TSG Committee Reports
- Ask the Experts
- News from the Field
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Printing and distribution of the Tapir Conservation Newsletter is supported by the Houston Zoo Inc., 1513 N. Mac Gregor, Houston, Texas 77030, United States, <http://www.houstonzoo.org>

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Tapir Conservation

Abbreviation	Tapir Cons.
ISSN	1813-2286
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Production & Distribution	This issue is kindly sponsored by Houston Zoo Inc., Cons. Program Asst., Kelly Russo, 1513 North Mac Gregor, Houston, Texas 77030, USA.
Subscriptions	Members of the Tapir Specialist Group receive the newsletter free of charge. Subscriptions for non-members are \$10.00 per year and can be obtained from Sheryl Todd, Tapir Preservation Fund, tapir@tapirback.com .
Website	www.tapirspecialistgroup.org

From the Chair

Letter from the Chair Patrícia Medici

Here we are again ... six months have passed since the publication of the last issue of the *Tapir Conservation* Newsletter and it is time to prepare another report and update all of you on our most recent activities. I have to be honest and admit that it is becoming harder and harder to write this Letter from the Chair! Every time I sit down in front of my computer to write this letter I realize how much our group has been doing and how much we have progressed in our effectiveness in terms of conservation of the four tapir species. It is really difficult to select the topics I want to mention! There is so much going on, so many activities being conducted, so many actions being put into practice, so many competent, incredible people working so hard ... but ... I know I have to select the highlights; otherwise this letter would end up having dozens of pages! Let me give it a try!

Before I say anything else, I would like to welcome our new *Tapir Conservation* Newsletter Contributions Editor, Leonardo Salas ... Known to the tapir community as Leo! As you will remember, our previous contributions editor was Siân Waters who, working together with Stefan Seitz and Kelly Russo and with funding from the Houston Zoo Inc., did the most amazing job and brought this publication to a whole new level, improving its design and, most importantly, its scientific quality. Despite the fact that I am sure that our editorial team will miss her a great deal, we absolutely understand the reasons why Siân had to pass the torch ... after all, she is one of our most active members and has a number of other jobs within the TSG, including Co-Deputy Chair and Coordinator of the Zoo Committee! So ... without further ado, I would like to thank Siân for all her hard work putting this newsletter together over the past two years. Thank you, Siân. We are extremely grateful for all your help. Now ... the torch is with you Leo and ... I would already like to congratulate you for the great job putting your first issue together! Excellent job!!!

Moving on ... I would like to let you know that our TSG Action Planning Committee keeps working very hard towards achieving the goal of revising and updating the first version of the IUCN/SSC *Tapir Status Survey and Conservation Action Plan* (Brooks *et al.* 1997). As you will probably remember, our first step towards achieving this goal was the organization

of the Malay Tapir PHVA Workshop held in Malaysia in August 2003. A total of 35 participants from Malaysia, Indonesia and Thailand, as well as TSG representatives from several other countries, produced a revised and updated Action Plan for the Malay tapir, listing and prioritizing strategies and actions for the conservation of the species. The document has been distributed to all workshop participants and other interested parties in Southeast Asia, and made available online on the TSG Website.

During the Second International Tapir Symposium held in Panama in January 2004, TSG members agreed that the next PHVA should focus on mountain tapirs. As a result, the Mountain Tapir PHVA Workshop was held in Colombia in October 2004. Approximately 70 representatives from the three mountain tapir range countries – Colombia, Ecuador, and Peru – as well as TSG officers from other countries, attended the workshop and produced a revised and updated Action Plan for the Mountain Tapir, once again, listing and prioritizing the most appropriate strategies and actions for the conservation of the species. The final report of the workshop is currently being reviewed and, as soon as it is finalized, it will be widely distributed in both Spanish and English, and made available online on the TSG Website. (For further information about the Mountain Tapir PHVA Workshop please see the article included in this issue).



The Baird's Tapir (*Tapirus bairdii*) will be the focus of the next Population and Habitat Viability Assessment (PHVA) Workshop organized by the IUCN/SSC Tapir Specialist Group (TSG). Credit William Konstant.

Considering that two of four tapir species have been the focus of the abovementioned PHVA workshops, we

can now say that we do have 50% of the second version of the Tapir Action Plan revised and updated. The next species we will focus on is the Baird's tapir, and we are currently in the process of organizing the "Baird's Tapir Conservation Workshop: Population and Habitat Viability Assessment (PHVA)", which will be held at The Belize Zoo and The Tropical Education Center (TEC), Belize, Central America, from August 15 to 19, 2005. Approximately 70 representatives, including field and captivity researchers and conservationists, representatives from governmental agencies, non-



The Belize Zoo and The Tropical Education Center are two of the main institutional supporters of the Baird's Tapir PHVA Workshop to be held in Belize, in August 2005.

governmental organizations, local and international conservation organizations, universities, research institutes, members of local communities, zoological institutions, etc., from the eight Baird's tapir range countries – Belize, Colombia, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua and Panama – are expected to attend the workshop. The Tapir Specialist Group is the organization undertaking the project, and our main partner is the IUCN/SSC Conservation Breeding Specialist Group (CBSG), which will be responsible for the design and facilitation of the workshop, as well as production of workshop materials and final reports. The institutional supporters of this project are the American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG), European Association of Zoos and Aquaria (EAZA) Tapir Taxon Advisory Group (TAG), The Belize Zoo & The Tropical Education Center (TEC), Belize, and Houston Zoo Inc., United States. At present, we have been able to raise approximately 63% of the funds needed to conduct this workshop. The organizations that have committed support to the meeting are the American Zoo and Aquarium Association (AZA) Tapir Taxon Advisory Group (TAG);

Houston Zoo Inc., USA; U.S. Fish & Wildlife Service, USA; Milwaukee County Zoological Gardens, USA; XCARET Zoo, Mexico; World Association of Zoos and Aquariums (WAZA), Switzerland; Nashville Zoo, USA; Sedgwick County Zoo, USA; Bergen County Zoological Park, USA; Los Angeles Zoo, USA; San Diego Zoo, USA; Franklin Park Zoo, USA; Omaha's Henry Doorly Zoo, USA; Jacksonville Zoo and Gardens, USA; Louisiana Purchase Zoo, USA; Wuppertal Zoo, Germany; BREC's Baton Rouge Zoo, USA; Connecticut's Beardsley Zoo Conservation Fund, USA; Brevard Zoo, USA; Lee Richardson Zoo, USA; and a few private donors.

Still on the subject of action planning, I would like to mention that our TSG Country Coordinators continue to work hard on the development of our National Action Plans for Tapir Research and Conservation. Our Country Coordinators for Argentina (Silvia Chalukian), Costa Rica (Fabricio Carbonell), Ecuador (Fernando Nogales and Leonardo Ordoñez Delgado), Honduras (Nereyda Estrada) and Peru (Richard Bodmer and Jessica Amanzo) are doing an excellent job, and should have their plans finalized in time to be presented during the next Tapir Symposium in Argentina. However, we are still lacking country coordinators for Malaysia, Nicaragua, and Venezuela. If you know of any professionals or organizations that would be willing to take over these positions, please let us know as soon as possible. We would greatly appreciate any suggestions.

Speaking of TSG meetings, I would like to mention that we have decided the dates for the Third International Tapir Symposium, which will be held in Buenos Aires, Argentina, from January 26 to 31. The main organizers of the conference are the Tapir Specialist Group, Houston Zoo Inc., Fundación Temaikén in Argentina, AZA Tapir Taxon Advisory Group (TAG), and EAZA Tapir Taxon Advisory Group (TAG). A small committee of TSG members sponsored by the Houston zoo traveled to Argentina in May, visited the hotel facilities, looked into the logistical aspects for the organization of the symposium in Buenos Aires, and kicked off the organization process. During the next months we will be promoting the conference, raising the necessary funds to hold it, and contacting potential speakers for our different sessions. We will make sure to keep you all posted about any developments regarding the next symposium, and we hope to see you all in Buenos Aires in January 2006!!!

Another important recent event for tapir conservation was organized by the Wildlife Conservation Society (WCS), in partnership with the TSG and the IUCN/SSC Pigs, Peccaries and Hippos Specialist Group. The "Lowland Tapir and White-lipped Peccary Range-Wide Priority Setting Workshop", was held in Santa Cruz, Bolivia, from April 3 to 10. The organization of this

workshop was listed as one of the priority actions included in the TSG Plans for Action 2004-2005 document produced during the Second International Tapir Symposium in Panama in January 2004. The major goals of this workshop were the establishment of a network of tapir and peccary researchers in order to facilitate information exchange and standardize research methods, assessment of the knowledge on distribution and conservation status of lowland tapirs and peccaries throughout their respective ranges, prioritization of current threats to the survival of these species across their ranges and creation of a framework to assess and alleviate these threats, and finally, the identification of priority areas for the implementation of tapir and peccary conservation efforts, prioritizing topics for further research. All tapir and peccary experts invited to attend this workshop, including all TSG Coordinators for the countries within the lowland tapir range and several TSG members, have contributed their own data and results for this process, which will be a significant step forward for the conservation of lowland tapirs and peccaries. Information and final results generated through the conduction of this workshop will be used for and included in the next version of the Lowland Tapir Action Plan.

Our TSG Committees continue to work tirelessly in putting the actions included in the TSG Plans for Action 2004-2005 into practice. I would like to highlight the excellent work done by our Zoo, Genetics and Education committees over the past six months. Siân Waters, coordinator of our Zoo Committee, is spending a lot of time and energy disseminating information about the TSG to regional zoological associations worldwide. A short article entitled "The TSG and its Relationship with Zoos" was published in *International Zoo News* at the end of 2004. The same information will also be published in the UK Zoo Federation's upcoming newsletter. EAZA News will also be publishing an article on field projects, which European zoological institutions and the TSG are supporting or coordinating. Additionally, TSG information was also sent to the AZA Communiqué, ARAZPA, SEAZA and Canadian Zoo Association. TSG members volunteered to translate the articles to both Spanish and Portuguese and they were sent to the Brazilian, Mexican, and Venezuelan Zoo Associations, as well as to the Conservation Breeding Specialist Group (CBSG) coordinators for Mesoamerica and Mexico.

Still on the matter of the Zoo Committee, I would like to let you know that thanks to Alan Shoemaker's incredible efficiency the "AZA Husbandry Standards For Tapirs" was modified for international use and translated into Portuguese, French and German. Additionally, the "Minimum Husbandry Standards for Tapirs", an article published by Rick Barongi in 1999,

has been translated into Spanish, Bahasa Indonesia, and Bahasa Malay (the Malaysian language). All versions for both documents are online on the TSG website and can be downloaded in PDF format. Alternatively, any TSG members or other persons interested in receiving electronic copies of these documents should contact Alan Shoemaker at sshoe@mindspring.com.

The coordinators of our Genetics Committee – Anders Gonçalves da Silva, Javier Sarria Perea, and Cristina Luís – spent the last six months shaping a new format for the "International Tapir Genetics Project", and the role of the Committee within the TSG. While on one hand the replies we got from the survey showed a wide variety of necessities, and attempts to secure direct funding for the project have so far been unsuccessful, on the other hand individual projects involving genetics of tapirs developed by researchers in and outside range countries are progressing at an amazing pace. To this effect, the emphasis of the International Project has changed into capacity building, technical advise, networking and when possible assistance in finding and securing financial support, rather than direct involvement. The committee coordinators have decided that by stimulating individual projects in range countries, these researchers might be inclined to share their results with the group, and these results could then be compiled from all or most range countries, thereby helping to define conservation priority areas as far as genetics is concerned. All information will, of course, be properly credited and researchers will actively participate in the analyses and making suggestions for recommendations. Projects currently working with the TSG Genetics Committee include Carlos Pedraza's Genetics of Mountain Tapirs in Colombia, Javier Sarría and Carlos Pedraza's Genetics of Captive Mountain Tapirs in North American Zoos, Jeffrey Ortiz's Genetics of Baird's Tapirs in Costa Rica, Anders Gonçalves da Silva and Patrícia Medici's Genetics of Lowland Tapirs in the Pontal do Paranapanema, São Paulo, Brazil, Andrés Tápias Árias' work with lowland tapirs in Ecuador, Jessica Amanzo's work with mountain tapirs in Peru, and Bengt Holst and Carl Traeholt's work with Malay tapirs in Malaysia. Furthermore, the Genetics Committee is working on their web pages, which will be included in the TSG Website. The pages will provide information about ongoing projects and Committee members, as well as guides for collection and analyses of molecular information in all three languages used by the group.

Kelly Russo, the coordinator of our Education & Outreach Committee, in conjunction with Gilia Angell, our Webmaster and coordinator of our Marketing Committee, has spent the better part of the past months working on the development of our TSG educational brochures and CD-ROM. The educational brochure will be designed in English and translated into Span-

ish, Portuguese, Bahasa Malay, and French. Printed copies of the brochure will be distributed at tapir holding zoos worldwide, and mailed to institutional partners, conservation organizations, agencies that have provided grant funding opportunities for tapir conservation projects, and range country governmental and non-governmental organizations, as well as schools, universities, local communities etc. In-country TSG Members, TSG Country Coordinators, and other contacts will help us to distribute the brochure, which will also be made available in downloadable format from the TSG Website. Additionally, Kelly has been working on our educational CD-ROM that will include tapir information and high-resolution photos for zoo exhibit graphics, and for the placement of our materials on other Websites.

Last but **DEFINITELY NOT** least, I would like to remind you all that our TSG Conservation Fund (TSGCF) continues to work on our fundraising campaigns and, most importantly, that if you would like to make a contribution to the TSGCF, **PLEASE DO NOT HESITATE TO DO SO!**

All you have to do is to make a check payable to the IUCN/SSC Tapir Specialist Group (TSG) and mail it to: Kelly Russo, Conservation Program Assistant, Houston Zoo Inc., 1513 North MacGregor, Houston, Texas 77030, United States. See!?! Pretty easy!!! We certainly appreciate any support and we thank you in advance!

You will be hearing from me in another six months and I am sure we will have a lot more to share!

Best wishes from Brazil,

Patrícia Medici

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TSG Committee Reports

Marketing Committee

By Gilia Angell

2004 Fundraising Campaign

In October 2004, the TSG Marketing and Fundraising Committees worked together to produce and send out 500 color brochures to individuals, zoos and other conservation organizations on our mailing list. Our letters to past contributors included notes of thanks for past support and an invitation to give again to our growing TSG Conservation Fund (TSGCF). Our printing and mailing costs were kindly underwritten by a TSG donor and the Woodland Park Zoo. Forty-eight donors responded with a total of US\$ 3,846 towards tapir conservation. Bill Konstant, Kelly Russo, and Kim LaFon at the Houston Zoo Inc. have graciously administered the fund and sent thank you letters to donors. Considering that totals from our 2003 mailing campaign were US\$ 2,394, the increase in contributions from individual donors in 2004 was 62%! Wholehearted thanks to those who generously gave to the TSG Conservation Fund in 2004. For 2005 we will conduct an online fundraising effort. Look for E-mails

about this later this year. We have many brochures left over from the mailing campaign that are available for TSG fundraising events. If you would like some for your fundraising activities, please contact Gilia Angell (gilia_angell@earthlink.net).

Tapirs in the Media

Awareness about tapirs is growing in the media recently, especially in the UK. *BBC Wildlife* magazine and photojournalist Dale Morris worked with TSG member Charles Foerster on the article aptly titled "Face to face with big nose" in the March 2005 issue. Dale Morris has generously donated his photos from this article for TSG's use on our site, in print, and marketing materials. British production company *Tiger Aspect* also contacted TSG asking for a researcher with an ongoing project suitable for filming for their documentary series "Last Chance to Save..." It was determined that Charles Foerster's project was a match and Charlie generously agreed to work with the film crew at his site. Popular British comedian Vic Reeves will host the tapir episode of this series and visited Charlie's Costa Rica site in May. Due to the celebrity endorsement aspect of this television feature, the potential is high for large media exposure to British

television viewers. TSG Marketing chair Gilia Angell spoke with the producers of this series to ensure TSG is mentioned in this programme.

TSG Website

We are striving to maintain an ever-growing website that maximally assists TSG in all its activities. Over the next 6 months, we plan to add navigation improvements, project profiles, a genetics database, an image gallery, and tie-ins to the online fundraising campaign.

Gilia Angell

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Genetics Committee

By Anders Gonçalves da Silva

A little over a year has gone by since the creation of the Genetics Committee within our group, and growth and pace of activities have been incredible. News include changes in the coordination of the group's activities, a webpage, and substantial changes to our International Tapirs Genetics Project, which is now associated with many new projects. Additionally, the Committee underwent a restructuring of its organization and procedures in order to be able to meet the demands for information and unified methodologies by tapir genetics researchers the world over. These are truly some exciting times for the Committee.

I would like to start by announcing a change in our ranks. Emilio Constantino joined us at the beginning and has worked with us for the first year. However, for personal reasons, he will not be able to continue as one of the Committee's coordinators. I would like to take this opportunity to thank Emilio on behalf of the Committee and the Group for his efforts. To fill in for him, a young scientist from Portugal has gladly accepted our offer to assist in the coordination of the Committee, to help us develop the International Tapir Genetics Project and other activities. I would like to introduce Cristina Luis to the TSG. Cristina is from Portugal and, along side Javier Sarria and I, will be forming the coordination team for the Committee. Cristina is a competent geneticist, who will soon be

obtaining her PhD from the University of Lisbon, and she is particularly interested in Malay tapirs.

Another exciting news is that soon the Committee will have its own webpage within the Group's site. The webpage will include information, documents and links regarding methods of collection and preservation of samples for genetic analyses, as well as funding options. We would also like to have a section on licenses and permits for each range country, so please send in reports of your experiences to any of the coordinators. The page will display small texts regarding the usefulness of genetics to conservation, and possible research questions, in the hope to give visitors an initial guide to the work we do. The page will also contain up-to-date information on the many projects involving genetics that are endorsed by the Group. In a way, we believe that the website can be used to attract funding to the individual projects, to the Group, and to act as a venue to acknowledge funding that has been obtained. Furthermore, it is a way of communicating our work to the public in general through a very dynamic form of media. Therefore, we hope that this space will be taken advantage of, and that project PI's will be quick to send us small summaries of their projects, with maybe a photo or two, so that we can add them to the webpage. When writing these summaries, we would like to suggest keeping them fun and simple, so as to appeal to the broadest public possible. Finally, the webpage will be initially launched in English, but Spanish and Portuguese versions are on their way.

Moving along, our International Tapir Genetics Project has been restructured due to several factors. As our Chair mentions in her letter, there was only a moderate response rate to our surveys, and even in these limited responses it was clear that researcher's needs, and resources, varies greatly. Additionally, initial attempts to find funding were unsuccessful, and we were advised to break up the project into areas, or species. As this was progressing, quite a few individual projects started up, which sought our endorsement and cooperation. We then realized that a more efficient path to reach the ITGP objectives would be to encourage individual projects by providing technical advice, networking opportunities, and letters of endorsement and recommendation for funding agencies; in exchange the ITGP would have access to the data (respecting ownership), and count with researchers' experience and expertise to help other Group members. To this end, we are now endorsing *in situ* projects in Argentina, Brazil, Colombia, Costa Rica, Ecuador, French Guiana, Peru, and hopefully soon in Southeast Asia. We are also endorsing two *ex situ* projects, one analyzing genetic diversity within the captive population of mountain tapirs in USA zoos led by Colombian researchers, and a second analyzing genetic diversity of the captive population of lowland tapirs within Argentinean zoos,

being led by Temaikén. Some of these projects are in advanced stages, while others are still on the drawing board, but all are very promising, and will certainly make important contributions to our tapir conservation efforts.

Finally, because of the growth that we have been experiencing, and the increase in the number of endorsement requests, the Committee coordinators have been in discussions on how to create a systematic protocol to ensure objective and critical evaluation of proposals and projects in a timely fashion. The new organization of the Committee will be announced soon, and we hope that this will allow us to continue to grow and offer support and space for as many projects as possible, ensuring a steady progress towards guaranteeing the future of tapirs and their habitat.

Anders Gonçalves da Silva

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Education & Outreach Committee

By Kelly Russo

The Education & Outreach Committee has been working hard in past few months on developing an educational brochure about tapirs. The finished result is a full-color, 8 page booklet incorporating Stephen Nash's beautiful tapir illustrations. The English version of the brochure is currently available for download on the TSG website. Look for alternate translations of the brochure in the coming months – Spanish, Portuguese, French and Bahasa Malay.

Our next project is an educational CD-Rom containing high resolution photos, range maps and information on tapirs. These CDs will be distributed and utilized as a reference tool for exhibit graphics, websites and curriculum development. If you have materials you would like to contribute to this CD, please contact Kelly Russo (krusso@houstonzoo.org).

Kelly Russo

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Ask the Experts

Fragmentation of Tapir Populations and the Loss of Heterozygosity

By Leo Salas

Ecological processes, relative to our own perception of time, run by many clocks. There are some that are relatively fast, say, within one year – successions of microbes in ponds, or the occupation of habitats by successful invader plants. Other processes go by slowly, taking several decades or more – the full regeneration of forest gaps, or the recovery of whale populations. The changes in tapir populations in fragmented forests, I may argue, lie somewhere in the middle.

Granted, the processes that create the fragmented forests will cause great reductions of tapirs per unit area in a short period of time, but once these are fragmented, other processes affecting the remaining tapir populations (hereafter referred to as “fragmentation”) may be relatively slow. For example, if fragmentation is not directly affecting the survival of the adult tapirs (because tapirs can and do forage in disturbed habitats), but is instead affecting the recruitment of juveniles, individuals may persist for several years or even decades in forest fragments. In such situations, the population might become extinct many years after the forests have been fragmented.

Several small populations of tapirs are becoming isolated from their core (i.e., larger) populations. Consider for example Baird's tapirs below (and east of) the Panama Canal – isolated from the northern populations. The same can be said for several popula-

tions of Andean tapirs. In the case of Malay tapirs on the island of Sumatra, according to a seminal paper by Santiapillai and Ramono in 1990, extensive deforestation in the past 50 years has caused a reduction of >80% of the island's forest cover, likely creating severely fragmented populations.

A complication in determining the impact of fragmentation on tapir populations living in these patches is the difficulty in measuring population dynamics parameters, such as birth rates, survival of newborns, juveniles, sub-adults and adults. The simple count of tapirs to detect trends would require drastic changes in numbers, because typically large effort is needed to count just a few individuals. The counts come associated with high sampling error. To have an acceptable chance to detect trends through the usual methods, if the changes in tapir numbers are relatively small (i.e., population numbers change slowly over time), many counts over many years may be required – at a significant cost.

The reader may note that a population of tapirs in a forest fragment may be maintained so long there is outside recruitment of individuals – i.e., migrants. In this state, the fragment may maintain a stable number of animals thanks to the influx of “new blood” from a nearby larger “source” population. In such case, determining the real effect of a fragmented habitat on a tapir population may be impossible through simple population counts. But what if the influx of migrants is not fast enough? What if the source population is too far away or non-existent? What if it was decimated too?

Genetic diversity, or heterozygosity, loosely interpreted here as the diversity of alleles in a population of genes or individuals, is directly related to population size. Breeding systems and other factors affecting the maintenance of heterozygosity levels aside, a decrease in numbers of tapirs will be evidenced by a percent loss in heterozygosity. An overly simplistic idea can then be devised: by comparing two once-connected populations in two forest fragments, one fragment large and one small, it may be possible to evidence through their heterozygosity levels, if the population in the smaller fragment is losing heterozygosity related to the population in the larger patch of forest. This is a very simplified idea that assumes that the amount of genetic diversity in a population is governed by a stochastic process called “genetic drift.” The drift is simply the result of some genes lost due to chance (i.e., randomness in determining which genes pass to the next generation due to various factors, including the randomness of pairings of parental genotypes). Clearly, if there is a selective advantage for a certain gene to be passed on to the next generation, it will not be lost by genetic drift. Hence, the loss of heterozygosity, as portrayed here, pertains to the “neutral genetic diversity” of the fragmented populations. The loss due to genetic drift

in a fragmented population will depend, among other things, on the time since isolation, the speed at which population numbers were reduced, and for how long they have remained small.

Following the same logic, we could conceivably think of a standard heterozygosity level for a healthy tapir population; that is, the level of heterozygosity of a population likely to survive on its own for, say, 500 years. Using this standard, we can assess the status of other populations in fragmented forests to determine which are at highest risk of extinction. Consider the following: quick-and-dirty simulations show that a population of 100 breeding tapirs in the best of conditions (that is, where each male has equal chance to mate with any of the females in the population, without hunting pressure and with intrinsic growth rate as predicted by allometric approximations and data from captive animals) may lose as much as 5 to 6% of its heterozygosity in 5 generations (where a generation is 10 years, or half the reproductive lifespan of tapirs). A population of 500 breeding tapirs shows no loss of heterozygosity in the same time span.

We asked our tapir experts about the feasibility of such an approach to determine the health of tapir populations in fragmented forests. Briefly put, something similar to the above can be done, so long as ecological and historic data on the populations is also available. However, the above unmentioned factors “left aside” creep back onto the proposal, extremely limiting its use. Keep reading, please.

Dr. Harald Beck, at the Center for Tropical Conservation in Duke University and a member of our panel of experts, supports the idea but suggests the inclusion of museum samples as well. He pointed to a similar study conducted on extirpated grey wolves in the US and Mexico vs. the populations in Alaska and Canada. The study, published in the journal *Molecular Ecology* of January of this year (full reference below), shows how the authors used museum records to assess the level of heterozygosity present in the remaining populations after glaciation refugia and human persecution drew populations in the lower 49 US states and Mexico extinct. The previous populations of grey wolves had more than twice the diversity of the present-day remnant populations. To fully understand Harald's suggestion, we must understand the problems associated with the comparisons. The challenges are certainly manifold. “There isn't a single accepted benchmark of heterozygosity (...) to strive for,” commented Brandie Smith, Director of Conservation and Science for the American Zoo and Aquarium Association (AZA) and a Ph.D. candidate at the University of Maryland. That is because species differ in the level of heterozygosity (due to events in the history of the species, such as the glaciation refugia and the grey wolves).

Anders Gonçalves da Silva, co-head of the TSG Genetics Committee and a PhD candidate at Columbia University, explained in more detail the problem of lack of heterozygosity benchmarks brought up by Brandie. "Much of what has been done in population genetics is extremely difficult to replicate (...) when we deal with wild populations." He reminds us that environmental conditions tend to vary greatly between sites and that these and other factors, not perceptible to our eyes, may affect the distribution of genes in populations. Thus "many of the population genetics concepts make sense [only] when it is specified the place and time in which measurements were taken (...), which makes any comparison between populations a tremendous challenge." Scales of time and space for genetic experiments may be too big to replicate too and, says he: "thus, we commonly use simulations [instead]."

Many statistical tools have been created to overcome these problems, Anders explains, but these come loaded with assumptions that are almost always violated in field studies and use little of the available data "(these use means and the likes, discarding the variance in the data)." Still, a lot can be done with the available techniques. Yet, "...an advantage is that [these techniques] allow us to describe the genetic variability as a single number (that can be compared between populations with some reservations), that along with information on the natural history of the species and some other information, can be very useful in determining the genetic status of the populations, and the possible risks of doing nothing." The key is to have these ecological and historical data to make sense of the differences observed.

Following Anders, Harald and Brandie, then, there is truly no standard against which to compare the heterozygosity status of any given population, rendering the question of monitoring fragmented populations unanswerable through genetics. Proper comparisons, Anders notes, simply state if populations differ in diversity and make no speculation about genetic diversity lost, because such claims "would be very difficult to demonstrate!" He thus adds that "genetic information can be very useful, if only with a good understanding of the ecology and history (of the populations). They walk hand in hand." The study on grey wolves mentioned above certainly relied on decades of data and studies on the history and population genetics of the species. This is why Harald's suggestion to use museum records is so very important.

If such a study were to be undertaken with tapirs, information on the ecology and history of tapir populations should be used, lest we commit the sins the experts mentioned. Assuming we have the necessary information and museum data, Brandie suggested to sample several populations of each tapir species using several micro satellite loci. Added she, "You could also

compare heterozygosities between the different tapir populations (looking at fixation indices to see if there is limited gene flow between populations of the same species), and between the different species (do the more endangered populations have less heterozygosity?)." Brandie also suggested looking at allelic diversity "(the average number of alleles per locus)," and concluded that "the work could eventually lead to recommendations for preservation (which areas/populations should we focus on preserving?) and management (translocating tapirs between subpopulation to increase overall genetic diversity)." The latter would be based on the prior knowledge that the differences observed are related to well-documented events in the history of the populations; events shown to have reduced the genetic diversity of the endangered populations (i.e., fragmentation events).

If the genetic comparison between two populations is not limited to heterozygosity levels, but includes population markers, it would shed light on other aspects of the effects of the fragmentation on both tapir populations that would help elucidate the history of these populations. It would evidence if there is, or was, any gene flow – through migrants – between both populations. Moreover, mutations acquired in fast-changing segments of DNA in both populations may give an indication of time elapsed since the isolation between the populations, which can then be correlated to the habitat changes that led to the isolation. If these kinds of information could be derived from the genetic studies, the basis for a comparison in heterozygosity levels for management, as proposed here, would have a more reasonable basis. Yet, the fact that there seem to be no research on this subject is perhaps the best indicative that a lot more needs to be known before we can conclude anything about heterozygosity lost between populations through simple comparisons, and likely also that the technology is not yet there to make such comparisons.

One expert took the extra step to comment on the management strategy alluded to by Brandie above: translocation. Zoe Bremer, a student of Heritage Management at the University of Derby who completed a study on Malay tapirs, is interested in looking at a similar problem with a closely related species – the Exmoor pony. She explained that "In the UK, the Rare Breeds Survival Trust is looking at the genetic profiles of equines at the moment. As you may know, the Exmoor is not a 'breed' in the usual sense since it pre-dates any human intervention in horse-breeding. The problem, given the small numbers of animals available for the Breed Society to use, is to maximize genetic variation whilst maintaining official breed standards and in this case, the standard is very restricted in terms of size, shape and color." I confess I did not know of the existence of the Exmoor pony.

After speaking to a retired veterinary surgeon who maintains a herd of the ponies, Zoe learned that there is "...a high level of homozygosity in Exmoors (about 46%) but there are no known hereditary diseases amongst them." She was also informed "...that feral sheep populations on Scottish islands (e.g. Soay, part of St. Kilda) seem perfectly healthy with the introduction of one new ram per community every second generation. I know that on Shetland the ponies have a stallion taken round the islands (by rowing boat!) for breeding. This is probably a better exercise with which to compare tapir populations than the breeding of sheep due to the genetic similarity between horses and tapirs. Perhaps the introduction of traveling entries is the answer, whereby captive raised tapirs are taken to visit isolated populations." Indeed, translocations may be called for in many of the currently fragmented tapir populations. But first, we must know which ones truly need it and in what order of priority. This is not a simple question of genetic diversity; it involves serious health issues as well. Also, warns Anders, "...care should be taken in translocation, to avoid outbreeding depression, which is analogous to inbreeding depres-

sion and happens because the introduced genes may disrupt adaptive gene sequences in the [fragmented population's] genome."

To end in a more positive note, Anders concludes that "there are many other things we can do with a bunch of feces. Lots of information related to the ecology and demography of a species is nowadays obtained through genetic studies. Therefore, I remain convinced that it can be a useful tool for the monitoring of populations."

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Reference on grey wolves (thanks to Dr. H. Beck):

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News from the Field

BRAZIL

The Influence of Large Herbivores on Neotropical Forests

By Patricia Medici

The project "Influence of Large Herbivores on Neotropical Forests" is a coordinated research initiative of the IUCN/SSC Tapir Specialist Group (TSG) that is being carried out in five countries of Latin America: El Rey National Park in Argentina, Morro do Diabo State Park in Brazil, Los Nevados National Park in Colombia, Corcovado National Park in Costa Rica, and Los Amigos Ecological Station in Peru. The coordinators of the project – Silvia Chalukian (Argentina), Patricia Medici (Brazil), Diego Lizcano (Colombia), Charles Foerster (Costa Rica), and Harald Beck (Peru) – are all members of the TSG. The primary goal of this project is to describe the influence large herbivores (tapirs, peccaries and deer)

exert on shaping and maintaining the understory plant communities of five different Neotropical ecosystems in Argentina, Brazil, Colombia, Costa Rica and Peru, and provide evidence that these animals are vital to the health of tropical forests and that more efforts should be made for their protection. Specifically, the main objective of the study is to examine how the removal of large herbivores will affect the physical structure and floristic diversity of the understory plant communities in primary and secondary forest habitats at each site. In order to simulate the removal of large herbivores from the forests (low densities or local extinction), we constructed exclosures to prevent them from foraging on vegetation in selected areas. Data has been gathered on different variables to describe structural and floristic changes in the plant communities over time.

The Brazilian component of the project – The Influence of Large Herbivores on the Atlantic Forest of Morro do Diabo State Park, São Paulo State, Brazil – was established in July 2004. The ecosystem under study in Brazil is the Atlantic Rainforest, and the species targeted are Lowland tapir (*Tapirus terrestris*), red brocket deer (*Mazama americana*), gray brocket deer (*Mazama gouazoubira*), white-lipped peccary (*Tayassu pecari*), and collared peccary (*Tayassu*



View of one of the enclosure plots.
Credit Patrícia Medici

tajacu). The funding for this part of the project, as well as for the Costa Rican component, came from the Houston Zoo Inc.

The materials used for the construction of the enclosure plots in Morro do Diabo State Park were wooden fence posts, wire chicken fence, and plastic ties to attach the fence to the posts. Fifty (50) enclosures were constructed along transects in two different habitat types found in Morro do Diabo State Park: 25 enclosures in secondary forest and 25 in mature forest. The distance between enclosures was 50 meters, and



View of one of the enclosure plots.
Credit Patrícia Medici

control plots (1x4 m) were established 10 meters to the right from each enclosure. Each enclosure measures 3x6 meters, with a height of 1 meter. A 20 cm high gap was left at the bottom of the barrier to allow access to smaller animals such as agouti, armadillo, coati etc. The 1x4 m sampling area in the center of the enclosure was divided into four 1x1 m quadrants. The outer 1 m wide buffer zone was not sampled because the vegetation may be browsed from outside the enclosure. Also, this vegetation is subjected to influences of investigator traffic. Plots are visited twice monthly in order to inspect for damage and any necessary repairs.

For each enclosure and control plot, two 1x1 m quadrants within the 1x4 m sampling area were chosen randomly. As a result, 2 m² of forest were sampled in each enclosure and control plot. All plants \geq than 10 cm high and with diameter \leq 5 cm were measured (height and diameter), separated into morpho-species and marked with PVC tags. Each plant was assigned a reference number for analysis. Plants with height $<$ 10 cm (considered to be seedlings) were counted. Horizontal cover was assessed through the needle method: a wooden stick is vertically placed in the geometrical center of each 1x1 m quadrant and the number of leaves touching the stick is counted.

The first measurements (baseline data) were collected between August and October 2004, and reflect the diversity and structure found within the enclosures and control plots right after their construction. For the mature forest, a total of 2,456 plants were marked and measured, including 1,292 plants in the enclosure plots (25.84 plants/m²) and 1,164 plants in the control plots (23.28 plants/m²). The number of morpho-species in the mature forest was 162, and 3,492 seedlings were counted. For the secondary forest, a total of 1,400 plants were marked and measured, including 788 plants in the enclosure plots (15.76 plants/m²) and 612 plants in the control plots (12.24 plants/m²). The number of morpho-species in the secondary forest was 88, and 1,258 seedlings were counted.

After the initial data collection, species-area curves were drawn for both mature and secondary forest in order to carry out a preliminary assessment of our



The Houston Zoo Inc. is the major donor of the Brazilian component of this project.



The 20-cm high gap left at the bottom of the enclosure barrier to allow access to smaller animals.
Credit Patrícia Medici

ability to capture the diversity of plants in the areas. Both curves seemed to have stabilized and reached an asymptote. As we move forward with the subsequent data collections, more sophisticated statistical analysis will be conducted in order to determine this ability.

The same sampling quadrants and plants will be measured twice a year, at the end of the wet season (April-May) and at the end of the dry season (September-October). At the end of the last data collection period (April-May 2009) a decision will be made



Researchers taking measurements and collecting baseline data.
Credit Patrícia Medici

whether to continue the project or not based on the results obtained by then.

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Tapir Extinction in the Atlantic Forests Between the Rio de Contas and the Rio Paraguaçu

By Kevin Fleisher

I regret to report that tapirs (*Tapirus terrestris*) are extinct in the Atlantic Forest remnants between the Rio de Contas and the Rio Paraguaçu, in Bahia State, Brazil, with the only memory of their existence being two place names on the map – a town named Poço d'Anta between Jequié and Jaguaquara and a rural area west of Taperoá called Cabeça d'Anta. Over the past seven years I have worked exploring what is left of the Atlantic Forest surrounding the coastal town of Ituberá, in a region of southern Bahia known as the Costa do Dendê (Palm Oil Coast). The focus of my dissertation research is to try to identify the factors that determine the distribution and relative abundance of medium and large mammals in this agro-forestry landscape in order to understand how human resource use affect the long-term persistence of these species. Early on in the study I found out that tapirs were extinct, but the when and why of this extinction only became clear after studying historical documents and interviewing old farmers who lived before the large-scale deforestation and landscape-transforming events of the 1950/60s.

History of Land Use and Hunting in Ituberá

There were two distinct peoples living in the Ituberá region when the Portuguese settled here in the mid-16th century: the Tupiniquins, who lived in villages

along the coast with a subsistence economy based on manioc cultivation, hunting and fishing; and the Botocudos (or Aimorés), who were wandering hunter-gatherer people whose territory incorporated all of the land beyond the coastal palisades. Along the coast just to the north lived the Tupinambás, whose culture was similar to that of the Tupiniquim. Soares de Sousa opens his classic 1587 treatise on the wildlife of Bahia with an account of the tapir and describes how the Tupi peoples hunted tapirs with bows and arrows, and sometimes raised young animals in their villages as pets. Prince Maximilian Wied-Neuwied (1821) gives the best account of the Botocudos and other hunter-gatherer peoples of the interior Atlantic Forests of Bahia; he describes them as expert long-bow hunters capable of killing any animal they encountered. While these peoples hunted tapirs, tapirs were not extirpated during their tenure of southern Bahia, probably because human population densities were low and the landscape was largely forested, and because of the temporally shifting spatial impact of human land use and hunting. The Botocudos stayed in an area as long as the hunting was good, after which they moved long distances to more plentiful hunting grounds. The Tupiniquims moved when soil fertility in their gardens decreased. In both cases, these movements alleviated hunting pressure in a given area, presumably allowing the wildlife to recover. At least in the case of the Tupiniquims, their garden fallows may have actually increased the value of the habitat for tapirs.

In the 1540s the Ituberá region became the province of the Jesuits, who established several towns along the coast by incorporating the defeated Tupiniquims and using their expertise to learn how to survive. The Jesuit tenure lasted until 1759 and, while they had increased the scale of agriculture through the commercial production of manioc flour, their settlements remained small and restricted to the coastal hills and islands because of conflicts with the Botocudos. The Botocudos thwarted attempts at inland migration by killing those who tried and by periodically sacking and burning the Jesuit settlements. Even with the final defeat of the Botocudos by the end of the 18th century, the colonists remained restricted to coastal towns and the region languished, remaining a sparsely populated backwater with a subsistence-based economy. Logging, while also limited to the coastal forests, remained selective and gradually intensified over the centuries. The landscape was still almost completely forested well into the 20th century. Hunting never stopped being an important subsistence activity. Although tapirs may have been shot out of the areas within several kilometers of the permanent settlements, they continued to persist in the forests beyond at least as late as the early 19th century, when Wied-Neuwied saw them in the hinterlands of Ilhéus and along the Rio Mucuri.

By the end of the 19th century Ituberá is described as an economic backwater with a populace of several thousand farmers subsisting on manioc cultivation. There is no indication that the landscape had fundamentally changed, and yet, this is the period during which tapirs were extirpated. The hinterlands were forested and inhabited by posseiros living on scattered homesteads in the hills (people who lived on vacant government land [terra devoluta] without legal title). These posseiros were the descendents of Tupiniquims, African, and European peoples who mixed all along the coast of Bahia; their way of life, based on manioc cultivation and the hunt, mostly resembled that of their Tupi ancestors. By all accounts, the population density in the hills surrounding Ituberá was very low with almost no one living more than 10 km from town. Forest disturbance was limited to small swidden plots and fallows, some small scale selective logging, and natural tree falls on steep slopes during times of heavy rain. I had the fortune of interviewing 8 people (75-84 years old) who were born into the life of the posseiros, themselves sons of posseiros. As hunting was a central part of this culture by being one of the main subsistence and leisure activities, people had a great knowledge of wildlife. Had tapirs existed in their lifetime, they would have been aware of the animals. Only one of these informants recalls hearing about tapirs during conversations between older people when he was young (60-70 years ago), but remembers nothing specific about the animal. The other informants do not remember the species being mentioned by their fathers, so it probably was gone at least during their grandfathers' generation, some 120-150 years ago (circa 1850-1880). This suggests that tapirs were extirpated when the landscape was almost completely forested and human population densities were relatively low, confirming the assertions that even subsistence hunters are capable of extirpating tapirs and that tapirs are particularly vulnerable to hunting pressure.

The tapir was the first mammal species to become extinct in Ituberá, proving to be more vulnerable than any other animal with the possible exception of the green and red macaw (*Ara chloroptera*), which disappeared at about the same time. Other species that were extirpated when the landscape was still forested include the giant armadillo (*Priodontes maximus*), last seen in the 1920s, and the white-lipped peccary (*Tayassu pecari*), shot out sometime in the 1930/40s. The jaguar (*Panthera onca*) was extirpated in the 1950s during the large scale forest clearing, while the red-billed curassow (*Crax blumenbachi*) held out until the 1970s. The yellow-breasted capuchin monkey (*Cebus xanthosternus*) and the capybara (*Hydrochoerus hydrochaeris*) are today on the brink of extinction.

Tapir Extinctions in the Forests beyond the Study Landscape

I visited the other main forest areas between the Rio de Contas and the Rio Paraguaçu in 2002 and 2003, and found a similar situation to that of Ituberá. All of the forests have been heavily logged and hunting pressure is chronic throughout. No one I interviewed had ever heard of tapirs in any of these areas and, although we interviewed very few people (2-4 in each region), the informants were hunters who showed good knowledge of the wildlife (i.e., details of natural history) and had lived there all or most of their lives. Deforestation for timber occurred as long ago as the early 19th century along the Rio Jequirica, but the major landscape transformation began with the spread of cacao cultivation north from Ilhéus during the late 19th century. Systematic and industrial scale logging for timber began in the 1950/60s for those areas that had not been already cleared for cattle pasture and cacao; no forests were spared. The best remaining tracts of forest are those on the high ridges of the Rio Preto and Rio Jequirica watersheds, and those on the ridges most remote from highways BA-001 and BR-101 between Camamu and Valença.

Lessons Learned

Despite the continued existence of 100,000s of hectares of forest between the Rio de Contas and the Rio Paraguaçu in Bahia, including up to 60,000 ha in the Ituberá region and an equal amount in the upper Rio Preto watershed, these forests are not appropriate for tapirs. Habitat is not lacking – even the disturbed forests of my study landscape retain a diverse flora (>400 species of trees and lianas); wetlands, riparian forests, and secondary forests with dense herbaceous growth and saplings are abundant. Hunting, however, is rampant and while 82.5% of the wildlife community studied persists, most species survive tenuously as reduced populations of skittish animals. There are no adequately protected reserves, even on properties of landowners who claim to be protecting their forests, and this situation is not likely to change in the near future. Tapirs have no place in landscapes such as these where the culture of hunting is deeply rooted and where there is virtually no law enforcement, regardless of habitat availability. Perhaps as the only source for hope, informants say that fewer youths are interested in hunting than ever before, so maybe one day tapirs can be brought back to roam in these hills again.

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COLOMBIA

Current Distribution and Conservation Status of the Colombian Lowland Tapir (*Tapirus terrestris colombianus*) and the Baird's or Central American Tapir (*Tapirus bairdii*) in Colombia

By Emilio Constantino

Introduction

Colombia is the only country to have the three American tapir species living within its borders, *Tapirus bairdii* (Central American, Chocó or Baird's tapir), *T. terrestris* (Lowland or Amazon tapir) and *T. pinchaque* (Mountain or Woolly tapir); also, a rare form or subspecies of the lowland tapir, known as Colombian tapir or *T. terrestris colombianus*. That richness reflects the great biodiversity of this country and the unique ecosystems it harbors. Regrettably, as highlighted in this report, little is known about the vast majority of the species and ecosystems at a time when they face high and tangible risks of extinction.

The Colombian tapir, *T. terrestris colombianus*, was classified from a few individuals collected by the American vertebrate taxonomist Phillip Hershkowitz during the 1940's and 50's in northern Colombia. The taxon is currently assigned to a population of the lowland tapir occurring in trans-Andean eco-regions, or regions located to the west of the Eastern cordillera of the Colombian Andes. Very little-known, over hunted and with most of its original habitat transformed, today this sub-species is considered critically endangered throughout all its distribution range.

The Baird's tapir was said to occur from southern Mexico, southwards across Central America and along the pacific coast of South America, south to north western Ecuador. Today doubts are cast about its southern distribution, but there are several references about the occurrence of this species in Colombia. In this country, the species is currently known to occur only in a few places of the Darien and northern Chocó eco-regions, and it is also considered critically endangered.

Urgent actions are needed to prevent these tapir species from becoming extinct in the near future: a complete ban on their hunting, the creation of nature

reserves and education of people living within their ranges. If these three actions (at least) are not taken seriously and resources are not invested, we may be witnessing the extinction of these remarkable animals in the next decades.

This report is the result of several years of field work by the author in the Colombian Darien, the Sinú, the Chocó, the Magdalena Medio and the Sierra Nevada de Santa Marta regions while promoting the creation of private nature reserves.

Historical Distribution of the Species

2a. *Tapirus terrestris colombianus* or Colombian tapir:

This species was first observed and described by an American scientist about 60 years ago in northern Colombia, but it was known long before by the indigenous peoples that inhabited the country, as can be deduced from the names given to many localities within its range: "Las dantas", "la danta", and so on. It is believed that the common American name for the tapir, "danta", has an aboriginal origin. It is very similar to the name used by the Embera people for these animals. The Embera lived in the Urabá region at the moment of the Spanish colonization, where the town of Santa Maria la Antigua del Darién was founded; it was the first Spanish settlement in continental America and port of entrance to South America.

The species used to inhabit all the jungles and savannas, from sea level to up to 1500 meters above sea level, between the western and eastern Andean ranges, including the Magdalena Medio region, the inter Andean valleys and the Sierra Nevada de Santa Marta Range. Also, it was known to occur in the Catatumbo, a Trans-Andean eco-region shared with Venezuela.

In the Upper Sinú valley, it was found by Hershkowitz (1954) to be sympatric with the Baird's tapir. The North-westernmost distribution locality for the species is currently believed to be the Atrato River, which drains from the northern Chocó watershed to the Caribbean Sea.

The Colombian tapir was originally found in the upper and mid Cauca, and in the upper Magdalena watersheds, where they have become extinct recently – in the last hundred years or so. It is present today in some remaining forest fragments along the mid and lower Magdalena region, the upper Sinú watershed and the Sierra Nevada de Santa Marta Range. There is some evidence that it also inhabited dry and semi-dry ecosystems in northern Colombia's Caribbean eco-region; eastwards, the lowland tapir also occurred in the Catatumbo watershed, where it was hunted by the Barí people; a damaged skull deposited in a Venezuelan museum collection is the only tangible evidence, but again, the region has many places known as Las Dantas or La

Danta, and it exists in the Barí mythology.

Today, most of the above mentioned areas have been transformed into grass fields for cattle ranching, oil palm plantations and rice fields. Most of the timber used for home furniture in Colombia has been taken from the Magdalena Medio jungles. In the last 20 years this region also has been one of the main places to grow coca for the cocaine foreign markets and the ground for intense warfare between left- and ultra right-wing subversive forces. The oil industry has also been an important factor for the colonization and destruction of these jungles.

2b. *Tapirus bairdii* or Baird's tapir:

This species is known to occur from tropical Mexico, southwards, across Central America and Panama, and up to North-western Colombia, even though the literature says that it reached North-western Ecuador, along the Chocó or pacific jungles of Colombia. Our recent search in museum collections all over the world showed that there is no proof of its presence in Ecuador or even in the Pacific coast of Colombia, except from the northern most sector of the Chocó, along the Serranía del Darién Range, along the border with Panama. The easternmost distribution range locality was the Upper Sinú valley, where it was found to be sympatric with the Colombian tapir.

Again, there are many places called Las Dantas or La Danta, along the pacific coast of Colombia, but only scattered unconfirmed records from hunters or natives indicate that the species occurred or may be currently present there.

There is also the belief among Afro-Americans and Indigenous peoples of central Chocó that if a newborn's navel is belted with tapir skin, the child will develop the strength of this animal. So far, no animals have been seen, nor collected south of the Baudó mountain range in northern Chocó. There are some reports from old hunters that knew the tapir in the Chocó jungles, in places such as the Anchicayá, Calima and Naya rivers, but there is not a single skin or bone to prove it.

The central and southern sectors of the Chocó have been inhabited by peoples of African ascendance who settled in these remote regions after escaping slavery. These peoples obtain most of their protein from fishing and bush meat, and may have had a great impact on the tapir population since three hundred years ago. Although these jungles remain fairly well conserved, over hunting, timber extraction, and farming along the rivers are common activities today. To make matters worse, coca for cocaine is being grown in large fields today. Warfare between left-wing guerrillas, ultra right-wing paramilitary, narco-traffickers and the official Colombian army has gained intensity in the last five years. This has been also the case for the upper Sinú region and the Darien Range, where combats, civilian

displacement and casualties are happening daily. These jungles still provide important amounts of timber and paper pulp for the markets.

Current Distribution of the Species (2005)

3a. *T. terrestris colombianus*:

Today the jungles that existed in most of the eco-regions are gone, except for a few large tracts in the Sierra Nevada de Santa Marta Range, Magdalena Medio Region, Serranía de San Lucas Range, the lower Cauca River and the Upper Sinú watershed.

In the Sierra Nevada de Santa Marta Range a fragmented population has been identified in the Palomino River watershed, where they are being protected by the indigenous Arhuaco community and by the Cooperativa de Pescadores del Río Palomino (a local activism group), by means of declaration of a nature reserve and by the direct education efforts of the inhabitants of the locality. More recently (August 2003), several tracks were observed on a dry creek in very dry forest ecosystems located in the Tayrona National Park (Jesus Castañeda, Tayrona National Park Ranger, pers. com.).

Another population has been identified in the upper Guatapuri watershed, and there are indications that the species is still present in the Sierra Nevada National Park, today under the management of the Kogui and Arhuaco indigenous people, but no recent research has been conducted to confirm so. The political situation of the Sierra Nevada de Santa Marta Range has made it difficult for researchers the access to the region.

In the Magdalena Medio region, where the jungles have been affected by logging and deforestation, several large and medium size patches of forest remain, including the Serranía de San Lucas Range, where there are reports of presence of tapirs. Several records from the El Encanto Nature Reserve, located in the Cimitarra River watershed, and in a new reserve along the lower Ermitaño River, where a nature reserve for the protection of the blue knobbed curassow has been declared, evidence that the species still present in the region. Other large patches of forest in the Antioquia Department, in the lower Cauca watershed, seems to have the species, but again, the difficult access to the region, due mainly to the political situation, has made it impossible for researchers to visit the area.

No recent records exist neither for the upper Sinú region nor the Catatumbo watershed, but the species may still present there, as large patches of forest remain in those areas, unfortunately heavily affected by warfare and drug crops.

Today, the species is considered extinct in the Upper Cauca valley, the Upper Magdalena valley, the Caribbean dry plains and the southern slopes of the Sierra Nevada de Santa Marta Range.

3b. *T. bairdii*:

Nowadays, only a fragmented population has been located near the visitor's centre of the Los Katíos National Park, in the northern Chocó eco-region, and it has been documented on video by Hector Restrepo, who estimates a total of eight to ten individuals still present in the park.

During 2004 several tracks and dung piles were observed near the Sasardí Integrated Nature Reserve, located in the Darién region. Occasional reports of tracks and sightings were obtained from local residents of the Colombian Darién, but the reports were made as something new and interesting, maybe because of the partial recovery of the species' population in those sectors. The species is probably still present along the Darien Range, but the political and warfare situation has made it impossible to visit in recent years.

Since its discovery in the upper Sinú by Hershkowitz, no more reports of the species have been obtained. The director of the Paramillo National Park, Mr. H. Martinez, reports the presence of tapirs there, but without distinguishing between *T. terrestris* or *T. bairdii*.

Embera indigenous people and several field researchers consider the species extinct in the Utría National Park in the south. No more records for this species exist in Colombia, but occasional reports from hunters and locals indicate that the species may be present in remote areas of the Baudó Range, and in the western foothills of the western cordillera in the departments of Chocó, Risaralda and Valle del Cauca.

Some places that need verification of presence are: Upper Baudó River; Las Orquídeas National Park; Paramillo National Park; Upper San Juan River / Tatamá National Park; Upper Fugiadó River; Middle Calima watershed / Ordoñez creek; and Western slopes of the Farallones de Cali National Park. The Awá indigenous people of western Nariño, near the Ecuadorian border, do not know the species and do not recognize it from pictures.

Project Activities

- Five (5) visits to the Darien eco-region;
- Five (5) visits to the Sierra Nevada de Santa Marta eco-region;
- Four (4) visits to the Magdalena Medio eco-region;
- Distribution of 50 posters of *Tapirus bairdii* among local people and organizations in the Darien eco-region, kindly provided by Dr. Eduardo Naranjo, from Mexico;
- Presentations to local people and organizations within the three eco-regions about the endangered status of the tapir species present in each;
- Promotion of the Civilian Society initiative for nature reserves in the three eco-regions;

- Confirmation of sightings and tracks in several places;
- Verification of presence in the Farallones de Cali National Park, so far negative for *T. bairdii* and *T. pinchaque*;
- Development of the Red Book data for *T. bairdii* (attached).

Recommendations

Both species, *T. bairdii* and *T. terrestris colombianus*, are considered critically endangered (CR) in Colombia by the recent Red Book of Colombian Mammals produced by the Humboldt Institute; urgent activities to reverse this trend include:

- Creation of more nature reserves and national parks in the species' ranges;
- Total ban of the hunting of tapirs;
- Awareness and education campaigns for local peoples and local authorities;
- Verification of actual presence for both species in some remote areas;
- Biological and ecological research on both species.

Acknowledgments

This report was made possible through the kind support of the IUCN/SSC Tapir Specialist Group (TSG), Tapir Preservation Fund, Lowry Park Zoo, and Red Colombiana de Reservas Naturales de la Sociedad Civil. Special thanks to Sheryl Todd, Patricia Medici, Dr. Eduardo Naranjo, Iván Lira Torres, Rick Barongi, Charles Foerster, Tomás Díaz, Franz Kaston, Hector Restrepo, Sergio Marquez, Andrés Upegui, Sr. Cayo from Palomino River and all the people that gave us information, both in the jungles and cities of Colombia.

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ATTACHMENT

Red Book of Mammals of Colombia

Autores:

Emilio Constantino, José Vicente Rodríguez,
Clara Solano.

DANTA CHOCOANA – *Tapirus bairdii* (Gill 1885)

Categoría Global UICN 2004: En Peligro EN

Categoría Nacional: En Peligro Crítico CR

Otros nombres comunes: Danta, Danto, Anta, Macho de monte, Anteburro, Tzimin (Maya), Tapir Centroamericano, Danta Centroamericana, Dandá (Emberá-Katio)

Distribución: Se encuentra desde el sur de México hasta el Golfo de Guayaquil en Ecuador. En Colombia se encuentra en las tierras bajas del Pacífico y en el flanco occidental de la Cordillera Occidental, en altitudes hasta de 1000 m (HERSHKOVITZ 1954; MATOLA et al. 1997). Aún no es clara su distribución en el Pacífico; actualmente el sitio más al sur conocido es el Parque Nacional Natural Ensenada de Utría, donde la especie es hoy reportada como recientemente extinta. Los demás sitios al sur de esta localidad están por comprobarse, al igual que el reporte para el Ecuador, del que no existen registros. En Costa Rica y Honduras la especie habita > 3000 msnm. En Colombia existen reportes anecdóticos de cazadores para el cerro Torrá, y los ríos Calima Medio (Quebrada Ordóñez), Anchicayá y Naya.

Descripción: La Danta Centroamericana es el mamífero más grande de Centroamérica, pudiendo llegar a pesar hasta 300 kg y medir 2 mts de longitud y 1 m de alzada (HERSHKOVITZ 1954; PADILLA & DOWNER 1994).

Habitat: Frecuenta los bosques húmedos y secos (e.g., Parque Nacional Guanacaste, en Costa Rica) de tierras bajas, aunque en algunas ocasiones se le ha visto en bosques montanos y páramos centroamericanos (MATOLA et al. 1997).

Historia Natural: Como todos los tapires, la Danta Centroamericana es un animal solitario. Su dieta se compone principalmente de hojas, frutas, cortezas y brotes tiernos de gran variedad de plantas, que ramonea mientras camina en zigzag (TERWILLIGER 1978; NARANJO 1995a, 1995b; NARANJO & CRUZ 1998). Para algunas plantas el tapir es un importante dispersor de semillas, especialmente de las de gran tamaño que no son dispersadas por otras especies; para otras especies actúa como depredador (JANZEN 1982). La Danta Centroamericana es una especie principalmente nocturna. Sus periodos de mayor actividad son 04:00-07:00 h y 18:00-20:00 h. Su ámbito hogareño varía entre 0,27 km² a 1,8 km² (NARANJO 1995a). Además del hombre, otros depredadores

adores importantes del tapir centroamericano son el Jaguar (*Panthera onca*), el Puma (*Puma concolor*) y el Caimán del Magdalena (*Crocodylus acutus*).

Estado Actual y Amenazas: Su principal amenaza es la cacería, que ha llevado a la especie a la extinción en algunas localidades, especialmente en el Urabá, las serranías de Tripogadí y del Darién, así como en el Sinú, y en general en toda la costa Pacífica. El gran tamaño del tapir hace que éste sea una de las presas más buscadas por los cazadores. La carne es aprovechada para la subsistencia y en algunas ocasiones los excedentes son vendidos en los mercados locales como carne de monte. Al igual que los demás tapires, *T. bairdii* es una especie muy sensible a la intervención de su hábitat y a la cacería (BROOKS et al. 1997). Aparentemente sólo las poblaciones del Parque Nacional Natural Los Katíos y algunas áreas aledañas en la Serranía del Darién serían el último remanente de esta especie en Colombia. Aún ahí, la continua presión de caza ejercida por los pobladores vecinos al parque, que viven en una situación social muy compleja por el conflicto armado, puede eventualmente estar poniendo en serio riesgo su viabilidad poblacional. Ya ha sido considerada como extinta en el Parque Nacional Natural Ensenada de Utría por los propios cazadores Embera (ULLOA et al. 1996). Esta situación ha motivado a considerar las poblaciones colombianas bajo el criterio A de rápida reducción en el tamaño poblacional, en virtud de una obvia reducción poblacional proyectada o sospechada en los últimos diez años en niveles mayores o iguales al 80%, lo que implica una categorización de En Peligro Crítico CR (A2cd+3cd) siguiendo las definiciones de la Unión Internacional para la Conservación de la Naturaleza (UICN).

Medidas de Conservación Tomadas: Debido a las drásticas reducciones poblacionales causadas mayormente por la cacería indiscriminada, la especie se encuentra incluida en el Apéndice I de la CITES. Se sospecha que aún exista una población en el Alto Sinú, Parque Nacional Natural Paramillo, donde la reportó Hershkowitz; podría existir en los Parques Nacionales Naturales Orquideas, Tatamá y Farallones de Cali, pero aún no hay evidencia.

Medidas de Conservación Propuestas: La restauración de los bosques chocoanos, con vocación forestal y un adecuado manejo de estos recursos, podría compensar la pérdida de hábitat que ha sufrido la especie. Se requieren estudios de campo para determinar su presencia en muchos lugares, especialmente, en la Serranía del Darién y de Los Saltos, así como en el Alto Sinú, Parque Nacional Natural Paramillo, donde aparentemente se ha extinguido. Se requieren estudios de disponibilidad de hábitat y monitoreo de sus poblaciones con el objeto de plantear un eventual programa de reintroducción con alta participación comunitaria que garantice un mínimo de éxito. La evaluación de los efectos de la minería y extracción forestal y la integración de esta especie a programas de educación ambiental son actividades altamente recomendables.

Linking Mountain Tapir Populations in South-Western Colombia

By Sergio Sandoval Arenas

The mountain tapir (*Tapirus pinchaque*) is perhaps the most endangered species in the family Tapiridae. Remnant populations of the species inhabit Andean ecosystems of Colombia, Ecuador and northern Peru, mainly at elevations between 2,000 and 4,500 m above sea level. Current total counts probably number less than 3,500 individuals and 70% (nearly 2,500 individuals) among these inhabit the Colombian Andes, along the southern part of the Central and Eastern Cordilleras (Lizcano et al. 2002). Unfortunately, the species' distribution range overlaps with areas of high human development in the country. With humans occupying and transforming the Andean forests at the lower limits of its distribution, the mountain tapir has been displaced to the thick, high Andean forests and páramos to search for food and refuge.

Habitat loss is not the only threat that the mountain tapir faces in Colombia. Although animals could seemingly disperse along the higher elevation areas of the Andean cordilleras, habitat fragmentation is probably disrupting this continuity, breaking apart the last mountain tapir populations (Figure 1). Expert analysis suggests that a viable mountain tapir population must be composed of at least 1,000 individuals living in a continuous area of nearly 300,000 hectares (Montenegro 2002). This scenario is difficult to find inside any currently protected area in the Andes of Colombia, where the largest section of continuous protected habitat for the species hardly encompasses 20% of this extension (59,900 ha. in Sumapaz National Park; Lizcano et al. 2002; Figure 1).

Because it is unlikely that there will be a viable population of mountain tapirs inside just one national park, the integration of various protected areas may be an alternative for the conservation of this species. One of the places where this kind of integration could be successful in Colombia is at the southern limit of the Central Cordillera, in an area known as the Colombian Massif. A nearly continuous belt of páramos and Andean forests runs along the ridge of the cordillera, representing a potential high Andean corridor. Along this belt, three national parks have been established (Puracé, Nevado del Huila and Las Hermosas) and the areas between them seem to have relative low levels of human disturbance (Figure 1).

During 2004, a pilot project took place in the northern sector of Puracé National Park. The objective of the

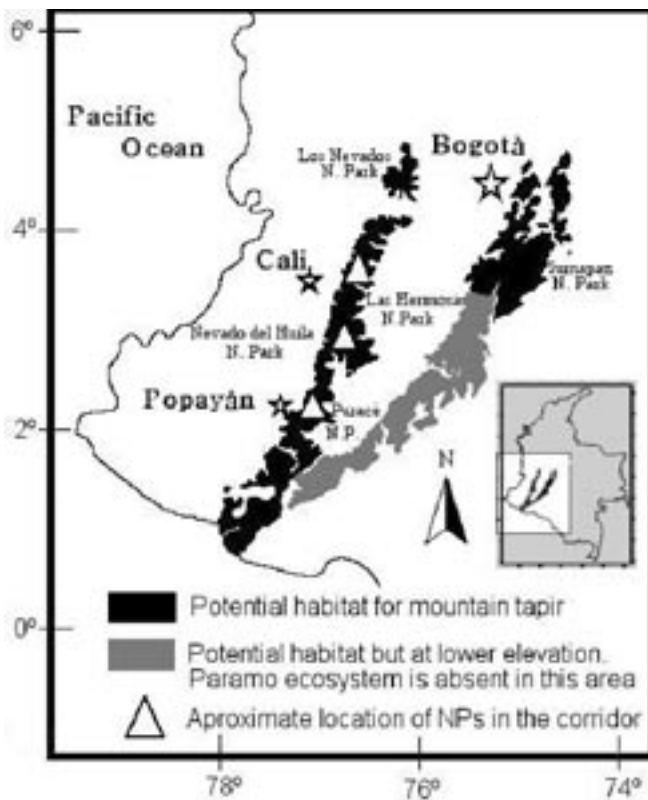


Figure 1. Remaining habitat of the mountain tapir in Colombia (Based on Colombian Ecosystems Map, Etter 1998).

project was to evaluate human threats and assess the status of mountain tapir populations in a representative area of the belt. Furthermore, after several meetings, agreements were secured with local agencies responsible for the environmental management of the areas included in the corridor. After one year of work it was concluded that the establishment of the corridor is possible and that the mountain tapir could be one of the focal species to be used in the monitoring process to evaluate the effectiveness of management of the area. It is necessary to initiate environmental education activities; young people in the area are ignorant of the existence of the mountain tapir and, although the adults have a positive attitude toward the species, the only benefit they perceive from it is the use of its body parts for traditional medicine.

There are several factors threatening the mountain tapir in the area, but maybe the worst of them is habitat degradation due to livestock introductions. The frequency of mountain tapir signs found in areas where livestock is kept tends to be low. Hunting is not very evident, but it occurs; it is probably not for subsistence purposes and may be an opportunistic activity (Figure 2).

Although at a large scale (1:2,000,000; Etter 1998) the corridor appears to be in place, upon closer inspec-

tion there could be several areas where the connectivity is lost due to habitat degradation. The goal on a second phase of the project will be to identify those critical gaps in order to implement site-specific ecological studies focused on mountain tapir dispersal patterns, and to develop environmental education programs for local people. If possible, future activities may include the use genetic and telemetry data as part of the monitoring process. The use of camera traps is being considered too.

Acknowledgements

I wish to thank the Los Angeles Zoo (USA), the Cali Zoological Foundation, the Colombian National Parks Unit and the Environmental Studies Group (GEA) of Cauca University at Popayan, for their support in the initial phase of this project. Special thanks to the people of Resguardo Indígena de Puracé for their assistance in the field.

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Figure 2. An injured mountain tapir found in the northern sector of Puracé National Park in 2003. The wound (inset) was presumably caused by a hunter using a machete. Photo by Juan Carlos Gaitán 2003

Contributed Papers

Manejo en Semi-Cautiverio del Tapir Amazónico (*Tapirus terrestris*) en Bosque Secundario Amazónico Ecuatoriano, Provincia de Pastaza

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Resumen

Al iniciar la experiencia de domesticación y manejo de mamíferos silvestres, tuvimos que averiguar qué exactamente comía cada especie del proyecto. En el caso de la danta o tapir (*Tapirus terrestris* Linnaeus), o "Sachawagra" (como se le llama en la lengua Kichwa), se tenía alguna información preliminar que debía probarse. Debido a que apremiaba el tiempo, decidimos llevar a "Bambi" – nuestro tapir hembra, en ese entonces todavía un bebé – a la selva virgen y averiguar de primera mano qué es lo que comía. "Bambi" nos ahorró futuros costos en insumos externos como alimento y medicina, y nos enseñó cuán importante era conservar el bosque en su estado natural para ser aprovechado sin dañarlo. Fue evidente que el concepto de modernización que destruye a cuenta de ampliar la frontera agrícola, era un retraso, una involución. Por el contrario, la experiencia nos demostró que aquella tecnología que valora la práctica indígena ancestral de domesticación y crianza de animales es la apropiada para trabajar con la fauna nativa amazónica en el contexto amazónico indígena, conservando especies que, como el tapir, enfrentan fuertes amenazas de extinción. El Centro Tecnológico de Recursos Amazónicos "Fátima" de la Organización de Pueblos Indígenas Kichwas de Pastaza (OPIP) ha realizado trabajos dentro de esta filosofía por más de 10 años, presentando tecnologías relativas a la domesticación, crianza y manejo del tapir amazónico. El Centro busca promover tecnologías alternativas de manejo de recursos que disminuyan la dependencia cada vez más creciente de mercados externos y que fomenten las iniciativas familiares, locales y comunitarias de manejo de la fauna como una fuente reconocida y tradicional de proteína animal.

Sobre el Centro Fátima

El Centro Tecnológico de Recursos Amazónicos de la Organización de Pueblos Kichwas de Pastaza OPIP, es un proyecto de domesticación, manejo y conservación de la fauna nativa amazónica, ubicado en la Parroquia Fátima, Provincia de Pastaza en el km 9 de la vía Puyo-Tena a 953 m.s.n.m. en la Alta Amazonía del Ecuador. Desde hace 16 años el Centro Fátima se estableció como un Zoocriadero que maneja especies nativas de fauna amazónica como tapir (*Tapirus terrestris*), capibara (*Hydrochaeris hydrochaeris*), saíno o pecarí de collar (*Tayassu tajacu*), guanta (*Agouti paca*), entre otras, con miras al manejo sustentable

de los recursos amazónicos aprovechados tradicionalmente por los pueblos indígenas amazónicos. Un parte de la finca fue convertida en pastizal para el establecimiento de ganadería insustentable y en la actualidad se encuentra en un proceso de regeneración/sucesión vegetal, distinguiéndose especies pioneras como *Pollalesta sp.*, *Cecropia sp.*, etc. En la superficie restante se ha realizado tala selectiva de madera pero aún conserva características de bosque húmedo tropical con especies como *Iriartea deltoidea*, *Bactris sp.*, *Socratea sp.*, etc.



Amor en una pareja de tapires amazónicos.
Credit Fernando Coloma

El Contexto Indígena Amazónico

El agotamiento de los recursos es una realidad que las poblaciones originarias de la Amazonía vienen afrontando desde hace mucho tiempo. El privilegio de la explotación irracional e insustentable de los recursos responde a procesos históricos. Prácticamente desde la conquista, se inició el deterioro de recursos, pues se veía a la Amazonía como fuente inagotable. Se ha evidenciado extracción descontrolada del caucho, el “boom” del petróleo y la Reforma Agraria que, a cuenta de ampliar la frontera agrícola como fórmula para el “desarrollo”, promovió la tala de bosques para el establecimiento de pasturas insustentables.

A consecuencia de estos cambios, los pueblos indígenas han experimentado un proceso de dependencia hacia los mercados externos lo cual ha causado la pérdida de la práctica tradicional de manejo de la fauna. El tapir y otros mamíferos amazónicos constituyen una fuente fundamental de proteína animal para los pueblos indígenas de toda la cuenca amazónica. Durante un período de 4 meses, el consumo de carne de tapir representó el 24% del total de carne silvestre consumida por cuatro comunidades y el 2% de la cacería de fauna silvestre en la Parroquia Curaray, en la Amazonía Ecuatoriana. (Freire 1997). Pero la fauna no es solamente componente del requerimiento alimentario, todo el contexto cultural gira entorno a las especies nativas a quienes se considera seres con espíritus poderosos. No es posible entender, por lo tanto, al ser humano lejos de sus recursos (Pachamama) en el entorno cultural indígena.

Por otro lado, el manejo de la fauna se ha practicado tradicionalmente y se pueden encontrar ejemplos de esto en varias comunidades. Permanentemente se manejan especies con miras al aprovechamiento de su carne, para consumo interno y para mantener control

y seguridad sobre su abundancia (soberanía alimentaria). Es frecuente encontrar saínos (*Tayassu tajacu*), venados (*Mazama americana*) o tapires siendo cuidados por niños en comunidades indígenas, creándose un importante vínculo entre ser humano y fauna silvestre.

Experiencias de Domesticación, Manejo y Conservación del Tapir

Hace más de 10 años “Bambi”, una cría de 2 meses de edad, llegó al proyecto proveniente de la parte baja de la Amazonía. Se tenía cierta experiencia previa en el manejo de un macho adulto que por problemas de infraestructura escapó. Para ese entonces, en la Amazonía ecuatoriana se había hecho muy poco por el manejo de recursos y se miraba a lo externo como una alternativa que excluía a iniciativas locales. Con el tiempo esta visión ha cambiado y en la actualidad se mira al manejo y la conservación como alternativas sustentables. El policultivo es una estrategia a seguir; la crianza de varias especies nativas simultáneamente ofrece ventajas porque disminuye la dependencia por un único recurso. El trabajo en policultivo se inició con corrales pequeños para posteriormente establecer parcelas de ½, 1, 2 o más hectáreas como zonas de manejo intensivo, así como parcelas de varias hectáreas para manejo extensivo y reintroducción de individuos (Figuras 1 y 2).

El objetivo del Proyecto es no agotar al bosque, manteniendo un número adecuado de animales, los que pueda soportar el fragmentado ecosistema en el que trabajamos. Se han obtenido 7 crías en semicautiverio con un promedio de 1 cría cada 19 meses. Solamente un animal falleció por enfermedad, mientras el resto ha llegado a edad reproductiva sin problemas. Los animales nacidos son trasladados a otros criaderos en distintas partes de la Amazonía para fomentar iniciativas similares. También se ha intenta-

Figura 1.
Corrales para manejo intensivo y extensivo del tapir.
Diseño:
Iván Jácome





Figura 2. Zona para el plan de manejo de fauna amazónica en comunidades indígenas amazónicas.
Diseño: Iván Jácome

do reintroducir individuos en las zonas circundantes. Debido al comportamiento solitario de la especie, algunos individuos han escapado y revertido naturalmente a su estado salvaje. Tres individuos frecuentan senderos en los límites de la finca y ocasionalmente entran a la misma, en particular en época de celo.

La alimentación se basa fundamentalmente en la flora de la localidad, el gasto en insumos externos es mínimo. Se ha elaborado una lista de las 70 especies más importantes para el consumo del tapir. Este número es alto, considerando el tipo de bosque (bosque secundario) en el que nos encontramos. Las especies más consumidas son hojas de la familia Araceae y frutos de la familia Arecaceae. Una guía de manejo, cría y conservación basada en estas experiencias ha sido elaborada para establecer un plan de manejo del tapir en diferentes comunidades.

Conservación y Educación Ambiental

A través de nuestras actividades de conservación, podemos educar y reclutar a más personas en las acti-



Andrés, en 1996, jugando con Ulises, el primer bebé de Bambi.
Credit Ruth Arias

vidades de protección del medio ambiente. Así como los conceptos de manejo y conservación, conservación y educación son dos conceptos que se complementan. En este sentido, se han brindado cursos de capacitación a pobladores locales que en parte han asimilado esta experiencia para desarrollar sus propias iniciativas locales, no solamente con manejo de tapir sino de otras especies: Guanta, guatuza (*Dasyprocta fuliginosa*), saíno, capibara, etc. El florecimiento de estas experiencias nos proporciona confianza en el trabajo realizado. Adicionalmente la elaboración de guías de manejo y conservación es una herramienta adecuada para capacitación y educación. Por otro lado, el ecoturismo nos brinda la posibilidad potencial de generar conciencia entre los visitantes.

Otras Experiencias Amazónicas

Una experiencia exitosa con tapires en una comunidad indígena amazónica es la de la comunidad Kichwa Sarayacu, Provincia de Pastaza, ubicada en las riberas del río Bobonaza en la Baja Amazonía. En esta se ha llegado a plantear el tema de la conservación con fines de seguridad alimenticia. Sarayaku es comunidad de base de la Organización de Pueblos Indígenas Kichwas de Pastaza OPIP. Actualmente se ha establecido una reserva donde se han reintroducido tapires y se domestica un tapir de seis meses que se mantiene en la comunidad; generalmente los niños se encargan de esta actividad (observación personal). Este proyecto genera plazas de trabajo para quienes trabajan como guardabosques rotativos. Solamente en este año, 48 personas se han beneficiado como guardabosques. El proyecto cumple ya cinco años en funcionamiento con opción a cinco más de prórroga y está dirigido por líderes de la comunidad.

Agradecimientos

El Centro Fátima representa y defiende los principios de la Organización de Pueblos Indígenas Kichwas de Pastaza (OPIP). Agradecemos a los presidentes que ha tenido OPIP desde su fundación hasta el presente y a todos los compañeros que en mayor o menor medida han estado a nuestro lado: Ashka pagrachu!!! A Patricia Medici por su apertura para la publicación de este documento.

Mayor información sobre el Centro Fátima se puede encontrar en www.puce.edu.ec/investigación/fátima y en la **GUÍA PARA EL MANEJO, CRÍA Y CONSERVACIÓN DEL TAPIR** (disponible a través del autor).

Preferencia por Fecas de Tapir Amazónico (*Tapirus terrestris*) de Escarabajos Estercoleros (Coleoptera: Scarabaeidae: Scarabaeinae) en Bosque Secundario Amazónico

Andrés Tapia

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Resumen

La importancia del tapir amazónico (*Tapirus terrestris* Linnaeus) en el ecosistema puede evidenciarse conociendo las relaciones animal-planta, animal-animal y animal-entorno. En este contexto se enmarca la relación Tapir-Escarabajo (Coleoptera: Scarabaeidae). La abundante masa fecal expulsada por el tapir, el mamífero terrestre más grande del Neotrópico, ofrece a los escarabajos estercoleros un medio adecuado para la formación de sus bolas-nido y el desarrollo de su ciclo vital. El presente estudio trata de determinar, mediante el empleo de fecas de tapir como cebos de trampa para escarabajos estercoleros, la preferencia que muestran los escarabajos por este alimento y la importancia del tapir en el ciclo de vida de los mismos en dos áreas: Disturbada (AD) y Medianamente disturbada (AMD) de bosque secundario amazónico. Para motivos de comparación, se muestreó también con trampas utilizando carroña como cebo. Se encontraron 13 especies de escarabajos que se alimentan de los dos tipos de cebo: 7 especies fueron exclusivas para fecas de tapir y 6 comunes para fecas y carroña. La especie más abundante en fecas de tapir fue *Ontherus* sp. Se encontraron 119 individuos de 13 especies en el área medianamente disturbada y 20 individuos de 4 especies en el área disturbada. Es importante comparar las dos áreas pues nos dan una idea de cómo el tapir está contribuyendo a la coprofauna incluso en zonas alteradas por la intervención antropogénica (bosques con tala selectiva de madera, bosques secundarios en regeneración, pastizales, etc).

Introducción

Las relaciones inter-específicas que ocurren en el Ecosistema amazónico, uno de los más diversos del planeta, se presentan aún entre organismos de características diversas pertenecientes a taxones distantes. Si se piensa en el tapir amazónico (*Tapirus terrestris* Linnaeus), el mamífero terrestre más grande del Neotrópico, y en los pequeños escarabajos peloteros/estercoleros (Coleoptera: Scarabaeidae Scarabaeinae), aparentemente no se encuentra relación entre ambos. Además de su función como dispersor de semillas (Emmons, 1999), la gran masa fecal producto de las deposiciones del tapir, proporciona un sustrato que varias especies de arácnidos, lepidópteros, orthopteros, coleopteros, etc., aprovechan para desarrollar sus ciclos de vida. Dentro de la Clase Insecta, Orden Coleoptera, los escarabajos peloteros, estercoleros o rodacacas, son el taxón que mayor beneficio obtiene de la masa fecal del tapir, utilizándola como medio de

incubación para huevos y desarrollo de sus funciones vitales.

Mediante el monitoreo biológico es posible describir la relación existente entre el tapir y los escarabajos peloteros y el provecho que éstos últimos obtienen de las heces de los primeros. La ecología de los escarabajos estercoleros está basada en la explotación de un recurso nutricionalmente rico como el excremento de grandes vertebrados (Bustos-Gomez y Lopera 1999), debido a su contenido de Fósforo y Potasio. Halffter (1959) menciona que los escarabajos estercoleros prefieren los excrementos de ungulados por sobre los de carnívoros. Sin embargo, muy pocos estudios han considerado las heces del tapir como un recurso alimenticio para los escarabajos estercoleros. Las numerosas investigaciones emplean como métodos de colección heces humanas. Bustos y Lopera (1999) describen al excremento de omnívoros (humanos) como el más apropiado, por sobre carroña, frutos y excremento de vaca.

Los escarabajos estercoleros cumplen la importante función de reciclaje de desechos orgánicos del suelo. En condiciones naturales los ecosistemas silvestres no tienen problemas sanitarios o desequilibrios causados por la acumulación de sustratos orgánicos sobrantes del metabolismo (excrementos) de los animales debido a la labor de los escarabajos (Locarno 1997); un solo individuo puede sepultar hasta 2 kg de heces en una noche. Por otra parte, al sepultar la materia fecal, el escarabajo impide la proliferación de parásitos presentes en las fecas (Halffter 1959). Por ejemplo, al enterrar el estiércol los escarabajos estercoleros impiden que los dípteros coloquen sus huevos y puedan multiplicarse y así contribuyen al control de la diseminación de enfermedades infectocontagiosas (Moron 1984). Por otra parte, Morón (1984) destaca la importancia médica de los escarabajos, los cuales pueden convertirse en vectores de enfermedades parasitarias al cumplir la función de huéspedes intermediarios de diferentes especies parásitas del hombre y otros animales que al ingerir al escarabajo adquieren el parásito. El tapir es huésped de una gran variedad de parásitos entre los cuales se destacan a los Ciliados *Buissonella tapiri* (da Cunha y Muniz 1925), *Balantidium coli*, *Prototapirella intestinalis* (da Cunha 1918), etc., detectados en el ciego y colon de los tapires y a los Nemátodos *Neumorshidia monostichia* (Chabaud 1957), *Teseraia* (Chabaud y Bain 1981), *Probstmayria tapiri* (van Waerebeke 1988), etc., presentes en el estómago del tapir. Escarabajos de los géneros *Cetonia*, *Melolontha*, *Phyllophaga*, *Scarabeus* han sido reportados como huéspedes de diversos parásitos (Moron 1984).

Hasta el momento, poco se ha investigado sobre la contribución del tapir a la entomofauna y la relación Tapir-Escarabajo en el ecosistema. Morón (1984) menciona que los escarabajos estercoleros pueden mostrar predilección por las fecas de tapir. Martínez (1951) hace mención de escarabajos estercoleros (*Glaphyrocantion proseni*) encontrados cerca de la región anal de *Tapirus terrestris*. Existen pocos trabajos que utilizan como cebos heces de monos *Alouatta sp* y estudian la coincidencia en las rutas de movimiento de monos y escarabajos estercoleros. Se han empleado en menor cantidad cebos con heces de vacas, venados, etc., mientras que la mayor parte de estudios emplean heces humanas. Anduaga y Halffter (1991) realizaron un estudio de escarabajos asociados a excremento de roedores y existen en Norteamérica estudios de escarabajos relacionados con heces de tortugas de la Florida (*Gopherus polyphemus*) (Anduaga y Halffter 1991). No existen estudios que avalen las trampas con cebos de heces de tapir para la colección de escarabajos estercoleros.

El hecho de no digerir completamente el alimento, en el que se pueden encontrar abundantes fibras vegetales y semillas, puede influir en la preferencia de los

escarabajos por las heces fecales del tapir. Especies saprófagas y coprófagas de las subfamilias Aphodiinae y Scarabaeidae pueden encontrarse en heces fecales de tapir. En un análisis macroscópico de 2 kg de masa fecal de una hembra en semi-cautiverio se encontraron 13 larvas y 4 adultos de *Aphodius sp.* (Coleoptera: Aphodinae) y 20 adultos de *Onthophagus sp.* (Coleoptera: Scarabaeidae) (observación personal).

Por cuanto los escarabajos peloteros son bioindicadores de la alteración del ecosistema y son utilizados en los monitoreos biológicos, el tapir, al contribuir con su ciclo de vida, permite que procesos biológicos en los que estos escarabajos participan se desarrollen. Esta función – poco descrita con respecto al tapir – brinda importante información que realza la importancia de la especie por su contribución a la coprofauna y destaca la prioridad de su conservación, pues su desaparición podría afectar las relaciones planta-animal, y animal-animal, alteración de la cadena trófica, etc. (Sandoval 2004).

Este aporte del tapir a la coprofauna no es exclusivo para ecosistemas con poca intervención antropogénica. Remanentes de bosque, bosques donde se ha realizado tala selectiva e incluso bosques secundarios en regeneración o pastizales podrían poseer una coprofauna que se vería beneficiada por la presencia del tapir, en caso de que se hayan realizado reintroducciones, sistemas de crianza en semi-cautiverio, etc en estos tipos de bosque. Es importante, por tanto, comparar la diversidad de escarabajos entre un bosque alterado y uno medianamente alterado, para determinar cómo el tapir –en caso de existir– en zonas alteradas e incluso en zoonocriaderos, centros de rescate, etc., estaría contribuyendo con el ciclo vital de los escarabajos estercoleros.

Materiales y Métodos

El presente estudio se realizó en el Centro Tecnológico de Recursos Amazónicos de la Organización de Pueblos Indígenas Kichwas de Pastaza (OPIP), Parroquia Fátima, Provincia de Pastaza ubicado en el km 9 de la vía Puyo-Tena a 953 m.s.n.m. en la Alta Amazonía del Ecuador. Según el Mapa Bioclimático y Ecológico del Ecuador, el área de estudio se encuentra en la formación vegetal de Bosque Muy Húmedo Tropical (Cañadas, 1983) con una precipitación anual y una temperatura media de 4.000 mm y 22°C respectivamente. La humedad relativa es del 85%.

El Centro Fátima es una finca de 28 ha. de bosque secundario amazónico colonizada hace 40 años a partir de la expedición de la Ley de Reforma Agraria y Colonización. Aproximadamente 6 ha (Área disturbada AD) fueron convertidas en pastizal para ser dedicadas a la actividad ganadera. Actualmente, ésta área se encuentra en regeneración, distinguiéndose especies pi-

oneras de bosque secundario como *Piptocoma discolor* y *Cecropia sp.* (Melendrez y Vogel 2000). Dos tapires -una madre con su cría- son mantenidos en semi-cautiverio en esta extensión. En las 22 ha. restantes (Área Medianamente Disturbada, AMD) se ha realizado tala selectiva de madera. Otros dos tapires tienen senderos en los límites de ésta área y los frecuentan ocasionalmente.

Para el estudio se realizaron dos transectos de 130 m en cada sitio (AD y AMD). En cada transecto se cebó con una trampa de caída ("pitfall") cada 10 m (en total 13 trampas). En el primer transecto de ambos sitios se colocaron 13 trampas utilizando como cebo fecas de tapir y en el segundo transecto de cada sitio se colocaron 13 trampas con carroña. Las trampas fueron revisadas cada 24 horas. El muestreo se efectuó entre junio y julio del 2004. Las muestras de fecas de tapir fueron colectadas hasta un día posterior a su deposición. Se registró el área donde se obtuvo la muestra (cuerpo de agua o tierra firme) y las condiciones de la misma.

El material colectado se identificó en el Departamento de Entomología del Museo de Ciencias Naturales de la Escuela Politécnica Nacional del Ecuador siguiendo la sistemática de guías para la identificación de taxa mediante claves estándar para escarabajos Ecuatorianos. Se examinaron las colecciones de especímenes de Scarabaeinae y se consultó a estudiantes del Museo.

Resultados

Se colectaron 139 individuos de Scarabaeidae pertenecientes a 13 especies utilizando cebos con heces de tapir y carroña con la siguiente composición: 119 individuos de 13 especies en AMD y 20 individuos de cuatro especies en el AD.

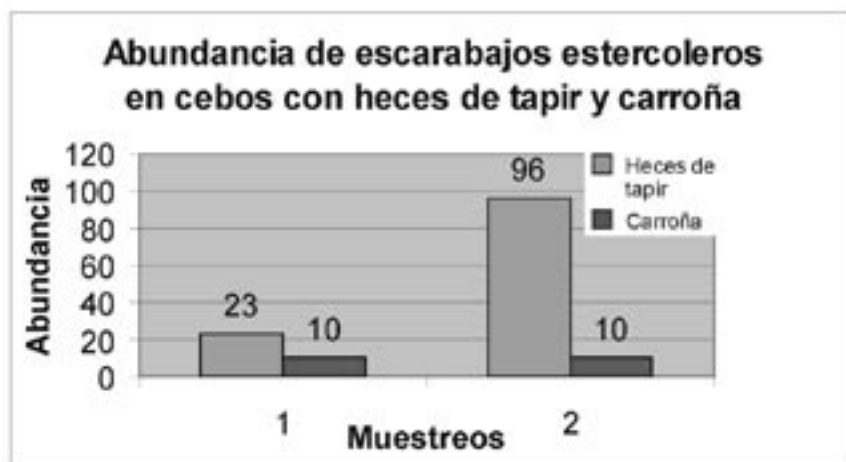
Cincuenta y un individuos (36,7% de la colecta) pertenecientes a siete especies se alimentaron exclusivamente de fecas de tapir. La composición fue la siguiente: *Dichotomius satanas* (29), *Eurystemus caribeus* (14), *Eurystemus foedus* (2), *Dichotomus quinquegens* (2), *Uroxys sp.* (1), *Canthon luteicolle* (1), *Oxystemus conspicillatum* (2).

Ochenta y ocho individuos (63,6% de la colecta) pertenecientes a seis especies se alimentaron tanto de fecas de tapir como de carroña. Su composición fue la siguiente: *Coprophanaeus telamon* (11), *Onthophagus sp* (4), *Deltochilum parile* (12), *Ontherus sp* (45), *Deltochilum amazonicum* (4), *Eurystemus plebejus* (12).

En total, 119 individuos (86%) se encontraron en trampas con heces de tapir y 20 (14%) en trampas con carroña. (Tabla 1). La especie más abundante en ambos tipos de trampa fue *Ontherus sp* con 45 individuos. El Índice de Diversidad de Shanon-Weiner (H') denotó mayor diversidad en el AMD (1,86 = Diversidad Media) que en el AD (1,31 = Diversidad Baja). El Índice de Diversidad de Shanon-Weiner en el AMD utilizando exclusivamente cebos con heces de tapir fue de 1,6 y así evidencia diversidad mediana para este tipo de cebo.

Tabla 1. Preferencia de escarabajos estercoleros por cebo con heces de tapir y carroña.

Especie	Abundancia absoluta		Abundancia relativa (%)	
	Cebo con heces de tapir	Cebo con carroña	Cebo con heces de tapir	Cebo con carroña
<i>Coprophanaeus telamon</i>	5	6	4,21	30
<i>Deltochilum parile</i>	2	10	1,68	50
<i>Dichotomius satanas</i>	29	-	24,37	-
<i>Ontherus sp</i>	44	1	36,97	5
<i>Eurystemus caribeus</i>	14	-	11,76	-
<i>Deltochilum amazonicum</i>	3	1	2,52	5
<i>Uroxys sp.</i>	1	-	0,84	-
<i>Canthon luteicolle</i>	1	-	0,84	-
<i>Eurystemus plebejus</i>	11	1	9,25	5
<i>Oxystemus conspicillatum</i>	2	-	1,68	-
<i>Onthophagus sp</i>	3	1	2,52	5
<i>Eurystemus foedus</i>	2	-	1,68	-
<i>Dichotomus quinquegens</i>	2	-	1,68	-
TOTAL	119	20	100	100



Cuadro I. Abundancia de escarabajos estercoleros en trampas con heces de tapir y carroña.

Discusión

Los resultados que arroja el presente estudio demuestran la importancia del tapir en el ecosistema amazónico por su contribución a la coprofauna. La baja riqueza y abundancia de escarabajos en el Área Disturbada (AD) responde a las características heterogéneas del ecosistema. Debido a la pérdida de la cobertura vegetal, las lluvias arrastran gran cantidad de material e inundan los senderos. En bosque menos intervenido, los árboles retienen la lluvia y el agua no se acumula. Las funciones de los escarabajos estercoleros se ven seriamente afectadas en áreas sin cobertura vegetal. Así, la riqueza y abundancia fue mayor en el AMD que en el AD. Estos resultados se esperaban pues el área disturbada corresponde a una zona colonizada hace 40 años para el establecimiento de pastizales y se encuentra actualmente en regeneración. LA alta precipitación (4.000 mm anuales) impide las funciones de los escarabajos.

Los resultados coinciden con los presentados por Bustos-Gomez y Lopera (1999), quienes encontraron diferencias significativas entre bosque y potrero (12 especies únicas para bosque, 2 para pastizal y 7 compartidas entre ambos) Los pastizales soportan una menor riqueza de especies y número de individuos con respecto al bosque nativo debido a que dentro de los bosques las condiciones son menos variables y es posible encontrar un mayor número de microhábitats que soportan una rica fauna de escarabajos coprófagos. (Bustos-Gomez y Lopera 1999) Esto explica la ausencia de *Oxysternon conspicillatum*, especie comúnmente encontrada en áreas abiertas pero con parches de vegetación que evitan la escorrentía.

Se encontraron cuatro especies compartiendo los

dos sitios muestreados; dos pertenecieron al género *Eurysternus*. *Eurysternus plebejus* fue la especie más frecuente en los dos sitios de estudio. Esta especie eutrópica presenta tolerancia encontrándose en habitats perturbados. Es además importante para el monitoreo biológico, por cuanto su abundancia crece en áreas con mayor nivel de intervención antropogénica, informando el estado del bosque si su abundancia aumenta cuando disminuye la de las especies estenotrópicas. (Bustos-Gomez y Lopera 1999).

Debido al cese de la actividad ganadera, la riqueza de escarabajos estercoleros podría aumentar en el futuro en el AD en regeneración. Las 13 especies identificadas en este estudio fueron encontradas en fecas de tapir, siete de ellas exclusivas para trampas con fecas y seis comunes en trampas con fecas y carroña: 119 individuos (86%) fueron encontrados en fecas de tapir y 20 en carroña (14%). *Coprophaneus telamon*, descrita como una especie carroñera también pudo encontrarse en fecas de tapir, si bien en menor número que en trampas con carroña. La única especie que demostró mayor predilección por carroña fue *Deltochilum parile* mientras las especies restantes se encontraron en mayor cantidad en fecas de tapir.

La poca disponibilidad de materia fecal, por la inexistencia de mamíferos grandes como felinos y primates en el área, puede influir en la afluencia mostrada en las fecas de tapir. Sobre este punto, Bustos-Gomez y Lopera (1999) mencionan que una parte importante de la dieta de los escarabajos son las bacterias presentes en gran cantidad en las heces de omnívoros. Estas bacterias pueden ser fundamentales en el metabolismo de los escarabajos y determinar la preferencia por este tipo de heces. Mientras tanto Halffter (1959) menciona que los escarabajos estercoleros prefieren los excrementos de ungulados sobre los de carnívoros. Sobre lo mencionado, huelga decir que el AMD posee senderos frecuentados ocasionalmente por tapires desde hace 5 años (Tapia 1999), por lo que sus fecas podrían haberse constituido en el principal recurso alimenticio para la coprofauna del sector.

El tipo de alimentación del tapir puede influir en la afluencia de escarabajos a sus heces. La diferencia en la alimentación entre la parte alta (900 m.s.n.m) y baja (200 m.s.n.m.) de la Región Amazónica podría ser determinante. En estado nativo se ha reportado la dieta del tapir a base de Muriti (*Mauritia flexuosa*) con un contenido de grasa del 53.2%, 43% de carbohidratos y 3.8% de proteínas (Bodmer 1990). Esta especie vegetal no existe en la Alta Amazonía. La Baja Amazonía, con mayores recursos vegetales ofrece al tapir una gran

variedad de frutos comestibles, mayor a la disponible en la Alta Amazonía. Hacen falta, por tanto, estudios similares a diferentes altitudes.

Una limitación para el acceso de los escarabajos a las fecas constituye el hecho de que el tapir generalmente defeca en cuerpos de agua o en sus cercanías. En este caso, los escarabajos no podrían acceder a las fecas y el uso de las fecas estaría condicionado al tipo de hábitat del tapir. La misma consideración debe hacerse para zonas de inundación temporal de la Baja Amazonía, en este caso, el uso de las fecas por parte de los escarabajos sería estacional.

Las especies colectadas en fecas de tapir ofrecen nuevos datos que realzan la importancia del tapir amazónico en el ecosistema por su contribución a la coprofauna. Su desaparición puede acarrear la alteración de las relaciones tapir-escarabajo, desencadenando la extinción o migración de la coprofauna y la consiguiente pérdida de diversidad del ecosistema amazónico.

A la gran cantidad de estudios sobre escarabajos estercoleros podría incorporarse el empleo de cebos con heces de tapir, animal que por su tamaño y hábitos alimenticios contribuye con la masa fecal utilizada por los escarabajos para el desarrollo de sus funciones vitales. La escasa metodología publicada con cebos con heces de tapir impide una mayor discusión al respecto. Sin embargo, los resultados presentados en los estudios de escarabajos coprófagos asociados a heces de roedores (Anduaga y Halffter 1991), tortugas terrestres de California (Halffter 1959), etc., permiten establecer la potencial utilidad de las fecas de tapir para futuras investigaciones.

Agradecimientos

La presentación de este trabajo fue posible gracias a la valiosa ayuda del Biólogo William Chamorro quien colaboró con la identificación de especímenes y la corrección de este artículo, y del personal del Departamento de Entomología de la Escuela Politécnica Nacional del Ecuador por permitir el acceso a las colecciones entomológicas.

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Conservation News

Red Danta – Report of Activities

*By Diego J. Lizcano, Jaime Andrés Suárez,
Sandra Correa & Sergio Sandoval*

During 2004 The Red Danta was committed to the organization, development and logistic support of The Mountain Tapir Population and Habitat Viability Assessment (PHVA) Workshop, which was carried out in Santuario de Fauna y Flora Otún Quimbaya in the city of Pereira, in October 2004. To the meeting attended more than 60 mountain tapir conservationist, experts, policy makers and indigenous people representing Colombia, Ecuador, Peru, USA, Mexico and Brazil.

A major change occurred in Red Danta. After consensus within its members, the Red Danta is not “only Colombian” any more. Starting this year, we hope to incorporate more Spanish-speaking people from other countries involved in tapir conservation projects or just interested in information about tapirs in Spanish. In 2005 we have grown from 46 to 61 members from Colombia, Ecuador, Peru and Venezuela. Following this major change, the Red Danta web page is been re-built and re-designed. We hope to finish this task by

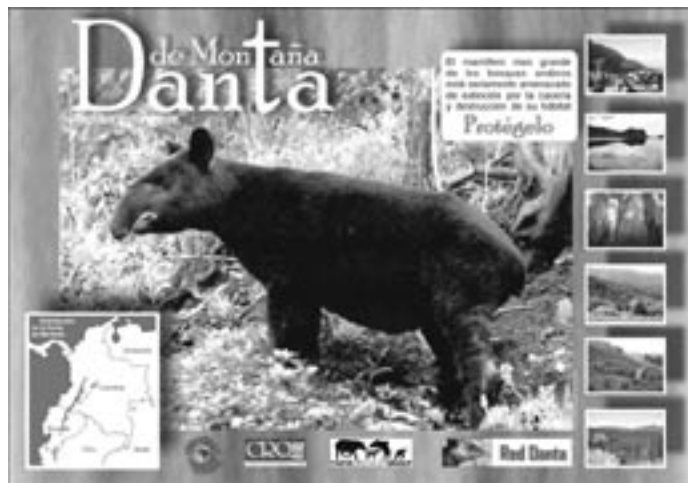


Figure 2. The Red Danta poster contributes to the awareness and education programs of local people and local authorities involved in mountain tapir conservation.

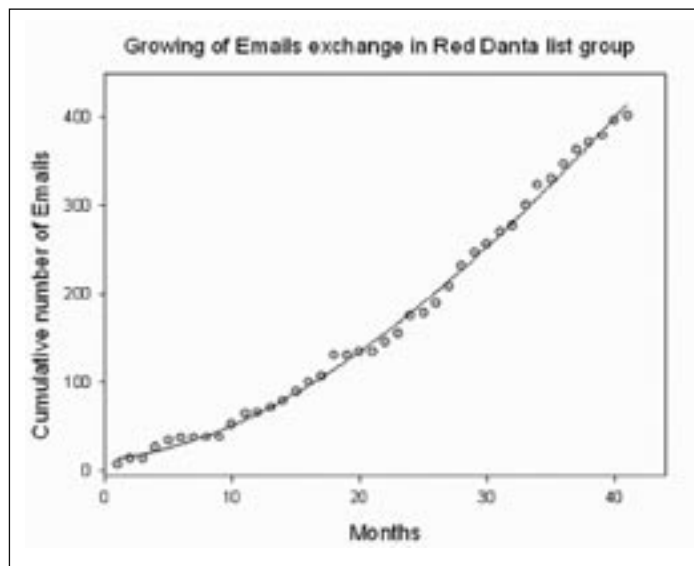


Figure 1. The number of exchanged emails within the Red Danta list group is continuously growing during time.

middle 2005. The number of exchanged emails within our list (fig. 1) and visits to our web page are growing fast. In February of 2005 alone, we had 497 visits, with the largest number of visits (56%) coming from Latin American servers. You are welcomed to check our web site at: <http://tapiruscol.tripod.com>

As a small contribution to the awareness and education programs of local people and local authorities involved in mountain tapir conservation, we designed a poster (fig. 2). It was designed jointly by Red Danta members Jaime Andres Suarez and Diego J. Lizcano; and Sandra Correa from Matecaña Zoo of Pereira, with Denis Torres’ design advices. The funds to print 1,500 posters were provided by Matecaña Zoo and Corporación Autónoma Regional del Quindío (CRQ). The poster was presented and initially distributed in a mountain tapir workshop in Matecaña Zoo in November 2004. During this workshop, local people from Los Nevados National Park and La Florida region were invited to spend a day at the zoo free of charges, to attend to two presentations on mountain tapir conservation. Additionally posters have been distributed to local people by Red Danta representatives: Carlos Pedraza in Nevado del Huila National Park, Andrés Guarnizo in several localities in the *Eje Cafetero* (a coffee-producing region) and widely in Quindío State by CRQ. The original graphics files of the posters are available upon request from Red Danta. Users may print their own posters using these files, but keeping

the logos of the original designers and sponsors, and adding the logos of their own organizations. For more details, please contact us.

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Footprinting Tapirs – The Development of a Footprint Identification Technique (FIT)

By Zoe Jewell & Sky Alibhai

In 2004 we established WildTrack, a small, independent research organization (www.wildtrack.org), to help census and monitor endangered species using non-invasive techniques. One of the tools we are using for this purpose is an award-winning footprint identification technique (FIT), which we developed for two



species of rhino, and have recently adapted successfully for the Bengal tiger. We are now working with several research groups to develop FIT for other endangered species.

We recently met with Patr cia Medici, Chair, IUCN/SSC Tapir Specialist Group (TSG) and discussed the possibility of extending this research for the benefit of the TSG as a whole. We mentioned that we had been working for some months with TSG member Silvia Chalukian in Argentina, and that the preliminary analysis of the footprint images Silvia has sent us of

lowland tapirs is very encouraging, suggesting that the technique will work well for this and other tapir species.

Because there has been much interest shown in the possible application of this technique, we are hoping to form a tapir footprinting group under the umbrella of the TSG, and hope to work with TSG members to develop FIT for use with their different species. Several members have contacted us already, and we hope we will be able to interest many more in participating.

FIT is non-invasive and cost-effective, and can produce highly accurate data for censusing and monitoring. These are objectively obtained and able to withstand scientific scrutiny. Because FIT is based on a traditional indigenous tracking technique, it is also an intuitive technique for many field trackers and scouts, and their expertise can be incorporated into the use of the technique. In contrast, some other, often invasive, monitoring techniques usually rely on expensive imported expertise and equipment. FIT is therefore particularly appropriate for developing countries and will also work well as a complementary technique with existing methods.

For each tapir species, we need to develop a specific FIT algorithm. Our aim is then to field-test the FIT by working closely with the participating field projects. Once the FIT algorithm is validated, we then hope to transfer all the necessary technology for FIT to be used on-site by the respective research groups when conducting their own census or monitoring activities, or (if so desired) to continue to offer this tool on a consultancy basis from off-site. For more information please contact Zoe Jewell (address below) or Patr cia Medici.

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Erratum

In our last issue, the article by Lizcano and Cavalier (Tapir Conservation 16: 18-23) mentions that in the only previous radio-tracking study of mountain tapirs (*T. pinchaque*), three animals were followed for one year. The data reported in that study (Downer, C. C. 1996; *Oryx* 30: 45-58) is in fact from two adult followed for three years and one adult followed for two years.

IUCN/SSC Tapir Specialist Group Members

Currently, the TSG has 92 members, including field researchers, educators, veterinarians, governmental agencies and NGO representatives, zoo personnel, consultants, university professors and students, from 26 different countries worldwide (Argentina, Australia, Belize, Bolivia, Brazil, Canada, Colombia, Costa Rica, Denmark, Ecuador, French Guiana, Germany, Guatemala, Honduras, Indonesia, Malaysia, Mexico, Paraguay, Republic of Panama, Peru, Taiwan, Thailand, The Netherlands, United Kingdom, United States, and Venezuela).



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Cover Photograph

A Baird's or Central American tapir cools down by wallowing in a mud pool in Corcovado National Park, Costa Rica. The photograph was taken by photojournalist Dale Morris while preparing a BBC Wildlife Magazine article on the Baird's tapir and TSG member Charles Foerster's research and conservation work. For more details, see Tapirs in the Media.



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Scope

This newsletter aims to provide information regarding all aspects of tapir natural history. Items of news, recent events, recent publications, thesis abstracts, workshop proceedings etc concerning tapirs are welcome. Manuscripts should be submitted in MS Word.

Deadlines

There are two deadlines per year: 31 March for publication in June and 30 September for publication in December.

Please include the full name and address of the authors underneath the title of the article and specify who is the corresponding author.

Full length articles on any aspect of tapir natural history should not be more than 15 pages in length (including references). An abstract is required and British English spelling is requested.

Figures and Maps

Articles etc can include black and white photographs, high quality figures and high quality maps and tables. Please send them as separate files (formats preferred: jpg, pdf, cdr, xls).

References

Please refer to these examples when listing references:

Journal Article

Herrera, J.C., Taber, A., Wallace, R.B. & Painter, L. 1999.

Lowland tapir (*Tapirus terrestris*) behavioural ecology in a southern Amazonian tropical forest. *Vida Silv. Tropicale* 8: 31-37.

Chapter in Book

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Book

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Thesis/Dissertation

Foerster, C.R. 1998. *Ambito de Hogar, Patron de Movimiento y Dieta de la Danta Centroamericana (Tapirus bairdii) en el Parque Nacional Corcovado, Costa Rica*. M.S. thesis. Universidad Nacional, Heredia, Costa Rica.

Report

Santiapilli, C. & Ramono, W.S. 1989. *The Status and Conservation of the Malayan tapir (Tapirus indicus) in Sumatra, Indonesia*. Unpublished Report, Worldwide Fund for Nature, Bogor, Indonesia.

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Tapir Conservation

The Newsletter of the IUCN/SSC Tapir Specialist Group

Volume 14/1 ■ No. 17 ■ June 2005

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