



Pantanal Giant Armadillo Project



Progress Report for

Natural Research

Project Coordinator: Dr Arnaud Desbiez

Funds awarded in 2012: £1,000

January 2013

Executive Summary

The giant armadillo (*Priodontes maximus*) is the largest of the armadillo species and can reach up to 150 cm and weigh up to 60 kilograms. Although giant armadillos range over much of South America almost nothing is known about them and most information is anecdotal. Due to its cryptic behavior and low population densities, this animal is very rarely seen. The giant armadillo is threatened with extinction and is currently classified as Vulnerable (A2cd) by the IUCN/SSC Red List of Threatened Species. This project aims to establish the first long-term ecological study of giant armadillos in the Brazilian Pantanal wetland. The main goal of the project is to investigate the ecology and biology of this species and other Xenarthrans in the study area to understand its function in the ecosystem using radio transmitters, camera traps, burrow surveys, resource monitoring, resource mapping and interviews.

The project was initiated in July 2010 and received a donation of **£ 1000** from the Mike Madders Award.

The research objective for 2012 was to expand and consolidate the giant armadillo research, expand the epidemiology study to other armadillos, begin ecological research on another species of armadillo in the study area and start publishing initial project results. The objective for environmental education and outreach was to introduce the project to the variety of stakeholders in the Pantanal, liaise with the media and private companies. The objectives for training and capacity building were to train 5 national scientists. All objectives for 2012 have been successfully met and surpassed.

- A total of 3 new individuals have been successfully captured and one re-captured; Telemetry methods are still being tested (external transmitters tend to fall off).
- Camera traps strategically placed in front of over 70 burrows since July 2010 and thousands of pictures of animals using, visiting or passing in front of the burrows have been taken;
- Role of giant armadillos as Ecosystem Engineers described and scientific paper submitted
- 30 fecal samples of giant armadillos as well as 16 of giant anteaters were collected in 2012
- Epidemiology study of other armadillos in the study area started (8 six-banded armadillos and 5 Southern naked tailed armadillo captured and sampled)
- 4 Southern naked tailed armadillos monitored
- Potential to expand the project to anteaters assessed;
- Media campaigns to introduce the species to both National and International public continued;
- Interviews on local knowledge conducted (>20)
- Talks and presentations on project, Pantanal and biodiversity conservation given in: rural and city schools, in ranches, universities, conferences, São Paulo Zoo
- 4 Brazilian professionals have been trained (1 veterinarian and 3 biologists)



Main Achievements: Research

The research objective for 2012 was to expand and consolidate the giant armadillo research, expand the epidemiology study to other armadillos, begin ecological research on another species of armadillo in the study area and start publishing initial project results.



Locating giant armadillos in their burrows continues to be very difficult, simply because these animals are so rare. Despite our almost constant field presence, only three animals were caught this year. Only one of them was recaptured after it's transmitter fell off and was replaced. One animal was captured in July, and two only 5 days apart in August. Since August, despite our best efforts and almost constant presence in the field no animals were captured. This year we experimented with specially designed external transmitters, as in 2013 we will be testing GPS external transmitters. We have managed to make the transmitter remain fixed on the animal for 90 days. The new GPS external transmitter was designed during a meeting in Phoenix with representatives from Telonics. However due to its small size it will record data for approximately only 30 days. Therefore we are confident that our method for fixing external transmitters is efficient for testing these new devices.

Monitoring giant armadillos has been extremely rewarding. In March 2013 we will analyze telemetry data collected in 2013. One of the most exciting moments of the project has been documenting through combined telemetry and camera traps, the mating, birth and parental behavior of giant armadillos. No information currently exists regarding giant armadillo reproduction. We now know that gestation last approximately 5 months, that one young is born as well as full description of parental care. Unfortunately the young was killed by another adult male. These observations will be described and submitted for publication in Edentata in 2013.



In addition to our truck (left) we now have a quad bike donated by Association Beauval Recherche et Conservation which greatly improved our efficiency enabling us to work in two areas at the same time.

Over 30 fecal samples of giant armadillos as well as 16 of giant anteaters were collected throughout the year. These will be used to compare diet as well as parasites. Dr. Renata Santos is leading the parasitological study and we hope to have these results by the end of 2013. Predated termite mounds have been monitored. Most of them fully recover from predation in a matter of weeks.

Another big surprise for 2012, was the ecological study on Southern Naked tailed armadillos. A species about which nothing is known! Most people don't know it even exists. We have discovered it is diurnal and highly fossorial. The literature lists it as a nocturnal species. We have put a lot of efforts in monitoring this species, mainly thanks to the quad bike donated by ZooParc Beauval. Three females and a male are being closely monitored. One of the females gave birth to one baby. The diurnal direct observations made of parental care helped us to interpret giant armadillo behaviors.



Southern naked tailed armadillo

Since the beginning of the project, giant armadillo excavations were searched for and 70 were monitored on average for 40 days using camera traps placed near their entrance. 2,113 sequences of pictures were taken documenting 23 species using the excavation or associated sound mound as a thermal refuge, shelter against predators, feeding ground or resting spot. A paper was submitted to Biotropica describing giant armadillos as ecosystem engineers. A poster on the subject was presented at the Biotropica Conference in Bonito, MS.



23 species have been documented using giant armadillo burrows or the associated sand mound

Our epidemiology study of armadillos is progressing well. We have samples for a total of 8 giant armadillos, 8 six banded armadillos and 5 Southern Naked tailed armadillos. For each individual a complete health assessment of captured animals was performed and biological samples collected. This included blood, feces, ectoparasites, urine, and nasal, oral, rectal, vaginal or preputial swabs for bacterial cultures. A small tissue sample is also collected for posterior DNA extraction and genetic and lepra analyses. Most importantly this year Danilo Kluyber (Pantanal Giant Armadillo veterinarian) has successfully established partnerships with Brazilian universities and laboratories to analyze all samples collected. These include: Fio Cruz, Fundação Oswaldo Cruz, Rio de Janeiro; Instituto Biologico, São Paulo; Instituto Lauro de Souza, São Paulo; UNIP, Universidade Paulistas, São Paulo; UFMT, Universidade Federal

do Mato Grosso; São Paulo Zoo, São Paulo. The Pantanal Giant Armadillo Veterinary Task force continues to be active and has reviewed all protocols used and will be publishing a paper on results in 2013.

Overall we are very pleased with our research achievements for 2012. We have more questions than answers, but have certainly had exciting breakthroughs. Most importantly now have data on home range, habitat selection, burrow ecology, social organization and some on reproduction to begin to make conservation recommendations for the species.



Gabriel Massocato who participated in most expeditions in 2012, is being hired by the project for 2013. Our team therefore consists of Arnaud Desbiez (Project coordinator – on the left), Danilo Kluyber (Veterinarian- in the middle of the picture above), Gabriel Massocato (biologist – on the right of the picture above) and consultant vet Renata Santos who participated in 4 expeditions. We continue to welcome and train trainees during our expeditions.

Main Achievements:

Environmental Education, Awareness campaigns, Outreach

We need to make the public aware of the existence of this incredible animal. Through our work this year we have discovered that few people know of this animal or very often believe it has already gone extinct. We were also alarmed to discover during numerous interviews with cowboys that there is a strong belief that if they ever encounter a giant armadillo they have to kill or else they will have bad luck for the rest of their lives. This animal is so rare that although they see their burrows, most cowboys have never seen one. However in the Northern part of the Pantanal two cowboys reported killing two giant armadillos each due to this belief.



Children learning in rural (left) and city schools (middle) and in the field (right) learning about Giant armadillos

Our team has certainly been busy spreading the word. We have given many talks about the species and the importance of preserving the Pantanal to: tourists visiting the ranch, landowners, workers and children in the Pantanal. We have established a partnership with two rural schools. We have visited several distant ranches and made presentations to the landowners and the staff. We put up a poster in local shops in the nearest small towns bordering the Pantanal. In Campo Grande Arnaud gave talks at schools, gave talks in two universities and Danilo gave a talk at the São Paulo Zoo. In Campo Grande Arnaud gave a presentation on the project in a conference to landowners from the Mato Grosso do Sul State.



Giving talks at a University in Aquidauana (left) and to landowners from Mato Grosso do Sul in Campo Grande (right)

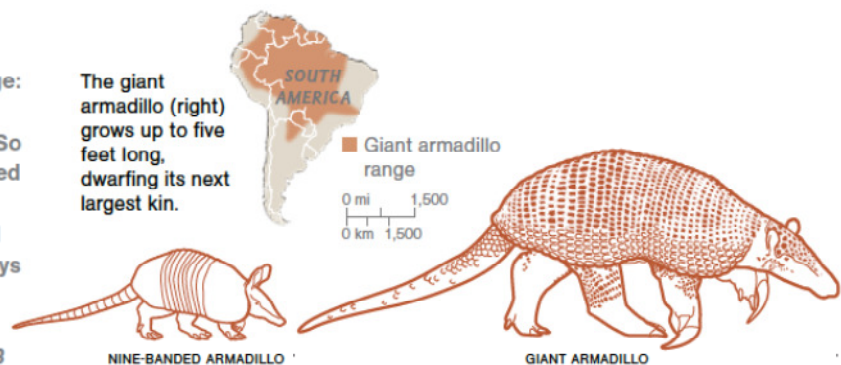
You may remember that last year the giant armadillo was featured in the BBC Nature news thanks to a press release from Chester Zoo. That article was translated and featured throughout Brazilian media. This same article is now part of a school manual exercise for six graders. Excellent way to reach a wide audience throughout Brazil!!

As for media, a small note on giant armadillos was featured in the June issue of National Geographic. Many zoos featured our project in their blog or newsletters. The three banded armadillo was selected as the mascot for the 2014 World Cup. This means that 2014 will be the year for us to promote armadillos and biodiversity conservation in the media. We must prepare for this!! In October American photographer Kevin Schafer spent 2 weeks with us in the field to take high resolution beautiful pictures of giant armadillos. We also welcomed environmental journalist Liana Jone who spent 5 days with us in the field to prepare several articles which will be published in 2013-2014.

The King of Armadillos

Studying giant armadillos poses a challenge: They're nocturnal and rarely emerge from burrows dug with the aid of a 6-inch claw. So researchers in the Brazilian Pantanal needed camera traps to get rare wild footage of *Priodontes maximus*. Arnaud Desbiez, head of the Pantanal Giant Armadillo Project, says the mammals spend their fleeting surface time seeking ants and termites and, occasionally, "knocking over our cameras." —JB

The giant armadillo (right) grows up to five feet long, dwarfing its next largest kin.



Thanks to our partnership with a Brazilian NGO called IPE we have made significant progress on our National environmental awareness initiatives and giant armadillos continued to be featured in a pamphlet developed by DANONE. IPE continues to try and develop a flip-flop in partnership with Havaianas to promote the species. So far the proposal was rejected but we hope that the world cup mascot being an armadillo will have changed things. Partnerships with private companies are an invaluable tool for us to reach the general public.



IPE continues trying to convince Havaianas to design a giant armadillo sandal

In 2013, we will certainly continue working with the national and international media to promote giant armadillos and the importance of preserving their habitat. When our article on Giant Armadillos as Ecosystem Engineers is published we will prepare a press release. A press release on the birth of a giant armadillo and it's first pictures will be promoted early 2013.

We have received numerous visitors at the ranch, all hoping to catch a glimpse of the elusive giant armadillo. Most special visits include Curt Boren from the Bergen Zoo and Aude Desmoulins from ZooParc Beauval both from institutions supporting the project. A group from the Houston Zoo also visited Baia das Pedras.

Main Achievements: Training and Capacity building

A total of four Brazilian professionals (3 biologists and 1 veterinarian) have received training and experienced the different aspects of a field Conservation project in the past year. It is important that our experience and knowledge be shared with the next generation of conservationists. The giant armadillo project is a great opportunity to provide firsthand experience and training. Arnaud Desbiez also gave a class at the ESCAS University in São Paulo and Ilheus about species research, action planning and population modeling.

Impact on Local Community

The project is fully supported by the local community in the study area. The project is being supported by Baía das Pedras ranch. Baía das Pedras is a 17,000 hectare privately owned traditional cattle ranch. They provide lodging and meals to the field team and are passionate about the project. In return, the team gives presentations and provide materials about the project to eco-tourists visiting the ranch. The entire community and neighboring ranches are involved in the project. Ranch workers participated actively in the search for giant armadillo tracks, burrows and other evidences. The project participates in the environmental education component for two local rural school. We visited and gave talks about the project in various neighboring ranches.



Arnaud presenting the project at Fazenda Baranco Alto

Reporting and Fundraising

Five small reports detailing the progress of the project were e-mailed in the past twelve months to supporting institutions. These communications have proven to be very popular. Many Zoos edited the information for their blogs. Each communication was accompanied by recent pictures from the field. During 2012, we actively fundraised for the project. In addition to the funds from the Mike Madders Award, we received funds from:

Association Beauval Recherche et Conservation (France) ; l'Association Jean-Marc Vichard pour la Conservation (France); Bergen County Zoo (USA); Cerza Zoo (France) ; Chester zoo (UK); Columbus Zoo (USA); Conservation des Espèces et des Populations Animales (CEPA) (France) ; Oklahoma City Zoo (USA); Natural Resources (MMA) (UK); Phoenix Zoo, (USA); Prins Bernhard fund for Nature (Holland); Sea World Busch Gardens (USA); Taronga Zoo (Australia); Taiwan Forestry Bureau (Taiwan); Zoo Conservation Outreach Group (ZCOG) and its partners, the Chattanooga Zoo, Jacksonville Zoo, Salisbury Zoo-Chesapeake AAZK, and the San Antonio Zoo and Aquarium.

Many thanks to all these donors without whom none of this would have been possible. We also received in kind support for IPE, Baia das Pedras ranch and the Sao Paulo Zoo

Plans for 2013

In 2013, we will pursue and consolidate the research on giant armadillos using methodologies we established in 2012. The plan is to capture and monitor 6 adult individuals (3 males and 3 females). We will be using GPS tags and compare the results obtained through VHF monitoring. We aim to investigate all methodologies and technologies which can be used to study giant armadillo. We hope that in the future other researchers will begin to study this species and we can provide them the best advice.

We have demonstrated that giant armadillos are ecosystem engineers through a paper that has been submitted. Now based on these results, a new study on the potential of giant armadillo burrows as hot spots for disease transmission will be initiated. Due to the high number of species from different ecological guilds it is possible that burrows may be a hotspot for transmission of diseases, through ticks, fleas, fungus, bacteria and viruses. Burrows may present new opportunities to bloodsuckers such as ticks and fleas. We were on numerous occasions infested by fleas while measuring older burrows. Many sequences of pictures taken showed mammals, such as the Southern tamandua, ocelot or tayras, scratching themselves on the sand mound after spending prolonged amounts of time in a burrow. In addition to the successive diversity of mammals remaining for prolonged periods, the dark, humid conditions with a constant temperature could potentially favor survival and proliferation of fungus, bacteria and viruses. A lot of questions regarding giant armadillo burrows remain to be addressed.

We will continue the epidemiological study of all armadillo species, and in 2013 will also collect samples from 6 giant anteaters and 10 Southern tamanduas. Funds permitting it, in May to July 2013 during the cold season we will capture and place a VHF/GPS harness on giant anteaters to begin a comparative study between giant anteaters and giant armadillo in the study area. We believe that in 2013 this work will only involve a few animals in order for us to test methodologies and the logistics of running several ecological studies in the same area with our small team.

We will continue liaising with national and international media. We will strive to make contacts with many journalists and photographers to have a large data base of articles and information to get armadillos in the media. We must prepare for 2014 where the symbol of the world cup in Brazil will be a three banded armadillo, this is a unique opportunity to advertise our cause. In 2013 we will prepare a publication detailing capture and anesthesia of giant armadillos based on results from 2011/2012. We will offer training to at least 5 more Brazilian Nationals. As in 2012 we will continue integrating the project to local and National initiatives and continue liaising with local and national authorities on project results and implications.

At the end of 2013 the first steps to evaluate and use data to evaluate the status of giant armadillos according to the IUCN/SCC red list criteria will be taken. Data will also be compiled for population viability analysis. An action plan for the species in the Pantanal biome will be created in 2015.