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Scientific expedition in Bororo indigenous territory in the Brazilian Savanna

Fabio Rossano Dario

Ethnobiological Researcher

Instituto de Pesquisas e Estudos da Vida Silvestre
Rua Leonardo Mota, 66 - São Paulo-SP, ZIP 05586-090, Brazil

E-mail address: fabiorossano@hotmail.com

Phone: +5511981541925

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ABSTRACT

This paper is a photographic summary of studies carried out in August 2010 in the Meruri village, Bororo Indigenous Territory, which is in the Mato Grosso State, Brazil, in the Savanna biome. A scientific expedition was carried out to analyze the environmental impacts of a project in the region and more specifically the possible interferences in the life of the indigenous inhabitants of the region and live in harmony with the environment. The photos show some structures of indigenous villages, the Das Garças River, the Savanna where studies were carried out and some of the bird species registered.

Keywords: Bororo indigenous, Cerrado, Das Garças River, Savanna

1. INTRODUCTION

The Brazilian Savanna (Cerrado biome) presents a great diversity of several different groups of organisms and, for this reason, is considered one of the most important endemism areas of South America [1]. This fact, together with the high level of disturbance in this biome, resulted in the inclusion of the Cerrado among the 25 hotspots of world biodiversity.

The number of vascular plants is greater than that found in most regions of the world: herbaceous, shrubs and arboreal plants and vines represent more than 7,000 species [2].

It is the second-largest biome in Brazil, represent approximately 22% of the Brazilian land surface, and includes most of central Brazil (Figure 1) and parts of northeastern Paraguay and eastern Bolivia [3], and covers about 2 million km², an area like the one occupied by Western Europe.

The Cerrado is the most diverse tropical savanna [4], and its landscape presents also great variation with several vegetation physiognomies, from open areas with large fields up to a close and dry forest with trees reaching 10 to 12 meters tall, the "Cerradão"; the Cerrado sensu stricto composed mainly by shrubs and small trees; and "Veredas" or the palm tree wetlands [5]. The rainfall variability strongly influences the composition of the Cerrado vegetation, whose herbaceous component is during the dry season dead or dormant until the next wet season [6].

The conservation effort in the Cerrado has always been secondary to that in the Amazon [8]. Extensive areas of forests in the Cerrado have been destroyed in the last decades and converting cleared forest lands to pastures and agricultural lands [9]. Nowadays only 8% of the original Cerrado area is still preserved, but only 0.85% of its area is legally protected [10]. The environmental impacts of deforestation and forest fragmentation include soil degradation, water pollution, and loss of biodiversity because monocultures are inhospitable to many species of birds and invertebrates that require diverse habitats [11, 27, 28].

The Cerrado is a biome rich in bird species, accounting for about 50% of the total number of bird species in Brazil (856 species) [12, 13], of which 30 species are endemic, and of these, 11.8% are threatened [14]. Among the many factors thought to contribute to the high bird species richness in the Neotropics is the high diversity of habitat and microhabitat types, some of which are unique to tropical [15, 16] regions.

The main objective of this scientific expedition was to detect the possible risks of impacts on the lives of the Bororo indigenous, due to the construction of small hydroelectric dams in

territory occupied by the indigenous. The study was carried out in the Meruri village, Bororo Indigenous Territory, in August 2010. The studied territory is located in Mato Grosso State, Brazil (Figure 2). It is inserted in part of the municipalities of Barra do Garças and General Carneiro. It lies between 15°23'S to 15°44'S latitude and 52°51'W to 53°13'W longitude, covering an area of 823 km². According to the sense accomplished in this study, the Meruri village had 425 indigenous in August 2010. The Bororo of the Meruri village is named *Bóku Mógorége* (savanna dwellers).

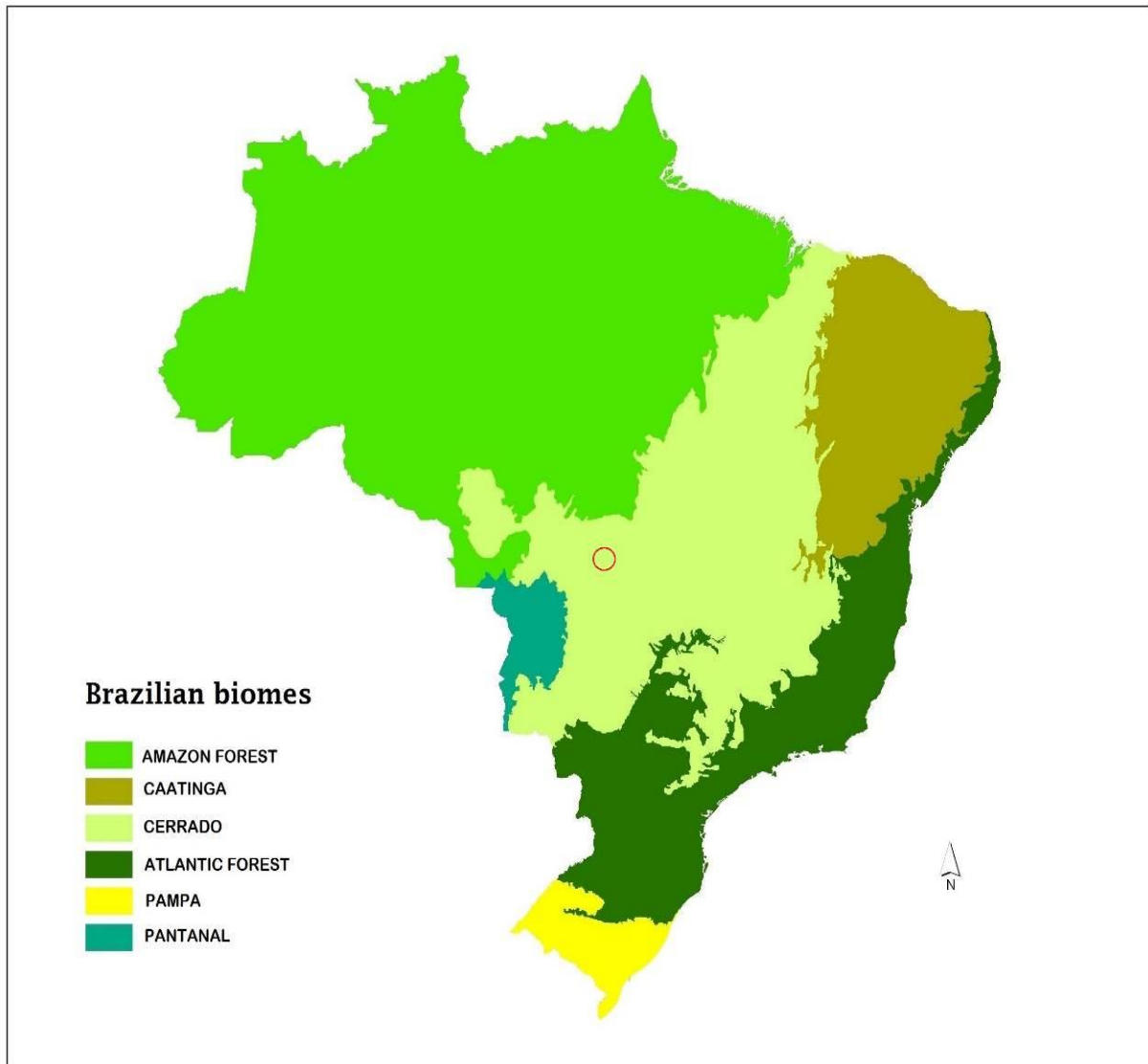


Figure 1. Map of the distribution of biomes in Brazil, according to IBGE [7]. The red circle indicates the approximate area where the study was carried.

The Meruri village is located on the Das Garças River basin, in the Savanna biome. The Savanna biome is a complex of phytophysionomies, a complex of formations, which

represents a gradient of ecologically related biomes, reason enough to consider this complex as a biological unit [17].

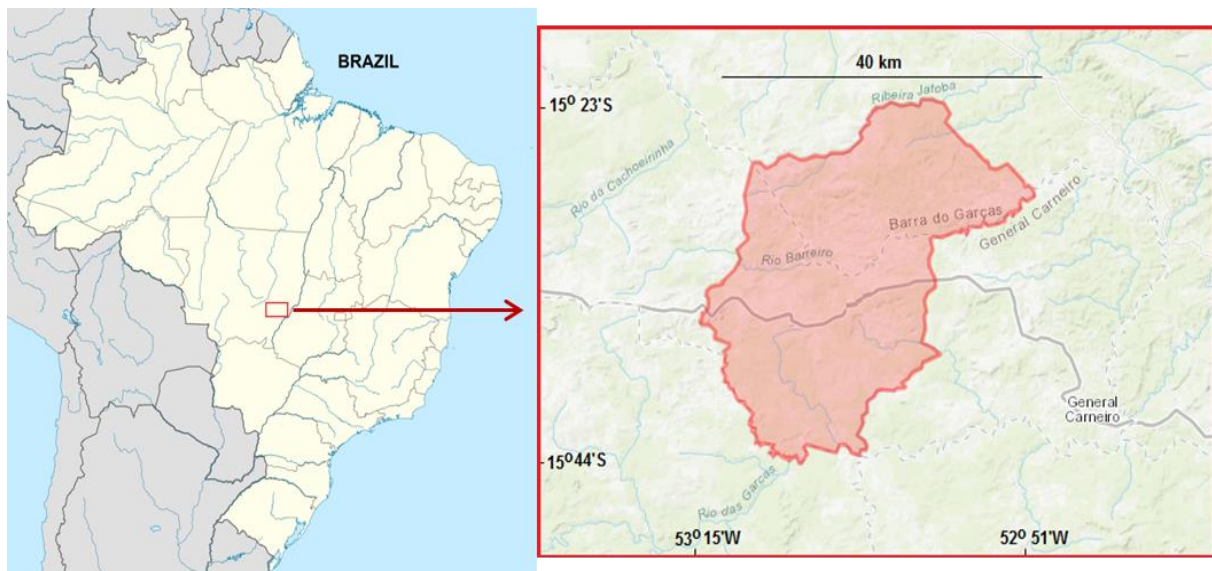


Figure 2. Localization of the Bororo Indigenous Territory studied.

At the edge of the main waterways in Bororo territory, such as Das Garças River, there is a gallery forest (Photos 1-8). It is a mixture of vegetation of species adapted to temporary flooding, and other species characteristic of the semi-deciduous forest [18, 19].

It is estimated that the Bororo indigenous have been living in this Center-West Region of Brazil for at least 7,000 years. Available historical sources inform that the initial contact of the Bororo with non-indigenous goes back to the 17th Century. Although today the Bororo possesses a discontinuous, deteriorated territory, the vigor of their culture and their political autonomy have been weapons against the predatory effects of their contact with 'the white man', which has been ongoing for at least 300 years [20].

According to the ethnographies studies on the Bororo Indians in Mato Grosso, Brazil [21], realized by Salesian priests, mainly by Antonio Colbacchini and written between 1920 and 1930, in their social organization, the Bororo are divided into two large groups: the *Tugarege* and the *Ecerae*. In addition to this general division, other clan subdivisions constitute family groups in a matrilineal way. In the complex Bororo social organization, individuals are classified according to their clan, their lineage, and their residential group. Descent among the Bororo is matrilineal; thus, the newborn receives a name that will identify him/her to his/her mother's clan. However, although that is the ideal norm of conduct, in practice this may be manipulated to satisfy other interests [22].

The Bororo live in balance with the environment where in which they live. They use natural resources to build their homes, such as timber for the structure and palm leaves to cover them (Photos 49-87). The Bororo economic system is characterized by a combination of the activities of gathering, hunting, fishing, and agriculture [23]. They mainly grow cassava and corn, which are the basis of their food (Photos 88-101). They are still expert hunters and

fishermen, despite the increasing scarcity of animals caused by the environmental imbalances brought about by agricultural and livestock activities in the regions where they live.

The hunting strategies used by the indigenous depend on the species of wildlife being chased, the climate, moon phases, and type of vegetation. The Bororo recognize a wide range of “ecological zones and sub-zones” in the environment that surround them, and the most important among them are *Bokú* (Savanna of Central Brazil), *Boe Éna Jaka* (gallery forest - Savanna transition zones) and *Itúra* (gallery forest) (Photos 9-48). Each ecological zone is associated to specific plants, soils and animals, representing an integrated system of those elements and man. Each zone is also divided into smaller subdivisions, and each division has its importance in the Bororo way of life [24].

The names of the birds in the Bororo language, in the title of some photos (Photos 49-78), were confirmed through consultations in the Bororo Encyclopedia kindly made available from the collection of Bororo culture in the Meruri village (Photo 102). In this Encyclopedia, there is a dense ethnographic description of paramount importance to researchers in all areas.

The Bororo Encyclopedia was written by the Salesian missionaries Angelo Venturelli and Cesare Albisetti in 1962 [25].

The term used by the Bororo to designate their original language is *Boe Wadáru*. Linguists classified it as isolated and possibly linked to the *Otuké* branch. Later a new paradigm simplified the classification of Indian languages, grouping them according to certain similarities, and the Bororo language was placed in the Macro-Jê linguistic branch [26]. According to National Indian Foundation (FUNAI), which is the Brazilian governmental protection agency for indigenous interests and their culture, nowadays the Bororo language is spoken by almost the entire Bororo population that is estimated at around 1,400 people. Thus, nowadays in all Bororo villages, the majority of the population speaks Portuguese and Bororo. In daily life, the language used is Bororo, with neologisms assimilated from regional Portuguese, which is used only in inter-ethnic contacts.

Bororo handicrafts, such as bracelets and headdresses made of bird feathers (Photos 88-96, 103), present at the “Documentation Center and Permanent Exhibition of Adornments and Handicrafts” of the Meruri village were kindly made available for consultation and photographic documentation.

All photos presented in this report were realized by Fabio Rossano Dario, using a digital photo camera Canon PowerShot.

2. CONCLUSIONS

The Cerrado and its rivers host an extraordinary variety of species, some endemic, others endangered, and many of which are still unknown. However, this region has experienced a continuing increase in anthropogenic pressures, mainly from deforestation, which implies a strong concern for the conservation of the biota of this region, and the security of indigenous communities who live in it.

The Bororo has a lot of knowledge about the ecological importance of the fauna, mainly in the dispersion of seeds of plants that they use in the feeding, as medicines and in the construction of their houses. In this way, as much the hunting as the extractivism of fruits and plants it is rationally realized by Bororo, with little environmental disturbance.

The indigenous knowledge about the ecological interactions between travels through generations from older to younger ones in oral transmission. The relationships established between the Bororo with the environment in which they live are complex, showing a mythical interaction between man and the elements of nature. They respect the rivers, the forest and all the living beings that live in it

The Bororo indigenous have a rich culture and they are very gentle and cultured people. They received the research team with great affection and taught us many things about the environment in which they live (Photo 101).

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Photo 1. Das Garças River and the riparian vegetation formed by semi-deciduous forest.



Photo 2. Natural sand beach on the Das Garças River. Observe the babassu palm (*Attalea speciosa*) in the riparian forest.



Photo 3. Riparian forest that follows the Das Garças River.



Photo 4. Das Garças River in the Bororo territory.



Photo 5. Natural sand beach on the Das Garças River.



Photo 6. Das Garças River in the Bororo territory.



Photo 7. Riparian forest of the Das Garças River.



Photo 8. Das Garças River.



Photo 9. Isolated mountain situated near Meruri village.



Photo 10. Sandstone rock outcrops in the Bororo territory.



Photo 11. In the background observe the “Morro Grande”, the main mountain in the Bororo territory.



Photo 12. The waters of stream *Tóri Kujagu* run over a slab of red stones.



Photo 13. A tropical savanna filled with undergrowth vegetation, bush and twisted trees are the main characteristics of the Cerrado.



Photo 14. The Savanna is the predominant vegetation in the Bororo territory.



Photo 15. The Gramineous-woody Savanna is one of the physiognomies of the cerrado biome.



Photo 16. Golden grass (*Singhnantus* sp) occurs in the Gramineous-woody Savanna and is used by the Bororo to make handicrafts.



Photo 17. Trees with twisted trunks and boughs characteristic of the Savanna. The thick bark of trees is important for protecting the inner tissues of stems of woody plants, especially from fire.



Photo 18. Sandstone rock outcrops present in the Bororo territory.



Photo 19. Annonaceae is one of the main botanical families of the Brazilian Savanna.



Photo 20. The lush flowers of the *Physocalymma scaberrimum* stand out in the Cerrado.



Photo 21. Barbatimão (*Stryphnodendron barbatiman*), typical cerrado tree specie, and important in Bororo medicine.



Photo 22. The Cerrado is one of the richest of all tropical savanna regions and has high levels of endemism.



Photo 23. Brazilian Savanna, highlighting the yellow flowers of the Golden Trumpet Tree (*Handroanthus chrysotrichus*).



Photo 24. Flowers of the Golden Trumpet Tree (*Handroanthus chrysotrichus*).



Photo 25. Golden Trumpet Tree (*Handroanthus chrysotrichus*) in bloom.



Photo 26. Golden Trumpet Tree (*Handroanthus chrysotrichus*) in bloom. It is a tree native to the Cerrado (tropical savannas) of Brazil, where it is known as "ipê-amarelo".



Photo 27. The Myrtaceae is one of the main families of the Brazilian Savanna, both in several species and density of trees and shrubs.



Photo 28. Branch of a myrtaceae species in full bloom.



Photo 29. The Cerrado the biologically richest savanna in the world, with about 10,000 plant species.



Photo 30. Probably around 800 species of trees are found in the Cerrado.



Photo 31. *Physocalymma scaberrimum* (pau-de-rosas, tulip wood) has lush ornamental flowers between August and September.



Photo 32. *Triplaris americana* is a tree in the botanical family Polygonaceae known by many common names, including pau-formiga (“ant tree”).



Photo 33. Fruit of *Sterculia apetala*, commonly known as manduvi, is a tree species in the family Malvaceae.



Photo 34. Much of the vegetation in the gallery forests is similar to nearby rainforest; however, there are some endemic species found only in the Cerrado gallery forests.



Photo 35. Embaúba (genus *Cecropia*) it belongs to the stratum of pioneer plants in the Brazilian Tropical Forests.



Photo 36. The unripe fruit of jenipapo (*Genipa americana*) produces a liquid used by Bororo as a dye for skin painting.



Photo 37. *Hymenaea stigonocarpa* (jatobá) is a large tree species from the Brazilian Savanna.



Photo 38. The fruits of the jatobá (*Hymenaea stigonocarpa*) are appreciated in Bororo food and by animals such as agouti and tapir.



Photo 39. Soil fertility, fire regime and hydrology are thought to be most influential in determining Cerrado vegetation.



Photo 40. Golden Trumpet Tree (*Handroanthus chrysotrichus*) in bloom.



Photo 41. From the buriti palm (*Mauritia flexuosa*) the Bororo use the leaves to cover their houses, the palm heart and the fruits for food.



Photo 42. The wood of the buritirana palm (*Mauritiella armata*) is used by the Bororo to make bows and arrows.



Photo 43. Murici (*Byrsonima spicata*), typical cerrado tree specie. Its name in the Bororo language is *kíe eviaréu í*.



Photo 44. Flowers of the murici (*Byrsonima spicata*), typical cerrado tree specie, whose fruits are appreciated by the Bororo and by the fauna.



Photo 45. Guabiroba (*Campomanesia pubescens*) is a wild shrub whose fruits are appreciated by the Bororo and by the fauna.



Photo 46. Mangaba (*Hancornia speciosa*) is perhaps the most appreciated fruit by the Bororo. It is just delicious, with a smooth flavor, soft and juicy flesh. Its name in the Bororo language is *Báto*.



Photo 47. *Curatella americana* fruits. This species, popularly called the “lixeira”, is a native cerrado tree specie.



Photo 48. In spring many plants are blooming in the Cerrado.

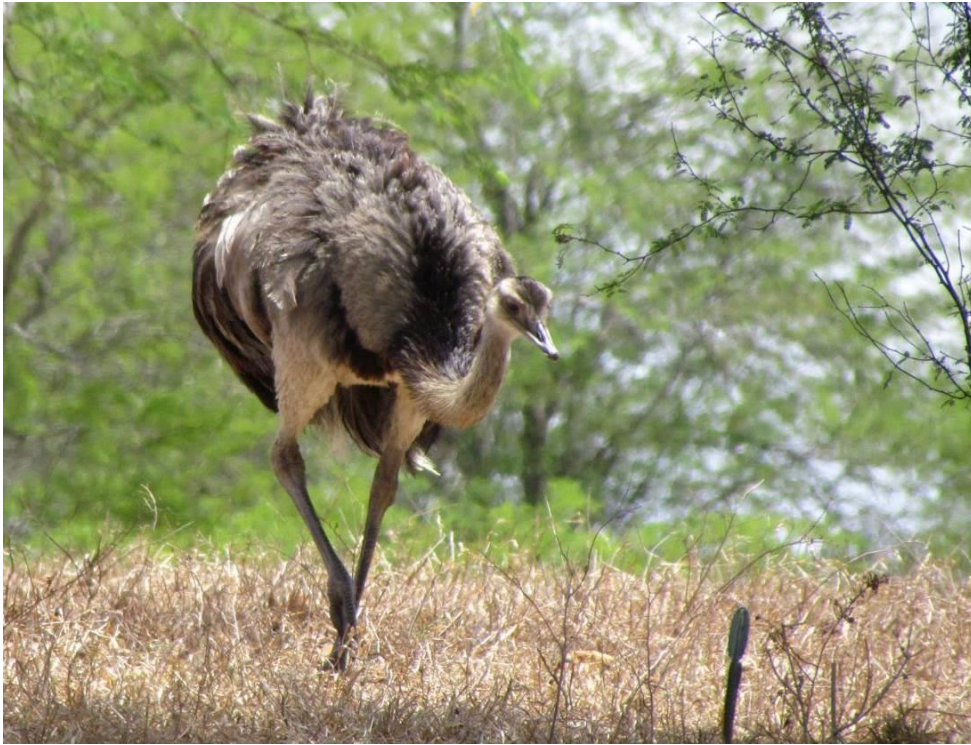


Photo 49. Greater Rhea (*Rhea americana*), a species of a flightless bird which is common in the Brazilian Savanna. Its name in the Bororo language is *Pári*.



Photo 50. *Bubulcus ibis* (Cattle Egret). This egret is very popular in Brazil, and its diet is essentially insectivorous.



Photo 51. *Ardea alba* (Great Egret). Its name in the Bororo language is *Báce*.



Photo 52. *Syrigma sibilatrix* (Whistling Heron).



Photo 53. *Theristicus caudatus* (Buff-necked Ibis).



Photo 54. *Coragyps atratus* (Black Vulture). Its name in the Bororo language is *Bái*.



Photo 55. *Rupornis magnirostris*, Accipitridae (Roadside Hawk).



Photo 56. *Vanellus chilensis* (Southern Lapwing) is a bird conspicuous and noisy. Its name in the Bororo language is *Tano*.



Photo 57. *Crotophaga ani* (Smooth-billed Ani). This is a very gregarious species, always found in noisy groups. Its name in the Bororo language is *Ori*.



Photo 58. The Guira Cuckoo (*Guira guira*) is an opportunistic predator, gathering small prey items on the ground or searching for them among branches. Its name in the Bororo language is *Bika*.



Photo 59. Unlike most owls, Burrowing Owls (*Athene cunicularia*) are often active during the day.



Photo 60. *Megaceryle torquata*, ♂ (Ringed Kingfisher). Its name in the Bororo language is *Kadómo*. It is a large, conspicuous and noisy kingfisher bird commonly found along the lower Das Garças River.



Photo 61. *Galbula ruficauda*, ♀ (Rufous-tailed Jacamar).



Photo 62. The Toco Toucan (*Ramphastos toco*), is the largest and probably the best known species in the toucan family. Its name in the Bororo language is *Apódo*.



Photo 63. The Campo Flicker (*Colaptes campestris*) is a species of bird in the woodpecker family. It is found in a wide range of open and semi-open habitats.



Photo 64. *Cariama cristata* (Red-legged Seriema). As it is a large terrestrial predator, it catches all kinds of prey even poisonous snakes as well as grains and small fruits. Its name in the Bororo language is *Béo*.



Photo 65. This *Falco sparverius*, ♂ (American Kestrel) is feeding on a mouse.



Photo 66. *Ara ararauna* (Blue-and-yellow Macaw) is a member of the large group of neotropical parrots known as macaws. Its name in the Bororo language is *Kuido*.



Photo 67. This *Forpus xanthopterygius* (Blue-winged Parrotlet) is occupying an abandoned nest of Rufous Hornero (*Furnarius rufus*). Its name in the Bororo language is *Kídoe*.



Photo 68. Turquoise-fronted Parrot (*Amazona aestiva*) is one of the most common Brazilian parrots kept in captivity as a pet or companion parrot. Its name in the Bororo language is *Réko*.



Photo 69. Rufous Hornero (*Furnarius rufus*). Its name in the portuguese is João-de-Barro. The nest of the species is a large thick clay "oven" placed on a tree, or man made structures such as fenceposts, telephone poles or buildings.



Photo 70. Great Kiskadee (*Pitangus sulphuratus*) is probably one of the best known birds in Brazil. It is audacious, has little fear of humans and its song is loud and marked.



Photo 71. The Fork-tailed Flycatcher (*Tyrannus savana*) is a passerine bird of the tyrant flycatcher family. Named for their distinguishingly long forked tail, are seen in lightly-forested or grassland areas.



Photo 72. The Brown-chested Martin (*Progne tapera*) is a species of passerine bird in the swallow family.



Photo 73. The Chalk-browed Mockingbird (*Mimus saturninus*) is a bird that feeds on fruits, insects and small vertebrates.



Photo 74. The Saffron Finch (*Sicalis flaveola*) is a tanager that is common in open and semi-open areas. Its can be aggressive toward other birds, as they tend to be territorial.



Photo 75. *Dacnis cayana*, ♀ (Blue Dacnis). This member of the tanager family occurs in forests and other woodlands. These are social birds which eat mainly insects gleaned from foliage, flowers or bromeliads. Fruit is often taken and usually swallowed whole.



Photo 76. The Wedge-tailed Grass-Finch (*Emberizoides herbicola*) is a species of bird in the family Thraupidae. Its natural habitats are dry savanna, subtropical or tropical seasonally wet or flooded lowland grassland, and heavily degraded former forest.



Photo 77. Black-throated Saltator (*Saltatricula atricollis*) is a bird which belongs to the family Thraupidae.



Photo 78. The Violaceous Euphonia (*Euphonia violacea*) is a small passerine bird in the true finch family. It occurs in forests, and second growth forests.



Photo 79. Bororo village house made of wood and babassu palm leaf (*Attalea speciosa*) and buriti palm leaf (*Mauritia flexuosa*). The roof is with metal tiles.



Photo 80. Bororo village house made of wood and babassu palm leaf (*Attalea speciosa*) for coverage.



Photo 81. Bororo village house made of wood and babassu palm leaf (*Attalea speciosa*) for coverage.



Photo 82. Bororo village house made of wood and covered with babassu palm leaves.



Photo 83. Bororo village house made of wood and covered with babassu palm leaves.



Photo 84. Detail of the Bororo house roof made of wood and babassu palm leaves.



Photo 85. Detail of the Bororo house roof made of wood and buriti palm leaves (*Mauritia flexuosa*).



Photo 86. Detail of the Bororo house roof made of braided babassu palm leaves.



Photo 87. Bridge over a stream built from the trunks of a sturdy wooden wall tree, known by the Bororo by the name of *ári ika* (*Austroplenckia populnea*).



Photo 88. Mat made by artisan from Bororo indigenous community with braided Buriti palm leaves.



Photo 89. Golden grass (*Singhnantus* sp.) a specie of grass present in the Gramineous-woody Savanna, with which the Bororo produce beautiful and delicate pieces of handicraft.



Photo 90. Earrings made by Bororo artisans using bird feathers and golden grass (*Singhnantus* sp.).



Photo 91. Basketry made by Bororo artisans with babassu and buriti palm leaves. Collection of “Documentation Center and Permanent Exhibition of Adornments and Handicrafts” of the Meruri village.



Photo 92. Hand Fan (abanico) made by Bororo artisan with Buriti palm leaves.



Photo 93. Fishing with bow and arrow.



Photo 94. Arrow made with bamboo and macaw feathers.



Photo 95. Drawings of jaguar (*adúgo*) made by Bororo children.



Photo 96. Bororo child with mask symbolizing a jaguar (*adúgo*).



Photo 97. The sugar cane (*Saccharum officinarum*) is a plant cultivated by the Bororo.



Photo 98. The pineapple (*Ananas comosus*) is indigenous to South America, where it has been cultivated.



Photo 99. The corn (*kuiadã*) is an important food cultivated by the Bororo.



Photo 100. Manioc (*Manihot esculenta*) is a root crop that is cultivated by many indigenous groups in Brazil.



Photo 101. In the company of dear Bororo friends.

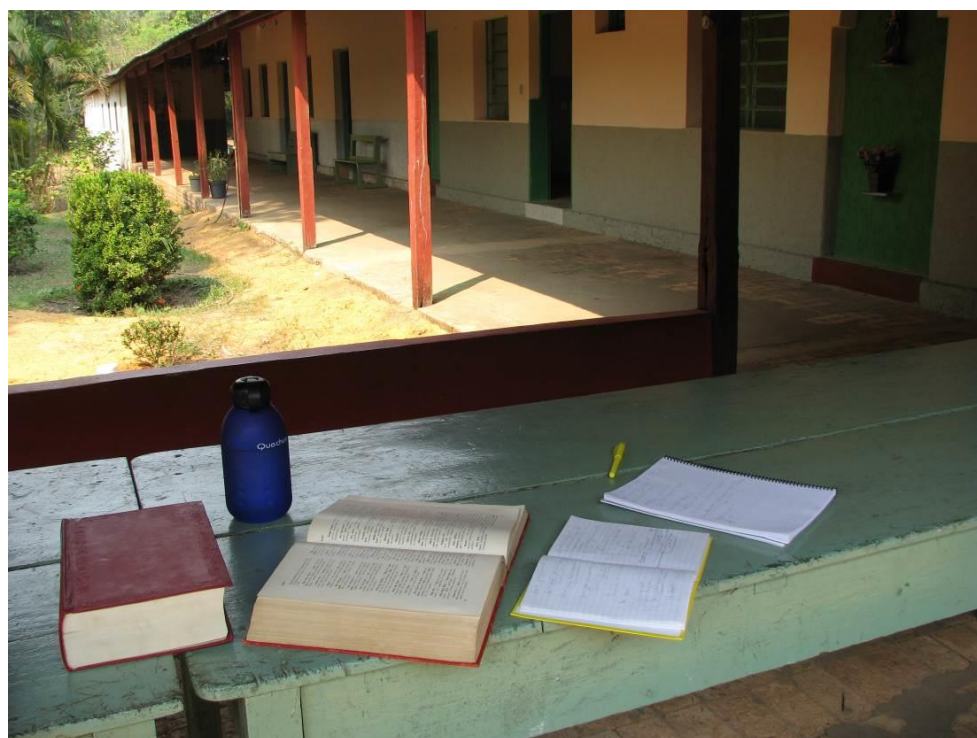


Photo 102. Consulting the Bororo Encyclopedia in the Salesian Mission in the Meruri village.



Photo 103. Headdress made with macaw, parrot, hawk, toucan and aracari feathers, belonging to different Bororo subclans.