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Abstract

The *comunidades ribeirinhas* ('riverine communities') are one of the most traditional settlements in the Pantanal region and are concentrated along the riverbanks. Over the course of centuries, the *ribeirinhos* adapted their way of life to the conditions of nature and made use of the ecological resources with the simple tools they had at their disposal. During the last decades, this population group has especially had to face growing pressure for modernisation because of regional development programmes, introducing modern agricultural methods like irrigation systems, in the Pantanal region. Today, the traditional culture of the *ribeirinhos* faces extinction. On one hand, urban families immigrate into the riverine regions, introduce modern ways of economy, construct weekend homes, and therefore substitute the traditional people. On the other hand, the *ribeirinhos* partly integrate into market-orientated production by adopting innovations and new technologies. This tendency, observed throughout all of the forest and floodplain regions in South America, results in a continuous degradation of the ecosystem. At the same time, the detailed traditional knowledge of these population groups in respect to the fragile ecological system of the Pantanal is in danger of being completely lost and its potentials there with, may be forgotten forever.

24.1 Introduction

The riverine communities belong – apart from the Indian communities – to the oldest in the Pantanal region. The *ribeirinhos* arrived with the gold diggers in the 18th century and settled along the riverbanks. They served the expedition troops – the so-called *bandeirantes* – as a main access point to the region. That is why today the riverbanks, especially those of the Paraguay and the Cuiabá River, are still the

most densely populated areas in the Pantanal region. Throughout the centuries the *ribeirinhos* adapted their way of life to the demands of nature and made use of the ecological resources with the simple tools they had at their disposal. Due to the dynamic of regional development in the Pantanal, this population group has especially had to face a growing pressure for modernisation, hence introducing modern production methods in agriculture and turning away from the traditional ecologically adapted methods.

These changes will be analysed in this article. After considering the environmental basis of the region, the analysis will at first focus on the traditional ways of life of the *ribeirinhos* in general and the transformations they have had to face. A more detailed examination of this structural change will then be demonstrated by describing the formation and development of two neighbouring *ribeirinho* communities upon the Cuiabá River, just south of the state capital.

24.2 Potentials and risks of the Pantanal ecosystem as a basis of the *ribeirinho* way of life

The geomorphological conditions of the Pantanal region provided very suitable conditions for the formation of the riverbanks (JUNK & NUNES DE CUNHA 2005). Due to its slight slope, the floodplain of the Pantanal allows the formation of numerous meandering rivers. The natural landscape is mainly characterised by its many lakes and temporary lagoons, which are also called *baías* (WILHELMY 1958; ASSINE & SOARES 2004). *Corixos* and *vazantes*, level shallow channels, connect the rivers and the lakes, sometimes all year round, sometimes only during the rainy season (GIRARD et al. 2003; WANTZEN et al. 2005). These channels provide access for the fish to reach their spawning areas in the *baías*. The vegetation is very diverse. Open grasslands, also called *campos limpos*, dominate the long-term flooded regions, while the higher parts that are only flooded for short periods of time or sporadically are covered by deciduous rain forests or dry forests. Gallery forests occur along the riverbeds (STEFAN 1964; SARMIENTO 1983; DA SILVA 1988; IBGE 1988; ZEILHOFER & SCHESSL 1999, and see chapters 7 and 12).

The regular and long-lasting flooding sets limits to agriculture for the Pantanal (JUNK & NUNES DA CUNHA 2005). This, along with the fact that most of the lands grass is very good for grazing, leads to widespread extensive cattle ranching in most of the Pantanal region. The areas directly along the rivers however are very suitable for the cultivation of agricultural products. This is due to their morphology: when entering the Pantanal, the sediment-loaded rivers deposit their solid load in narrow alluvial riverbanks that reach far into the floodplains. These are flooded each year but only for a short period of time, providing adequate soil conditions for forest

development (HAASE 1999). Furthermore, fluvial sediments are regularly deposited there, developing solonetz soils and improving the otherwise limited fertility of the ground (MELO 1957; ZEILHOFER & SCHESSEL 1999, and see chapter 3). These small strips of land along the rivers, also called *zona ribeirinha*, are today used agriculturally and have the highest population density in the Pantanal region due to the fact that all communities are located in this *zona ribeirinha* (Fig. 24.1).

The density of the population is associated with the abundance of fish in the Pantanal rivers which is due to the seasonal migration of great shoals of fish (LIMA 1986, 1987; HYLANDER et al. 2000; YOKOO et al. 2001). From June to October, when the water reaches its lowest level, the popularly so-called *peixes de escama* ('scaled fish'), such as Dourado (*Salminus maxillosus*) and Curimbatá (*Prochilodus lineatus*), migrate upriver in large shoals in order to spawn in the calm waters of the *baías* and *corixos* during the flood season from January to April (Fig. 24.2). During that time, the popularly so-called *peixes de couro* ('leather-skinned fish'), such as Pintado (*Pseudoplatystoma corruscans*), various species of catfish (*Pimelodus spp.*) and Jaú (*Paulicea luetkeni*), migrate upriver (see chapters 17, 22, 30). Due to the extraordinary, plentiful fish in the rivers, mostly in the dry season, fish was traditionally and still is the most important food source for the *ribeirinhos*. Agricultural products are only cultivated in a minor fashion and then, exclusively during the rainy season.

24.3 The importance of the ribeirinhos in the history of the Pantanal and their adaptation to economic and ecological conditions

Due to their way of life, the *ribeirinhos* are able to make use of the natural resources of the Pantanal in an ideal way. Etymologically, the word *ribeirinho* comes from the word *ribeiro* (port.: creek) and in its widest sense is used for people living close to rivers (FERREIRA 1986). While there is no explicit definition for the word *ribeirinho* in the Pantanal region, several attempts have been made to define the corresponding traditionally subsistence-orientated smallholders in the Amazon region under the term *caboclo* (POSEY & BALÉE 1989; SILVA-FORSBERG & FEARNSIDE 1997; PADOCH et al. 1999; DENEVAN 2001). The *caboclos* in the Amazon as well as the *ribeirinhos* in the Pantanal were European settlers (or at least of European origin) advancing into the different regions in order to settle on the riverbanks (JUNK 1989; PACE 1997; STERNBERG 1998). They intermixed with the local indigenous population and adopted elements of their way of life. They acquired the knowledge of the *indios* of the local ecosystem and applied it by using environmental sources such as fishing and gathering fruits of the *cerrado* vegetation. The European heritage and cultural background became especially visible in their settlement pattern: permanent residence, land con-

The *zona ribeirinha* of the Rio Cuiabá

(Strongly modified after Melo 1957)

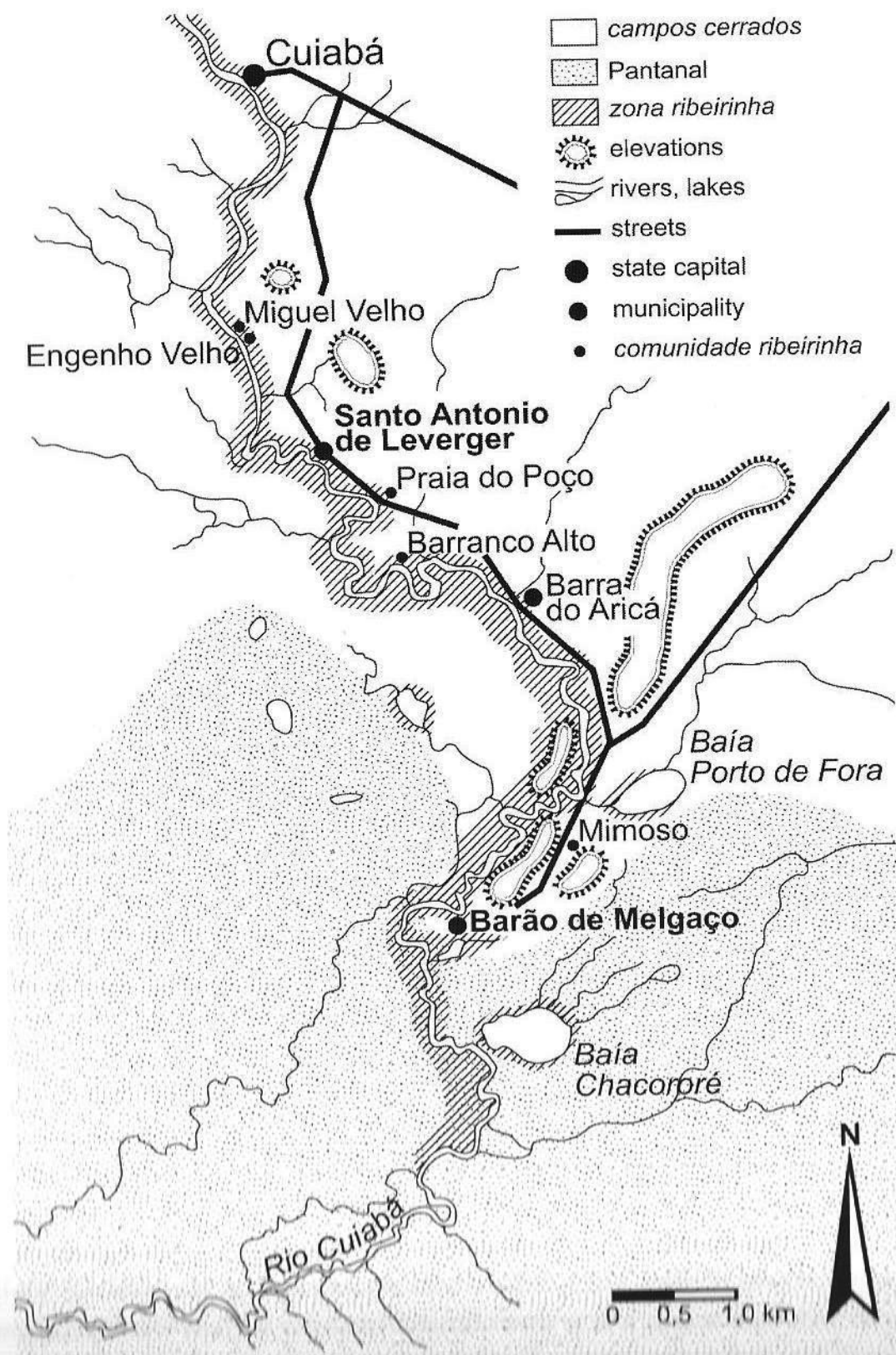


Fig. 24.1 The *zona ribeirinha* of the Rio Cuiabá.

Water level and migration of fish swarms

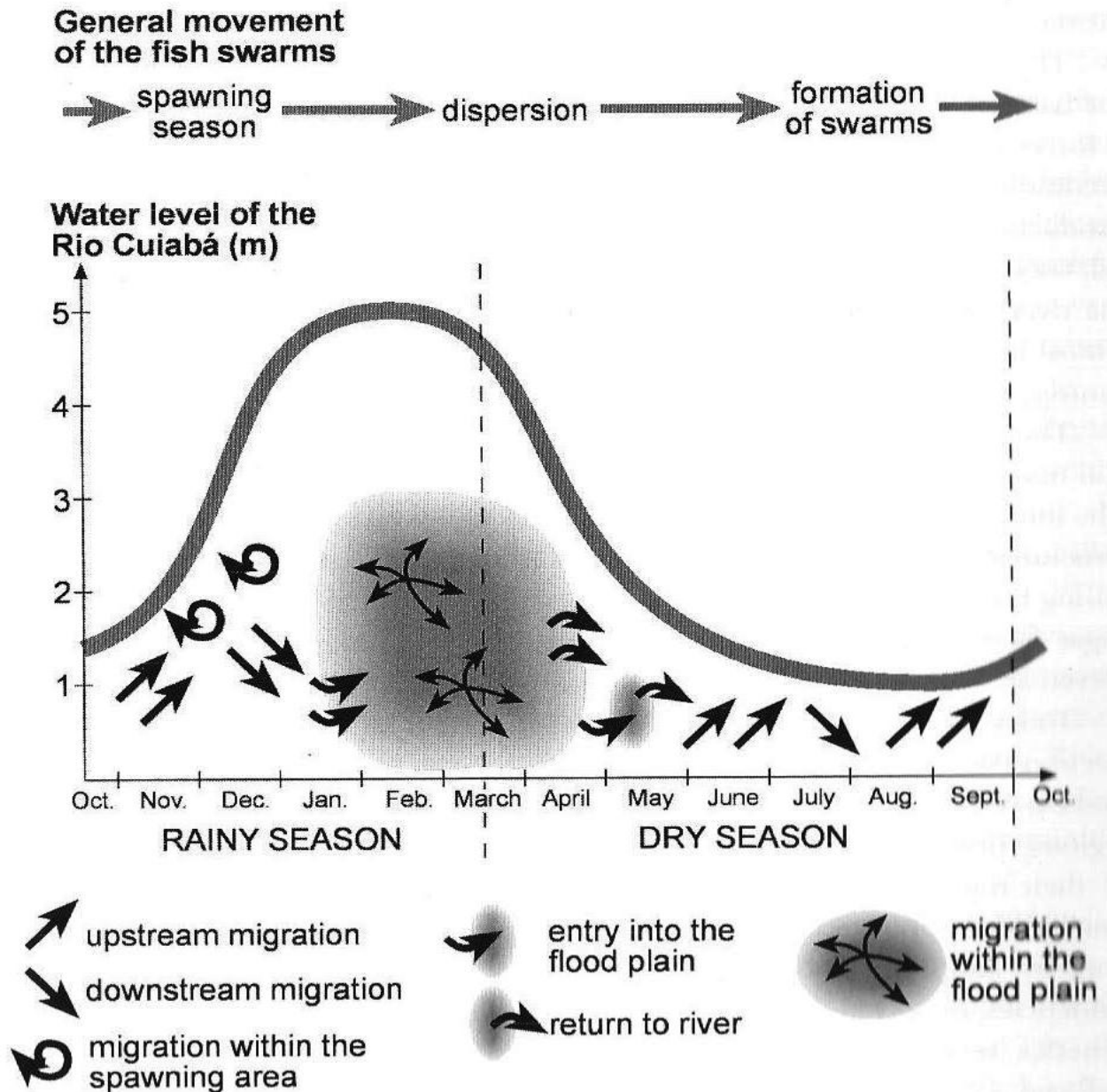


Fig. 24.2 Water level and migration of fish swarms. (Modified from Lima 1987)

sidered as individual property, domestication of animals and agricultural techniques like crop rotation, fertilisation and fallow land were important characteristics of this.

The economic structure evolving from this consists of various combinations of fishing, agriculture, gardening, gathering and hunting, depending on the regional ecological situation. The farm labour is exclusively confined to family members,

who use very simple tools derived from nature, most of which originate from the surrounding area. The entire production is geared to self-sufficiency. Production surpluses are sold to mobile traders operating on the rivers. This prevents a strong social stratification within the group of *ribeirinhos*. At the same time, subsistence farming guarantees the security of autonomy.

The river is the most important element in the life of the *ribeirinhos*. It builds the basis of their lives by providing them with staple food: fish. At the same time, it forces them to adapt to the rhythm of low waters and floods. Accordingly living accommodation (for example houses on stilts) and the cultivation of agricultural products have to be adjusted to the great fluctuations of the river levels. The local, social and economic isolation is also characteristic of the *ribeirinhos*, however, the river serves as a means of communication and transport as their houses are almost impossible to reach by land. They are very remote from any of the regional centres, since there are rarely any connecting roads.

The word *ribeirinho* thus describes a way of life that is deeply linked with river and traditional subsistence farming, which only changed a couple of decades ago. The integration of these riverine people into the global market or regional market structures – which took place in the Amazon in the middle of the 19th century during the rubber boom and in the Pantanal at the end of the 19th century, when sugar factories settled in the region – changed this situation. The *ribeirinhos* now served as workers for the sugar production (ROSS 1978; NEUBURGER 2005).

Today, the traditional culture of the *ribeirinhos* and of the *caboclos*, faces extinction (WOLF 1955; MORAN 1974; PABST 1988; DE JONG 2001; KVIST et al. 2001; PINEDO-VASQUEZ et al. 2002). On one hand, new settlers advance into their regions, bringing with them modern ways of economy and driving them out of their traditional settlement areas. On the other hand, parts of the traditional smallholder population integrate into the expanding capitalistic ways of production, by adopting innovations and entering the market. These modernisation tendencies, observed throughout all of the forest and floodplain regions in South America, result in a continuous degradation of the ecosystem (SMITH 1985; EDEN & PARRY 1996).

In the Pantanal of Mato Grosso, the rate of rural exodus of *ribeirinhos* is very high. Due to migration, the rural population in the municipalities of Barão de Melgaço, Cáceres, Poconé and Santa Antônio do Leverger, halved between 1970 and 2000 (IBGE 2000). Despite the high migration rate, the *ribeirinhos* still build the largest population group, even though their settlement area only comprises of a small percentage of the Pantanal region. In the following sections the most important factors of the developments of the recent decades and the resulting impacts on the *ribeirinhos*, are analysed.

24.3.1 The formation of ribeirão communities in the Pantanal

Most *ribeirão* communities were founded when *bandeirantes* from São Paulo settled on the riverbanks of the Cuiabá and Paraguay River, during expeditions to dig for gold and capture Indian slaves (DA SILVA & SILVA 1995; NEUBURGER 1996). Therefore, the origins of the communities presumably date back to the 18th century. The ecological environment – fertile grounds in the areas flooded by the river, great shoals of fish and diversity of fauna – offered an ideal basis for the economic structure of the new settlers. Particularly the embankments of the Rio Cuiabá between the towns of Santo Antonio de Leverger and Barão de Melgaço, which are several kilometres wide, represent a preferable area of settlement for the *ribeirinhos* in the Pantanal. Upriver of this section of the river, the embankment gets very narrow while south of it, lay the floodplains of the Pantanal with their long-lasting floods (Fig. 24.2 and Table 24.1).

The *ribeirinhos* basically earned their livelihoods with fishing. To a lesser degree they also hunted and cultivated staple food like corn, rice, beans and manioc on the subsistence principle (CORREA FILHO 1946). As the local soils were very fertile, the people soon began cultivating sugar cane in order to produce crude sugar, called *rapadura*, and sugarcane brandy in small wooden mills (AZZI 1961; SOUZA 1978). These products were traded in the whole region. The trade with fish, *rapadura* and brandy, especially in villages close to the Rio Cuiabá, experienced a boom in the beginning of the 19th century and grew steadily. With the growing importance of these trading structures, some communities on the Cuiabá and Paraguay Rivers developed into important trading centres (ESTADO DE MATO GROSSO/DREC). More than 20 species of plants were cultivated by the riverine traditional communities and more than hundred species used (DE MORAIS 2008).

The opening of the Paraguay River for international shipping in 1856, as a result of the peace treaty between Argentina and Brazil, recognizing the independence of Uruguay and Paraguay, created a considerable economic boom for the region. For the first time modern steam engines could be transported into the region. Some landowners already producing *rapadura* and schnapps, called *cachaça*, in small sugar mills and with land directly at the Cuiabá or Paraguay River, installed big steam-operated iron mills and could consequently produce larger quantities. The import of modern machinery also enabled a diversification of the products: refined sugar and alcohol were added. This is why large sugar factories, called *usinas*, began to emerge along the Rio Cuiabá at the end of the 19th century, supplying the regional market with these products (SIQUEIRA et al. 1990; BORGES 1991). With the introduction of the big sugar factories in the region, the conditions of life for the *ribeirinhos* insidiously changed. On one hand, the landowners enlarged

Table 24.1 Characterisation of traditional and indigenous communities in the Pantanal region.

Communi- nity	Munici- pality	Ecologi- cal region	Associ- ated river	Principal economic activities	Relation with the variability of water level
<i>Sucuri</i>	Cuiabá	Paraguay depres- sion	Cuiabá	fishery, paid work, production of <i>farinha</i> , horticulture, production of traditional sweets	high
<i>Praia Grande</i>	Várzea Grande	Paraguay depres- sion	Cuiabá	fishery, paid work, horticulture, production of traditional sweets, tourism	high
<i>Mimoso</i>	Santo An- tonio de Leverger	Pantanal	Cuiabá	cattle ranching, horticulture, production of traditional sweets,	low
<i>Praia do Poço</i>	Santo An- tonio de Leverger	Paraguay depres- sion	Cuiabá	production of <i>rapadura</i> , horticulture	high
<i>Morro Grande</i>	Santo An- tonio de Leverger	Paraguay depres- sion	Cuiabá	production of <i>farinha</i>	middle
<i>Barranco Alto</i>	Santo An- tonio de Leverger	Pantanal	Cuiabá	fishery, production of food crops	high
<i>Estirão Comprido</i>	Barão de Melgaço	Pantanal	Cuiabá	fishery, production of food crops	middle
<i>Porto Brandão</i>	Santo An- tonio de Leverger	Pantanal	Cuiabá	fishery, hunting, production of food crops, extractivism	high
<i>Guató</i>	Ilha Insua- Corumbá	Pantanal	Paraguay	fishery, extractivism, production of food crops	middle
<i>Bororo (village of Teresa Cristina)</i>	Rondo- nópolis	Planalto	Cuiabá	production of food crops, extractivism	middle
<i>Bororo (village of Pirigara)</i>	Barão de Melgaço	Pantanal	Cuiabá	fishery, extractivism, production of food crops	high
<i>Pareci (village of Rio For- moso)</i>	Tangará da Serra	Planalto	upper Rio Paraguay	production of food crops, extractivism, production of handycraft	middle
<i>Umutina, Parecis</i>	Barra do Bugres	Planalto	Paraguay	fishery, extractivism, production of food crops	high

Source: Own compilation of information of GERA-UFMT 1998; da Silva and Silva 1995; Amoroso 1997; Ferreira 1995; Costa Jr. 1995; Reis 1996; da Silva et al. 1998

their sugar cane plantations and drove the *ribeirinhos* out of the fertile grounds along the rivers. On the other hand, sugar factories offered seasonal jobs for the *ribeirinho* population. Apart from this, almost every *ribeirinho* family cultivated a few hectares of sugar cane on their own land, in order to sell it to the factories. When the sugar factories closed in the 1950s and 1960s – the local sugar production no longer being able to compete with the cheap products of the main cultivation areas in north-eastern Brazil – the *ribeirinhos* lost this additional source of income. As a result, some families migrated to the core municipality. Others extended their agricultural production and sold their products to trading ships that commuted regularly on the Rio Cuiabá.

24.3.2 Modern influences, impoverishment and ecological degradation

In the 1960s and 1970s, the first projects within the framework of the so-called *Marcha para Oeste* policy, the 'Go West' policy of the Brazilian government to open up the Amazon region, were implemented in the state of Mato Grosso (COY & LÜCKER 1993; NEUBURGER & COY 2000). Their goal was to integrate the peripheral regions of the Amazon into the national economy and to populate these areas (BERTRAN 1988; COY 1991). By building highways and implementing colonisation projects in the *cerrado* areas, the economical dynamic of the region shifted into the higher regions of the Pantanal, while the floodplains were excluded from this development.

The general improvement of the road network in Mato Grosso, especially the road São Paulo – Cuiabá, created great competition for shipping. The transportation of goods from Europe via the La Plata river system had always been very expensive and time-consuming. Due to cheaper transportation by road, shipping on the Pantanal rivers was suspended at the end of the 1970s. This resulted in an almost complete isolation from the regional market and communication structures for the *ribeirinhos*. The few roads of access, built to connect the *ribeirinho* settlements to the road network, could not stop the decline of their standard of living; since they did not have any means of transportation for instance cars or ox-drawn carriages, to sell their production surpluses. The *ribeirinho* population faced growing impoverishment and finally they migrated in large numbers to the neighbouring cities.

In order to control such displacement processes, which were a consequence of the beginning of the modernisation in the rural area of Mato Grosso, extensive programmes for the support of smallholders were introduced. They aimed at modernising the traditional subsistence-oriented economy and at improving the income level of the families. The international programme for regional development POLONOROESTE, which was supported by the World Bank, offered numerous inexpensive credits to smallholders and *ribeirinhos* in order for them to

diversify and modernise their agricultural production (COY 1988; KLEIN 1998). This programme existed until the mid-1980s and was continued by the PRODEA-GRO project in the 1990s.

Several projects introducing intensive irrigation for the cultivation of vegetables were developed for the *ribeirinhos* (NEUBURGER 1994). These appeared to be ideally adapted to the potentials of the region – availability of water and short transport distances to the city of Cuiabá. The projects focused on particularly small farms with less than 100 hectares, of which the owners were dependent on. Low interest bank credits were granted to finance irrigation systems and inputs like seed, fertiliser and pesticides.

In spite of the considerable rate of success within the first years of the project, major problems soon occurred. The profitability of the projects was reduced by low production and falling product prices accompanied by rising costs for investment goods. This led to an immense reduction in profits of vegetable cultivation and caused a considerable loss of income with a simultaneous increase of debts for the families involved. Due to the aforesaid problems numerous farmers gave up irrigation within a few years. In view of their high debts, they often even had to sell their small farms and, thus, lost their basic livelihood.

As well as suffering the disadvantages of agricultural modernisation tendencies, the *ribeirinho* communities situated close to the bigger cities Cáceres and Cuiabá, had to face an additional displacement burden (NEUBURGER 1995, 2005). The fast pace of development of the cities in the 1970s and 1980s increased the need for nearby recreational areas for the urban population. In view of their rural character, fishing possibilities and water sports, the *ribeirinho* communities offered attractive leisure activities. This caused a growing demand for property by the urban population in the *ribeirinho* region. Large bungalow-like holiday houses emerged. The local *ribeirinho* families that lost their properties due to this development had to face another major setback concerning their social status. Today, these families often take care of the holiday domiciles of the rich families from Cuiabá City. Many *ribeirinho* families in the meantime, sell their houses at the Cuiabá River to fisherman from other States and thereafter are employed by them. The same displacement process of *ribeirinhos* also occurs with many other traditional communities living along the Cuiabá River downstream of the capital (DA SILVA et al. 2008).

24.4 Engenho Velho and Miguel Velho as case studies of typical *ribeirinho* communities

The outlined development in the *ribeirinho* settlements, the change of socio-economic structure and the development of the relationship between people and

nature can be shown by analysing the two neighbouring *ribeirinho* communities Engenho Velho and Miguel Velho situated approximately 20 km south of the states Capital at the Rio Cuiabá (NEUBURGER 1995).

24.4.1 The historical survey of Engenho Velho and Miguel Velho: foundation, boom and degradation

The region of Engenho Velho and Miguel Velho was first mentioned in documents in 1820. After an area of about 1800 hectares had initially been used for extensive cattle breeding, two groups of families – probably former slaves – occupied the land along the river and divided the former *fazenda* into two parts: Engenho Velho in the south and Miguel Velho in the north (Fig. 24.3, A). Due to immigration from Bolivia, northeastern Brazil and the surrounding areas, as well as high natural population growth and the practice of property inheritance, the land was further divided. As a result, each family only held a small lot to cultivate at the river, without having a land title for it and therefore not officially owning the land (Fig. 24.3, B). A small area of about 30 hectares in the east was occupied by families from the neighbouring district Bocaina and also divided into small parcels. Until the 1980s, this led to violent disputes between the villages Engenho Velho and Miguel Velho on the one side and Bocaina on the other.

The families of Engenho Velho and Miguel Velho adjusted their settlements to the natural environment of the riverbanks. The *ribeirinhos* chose to settle directly on the riverbanks because of their identification with their former native evergreen tropical forests. Hence, these were especially suitable for them regarding habitual

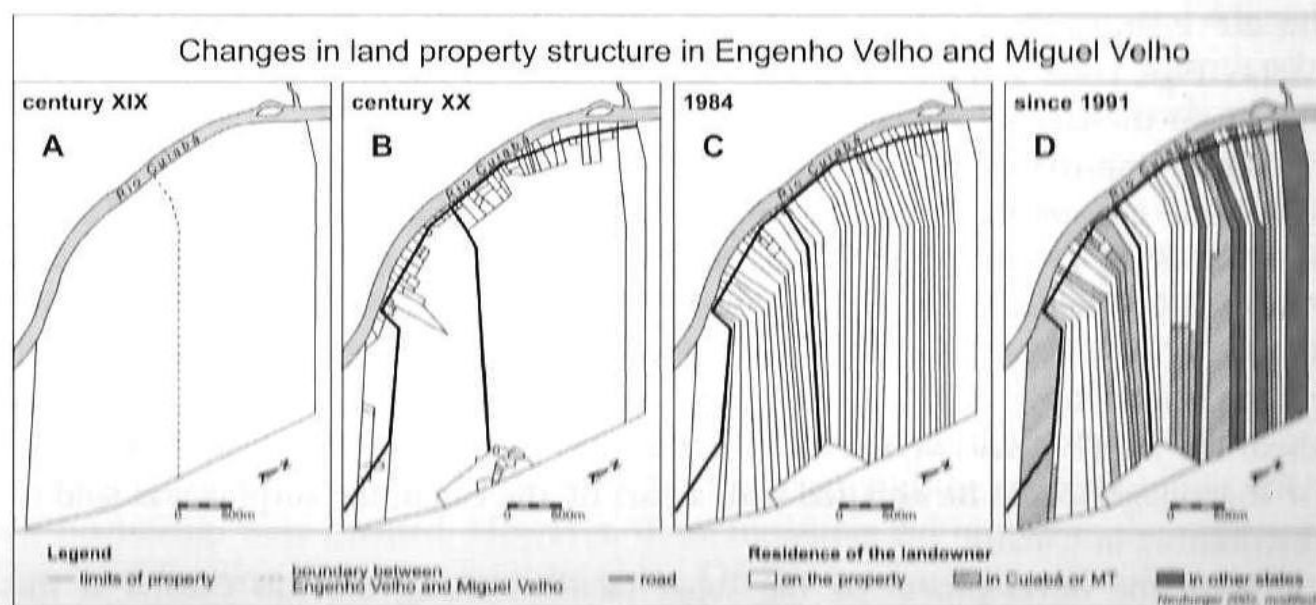


Fig. 24.3 Changes in land property structure in Engenho Velho and Miguel Velho.

and agricultural use. These banks are high enough only to be flooded for very short periods of time, when the river reaches its highest level, but not too high as to be dried out completely during the dry season. In addition, the fertile alluvial soil is constantly renewed due to regular flooding (MELO 1957; ZEILHOFER & SCHESSL 1999). The embankment displays the specific characteristic profile of the Pantanal rivers (Fig. 24.4). In some parts of the riverbank a small plantation can be found. This plantation is flooded during the rainy season, but falls dry during the dry period. The terrain directly along the river forms a 50-100 meter wide depression, the so-called *baixada*. The elevated section bordering this *baixada* was in some parts heaped up by the *ribeirinhos* to protect the farmsteads from heavy, long-lasting floods. Behind it, the ground drops again slightly, which is why *baías* and *corixos* can be found here. In the described profile, the 200-300 meter wide embankment created by the Rio Cuiabá reaches from the river to the elevated farmsteads.

The *ribeirinhos* cultivated staple food for their own use, using the principle of crop rotation and slash-and-burn. The change of rainy season to dry season was the dominating factor for their way of working and their economic structures. Since most parts of the *baixada* are flooded during the rainy season, rice, corn and beans were cultivated near the farmstead during those periods. In the dry season, the cultivation of sweet potatoes and tomatoes was limited to the *plantio de praia*, which only included small plantations at the embankment. In some years, when the water reached its lowest levels, resulting small river islets were also used for cultivation. The scarce precipitation did not allow for any of the other areas to be cultivated. Due to the permeability of the ground, the water from the rainy season was not retained and therefore the cultivation of these areas was not possible (WILHELMY 1958; ZEILHOFER & SCHESSL 1999). In addition to staple food, most families cultivated sugar cane in order to produce *rapadura*. In the beginning of the 20th century, 30 *engenhos* existed in the two villages Engenho Velho and Miguel Velho. Pigs, cows and chickens were kept in order to supply meat demand. Fruit trees near the farmsteads provided a variation of diet.

More important, than the cultivation of staple food, was fishing, which was very time consuming. Between May and October edible fish – Pacu (*Piaractus mesopotamicus*), Dourado (*Salminus maxillosus*), Piraputanga (*Brycon microlepis*), and Curimbatá (*Prochilodus lineatus*), as well as the Lambari (*Astyanax abramis*) and Piquira (*Characidium laterale*) which are used for oil production – were mostly caught. In October and November it was the so-called *peixes de couro*, among them the Jau (*Paulicea luetkeni*) and the Barbado (*Pinirampus pinirampu*). The needs of the villages could be satisfied with a part of the catch, the surplus was sold to distributors in Cuiabá.

With the development of big sugar factories along the Rio Cuiabá at the end of the 19th and the beginning of the 20th century, the conditions of the life

of the *ribeirinhos* changed. They either found seasonal work in the factories, or they cultivated between 2 and 5 hectares of sugar cane in order to sell it to the *usinas* of Conceição, Maravilha and São Sebastião. After the decline of the sugar factories in the 1950s and 1960s, the population of Engenho Velho and Miguel Velho, as well as the other *ribeirinhos* at the Rio Cuiabá, had to look for alternative sources of income. Most families started cultivating alternative products like potatoes, pumpkins and tobacco, selling to neighbouring villages and towns via trading ships, commuting regularly between Corumbá and Cuiabá. In return, the *ribeirinhos* bought products they could not produce themselves from the *lanchas* as, for example, salt, fuels, textiles, clothes, etc. The decline of the sugar factories also had a strong impact upon other communities along the Cuiabá River downstream Cuiabá city, e.g. the Cuiabá Mirim community (GALDINO & DA SILVA 2007).

The main source of income during the dry season remained fishing. In 1969, the Brazilian Ministry of the Environment IBAMA prohibited the use of all kinds of fishing nets, in order to protect the shoals of fish. Since then, fishing is only permitted with fishing rods. Fishing during the spawning period, between November 10th and February 10th and generally in the *baías* – close to water springs and next to waterfalls – was prohibited. These major restrictions, however, only resulted in a minor decrease of fishing, since the law could not be enforced due to the difficulty of carrying out controls. In Engenho Velho and Miguel Velho, illegal fishing with nets was and is still practiced on a large scale. Nepotism and corruption protect the fishermen from high fines. As well as losses of income due to the new fishing laws (the resulting corruption leads to higher prices) the *ribeirinhos* lost a major chance of increasing their income through selling their agricultural products, with the expiry of the river trade. The resulting impoverishment forced a lot of families to migrate to the close-by cities.

The construction of infrastructure facilities in Engenho Velho and Miguel Velho during the 1980s was aimed to reduce migration into the cities. Both villages were connected to electricity and a well was built in order to provide water. The installation of a telephone station brought a major advantage, especially for the fishermen: the direct contact with the traders was advantageous for the selling of perishable goods. In 1984, INCRA compiled a land register in order to grant official ownership of the land in the region. The entire area of the former *fazenda* was measured and divided between the families of Engenho Velho and Miguel Velho into lots of 15-35 hectares. This led to a composition of strips of farmland extending behind each farmstead (Fig. 24.3, C). During the next couple of years the lots were entered in the local land register and the corresponding titles of ownership were granted. However, these measures did not bring the expected result of limiting migration into the cities. On the contrary: the official legal declarations of ownership made the sale of land much easier. At the same time, the

demand for properties by the upper class of the population of Cuiabá rose. They had discovered an ideal setting for leisure activities in Engenho Velho and Miguel Velho. Therefore, much land was sold to foreigners during the next few years (Fig. 24.3, D).

Nowadays, these *ribeirinhos* are facing an additional important change in the natural hydrological regime of the Cuiabá River, i.e. due to the construction of the Manso hydropower dam, which they consider as being responsible for the decline of fisheries (SIMONI 2004; DA SILVA et al 2008).

24.4.2 Modernisation as a survival strategy of the *ribeirinhos* in Engenho Velho and Miguel Velho

In order to limit the migration into the cities from Engenho Velho and Miguel Velho and to better the income of the local people, the State Agency for Agricultural Extension Service EMATER undertook irrigation projects in 1985. Financed by credits within the POLONOROESTE-Programme, irrigation and the production of vegetables and beans were promoted. Engenho Velho and Miguel Velho were chosen for the irrigation projects because on one hand the contours of the geographical conditions were suitable for irrigation, on the other hand because Cuiabá was easily accessible, which made quick sales of the perishable goods possible.

EMATER and the local smallholder association worked hand in hand to organise the projects. They advertised the projects in villages and received great interest in the beginning. However, the credit conditions, especially the mortgaging of the properties and houses, deterred a lot of people. Furthermore, economic and social selection criteria limited the number of eligible people. Therefore, only 13 projects could be implemented. However, when giving out the appropriations, the general guidelines of the projects were not always followed. For example, companies with owners living in Cuiabá and with non-agricultural incomes received low interest rate credits as well.

During the dry season, the farmers almost exclusively cultivated and irrigated pepper, aubergines, jiló (*Solanum gilo* Raddi), cucumber, pumpkin, maxixe (*Cucumis anguria* L.), zucchini and beans in the fields behind their farmsteads (Fig. 24.4). The varied cultivation permitted a flexibility of labour, costs and market income for the period between April and November. The task of tending the fields, sowing, fertilisation and the use of pesticides were mostly done between April and May, while in June, the first harvests could be reaped. The diversity of products made it possible to stretch the harvesting over several of months, usually until November, the beginning of the rainy season. For the main harvest period between September and November, the farmers often needed additional workers, since an average

of 2 workers per hectare was needed. Sometimes relatives helped out, sometimes seasonal workers were hired or the harvesting was realised by neighbours helping each other. The products hardly changed during the rainy season. Although during that time, cultivation was limited to the fields behind the farmsteads, since the *baixada* is flooded during this season (Fig. 24.4). If necessary, the irrigation was also carried out during the rainy season.

With the introduction of irrigation, the everyday life and work rhythm of the families changed completely. The intensive labour involved in vegetable cultivation forced them to give up their traditional activities, including fishing, as well as the cultivation of rice, corn and beans. The area for crops on the farms was enlarged, so that every family member was busy throughout the year. Since economic practices are closely linked to social and cultural rituals in traditional populations, these changes brought about dissolution of the former family and social life.

Furthermore, the *ribeirinho* families lacked experience regarding intensive cultivation and the use of agricultural chemicals. Therefore, during the first years of the projects, the productivity stagnated on an unsatisfying low level. It also dropped even further due to a growing pest infestation. At the same time the marketing of the products caused major problems, since the Mato Grosso market for fresh produce, until today, is under the control of a few, well established wholesalers. They set obstacles for new traders trying to build an existence and manipulate prices according to their own needs (GALLUS 1994). On top of that the vegetable

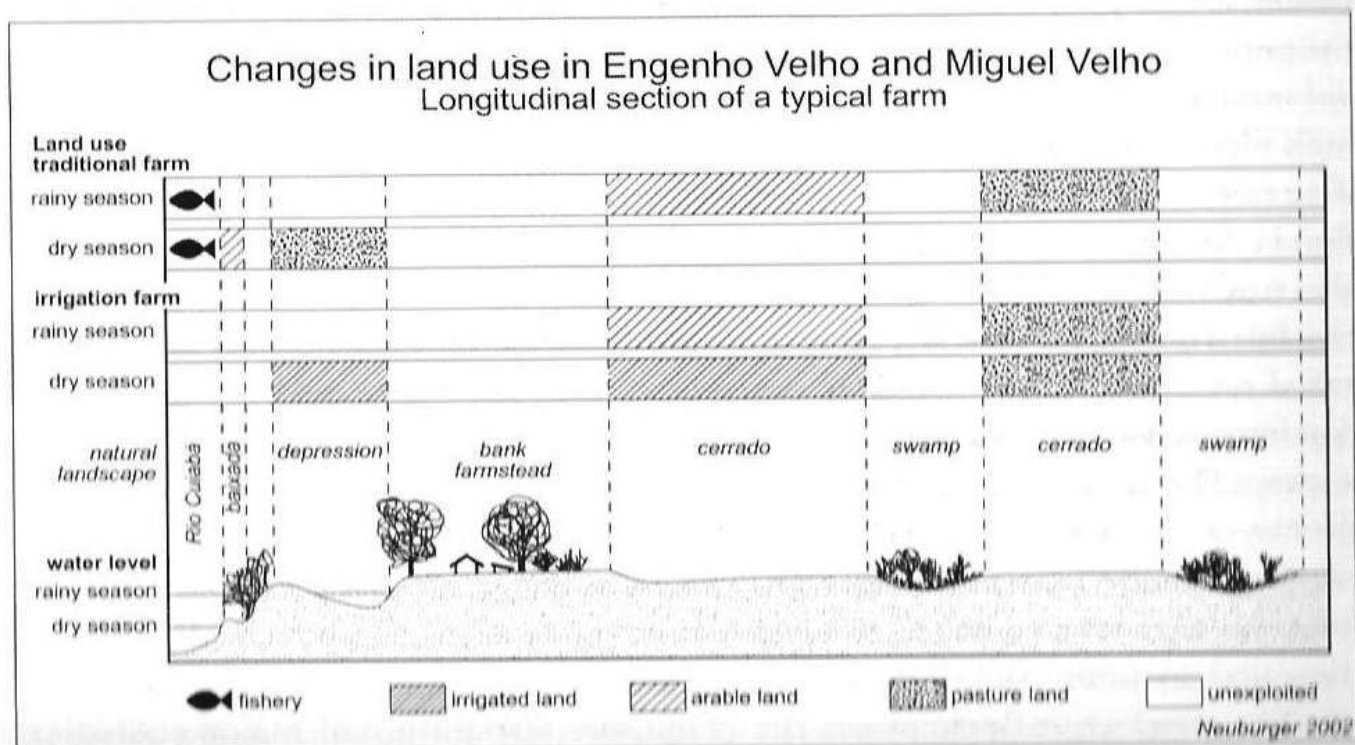


Fig. 24.4 Changes in land use in Engenho Velho and Miguel Velho.

farmers, in spite of their high debts, were forced to invest in expensive equipment in order to keep production flowing.

Due to the above stated problems, about 60% of the farmers already gave irrigation up after a few years. The families that still use irrigation today are, in most cases, farms with a favourable economic structure. Most of them have alternate sources of income in order to overcome crises. Some families have tried to diversify their sources of income: they built little ponds, buying fish during the dry season, when it is cheap, or catching it themselves, and keeping it in their ponds until reselling it during the rainy season, when prices for fish – especially during the Holy Week – rise immensely. The other families, who didn't have sufficient capital for these investments, abandoned irrigation. However, by doing that they lost a great part of their income and suffered an extreme decline of their standard of living: they had high debts and were therefore forced to sell their farms and migrate to Cuiabá, where they face a life of poverty and informality in the slums of the outskirts of the city.

24.5 Discussion and conclusions

As shown in the outlined examples, the *ribeirinhos* have always had a special affinity to the ecological conditions. General modernisation impulses and the growing migration pressure caused by the urban population create a growing disturbance in this balance and often lead to ecological degradation and social descent.

Whilst settling on the banks of the Pantanal rivers, the *ribeirinhos* used the potentials of the environment without causing sustainable damage to the ecosystem. At the same time, they protected themselves against possible risks. The regular flooding did not create any existential problems for the *comunidades ribeirinhas*. The inhabitants built their huts on the higher parts of the embankments, which they built up higher if necessary. Through this, they created an effective protection against long-lasting floods. During the occasional mega floods that occur about every 30 years, which also reach the farmsteads, the families moved back into the higher parts of the hinterland. The special building technique of mud stick construction for the houses, called *pan-a-pique*, kept them from being destroyed. They were made of clay put on perches and built on a frame of high poles. Floods only loosened the clay and carried it away. The firmly rooted frame stayed undamaged. When the water moved back, the clay could easily be renewed. In the last couple of years, however, more and more houses of stone have been built in the *ribeirinho* villages. Houses built with modern materials are a status symbol, although these houses are not adapted to the environment and are often badly damaged during floods.

The modern influences on the economic structure had major ecological effects. Primarily, the life of the *ribeirinhos* was closely linked to the ecological

conditions. The abundance of fish in the Pantanal rivers was, especially during the dry season, an ideal source of nourishment. The cultivation of staple food through hoe-farming only served as an addition to the basic diet. It was carried out in a minor fashion, partly because fishing was very time consuming and did not leave much time for agricultural work, partly because the lack of precipitation or the regular floods did not allow for large-scale agricultural production. The irrigation projects changed this and made it possible for much larger areas to be farmed almost all year round. Intensive use as well as widespread use of agricultural chemicals led to growing contamination of the soils, as well as of the river and ground water and damaged the entire ecosystem of the Pantanal. Moreover, the *ribeirinhos* as well as the wealthy people from Cuiabá cleared the protecting bush from the riverbanks, so that the embankments today are particularly vulnerable to rapid erosion during the rainy season. The resulting loss of land causes great problems because it is especially the fertile soils that are lost.

As shown earlier, the affinity to nature during the foundation of the *comunidades ribeirinhas* was complete. The developments of later years forced the *ribeirinhos* to give up their life style and to adopt modern productivity. This modernisation, however, did not result in any of the expected improvement to the conditions of life to those traditional groups, but led to new problems, and increased the pressure on the *ribeirinhos* to migrate. Their way of life and their primal knowledge is in danger of being lost completely. However, the detailed ancient knowledge regarding the ecological system of the Pantanal region and the potentials of adequate use and management of the natural resources such as the *ribeirinhos* still possess, could be an important basis for the search for perspectives in respect of sustainable development in the ecologically fragile region.

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