People and Forest Products in Central Amazonia: the Multidisciplinary Approach of Extractivism

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Introduction and context

Extractivism is often thought of as obsolete, a reminder of Brazil's numerous economic cycles. The recent political activities of the *seringueiros* trade unions and the growing public awareness of ecological problems have served to propel this long-established practice in forest resource management into the centre of the debate on the future of forest ecosystems in Amazonia.

For some years, the question of the place of extractivism in regional development has given rise to numerous controversies between groups with two opposing points of view. For one, the low returns, the precarious balance of resources, the narrow scope of the markets, the competition from synthesized products or availability of products from industrialized plantations and the growing marginalization of the actors, all compound to condemn extractivism as a model of exploitation of Amazonian ecosystems with no practical value. For the other, the economic arguments alone do not justify this judgement. The ecological aspect of extractivism, which exploits the intrinsic value of the forest, stands opposed to the degradation caused by recent regional management policies that promote new schemes of development based on pastures and agricultural pioneer settlements. The protagonists of this point of view suggest the creation of extractive reserves within which management practices would be geared towards the socio-cultural requirements of the forest inhabitants whilst maintaining the biodiversity of the ecosystem. This new concept would favour the evolution of extractivism towards an economically and socially viable means of support. These extractive reserves would also recognize the producers' own rights to their means of subsistence i.e. the forest.

The local and regional political powers are concerned by this debate which again brings to the fore the central question of land tenure in Brazilian society. But generally the debate only takes into account the better known and most publicized examples of extractivism such as the situation of the rubber tapers (*seringueiros*) of Acre or of the *castanha*[2] gatherers of the Marabá region, leaving many aspects uncovered.

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DEFINITION

For the purposes of our research, we have defined extractivism as 'the systems of exploitation of forest products that are intended for sale on the regional (within country), national or international markets'.

Extractive activities are distinct from those of a hunter-gatherer society whose products are only for household consumption or for local exchange. Extractivism and gathering are born of two different types of economic logic, one regulated by the exterior market, the other by the needs of the domestic unit. Our research has only dealt with non-timber forest products, excluding all the activities linked with logging or commercial hunting and fisheries.

A FRAGMENTED BODY OF KNOWLEDGE

In spite of an important body of literature, data on extractivism are still fragmented. Since the end of the last century, reports and publications have reflected successive interests. Following studies by the naturalist travellers of the nineteenth century, reports appeared that dealt with prospecting for natural resources or boundary delimitation as a response to the increasing interest in rubber exploitation. Technical papers on extraction or product transformation processes were also being published. Between 1930 and 1950, much of the work dealt with the cultivation of species which were of economic interest, mostly *seringueira* and *castanheira*. Only recently has the centre of interest moved from the products to the systems which are the basis of their production. Certainly, it was imperative to counter the destructive exploitation of ecosystems and necessary to bring to the awareness of the public the cause of environmental depletion in Amazonia. But these recent publications only reflect a partial view of extractivism, mostly focusing on rubber exploitation in Acre.

Today, one may be surprised at the dearth of scientific publications dealing with the taxonomy of the species, their ecology and their yield under natural conditions, while a lot of information is available concerning their cultivation, physiology in controlled conditions or the plantation economy. *Seringueira* and *castanheira* are good examples of this.

Although extractivism sits on the boundary between ecology and economy, there have been very few studies and publications taking a systems approach to evaluating its long-term sustainability. From an ecological point of view, the continuation of the forest ecosystems bear witness to the ecological viability of extractivism following past activities. Ecological viability, however, has still to be demonstrated in the light of concerns about intensified production with the possible creation of new markets.

THE UNIVERSALITY OF EXTRACTIVISM

Extractivism cannot simply be reduced to the classical exploitation of the *seringueira* or of the *castanheira*, nor is it solely an Amazonian practice. It can be observed both in dry and humid regions and under both tropical and temperate climates. The gathering of edible fungus, lifting gentian roots, tapping

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2. The scientific names of the species discussed in this paper are given in Table 1.

maple tree sap, collecting thyme and many other examples serve to demonstrate the universality of this activity. It appears in various types of societies and in many different technological environments.

This negates the idea that extractivism is an archaic way of exploiting natural resources whose demise can be confidently predicted. On the contrary, it shows that this activity can persist within any model of development of a society. Attention must be focused on the analysis of its different forms as well as on their capacity to adapt to different socio-economic environments.

Our approach has been to analyze the variability of extractivism and to observe its place within different Amazonian production systems, as shaped by local sociological, economic and ecological factors. The lack of readily available historical data led us to compare different contemporary situations, in order to identify the factors that influence the local dynamic and to evaluate the potential of extractivism for integration into future development policies.

Dimensions of extractivism

THE ECOLOGICAL DIMENSION

Ecosystems and species diversity

Of some thirty products collected in the wild and recorded in the annual statistics of the Brazilian Institute of Geography and Statistics (IBGE), about fifteen come from Amazonian species (Table 1). For 10 years now, this list has been shrinking.

Products such as rotenone extracted from the *timbós*, or linalol distilled from the wood of *pau-rosa*, have to compete with synthetic substitutes. They have disappeared from statistical records but their exploitation continues on a smaller scale. Other products of low economic value or those which are only marketed on a regional scale have never been computed in the national statistics but make up part of the local activities. Examples of such products are *babaçu* or *buçu* palm leaves used for thatching, forest fruits such as *tucumã*, *patauá* and *bacaba*, and medicinal plants such as *muirapuama* or *pedra hume kaá*. All of them bear witness to the diversity and flexibility of the systems of forest use.

Extractivism exists in all the Amazonian ecosystems, flooded (*várzea*) and non-flooded (*terra firme*), and it can evolve in parallel with ecological changes. For example, in the vicinity of Manaus, where pasture and cultivation are gradually taking the place of the forest, harvesting the fruits of palm species which grow well in fallow lands is substituting the classical extractive activities based on *castanha* and *seringa*.

This resource diversity may be one of the main advantages of extractivism in that it permits great flexibility of exploitation in the context of environmental changes, as long as relevant markets exist or can be stimulated.

Impacts of extractivism

Extractivism, as it has been carried out for more than a century, is characterized by low capital investment and poor technology. Manpower remains the main tool of extraction, transport and product transformation. Though the exploitation of *pau-rosa* may contradict this model, it is valid for most extractive activities which are sparsely distributed over a huge area and therefore have low impact. At the same time, this

Table I. Exploited species in Central Amazonia (the more valuable species are labelled with *).

BRAZILIAN NAME	SPECIES	FAMILY	USED ORGAN	PRACTICE	PRODUCT
*Açaí-do-mato**	*Euterpe precatoria* Mart.	PALMAE	fruits	picking	fruits
Açaí-do-Pará	*Euterpe oleracea* Mart.	PALMAE	fruits	picking	fruits
			buds	pruning	palm hearts
*Andiroba**	*Carapa guianensis* Aublet	MELIACEAE	seeds	gathering	oil
"	*Carapa procera* A.DC.	"	"	"	"
Babaçu	*Orbignya* cf. *phalerata* Mart.	PALMAE	leaves	pruning	thatching
*Balata**	*Manilkara bidentata* A. Chev.	SAPOTACEAE	latex	felling	gum
Buçu	*Manicaria martiana* Burret	PALMAE	leaves	pruning	thatching
Buriti	*Mauritia flexuosa* L.f.	PALMAE	fruits	picking	fruits
*Castanha**	*Bertholletia excelsa* H.B.K.	LECYTHIDACEAE	seeds	gathering	seeds
Caucho	*Castilloa ulei* Mart.	MORACEAE	latex	tapping	gum
Chambira	*Astrocaryum chambira* Burret	PALMAE	leaves	pruning	fibres
Cipó-titica	*Heteropsis* spp.	ARACEAE	aerial roots	pruning	fibres
*Copaiba**	*Copaifera* spp.	LEGUMINOSAE (CAES)	oleo-resin	tapping	oleo-resin
Cumaru	*Dipteryx odorata* (Aublet) Willd.	LEGUMINOSAE (PAP)	seeds	gathering	cumarin
Jauari	*Astrocaryum jauari* Mart.	PALMAE	bud	pruning	palm hearts
*Maçaranduba**	*Manilkara* spp.	SAPOTACEAE	latex	felling	gum
Muirapuama	*Ptychopetalum olacoides* Benth.	OLACACEAE	root	lifting	medicinal
Pataua	*Jessenia bataua* (Mart.) Burret	PALMAE	fruits	gathering	fruits
*Pau rosa**	*Aniba rosaeodora* Ducke	LAURACEAE	stem	felling	linalol
Pedra-hume-kaá	*Myrcia citrifolia* (Aubl.) Urb.	MYRTACEAE	leaves	pruning	medicinal
*Piaçabeira**	*Leopoldinia piassaba* Wall.	PALMAE	leaves, sheaths	pruning	fibres
Puxuri	*Licaria pucherii* (R. et P.) Kosterm.	LAURACEAE	seeds	gathering	medicinal
*Seringas**	*Hevea* spp.	EUPHORBIACEAE	latex	tapping	gum
*Sorvas**	*Couma macrocarpa* Barb. Rodr.	APOCYNACEAE	latex	felling	gum
	Couma utilis (Mart.) Muell. Arg.			tapping	
Timbós	*Derris* spp.	LEGUMINOSAE (PAP)	roots	lifting	rotenone
Tucumã	*Astrocaryum aculeatum* G. Meyer	PALMAE	fruits	gathering	fruits
Ucuuba	*Virola surinamensis* (Rottb.) Warb.	MYRISTICACEAE	seeds	gathering	oil

general judgement has to be moderated by a more accurate analysis of the impact of extractive activities on different levels - the individual, the plant population, and the natural environment. Impact varies according to the practices of collection which can be classified into four categories.

First, wood is felled for use as lumber, fuel, or as a source of different substances such as the essential oil of *pau rosa*. Felling is also used to collect some latexes (*sorvão*, *balata*, *maçaranduba*, *caucho*). Felling for latex should be replaced by tapping, which gives a lower immediate yield but preserves the resource.

The second type of practice is to prune one organ of the plant. Fibres are cut from the sheath of the *piaçabeira* leaves or extracted from the younger leaves of other palm species (*chambira*, *tucumã*). Palm hearts are harvested by pruning some of the stems of multi-stem

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Regardless of the organ collected, pruning usually allows the individual to survive and permits the regeneration of the resource within a reasonable period, though much depends on the technique used and its frequency and intensity. The resource can be managed and cases of over-exploitation leading to the death of the individual are rare. This practice may also favour the productivity of the resource, as shown by the following examples.

To allow the survival and growth of the palm, *piaçaba* collectors never cut the two or three younger leaves. Comparing two sets of fifteen palms (one exploited, the other not), Emperaire and Lescure (1993) observed a mean annual production of leaves of 4.1 in the exploited set, and 2.7 in the unexploited one. Anderson and Jardim (1989) observed that pruning stems of *açaí do Pará* to collect palm hearts induces a higher rate of sprouting and enhances fruit production if compared with unexploited individuals.

Pruning does not, however, always enhance the growth of the individual. Following the collection of its aerial roots, *cipó titica* tends to disappear from the exploited areas.

Plants respond to tapping in various ways. Observations made on cultivated *Hevea* (Compagnon 1986) show negative reactions such as a lower growth in diameter (1-2 cm $year^{-1}$ versus 3 cm $year^{-1}$) and a 30 to 50% decrease in leaf production. On the other hand, latex and flower production increases. In the long term, however, latex production declines and trees are no longer exploited after 25 years.

In the *seringais*, the impact of tapping on individuals depends mostly on the tapper's skill. It is well known that incising the cambium can lead to the death of the tree. As the tappers alternate their collection route (*estradas*) from one day to the next, a single tree is tapped only two or three times a week. Moreover, in numerous *seringais*, rubber trees are found in flooded and non-flooded areas. The former are exploited in the dry season, the latter in the rainy season. The individual rate of exploitation is low and this could explain the longevity of production of the trees which, for some observers, is reputed to be more than 50 years (Nicolas 1981).

In the case of *copaíba*, the only observations available deal with *Copaifera multijuga* which is not the best producing Amazonian species (Nelson 1987). The Alencar experiment of successive tapping (1982) demonstrates an increase of production after the first collection of oil, followed by a regular decrease in yields, even where a one-year rest is respected between two tappings. For species of the genus *Copaifera*, the true biological role of the oleo-resin is still unknown. Nascimento (1980) hypothesizes that this product plays a part in the protection of the plant from different pathogenic agents and from herbivores. If this was indeed demonstrated, exploitation of the oleo-resin could have a disastrous effect on the plant.

Impacts on plant populations

The true impact of felling on the plant populations cannot be evaluated without considering the rate of regeneration for each species. Few data are available concerning the regeneration of species of economic interest under natural conditions. Exceptions are found in a few experiments dealing with 'natural' sylviculture worked out by CELOS in Suriname, INPA near Manaus and CTFT in French Guyana, and in a few studies into sustainable logging of small Amazonian communities, such as those

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described by Hartshorn (1989).

Of the species that are of interest to us, *pau rosa* is the only one felled. The bibliographic data and the current studies on plant population structures and regeneration (Mitja and Lescure 1993) emphasize the low density of the species (one exploitable individual in 5-10 ha), huge mortality of the seedlings and saplings and low growth rate. Regeneration of the species in exploited areas is even more compromised by the fact that no adult is conserved within the area. Regeneration is then only possible from the seed stocked in the soil, which have a short period of viability, and from pre-existent seedlings.

Pruning usually has low impact on the plant population but this is not so clearly demonstrated in the case of *cipó titica* exploitation.

The impact of gathering on individuals within the species may be negligible but might nonetheless be important at the plant population level. Seed predation may distort the demographic process and over-gathering of seeds may lead to an ageing population, if not its demise. Further studies are required in order better to evaluate the true impact of this practice on the various exploited species.

Impacts on the natural environment

Felling *pau rosa* has a fairly low impact on the environment. In a 490 ha area, where 60 trees over 20 cm in diameter have been felled, the degraded area per exploited tree is equal to 273 m^2 due to felling, and to 714 m^2 due to transport. The degraded areas represent 1% of the total land area exploited. This can be compared to the impact of multispecies logging which disturbs between 28% (Uhl and Vieira 1989) and 41% (Schmitt 1989) of the exploited area.

Pruning, tapping or gathering have a very low impact on the vegetation. This impact only results from opening and clearing the footpaths which provide access to the exploited trees in the forest. This low level of impact is also maintained because people remain the sole source of work-power.

Extractive activities of all kinds have an indirect impact on the environment through hunting, which is an important contribution to the subsistence of the collector.

THE SOCIO-ECONOMIC DIMENSIONS

The actors

From collecting the products in the forest to marketing them, the actors in extractivism are many and are linked by social relations of production and power whose diversity depends on the resources, market accessibility and local history.

Along the production chain, one can identify the collectors, the patrons who are landowners or who hold concessions on the land, the wholesalers, and various middlemen who are directly or indirectly controlled by the patrons. Any one individual may fulfil more than one of these different roles.

The patrons

The history of extractivism reflects the ideology of the prodigality of nature allied to the myth of a boundless territory. The exploitation of areas rich in resources of high commercial value has been organized by a few merchants or adventurers, owning the capital, capable of appropriating large land areas and obtaining the manpower necessary for their exploitation. They are known under the generic word of patrons (*patrões*). Markets have been supplied through a

widespread form of work relations based on an exchange system known as *aviamento*. Production relations were characterized by the extortion of work from collectors who were generally displaced and poorly qualified.

Though the subordination of the collectors to their patrons has been decreasing during recent decades, the figure of the patron remains resistant to change through the strength of the exchange system.

The collectors

Up until the second half of the nineteenth century, extractivism was limited and gave rise to low exportation levels. Less than 1000 tons of *borracha* were exported in 1847, more than 21,000 tons in 1897 (Bello and Monteiro da Silva 1986). The industrialization of Europe increased the demand for different products such as gums and triggered a change in the recruitment of manpower for extractive activities. Initially this manpower was mostly indigenous. In the last years of the century in the Nordeste region, the shortage of land (other than that owned by the oligarchy) available for the newly released slaves, and the dryness experienced at this time, combined to encourage a wide recruitment of manpower outside Amazonia in order to respond to growing market demands (Teixeira 1980). Between 1890 and 1900, more than 200,000 people moved from Nordeste to Amazonia. During the Second World War, the United States Government, requiring rubber for its war industry, encouraged an increase in the exploitation of rubber, and a second wave of migrants known as the 'rubber soldiers' (*soldados da borracha*) came to the region. More recently, the large-scale opening of roads (43,672 km in 1985) and the various colonization plans supported by the State and organized by SUDAM and INCRA attracted an heterogeneous population to the region.

Today collectors are drawn from various groups including indigenous peoples, *caboclos* descended from the long racial and cultural crossbreeding process which developed throughout the different phases of occupation of Amazonia (Grenand and Grenand 1990), descendants of immigrants from the Nordeste (*cariús*) who arrived during the auspicious days of rubber exploitation, and more recently immigrants desirous of the status of agriculturists, attracted by the availability of land in the region.

Each one of these groups demonstrates different practices of extractivism and maintains this activity for different purposes. For indigenous peoples, the aim is still to secure the collective social pattern of life and to maintain their communities in the national society. The *caboclos*, whose quest to meet their economic needs has always forced them to move, are only looking for a means of subsistence in the forest. The population of descendants from Nordeste emigrants has been stable for a long time. Whilst remaining subordinated by the patrons, they wish to secure their activity and improve their economic situation. The more recent peasant migrants from other regions, who have been drawn to Amazonia either spontaneously or with government sponsorship, are mostly involved in agriculture but may turn to extractivism as an occasional activity.

For some, extractivism is a full-time activity. For most of them, it only represents a source of complementary and seasonal income. Some of the collectors have always lived and worked in the forest, others have already earned a livelihood in an urban environment. Some may collect the products regularly from

one year to the next, others demonstrate a wide flexibility in their activities but mostly remain agriculturists.

Within the *caboclo* culture, familial structures predominate over community life as a result of the fragility of the social fabric, consequently reinforcing the nuclear family. For example, the concentration into communities of the widespread settlements all along the Rio Negro was initiated by the Catholic Church in the 1950s. However, this regrouping did not bring about a sense of communal interdependence. The sole collective activity (*ajuri*) which is carried out, is the yearly felling of trees in order to open the swiddens. These villages show huge demographic fluctuations. The mobility of the families is linked to three main factors: the temporary practice of extractivism, the quest for salaried employment and the need for schools and access to health care (Pinton and Emperaire 1992).

The mobility of the *caboclos* can be contrasted with the sedentary behaviour of the descendants of the Nordeste migrants. This can be observed for example in the middle Juruá region where the high density of *Hevea* has supported a considerable exploitation of rubber since the beginning of this century (Mendonça 1989). The *seringueiros* can be characterized by the permanency of their settlements and the continuity of their activity. Anchored in the region or even in the same *seringal* for three generations, their main activity from a young age continues to be rubber tapping. Depending on the social organization of the production in the *seringais* the families remain scattered, though a few spontaneous regroupings appear for a few years, due to the failure of the traditional socio-economic system (Lescure *et al.* 1992). In spite of these regroupings and in spite of the multiplication of the kinship relations between the collectors and other members of the commercial chain, activities remain highly individualistic.

The middlemen

The succession of exchanges all along the commercial chain involve numerous middlemen who may or may not depend on a patron. A few collectors who are capable of keeping accounts may sometimes establish themselves as small patrons. They may control four or five families but they do not have enough resources to extend their authority further. They may be able to insert themselves more comfortably within the exchange system by forging kinship links with the patron. As they are prepared to extort work from the families under their control, they may accumulate a little capital which would permit them to strengthen their social status or to quit the system altogether.

In some areas, a patron who retires or loses power may liberate an economic space over which small itinerant dealers, the *regatões*, will dispute. Cruising on the rivers in order to barter food and manufactured products for different local resources, they compete with the patrons or are sometimes the only economic agent in contact with the collectors.

The wholesalers

At the top of the chain, the wholesalers who live in town buy the products from the patrons in order to sell them on the home or foreign markets. They usually advance money and/or goods to the patrons according to their projected production levels, and then establish a client-patron link analogous to the one which exists between the patron and the collector. Within the areas where *caboclos* no longer depend on a patron, or where new products such as forest fruits or med-

icinal plants are marketed, the wholesalers send their own representatives who negotiate for the products and send them on to Manaus.

In Manaus, just three wholesalers monopolize almost all the market of the traditional products - the gums, the Brazil nuts and the essential oil of *pau rosa*. The exportation of these products gives an annual turnover of about US $10 million. There are almost twenty wholesalers controlling the fibres market for *piaçaba* and *cipó titica*. It is difficult to evaluate the number of wholesalers for the market of the forest fruits (*açaí* and *tucumã*).

The factories for transforming the products are all characterized by decayed and dilapidated machinery, often installed between the two World Wars, paternalistic labour relations and the familial aspect of the firm which gives it its social cohesion. In appearance, the factories look as if no investment or policy of modernization and improvement of labour conditions have ever been attempted, not even during the more dynamic periods. The staff, mostly women, work year after year although they may be laid off during times of shortage of products. Consequently the staff turnover rate is very low. The attachment of the workforce to the firm and its owners is linked to the marked paternalistic character of the work relationships, and one may wonder whether it is the reciprocal obligations or the economic values of the production which maintain the continuation of the activity (Aubertin 1993).

Over a long period, the main wholesaler families have diversified their activities in trade and into the factories in the Free Zone of Manaus and left the management of the extractivism sector in the hands of some of their elders. Though becoming negligible if compared to the fabulous incomes they generated in the past, these activities still produce benefits because of the low level of investment. Their main interest, however, seems to be found in the continuation of a long-established and complex network of social relationships which permit those families to maintain their political influence and their glamorous lifestyle. According to these last 'barons' of extractivism, the decline of the activity is mostly due to external factors. They claim that the financial support of the State to the Free Zone and the taxes levied on marketing of the natural resources have worked against the development of an economy based on forest management and have penalized the forest-dwelling *caboclo*.

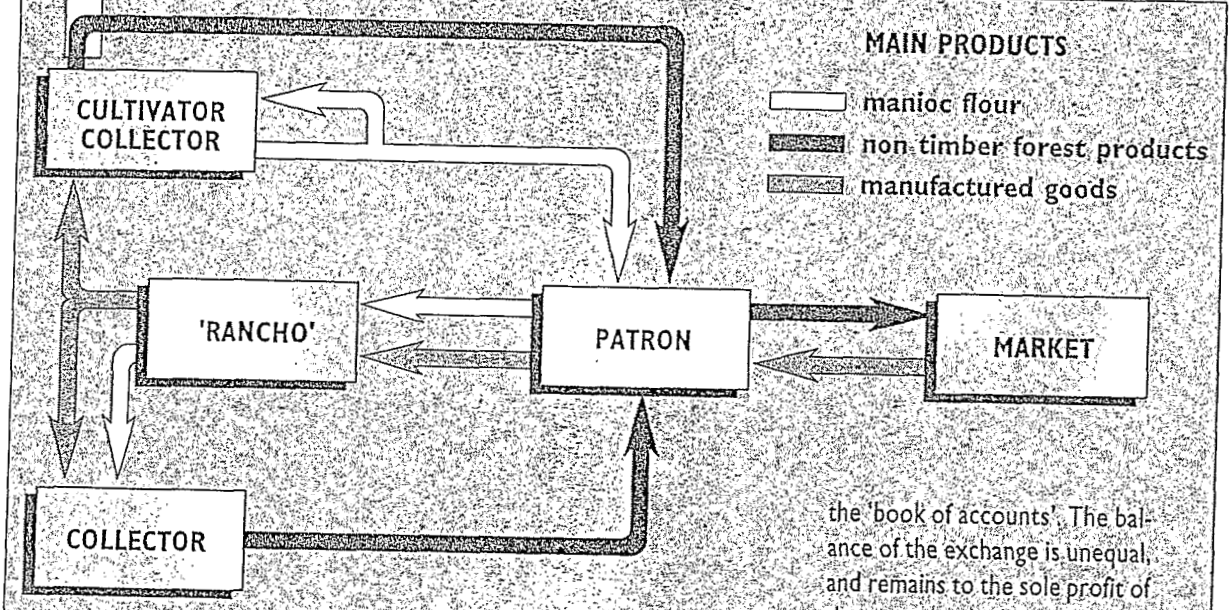
All these actors make up the networks which link hundreds of collectors to the same wholesaler. Each parallel network uses its influence to control the labour and production markets. The Amazonian region cannot be considered without regard to this system, which shaped the social fabric of the region and gave it its cohesion through the relationships of reciprocal obligation inherited from one generation to another (see also Box 1).

'Aviamento' - The exchange

The traditional form of exchanges (known as *aviamento*) has been described by other authors, and we shall only outline its prominent features and aspects.

Before departure, the patron supplies the collector with a set of goods needed for working and surviving during his journey. The acceptance of this package, known as the *rancho*, puts the collector into the position of client (*freguês*) of the patron. In return for this advance, the collector will give his patron all of his production.

PRODUCTS, GOODS AND FLOUR: THE THREE PARTS OF AN UNEQUAL EXCHANGE



Extractive activities currently show a decreasing importance from the macro-economic point of view. On the other hand, many data demonstrate that they contribute an important part, if not the major part, of the yearly income of forest dwellers. However, the low standard of life of the collectors and the strong social injustice which arises from the patrons-collectors relationships have to be pointed out. The dependency of the collectors on their patrons remains the principal factor acting against an improvement of the living conditions of the forest inhabitants. This dependency is mostly supported by a specific kind of exchange known as *aviamento*, which characterizes the social relations between the collectors and the patrons. The figure summarizes the structure of this exchange.

Three kinds of products are part of this exchange:

- The natural products collected in the forest;
- The goods supplied by the patron to the collector, which are for consumption and production, and constitute a package known as the *rancho*;
- The manioc flour may be part of the *rancho* if the collector does not produce his own. In most cases, however, the collector is also agriculturist and supplies his own flour for the journey whilst surplus production is bartered with the patron.

The figure shows the simplest form of circulation of these products. Usually, many middlemen act in the exchange system. The figure outlines the importance of manioc flour within the exchange, which appears as the main agent for regulating the level of the debt of the collector.

The exchange is a barter, while symbolized in monetary value through the 'book of accounts'. The balance of the exchange is unequal, and remains to the sole profit of the patron, which is earned by trading the natural products on one hand, and supplying the collector with differents goods on the other. For the collector, who has no access to the market, prices of the goods will be higher than on the market of the nearest urban centre. High incremental factors (such as 300% for tobacco and petrol, and 200% for soap) have been observed. It can be calculated, in the Juruá region in September 1992 for example, that the producer who depended on a patron or on a *regatão* had to produce 3.75 times more flour in order to supply the same goods than the independent producer who had a direct access to the market.

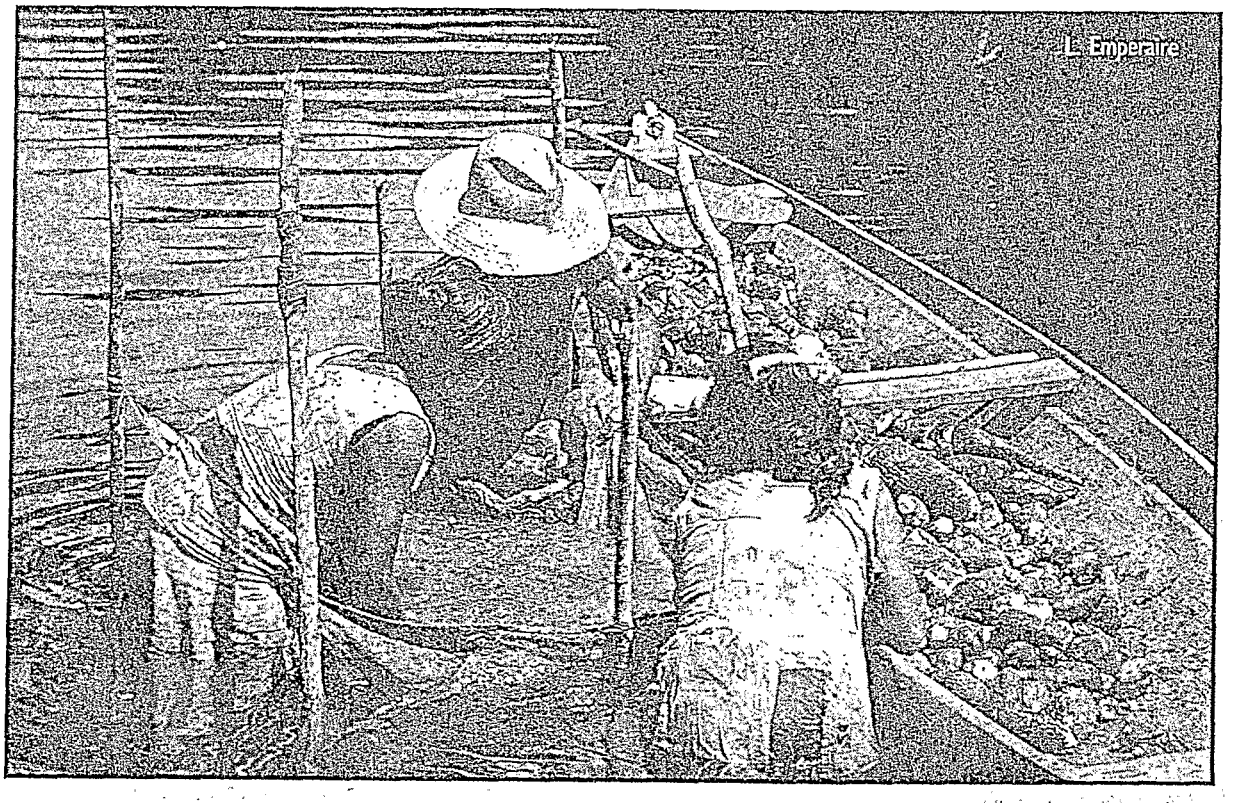
Within this system, debt appears to be a structural character. To the extent that the patron fixes the prices and the interest on the goods advanced and impedes access to the market, the collector remains in debt.

Within the exchange, the absence of money signifies a system of barter. However, the exchange is recorded in a book and becomes symbolized in terms of monetary value. The goods advanced and their value, the interest on the loan which they represent and the quantities and values of the collected products are all noted in this book and used to calculate the balance of the exchange.

Faced with an illiterate client the patron can easily turn this exchange to his own benefit. Fixing the price of the goods and products, cheating on the balance and deducting a tarif for the excess water content of the products, all give him the opportunity to adjust the balance of exchange in his own favour. The client will remain in debt and be obliged to request a new supply in order to continue his activity. It should be pointed out that within this situation, the client feels obliged to the patron and considers the new loan of goods as a favour.

Moreover, the patron often monopolizes the transport on the river and appears as the impassable interface between the market economy and the *aviamento*. He actually controls the exchange system and prohibits any change from a captive economy based on a series of unequal exchanges, to a cash economy.

These economic links between the collectors and their patrons support a social relationship of paternalism and authority where the collector believes that the apparent protection by the patron is his best social guarantee. The nature of this social relationship leads the *caboclo* into a logic of dependence and submission from which he hardly ever escapes.



Manioc is the principal crop and staple food of Amazonia, and constitutes an important part of the *rancho*.

Despite the weakening markets, many of the patrons continue to benefit and maintain their authority. Overall profits have been maintained by increasing the prices of the goods supplied to the collector, whose equivalence in bartered products has often become outrageously inflated and whose top price is only limited by the ability of the patron to maintain the level of manpower. Within this context of impoverishment, the collector may strengthen his social links with the patron in order to secure the indispensable goods.

As long as the patron does not have to compete with new commercial agents, the *caboclo* cannot easily break out of this spiral of subordination. Even when the patrons disappear from some rivers, the collectors may often not be able to negotiate with the small itinerant merchants who take advantage of the lack of competition. The only options open to him are to move to the town, to return to subsistence farming or to attempt marketing the forest or agricultural products directly.

The place of manioc flour

The patron's benefits come from marketing the products as well as from the value of the goods he advances. As manioc flour is the staple food of Amazonia, it constitutes an important part of the *rancho*. In optimizing his benefits, the patron wishes to maximize the production capacity of his manpower but also to control the supply of flour and other goods. This strategy hampers the improvement of agriculture, even for household consumption (Pinton and Emperaire 1992, Terri 1977). Agriculture has only been allowed during periods of economic crisis, and then it was limited to household necessities with any surpluses having to be handed over to the patron[3].

3. Depending on the different economic cycles that succeed each other, the balance between agriculture and extractivism fluctuates, but these activities appear much more in conflict than in a complementary relationship. During the 19th century, agriculture declined with the development of extractive activities which absorbed most of the available labour force. With the 1913 crisis, in order to limit their expenditure in supplying goods, the patrons enhanced the small-scale agriculture from which products such as manioc flour and tobacco were used to supply the tappers in the seringais. Some of the forest dwellers specialized in this production. Self-supplying communities then arose to limit the costs of production. The enhancement of rubber tapping activities in 1942 limited once more the agriculture production until the 1960s, when the weakening of the patrons' capacity to supply goods led the collectors to diversify their activities.

The enhancement of manioc flour production today indicates the decrease of the power of the patrons. Most of the producers at least secure their own consumption in order to minimize their debt. But excess of production is still mostly collected by the patron and is then sold to their least dynamic clients with a large profit. As long as the *caboclos* prefer to sell their excess of production to the patron rather than to the neighbouring families, the flour will remain under the control of the patrons. Whether it is consumed by the family or sold, produced or bought, manioc flour can be seen as a regulating factor of the fluctuations of the local economic environment.

TOWARDS A CASH ECONOMY

The weakening power of the patrons and the loss of their monopolies, the development of small urban centres and roads, and the emergence of a local political power all contribute to developing a cash economy which remains more or less under the control of the patrons. In many regions, the traditional system of extractivism is practised alongside a contemporary form which escapes the *aviamento*.

In the remote regions, the *regatões* divert a proportion of the profit from the patrons and develop another kind of social relationship with the collector. The exchange still remains a barter (and indeed one wonders how this situation could change within an inflationary context where cash can not be used by those who are unable to quickly recycle it). The collector negotiates with the merchant following a different kind of logic, closer to that of a simple economic exchange, and the paternalistic aspect tends to disappear.

One of the factors involved in the decline of extractivism is the lack of manpower, which has been attracted by the towns. On the other hand, the rapid urbanization experienced by State of Amazonas has contributed to the development of a regional market based on other non-timber forest products. In the vicinity of Manaus, new activities have arisen which respond to the demand from the town for forest fruits and medicinal plants. This sector escapes from the traditional network, linked with extractivism.

Harvesting and marketing of the *açaí* fruits is one example. These palm fruits have to be processed within 72 hours and their marketing requires an efficient organization of distribution which involves collectors, middlemen and small-scale craftsmen processing the product into juices and sorbets. These agents are often from families with kinship links in both forest and city. In the popular parts of the city, numerous small street vendors selling juices or sorbets complete the chain in which most of the exchanges are cash (Castro 1993). A similar situation arises from the exploitation of *tucumã* fruit (Bressolette and Rasse 1992).

The exploitation of medicinal plants is also highly monetized but it does not show such a strong familial pattern (Coelho Ferreira 1992). In the region of Maués, where medicinal plants have been marketed locally for a long time, some merchants have started to attract regional and urban clientele by supplying small-scale pharmaceutical factories (Pinton and Delavaux 1992).

The exploitation of *pau rosa* and palm hearts is also monetized. In the case of *pau rosa*, the exploitation resembles that of logging and mechanical equipment such as chain saws and skidders are necessary. Depending on the region, the labour is remunerated through the sys-

tem of *aviamento* or in cash. The collection of palm hearts that supports the small factory of the village of Barcelos (Rio Negro) is paid for in cash according to the amount delivered.

This evolution towards a monetized system of exchanges allows a decrease in the social constraints linked with the *aviamento*. In this way it corresponds to the projects of the forest dwellers. The collectors try to become independent producers, sometimes through the creation of associative organizations. They wish to escape wage earning, considered precarious due to the Brazilian inflation rate. All the discourses and the behaviours of the *caboclo* suggest preference for autonomy over either dependency on the patron or the 'proletarianization' associated with the urban activities.

Appropriation of the resources

Technical processes, social relationships and organization of labour all depend on different factors such as the nature of the resource, the pattern of its spatial distribution, the kind of vegetation, where it is found, and the local land tenure. A few examples serve to illustrate the variability of the situations that can be observed.

Usually the patron exploits land which may belong to him or is rented from another patron or from the State with a concession for harvesting. Whatever their nature, one remains surprised by the evident lack of management. The land is mostly considered by the patrons as an object of production - an available reserve from which resources are drawn - more than as a means of production. This attitude can be related to the Amazonian myth of the prodigality of nature.

The lack of management strategy is obvious everywhere. In the *seringais*, the density of rubber trees could have been intensified and in the *castanhais* the older trees could have been felled to the benefit of the more productive younger ones. Only the footpaths which are cleaned each year by the collectors bear witness to any management. The patrons have never tried to increase the density of the resource in the forest and have preferred single-species cultivation of rubber trees, a venture supported in the past by numerous governmental subsidies. All have been unsuccessful.

In the vicinity of the urban centres, whatever their size, merchants and cattlemen tend to push the small producer towards the interior, and conflicts over the use of land among protagonists are numerous and sometimes violent.

For the collector, the appropriation of the resource is closely linked to the nature of that resource. In a *seringal* owned by a patron, year after year the *seringueiro* taps the same trees over which he has the exclusive rights and cleans the footpaths which link them (*estradas*). This long-term personalized allocation of the resource is also in use in the *castanhais* and seems to be accepted by everyone. The collector is not however concerned with improving the plant population, which he views in a similar way to the patron.

In the case of other products, resource appropriation is seasonal. The *piaçabeiros* for example work throughout their stay in the forest within the areas chosen at the beginning of the season. It seems that there is no particular rule for the allocation of a territory for exploitation.

In the special case of *pau rosa* exploitation, prior prospecting for the resource is necessary, which is entrusted to an experienced tree-finder. He will mark the bark of the trees found with his initials and appropriates the resource temporarily. He will be paid depending

on the number and girth of the trees found. The other workers who fell and carry the logs away are paid on a daily basis and do not have any rights to appropriate the resource.

Labour organization

The social organization of labour depends on the nature and proximity of the resource as well as on the level of autonomy of the collectors in their relations with the patron. Different situations may be observed.

In the classical *seringais* and *castanhais*, the families are scattered all over the territory and depend completely on the patron. Each collector works for himself and takes on the full tasks of collection, transport and initial processing of the product. For other resources such as *piaçaba*, *sorva*, *puxuri* or *copaíba*, labour organization remains individualistic, even if the remoteness of the resources justifies collecting expeditions organized by the patrons and known as *empresas*. They bring together a few dozen men for a long journey in the forest, where each of them plays an equal role.

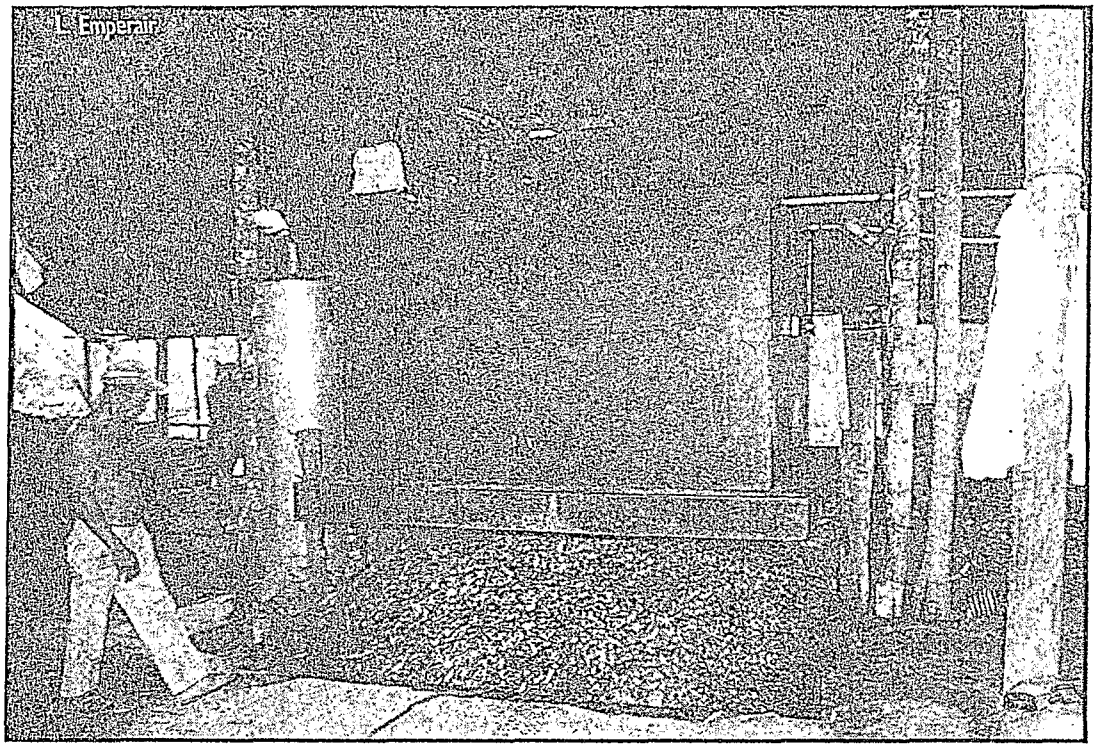
Once more, the case of *pau rosa* exploitation appears different, as it is based on a pyramidal and hierarchical organization of activities. Tree-finders prospect the resource, *tiradores* fell the logs and carry them to the camp, lorry drivers transport them to the factory where other men, organized into different tasks, extract the essential oil from the wood. Each activity carries a particular contract. Workers are usually paid in cash for their labour, though one can still sometimes observe a survival of the *aviamento.*

In areas where agriculture tends to develop, the time dedicated by farmers to extractivism is restricted to cases of urgent necessity such as refunding a debt, buying an expensive item or responding to occasional agricultural failure. They will then make a few weeks' journey in the forest, alone or in groups but not as part of an *empresa*. These expeditions often take place in the school holidays, as long as the water level permits access to resources. They work for their own patron who is represented by an itinerant middleman and though living together in a temporary camp, the organization of activities is individualistic.

This kind of organization is possible because the products can easily be stocked for a long time, whilst waiting for the patron or his middleman. The case of marketing wild fruits is different as the product can not be conserved beyond a few days. This resource is exploited in a forested area close to home which belongs to the collector or is rented from a neighbour. Numerous collectors sell their production directly on the market to improve their income.

In some regions, such as the middle Juruá, the collectors are beginning to organize themselves to confront the economic monopoly which the *regatões* may have inherited from the patrons. Associations of producers are being organized in order to create their own marketing chain. These experiments, which mostly concern agricultural production, are promising from an economic point of view. They still have to demonstrate their ability to manage the problem of land tenure or to organize sustainable production (Lescure *et al.* 1992).

Finally, we have to remember the recently created extractive reserves which benefit from a particular type of land tenure, the land being collectively appropriated but the resources allocated to different families in the community. Tapping remains an individual activity



The wood of *pau rosa* is converted into chips and distilled.

but the first stages of marketing are organized by members of the community, thus liberating them from dependence on the patrons.

The place of extractivism in Amazonian production systems

DIFFERENT TYPES OF PRODUCTION SYSTEMS

Today extractive activities are mostly associated with other types of production such as agriculture, fruit tree cultivation, hunting, fishing, and even small-scale animal husbandry. The balance between these activities depends more on local socio-economic conditions than on ecological ones. Different production systems can be recognized, as described in the following paragraphs.

The purely extractive system

The traditional system of production based solely on extractive activities was the pattern for the region during the halcyon days of the rubber boom. Today, where it remains, it involves only a few people who for various reasons do not dedicate their time to agriculture and consequently rely on selling their labour. It is often young single men who prefer this temporary condition, while they are trying to set up a family.

This historical model is based on a bonded labour force (manpower being plentiful and mobile), which served to prevent the development of agriculture by prohibiting any activity other than collecting the products, gave rise to obvious social injustice and strongly denied the local cultures.

The mixed agriculture-extractivism system

Over some twenty years, the interest of the patrons in extractive activities decreased. This attitude is usually thought to be in response to the decreasing market for the products. But it should be pointed out that other factors may have played a part in this trend. For example, new opportunities to make profits have arisen from the creation of the Free Zone of Manaus. Land speculation has been encouraged or tolerated by the opening of roads in Amazonia and the planning of new settlements. Whatever the cause, the patrons gradually withdrew their capital from the extractivism sector for investment elsewhere. The social dynamics accompanying this process differ from one place to the other.

In some cases, such as those observed in the middle Rio Negro region, the traditional power of the patrons is now competing with other forms of local authority and paternalistic assistance linked with the emergence of new political leaders. Although the big *empresas* have become rare, extraction of *sorva*, *piaçaba*, *seringa* and *castanha* continue on a smaller scale and at a slower rate and remain under the control of numerous small patrons. This continuity could be linked to the diversity of the products but it is also supported by complicity between the local political power and the small patrons.

A few families of producers are seeking autonomy and stability. They understand well that the development of subsistence activities (agriculture, hunting and fishing) and the barter of the surplus production with the *regatões* enable them to escape from the control of the patron and free themselves from the system of *aviamento*. But extractive activities stay part of their system of production and our enquiries demonstrate that the balance of activities varies from one family to another throughout the full range of the continuum.

The *seringueiros* of the middle Juruá region have entirely dedicated themselves to rubber production since the end of the last century. The withdrawing patrons left them disorganized and facing the lack of marketing opportunities, which are now only provided by *regatões* whose visits are highly unpredictable. Moreover, if the *regatão* substitutes the patron from the economic point of view, he will never assume the figure of protector as the patron did. If in the Rio Negro the increase of autonomy of the producer can be interpreted as a social victory, in the Juruá it remains a consequence of the failure of the socio-economic system.

Whatever the case, the producer brings together agriculture and extractivism in order to secure his own consumption and to minimize his debt. He allocates his time to these activities in different proportions. The choice of the collected products depends on the accessibility of the resources, the compatibility of the extractive activities with the agricultural calendar, and the values of the different products.

Agriculture is mostly based on manioc flour production which is the staple food. Surplus production is sold or bartered. Diverse manioc varieties (2 to 30 in the cases studied) are combined with other species in different proportions (sugar cane, yams, pineapple, etc.). The impact on the forest of these activities remains low. Yearly felled swidden areas range from 0.5 to 1.5 ha for each family and clearings alternate yearly between primary forest and 5 to 10 year old fallow lands. A domestic unit will farm 2-3 ha in isolated plots, widely spread in a total area of 15-30 ha.

The system can be improved by setting up a small multi-species orchard around the house, to provide for household consumption. Fallow lands may also be enriched with fruit species to produce a dietary complement. However, these agroforestry practices remain limited and never involve practices of enriching the forest or the fallow lands with species of economic interest.

The three part system: agriculture, agroforestry, extractivism

This system seems to be supported by the conjunction of three factors: disappearance of the patron-client link, accessibility to a market, and land ownership. Fruits, mostly from palms, constitute the largest part of the exploited wild resources. This system can be observed in the municipalities close to Manaus or in the Amazon estuary.

Extractive activity is limited to the forest close to the house. Diverse agroforestry practices are observed in the different exploited areas. The size of orchards increases, the fallow lands and the forest are enriched with economic species by selective thinning. For example, in the managed forests of the Amazon estuary, the species richness decreases by 50% while the density of useful species increases. The Importance Value Index (IVI) of these species increases from 85% in natural forest to 96% in managed forest. Depending on the categories of use, this progression is positive for the food and medicinal species, but negative for the fuel species or those used for lumber or handicraft materials (Anderson 1990). But it should be pointed out that the size of managed forest area remains small and the impact of management limited.

The municipalities of Iranduba (Bressolette and Rasse 1992) and Manaquiri (Castro 1993), close to Manaus, are further examples. The market for the *açaí* fruit increases depending on the demand of the city. Exploitation of this light-demanding palm can be carried out in natural populations, in agroforestry systems such as the multi-species orchards or in single-species cultivation, depending on the producers' preferred strategies.

Agroforestry provides a better income than extractivism (see Box 2). The choice of one or the other kind of exploitation depends on other factors, such as the farming calendar, as fruiting seasons differ, as does the ability of the producer to specialize his production system. In fact, collecting from the forest can only represent a sporadic activity that complements the familial income. Cultivation remains speculative and is profitable only if production balances the 15 days of 'non-productive' work necessary for cleaning. The extractive production system may be the best choice in many cases as it gives more flexibility to the production system of the family unit.

The mixed agriculture-agroforestry system

The small farming settlements of *várzea* are a good example of the mixed agriculture-agroforestry systems from which the extractive component has disappeared. Around the house, the orchard is made up of 20-26 species (Guillaumet *et al.* 1990, Saragoussi *et al.* 1990). Close to home, the producer often owns a small 1-2 ha plantation of cacao growing under a rubber-tree cover. This kind of mixed plantation has been supported by state policies. In addition to the factors that are necessary to the three part system, here we have to consider other factors such as subsidies which have an impact at the regional scale.

A COMPARISON OF TIME ALLOCATION AND ECONOMIC INCOME FOR SEV

A comparison has been made of traditional manioc cultivation, *açaí* fruit harvesting in both agroforestry systems and natural stands, and *piaçaba* fibre collection.

Manioc cultivation

Traditional manioc cultivation is carried out within swiddens slashed and burned yearly from either the forest (primary or old secondary stage) or fallow land. Each swidden will support two cycles of production and then be abandoned to natural regeneration processes. Numerous studies on slash and burn cultivation demonstrate that a 30 year regeneration period is needed before slashing again, in order to secure good soil fertility. Most of the agriculturists here, however, are slashing again after a 10 year regeneration period.

Usually the producer cultivates a plot felled from forest one year, and the next year a plot felled from fallow. The time allocation and the production have then to be calculated within four different situations: swiddens from primary forest, first and second cycles (PF1, PF2), and swiddens from fallow, first and second cycles (F1, F2).

To secure the rotation of the swidden, sustainable cultivation will need a total area of 32 ha in the 30 year pattern and 12 ha in the 10 year pattern of management.

Elements of calculation

For calculating we assume the following values:

- Two cycles in a swidden slashed from forest give 23 tons of tubers and 18.6 tons if slashed in a 10 year old fallow;
- The producer can process the tubers either for manioc flour only (process 1) or for both manioc flour and tapioca production (process 2). In process 1, the manioc flour represents 35% of the fresh tuber weight and the time allocation is 1.9 days for 50 kg of flour. In process 2, manioc flour represents 26% and tapioca 5% of the fresh tuber weight and time allocation is 2.4 days for 50 kg of flour and corresponding tapioca;
- The price of the manioc flour is $213 a ton and tapioca is $670 a ton;
- The duration of the two cycles in one area is 2.5 years.

	PF	F
Tuber production		
On 2 cycles (tons ha^{-1})	23	18.6
Time allocation (days)	310	275
Process 1		
Manioc flour (kg ha^{-1})	8050	6510
Processing time (days)	306	247
Intermediary consumption ($)	22	18
Net income ($ ha^{-1})	1693	1369
Process 2		
Manioc flour (kg ha^{-1})	5990	4836
Tapioca (kg ha^{-1})	1150	930
Processing time (days)	288	232
Intermediary consumption ($)	21	17
Net income ($ ha^{-1})	2025	1636
Yearly net incomes ($ ha^{-1} $year^{-1}$)		
Process 1	677	548
Process 2	810	654
Remuneration on labour ($ man^{-1} day^{-1})		
Process 1	2.75	2.62
Process 2	3.39	2.23

Data are from Bressolette and Rasse (1992), Pereira (1992).

Extractivism in Brazilian Amazonia: Perspectives on Regional Development
Miguel Clüsener-Godt and Ignacy Sachs (Eds) - UNESCO 1992

Harvesting of açaí fruits

The parameters for calculation differ depending on the exploited area, whether from agroforest (AF) or natural stands (NS).

	AGROFOREST (AF)	NATURAL STANDS (NS)
Density of mature trees (no. ha^{-1})	400	186
Harvesting time (hours tree^{-1})	0.25	0.5
Fruit productivity (kg tree^{-1})	13.2	11.2
Fruit productivity (kg ha^{-1})	5280	2083
Transport (hours day^{-1})	0	1-2
Time allocated to management (days year^{-1})	15	0
Total time allocated for one ha production: harvesting, maintenance and wine processing (days)	79.4	36-40
Intermediary consumption ($)	0	0
Net income ($ ha^{-1} year^{-1})	686	271
Net income ($ man^{-1} day^{-1})	8.6	6.8-7.5

We assume that the producer markets the processed *açaí* wine; 1 kg of fruit yields 1 litre of wine; one man can process 50 litres in 3 hours; price of the wine is $0.13 l^{-1}.

Data are from Bressolette and Rasse (1992), Castro (1993).

Exploitation of piaçaba fibres

Two calculations are made depending on the characteristics of natural stands. In the first one we assume the density of palms is 200 ha^{-1} of which 60% are exploited, in contrast to the second case where the density is 400 ha^{-1} of which 70% are exploited. The mean production is assumed to be 2.8 kg of fibre per palm. The mean time for collecting the fibre is 0.5 hours per palm. The mean length of a day's labour is 7.25 hours from which 1.9 hours are allocated walking to the area and transport back to the camp. The current price paid to the collector for the fibre is $0.30 kg^{-1}. Depending on the density of the stands, the net income ranges from $101 ha^{-1} to $235 ha^{-1} and the day of labour is remunerated at $6.17.

Original data from Emperaire *et al.* (1992).

Summary of the comparisons:

	CULTIVATION	EXTRACTIVISM		
	Manioc	Açaí	Açaí	Piaçaba
Net income ($ ha^{-1} year^{-1})	548-810	686	271	101-235
Remuneration ($ man^{-1} day^{-1})	2.2-2.4	8.6	6.8-7.5	6.17

The pure agriculture system

In the vicinity of urban centres, the producer tends to reduce the system to its agricultural component only, cultivating mostly market-garden produce. The small agroforestry area of orchard is conserved. Fruit cultivation for the market is concentrated on single-species plantations (pawpaw, passion fruit, *cupuaçu* etc.).

In the two previous cases, the area of the land exploited does not increase because the production is limited by the lack of other forms of energy input than human labour. But the impact on the forest does increase due to the concentration of population and quite often the addition to the system of small-scale livestock raising. An agricultural environment replaces the forest, and the biodiversity resources of the forest are drawn upon only sporadically.

The factors of change

A first analysis allows us to identify the main factors of change within the production systems. The emergence of the mixed system, extractivism-agriculture, is supported by the weakening powers of the patrons and consequently the increasing autonomy of the producers. This system, which is mostly oriented towards household consumption, can perpetuate as long as access to resources remains possible, population density is low and the markets do not change. For the landless *caboclo*, it remains valuable, as cultivating a piece of land is an absolutely basic requirement before possible claims for land ownership will be considered.

The third system improves the agroforestry practices which are a form of long-term speculation. It supplies household consumption needs as well as surplus production which will be marketed. It requires an accessible market and land ownership. Each year the families decide their own strategy, which may or may not include extractive activities, depending on numerous factors. It probably represents the more flexible system and the best opportunity for the small producer to follow the fluctuations of the market.

Extractivism is disappearing with the growing pressure on land, limited accessibility to resources, the consolidation of the market and the availability of capital which may come from government support. Specialization of production and increased capital contribute to setting up a pure agricultural system.

Towards an improved extractivism

In the previous sections we have analyzed how extractivism can be considered as an economic management of forest ecosystems whilst allowing ecological sustainability. Except for the trees that are felled and the disturbance associated with felling, the impact of extractivism remains limited, as does that of small-scale agriculture for household consumption. We have pointed out the great diversity of situations, the complexity of their socio-economic and ecological components, and their capacity to change. We have also demonstrated the complementary nature of extractivism and small-scale agriculture. This last point has to be borne in mind throughout the discussions that follow.

In its current form, extractivism does not represent a satisfactory alternative for the long-term future. The low income that it generates, and the socio-economic structures that it contributes to maintaining, devalue the perception of this activity. It is currently replaced by subsistence agriculture in remote

regions or commercial agriculture in places that are near an urban centre.

Extractivism can however respond to some of the demands. For example, consumer centres support new markets such as wild fruits, the incomes of extractive activities contribute to the income of a part of the population, and most extractive activities do not damage the ecosystem.

These considerations demonstrate that with some improvements, the extractive activities associated with other production activities could be integrated in development scenarios. They also demonstrate that an overall simplistic judgement of extractivism is not possible. In all cases, the perspectives for change or solutions for improving the systems have to be locally evaluated depending on the nature of the ecosystems and available resources, as well as on the socio-economic environment. Discussion has to take place on the improvement of living conditions, the protection of ecosystems and the development of markets. With this in mind, local justifications can be made for the creation of extractive reserves which guarantee the producers the space they need for their activities as well as their independence from a patron.

Today only a small number of reserves exist and all are still experimental. In response to those who are alarmed about the hypothetical extension of the reserves, it has to be pointed out that they only cover 23,000 km^2, that is 0.6% of the Brazilian Amazonian forest. It should also be pointed out that 80% of the territory of Acre belongs to only 320 *latifundios* and that in the State of Amazonas the ten biggest land owners own altogether 117,000 km^2 (Ribeiro 1990). In the light of these pressures and interests, there is little chance of the number of extractive reserves being multiplied.

Other ways of organizing extractive activities could be suggested, bearing in mind that these activities have to be regulated according to the biology of the species and the future development of the production systems.

In Amazonia, conservation units represent more than 174,000 km^2 or 4.7% of the area (Table 2). Part of the surrounding areas could be designated for mixed production systems, extractivism-agriculture, whose environmental impact is low. Those areas could then constitute buffer zones, characteristic of the biosphere reserve concept promoted by UNESCO. In this perspective, it could be interesting to re-evaluate the case of the of Rio Jaú Natural Park, the largest in the world and quite impossible to control.

Other sparsely populated areas with poor agricultural potential, such as the white-sands forests of the Upper Rio Negro, could constitute some 'areas of extraction' with a specific legal status. Within these areas, collection could be organized following a quota system,

Table 2. Protected areas in Brazilian Amazonia.

Nature of protected area	Area (km^2)	% of protected areas	% of Brazilian rain forest (3,700,000 km^2)
National Parks*	75.868	43,5	2,1
State Parks*	7.031	4,1	0,2
State Biological Reserves*	1	0,0	0,0
National Ecological Reserves*	1	0,0	0,0
National Forests	67.798	38,9	1,8
Total	174.127	100,0	4,7
Extractive, Reserves**	21.630	-	0,6

Sources: * IGBE 1990
** IBAMA - CNPT 1992

dependent on the regeneration rate of the resources. This kind of area could be easily created within State lands (*terras devolutas*) or by appropriation of large areas of land from the patrons.

It seems however more urgent and of greater interest to delimit forested areas which could be used for extractivism within the territory of the municipalities where agriculture is tending to remove most of the forest cover, such as Iranduba near Manaus. In such preserved areas, extractive activities (mostly harvesting wild fruits) could contribute to the economic balance of small farming systems by providing a complementary and seasonal income. Such a policy would also maintain patches of forest cover for other purposes such as leisure activities of urban dwellers and for educational needs.

The fundamental question remains as to whether these extractive reserves, buffer zones or areas of extraction will constitute zones of under-development or on the contrary become centres of ecologically sound development. Four aspects need to be examined: valorization of the products; revamping the trading channels; laws regarding the protection of resources; and improvement of management practices.

VALORIZATION OF THE PRODUCTS

Prices for rubber have been maintained by support from governmental subsidies. A similar approach could be taken with other extracted products. Another option would be to create new markets among ecologically minded consumers, the 'green market'. Tentative moves have already been made in this direction to promote extractive activities. Supported by a growing ecological awareness within the developed countries and the strong social perceptions that accompany it, these attempts make use of a symbolic value which may be the greater part of the total value of the product (Aubertin 1992). The consumer not only buys a product but the ethical choice contributes to the conservation of Amazonian forest. The market remains volatile, dependent on what is at present a fashion for green products.

It is not surprising that the actors in this new marketing chain are in groups with a high political motivation carrying an ecological banner, such as communities of extractive and indigenous reserves, supported by diverse NGOs[4]. Though it seems premature to evaluate the economic and sociological consequences of these experiments, they are at least innovative in their attempts to modernize the marketing chain. But the producers are in a privileged position of receiving support from NGOs to market the products. They remain, once more, in a dependent position. Only in facing squarely the problems of the open market will they gain their autonomy.

One of the means of improving of the system is the added value given by locally processing the products such as *tágua* seeds, *andiroba* or *ucuuba* oil, *copaíba* oleo-resin, fruits of *açaí* and *buriti*, seeds of *castanha*[5]. Local factories for processing the products should be developed[6]. New hand-crafted products based on traditional know-how such as basket work using local fibres or cane furniture using *cipó titica* should also be further encouraged.

Further research and experiments into ways of increasing the value of the products and distributing the profits better among the actors are obviously necessary. It has to borne in mind, however, that the concept of profitability in economic terms may not be the only way to evaluate the future of extrac-

tivism which has to be analysed with other concepts than those of the classical economics.

REVAMPING THE TRADING CHANNELS

From the collector to the point of export, the price of traditional products may increase by a factor of 10 to 20. This is no longer the case for wild fruits and medicinal plants where the marketing is outside the traditional channels and involves fewer middlemen.

Revamping the marketing channels is not only a matter of limiting middlemen or intermediary benefits but also resolving other problems such as improved transport organization. The small producer often cannot comply with the conditions set for freight on the river. Some of them may be illiterate or be far from administrative offices. Others who are closer to the market often have to choose between using the services of middleman for transporting or working illegally. Whatever they choose, they will still be vulnerable in the face of different powers.

If radical change of market organization involves dealing with the structures of economic and political power, it also has to surmount behavioural problems. The previous decades of servitude and isolation of the collectors hamper change in working relations. This has been clearly observed in different situations, such as the experiments with direct marketing of the *tágua* in Ecuador (Hidalgo 1992) and the extractive reserves in Brazil (Geffray 1992).

PROTECTION OF SPECIES OF ECONOMIC INTEREST

Everyone exploiting natural resources in Brazil, whether animal or vegetal, has to be registered with IBAMA (IBDF, Ordinance No. 0302/IBDF-P, 1988) and has to pay a yearly tax ($16 in 1992). In practice, this legal measure only concerns the biggest patrons and merchants. Moreover, any company taking more than 12,000 m^3 of raw forest material (RFM) from the forest has to face restrictions and is obliged either to replant following various designs (IBAMA, Ordinance No. 441/1989), or to pay a tax in order to contribute to the fund for forest maintenance (*Fundo de Reposição Florestal*). This fund was designated for the support of reafforestation programmes which have, as yet, not been implemented. This directive only concerns logging, therefore in this discussion, only *pau rosa*. To be below legal obligations, the lower level of exploitation is equivalent to 120 tons of oil a year (1 ton for 100 m^3 RFM) which is higher than the quantity exported yearly by the State of Amazonas. The result is that the activity is currently free of any legal obligations.

4. Since 1990, Conservation International has supported the traditional harvesting of vegetable ivory in the community of Rio Santiago Cayapas (Ecuador). A market has been created in the United States as well as a local chain of marketing in order to export raw material. Of the 150 tons of seeds of *Phytelephas aequatorialis* collected during six months, 50 tons have been directly marketed, bypassing the local wholesalers who used to impede access to the market (Hidalgo 1992).
5. An agreement between the Aukre Trade Company and the Pukanu Trade Company on the one hand, and the Body Shop on the other, has been set up to market 2500 kg of Brazil nut oil, giving a turnover of $87,000. This sum is equivalent to that generated by logging mogno (*Swietenia* sp.) in the indigenous reserve (Folha de São Paulo, 3 August 1992), but it only represents 0.1% of Body Shop's turnover (Posey 1992).
6. The second stage of the project of Conservation International will be to substitute the US factories with a local one.

Companies that market less than 12,000 m^3 RFM a year are simply required to contribute to the fund for forest maintenance. For the *pau rosa* oil producers, this yearly tax corresponds to $58 per 180 litre barrel in 1992, less than 1% of the FOB price of the product.

Although *pau rosa* comes under the list of endangered species (IBAMA Ordinance No. 6-N from 15 January 1992), there is no satisfactory legislation to regulate its exploitation. Especially significant is the lack of any legislation that would oblige the exploiters simply to keep alive a few mature trees in the exploited area in order to ensure species regeneration.

Today *castanheira* is recorded in the IBAMA list of vulnerable species (IBDF Ordinance No. 122 from 19 March 1985). The trees cannot be felled other than in cases of public interest even if they are old or unhealthy. This prohibition is ill-founded from both biological and management points of view, as it contributes to the ageing of the exploited population and a consequent weakening of production. It would be better to secure a good rate of regeneration of the resource by limiting the removal of seeds.

The exploitation of palm hearts is also controlled by legislation (IBAMA Ordinance No. 439/1989 P from 9 August 1989). It obliges reafforestation with the same species or one with higher market value. The minimum density of replanting depends on the species. This measure, however, is not justified for the species exploited in Amazonia (*Euterpe oleracea* and *Astrocaryum jauari*) as they naturally resprout from the base.

This short review demonstrates that legislation mostly concerns logging activities and is poorly adapted to local economic conditions and to the ecological characteristics of the resources. Long-term extractive activities of natural resources always abut on the concept of a threshold of exploitation, depending on the biology of the particular resource. Exploitation quotas should be considered, but specific data are needed to contribute to the writing of regulations and guidelines adapted to each species.

Within the buffer zones or the large uncontrolled conservation units, it would be useful to permit the practice of extractive activities within a legal framework. This could provide the opportunity to encourage awareness of conservation schemes, which could be seen by the inhabitants not simply as a set of prohibitions but as valuable management guides and practices. The income generated by extractivism could balance the loss incurred by the prohibition of exploitation of a few areas which are entirely protected or the prohibition of management with high ecological impact such as logging or commercial game. Such a policy can only work in conjunction with a change of the marketing structures in order to provide a higher income for the collectors.

IMPROVEMENT OF MANAGEMENT PRACTICES

To improve collection of products within the natural environment two obstacles must be overcome: the availability of the resource and the low productivity of the work force. Intensification of the production can be achieved by improvements in management practices and increasing the productivity of plant stock. Attempts at agrosylvicultural cultivation should not be excluded.

MANAGEMENT OF THE FOREST

Sets of techniques are available to enrich the forest in valuable species such as planting in forest trails, enriching gaps, selective felling of old individuals and cutting vines in order to increase the amount of light and reduce competition. As yet, we have not observed any of these practices, other than enriching the fallows in fruit species in order to complete the basic household needs. The forest is usually thought of as a place for natural harvesting which does not need to be managed. In carrying out any improvement experiments within a community, it should be borne in mind that the collectors need prior information to convince them of the value of changing practices in order to increase the productivity of the natural stock.

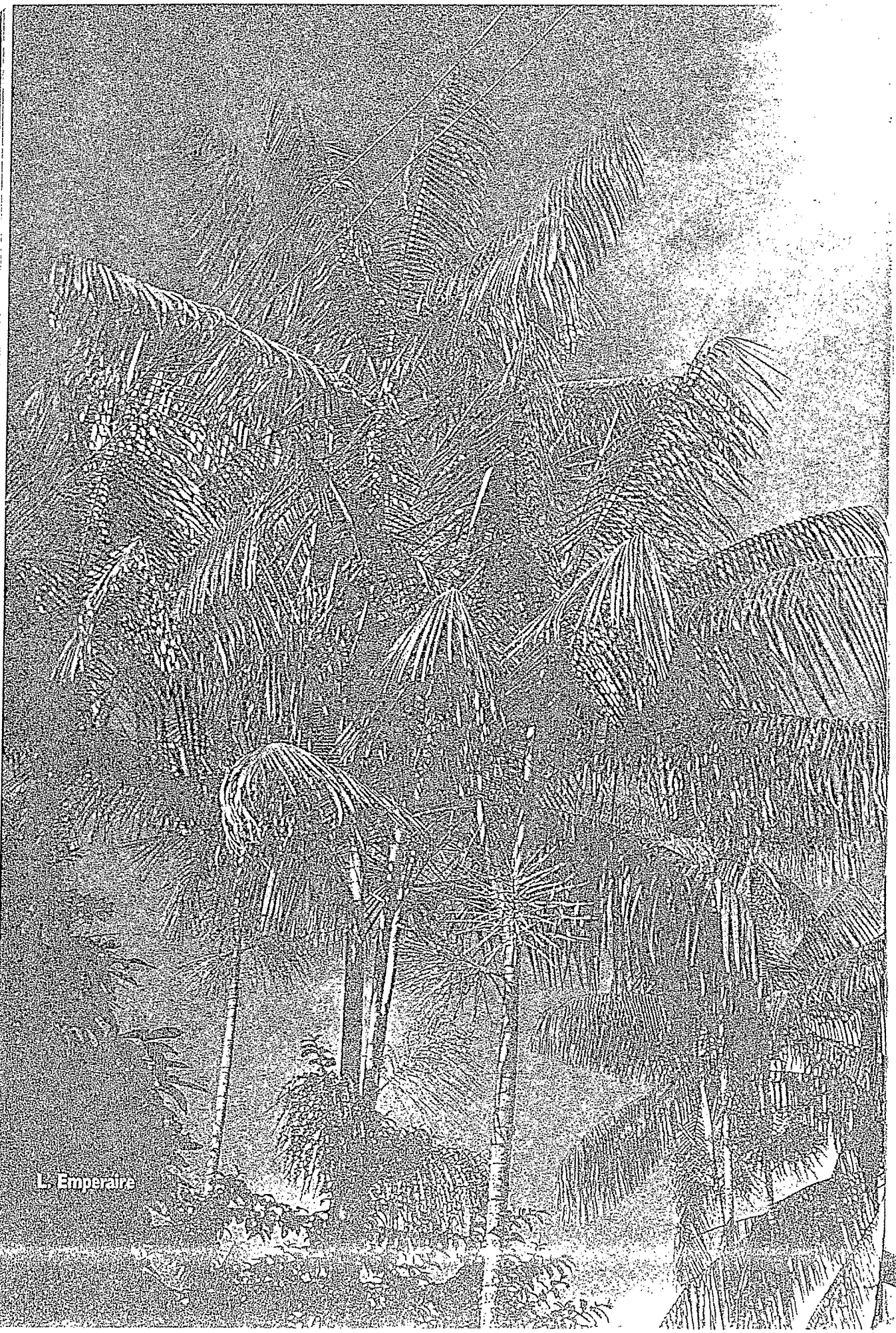
AGROFORESTRY SYSTEMS

A few attempts at planting species of economic interest in agroforestry systems have been observed. The species involved in those systems are mostly *açaí* and *andiroba*, occasionally *pau rosa* in the Maués region, and we observed one attempt with *puxuri* in the middle Rio Negro. All of them were individual initiatives. Other systems have been supported by State development policies, such as the small plantations of rubber-trees spread widely over the *várzea*. Whether individual or State supported, these plantations conformed with the traditional agrosylvicultural way of planting orchards.

On a larger scale, one finds other experiments such as the numerous single-species plantations of *seringa* carried out by companies, usually with government subsidies. A few plantations of *andiroba* have been set up by a logging company. Some *fazendeiros*, disappointed with the low productivity of their pastures, have tried to change the land use to *castanha* cultivation. Those plantations usually follow a single-species cultivation model.

According to the IBGE (1990) calculations, 78% of the population of the State of Amazonas will live in the cities at the beginning of the next century, compared with 60% in 1980. This urban concentration leads us to expect growing demand for products such as wild fruits, medicinal plants or fuel wood, which are currently supplied by extractive activities. With this in mind, there is an urgent need for research into the autecology and productivity of species of economic interest, in order to develop enrichment practices and mixed agroforestry systems.

Finally, it should be remembered that extractivism remains a major component of the production system for a large number of forest dwellers and thus should contribute to the improvement of their life conditions, at least in the medium-term. It will not develop without a restructuring of marketing channels and an increase in the prices paid for the products. In many cases, including that of rubber exploitation, management practices such as enriching the stock of resources and extending agroforestry systems should be improved in relation to the other productive activities and implemented according to the local environmental conditions. With this in view, further research is needed, which should be carried out under real-life conditions, in close relation with the producers and their communities.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Guillaumet, J.-L.; Grenand, P.; Bahri, S.; Grenand, F.; Lourd, M.; Dos Santos, A.A.; Gély, A. 1990. Les jardins-vergers familiaux d'Amazonie centrale: un exemple d'utilisation de l'espace. *Turrialba* 40(1): 63-81.

Hartshorn, G.S. 1989. Sustained yield management of natural forest: the Palcazu production forest. In: Browder, J.O. (Ed.), *Fragile Lands in Latin America*, 130-139. Westview Press, Boulder.

Hidalgo, R.C. 1992. The tagua initiative in Ecuador: a community approach to tropical rain forest conservation and development. In: Plotkin, M.; Famorale, L. (Eds), *Sustainable Harvest and Marketing of Rain Forest Products*, 263-273. Island Press, Washington, D.C.

IBGE. 1990. *Anuário estatístico*. Instituto Brasileiro de Geografia et Estatística (IBGE), Rio de Janeiro.

Lescure, J.-P.; Pinton, F.; Delavaux, J.J. 1992. *La réserve extractiviste: Un outil de protection du petit producteur et de la forêt ? Rapport de mission dans le moyen Juruá.* ORSTOM/INPA, Manaus.

Mendonça, B. Gal. 1989. *Reconhecimento do Rio Juruá (1905).* Fund. Cult. Estado do Acre/Ed. Itatiaia, Belo Horizonte.

Mitja, D.; Lescure, J.-P. 1993. L'extractivisme du *pau-rosa*. In: *Rapport final SOFT*. Doc. multigraphié. Ministère de l'Environnement/ ORSTOM/ INPA, Paris, Manaus.

Nascimento, J.C. 1980. Ecological studies of sesquiterpenes and phenolic compounds in leaves of *Copaifera multijuga* Hayne (Leguminosae) in a central Amazonian rain forest. Ph.D. Thesis. University of California.

Nelson, B. 1987. Relatório sobre o gênero *Copaifera,* fonte de óleo-resina. Mimeographed document. INPA/FUA, Manaus.

Nicolas, D. 1981. Rapport de prospection d'*Hevea* dans l'Acre. Unpublished report.

Pereira, H. dos S. 1992. *Extractivismo e agricultura: as escolhas de uma comunidade ribeirinha do Médio Solimões*. M.A. Dissertation. INPA/FUA, Manaus.

Pinton, F.; Emperaire L. 1992. L'extractivisme en Amazonie brésilienne, un système en crise d'identité. *Cah. Sci. Hum. ORSTOM* 28(4): 685-703.

Pinton, F.; Delavaux J.-J. 1992. Côté forêt, côté jardin : Notes sur l'usage du végétal dans la région de Maués. Rapport de mission. ORSTOM/INPA, Manaus.

Posey, D.A. 1992. Traditional knowledge, conservation, and 'the rain forest harvest'. In: Plotkin, M.; Famolare, L. (Eds), *Sustainable Harvest and Marketing of Rain Forest Products*, 46-50. Island Press, Washington, D.C.

Ribeiro, B. 1990. *Amazônia urgente. Cinco séculos de história e ecologia.* Editora Itaiaia Ltd, Belo Horizonte.

Santos, R. 1980. *História econômica da Amazônia (1800-1920).* T.A. Queiroz, São Paulo.

Saragoussi, M.; Martel, J.H.; Assis Ribeiro, G. de. 1990. Comparação na composição de quintais de três localidades de terra firme do Estado do Amazonas. In: Posey, D.A.; Overal, W.L. (Eds), *Ethnobiology: Implications and applications. Proceed. 1st Intern. Cong. Ethnobiology*, 295-303. Museu Paraense E. Goeldi, Belém.

Schmitt, L. 1989. Etude des peuplements naturels en forêt dense guyanaise. Compte-rendu de mise en application des traitements sylvicoles sur le dispositif de Paracou. Mimeographed. CTFT, Kourou.

Teixeira, C.C. 1980. O aviamento e o barracão na sociedade do seringal (estudo sobre a produção extractiva da borracha na Amazônia). Dissertação de mestrado em Sociologia. USP, São Paulo.

Terri, V. de A. 1977. Os indios Kashinawa, do 'caboclo' ao 'acreano'. Tese de Mestrado. UNB, Brasília.

Uhl, C.; Vieira, J.C.G. 1989. Ecological impacts of selective logging in the Brazilian Amazon. A case study from the Paragominas region of the State of Pará. *Biotropica* 21(2): 98-106.

Euterpe precatoria, a palm of swampy valley bottoms of central and eastern Amazonia, whose heart and fruits hold considerable food potential. Shown here planted in orchards, São Gabriel da Cachooeira.

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References

Alencar, J. da C. 1982. Estudos silviculturais de uma populaçâo natural de *Copaifera multijuga* Hayne, Leguminosae, na Amazônia central. 2. Produçâo de óleo-resina. *Acta Amazônica* 12(1): 75-89.

Anderson, A.B. 1990. Extraction and Forest Management by Rural Inhabitants in the Amazon Estuary. In: Anderson, A. (Ed.), *Alternatives to Deforestation: Steps Toward Sustainable Use of the Amazon Rain Forest*, 65-85. Columbia University Press, New York.

Anderson, A.B.; Jardim, M.A.G. 1989. Costs and benefits of floodplain forest management by rural inhabitants in the Amazon estuary. A case study of *açaí* palm production. In: Browder, J.O. (Ed.), *Fragile Lands in Latin America*, 114-129. Westview Press, Boulder.

Aubertin, C. 1992. Les marchés amazoniens de l'extractivisme. Paper presented to 'La journée des économistes'. ORSTOM.

Aubertin, C. 1993. Extractivisme végétal et préservation de la forêt amazonienne. *Les Cahiers du Brésil Contemporain*, n° 21: 21-37.

Bello, W.; Monteiro da Silva. 1986. (Ed. facsimilé de 1907). Exploraçâo das fibras. In: IBGE *Séries estatísticas retrospectivas*. Vol. 2, t. 1, 93-136. IBGE, Rio de Janeiro.

Bressolette, V.; Rasse, E. 1992. Devenir de l'extractivisme dans trois communautés: Limâo, Açutuba, Sâo José, à Iranduba, zone proche de Manaus. De la dépendance du patron à la dépendance du foncier. Rapport de stage. CNEARC, Montpellier.

Castro, A. de. 1993. L'extractivisme de l'*açaí*. In: *Rapport final SOFT*. Ministère de l'Environnememt/ORSTOM/INPA, Paris/Manaus.

Coelho Ferreira, M. 1992. *Les plantes médicinales à Manaus: utilisation et commercialisation*. Mémoire de DESU. Université Paris VI, Paris.

Compagnon, P. 1986. *Le caoutchouc naturel. Biologie, culture, production*. Maisonneuve et Larose, Paris.

Emperaire, L.; Lescure, J.-P. 1993. L'extractivisme de la piaçaba. In: *Rapport final SOFT*. Doc. multigraphié. Ministère de l'Environnement/ ORSTOM/INPA, Paris, Manaus.

Emperaire, L.; Lescure, J.-P.; Pinton, F. 1992. *Rapport de mission à Taperera, Moyen Rio Negro, Juillet 1992*. ORSTOM/ INPA, Manaus.

Geffray, C. 1992. La dette imaginaire des collecteurs de caoutchouc. *Cah. Sci. Hum. ORSTOM* 28(4): 705-728.

Grenand, P.; Grenand, F. 1990. Une identité insaisissable: les caboclos amazoniens. *Cahiers d' Etudes Rurales* 120: 17-39.

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