Catarina A. Cardoso, London School of Economics
Department of Geography, London School of Economics
Houghton St, London WC2A 2AE, UK
Fax: 4417 1955 7412
Email: C.A.Cardoso@lse.ac.uk

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Paper: The role of external agents in the development of a common property rights institution: the Extractive Reserve Chico Mendes in Brazilian Amazonia

Introduction

It is now well established that under certain conditions, common property regimes can provide the necessary incentives for the sustainable management of natural resources. Scholars have examined the features that these institutions must have to prevent resource depletion and when users are likely to develop robust common property regimes (Ostrom, 1990; McKean, 1992; Singleton and Taylor, 1992). One of the key factors identified in the literature on common property regimes is the role of the external context and in particular that provided by the role of the state in supporting and protecting common property rights (Ostrom, 1990; Richards, 1997). This paper focuses on the interaction between the external context and the users of a particular common resource: it examines the role that international concern with deforestation interacting with national and local/internal factors has had in shaping a common property regime, the Extractive Reserves Chico Mendes in Brazilian Amazonia.

The paper is structured in four parts. Section one presents an overview of the recent developments in the literature on common property regimes. Section two reviews the external context of the case study - the evolution of national and international policies for Brazilian Amazonia. Section three examines the process that led to the creation of extractive reserves. Section four analyses the features of the Chico Mendes reserve based on the authors' interviews with inhabitants of the reserve and key informers. Finally, section five summarises the examination of extractive reserves and discusses the robustness of the Extractive Reserve Chico Mendes.

The development of robust common property regimes

A common property regime refers to an institution in which a group of individuals has common rights over a resource and all other potential users are excluded from using the resource in question (Ciriacy-Wantrup and Bishop, 1975; Stevenson, 1991; Bromley, 1991). Individuals owning a resource in common have to deal with two types of situations that may lead to the depletion of the resource: the use of the resource by non-owners and the overuse of the resource by the owners themselves. The first situation usually arises because areas managed under common property regimes have been regularly considered as "no-one's property" and thus open for everybody to use. If everybody has access to the resource, the 'tragedy of the commons' described by Hardin (1967) may occur. The second situation, the overuse of the resource by the appointed users, results from the existence of the free-rider problem. Some co-owners may overuse the resource in the belief that conservation measures

by the rest of the group will guarantee that the resource is not depleted. A robust common property regime is one that has the necessary mechanisms for preventing the depletion of the resource by both outsiders and co-owners.

Robust common property regimes tend to exhibit several key characteristics. First, the boundaries of the resource are well defined, that it is clear to the users what they are managing[1], and the limitations placed on outsiders. In the case of fisheries, for example, the fish itself is mobile but there are well defined territories, e.g. up to 15 km from the coast, where only the members of the group are allowed to fish (Berkes, 1987). Who the members of the group of co-owners are is also well established. In this way it is clear who should be prevented from using the resource and to whom regulations controlling the rate of appropriation of the resource apply.

The existence of regulations designed by the co-owners themselves is a common feature of robust common property regimes. These rules are usually designed specifically to prevent the destruction of the resource (Hames, 1987). In the case of isolated communities, they may occur in the form of cultural beliefs, but such arrangements often lose their impact with changes in the original conditions, e.g. entrance of the market or a new technology that permits higher levels of extraction. If rules are specifically designed to prevent overuse of the resource, users will more easily be able to adapt them to new conditions. Rules should also be clear and easy to enforce (McKean, 1992) and should be adapted to local conditions with users able to change them if necessary (Ostrom, 1990).

Compliance with the rules should be monitored. In the case of small communities, social pressure may prevent users from free riding, but this is not the case when groups are larger and one can defect without being noticed. Monitoring can be performed by the users themselves, or by contracted agents. Some communities actually prefer to have external agents monitoring the rules rather than controlling each other's actions but these agents are, in the final instance, accountable to the co-owners of the resource (Martin, 1987). Monitoring mechanisms may be embedded in the rules. For instance, if access to the common resource is forbidden during a certain period of the year, it is clear that anyone entering the area is breaking the established rule (McKean, 1992). In case of defection there should be some penalty that should preferably be gradual Ostrom (1990). The application of a small penalty for a user who breaks a rule for the first time will be sufficient to remind the co-owner that the regime mechanisms to prevent free-riding are efficient; this in turn increases reliance on the system and, by extension, compliance with the established rules. On the contrary, imposing a large penalty may create resentment and unwillingness to conform with the rules in the future. Together with enforcement procedures there should also be conflict resolution mechanisms. This will avoid escalation of conflicts that may result in the destruction of the system and the depletion of the resource.

The literature on common property regimes suggests that several other factors tend to be present when users of a resource develop robust institutions. One is that co-owners know the carrying capacity and ecological features of the resource to be able to design rules for its conservation. The demand-supply conditions for the resource should also require that some limitations to its use are implemented – the need for establishing property rights over a

[1] Using the resource implies only taken units from it, managing the resource involves also taking decisions concerning the use of the resource in the medium and long term.

resource only arises when the resource becomes scarce and thus open access may result in the depletion or destruction of the resource base.

The characteristics of the group of users are crucial in the development of a robust common property regime. It is generally agreed that groups which are small, whose members are relatively homogenous, who expect to continue interacting with one another over time, and are highly dependent on the resource base are more likely to establish robust institutions than large and heterogeneous groups (Singleton and Taylor, 1992; Bromley and Cernea, 1989). However, there is also evidence of large and heterogeneous groups that developed common property regimes (Ostrom, 1990; Gadgil and Iyer, 1989). According to Ostrom, independent of the size of the group, users of a common resource will be more likely to develop an arrangement to prevent the depletion of their resource if they share generalised norms of reciprocity and trust, a common judgement that they will be harmed if they do not change the situation and if all users are affected in similar ways by the proposed change.

The development and resilience of common property regimes is also related to the external context: the role of the state and of the more general context, such as development of a market economy in previously isolated areas and increases in population in the region. The state may act as a controller, may be indifferent or faciliatitive (Ostrom, 1990). A controller state is one that does not leave the users of the resource the necessary autonomy to set up their own management system (Goodland, Ledec and Webb, 1989; Bromley and Cernea, 1989; Hilton, 1992).

An indifferent state is one that neither undermines nor supports common property regimes. In this case, users of a resource can organise themselves and set up their own regimes for managing common resources. However, there are common property regimes have been disrupted by external threats because they did not receive the necessary protection of their property rights from the state. For instance, an increase in population in neighbouring areas may put a strain on the CP regime that the users alone may not be able to solve. In the case of Latin American forests, the disruption of common property regimes has often been due to the tacit or open encouragement of colonisation over existing CP regimes, policies supporting vested interests groups in the same or contingent areas and to failure to uphold basic law and order (Richards, 1997).

A ‘facilitative’ state is one that supports common property regimes. This support may take a number of forms. The most important is the recognition of the rights of co-owners of a resource, and the protection of these rights (Baines, 1989). The state may also support regimes by providing arenas for conflict resolution. An examination of Japanese commons by McKean (1992) for example, shows the importance of access to courts where the villagers could solve their disputes. Similarly, Pinkerton (1992) and Acheson (1989) examine cases of co-management, where users of a common resource manage it in co-operation with state agencies that provide the necessary technical information and legal backup for their arrangements.

In the case of large groups of users and complex resource systems, common property regimes may be established in the form of a ‘federal structure of nested layers’ (Ostrom, 1990): that is, the organisation of the users of the resource occurs in different levels, and some of these include regional and national jurisdiction. This may happen because the problems involved in the use of a natural resource exist at different levels. A group of users may be able to develop

a robust common property regime at the lower level, but the sustenance of the resource may also depend on action at other levels, or by other groups of users of the resource. This would require action that is beyond the local group of users and further external support (Pinkerton, 1987).

The Amazon rainforest is one of those resources whose use may involve problems at different levels. The various components of the forest ecosystem are interdependent, and deforestation of large areas of forest has impacts on neighbouring areas as well as on the global environment. For instance, clearing of a large patch of forest will destroy the local endemic species as well as those of neighbouring areas that depend on large extensions of forest for performing their ecological functions. Loss of species has a negative impact on humankind as a whole because of the importance of biodiversity for pharmaceutical and food research. In addition, deforestation of large areas curtails the role of the Amazon rainforest as a carbon sink and releases CO_2 into the atmosphere, contributing to global climate change (Lovejoy and Salati, 1983; Fearnside, 1997; Sioli, 1985).

Due to the role of the rainforest at the global level, international actors, as we shall see below, have played an important role in influencing policies for the Amazon region. The development and robustness of extractive reserves is related not only to the characteristics of the group of users, the rubber tappers, the features of their own specific resources and the role of national policies but also to the external context, which in the case of extractive reserves refers to the interaction of national and international actors in defining policies for the region.

Brazilian Amazonia

For the purposes of this case study, the history of Brazilian Amazonia begins in the late 19th century when workers from all over Brazil, especially the Northeast, migrated to Amazonia to work in the collection of wild rubber (*Hevea Brasiliensis).* The discovery of how to make rubber elastic properties permanent and the growth of industrialisation in Europe made world demand for rubber boom. Amazonia was virtually the only supplier of the product and for the next few years the region's economy was geared towards the export of natural rubber. In the 1920s, with the development of rubber plantations developed in Southeast Asia, the Amazonian monopoly ended. Apart from a brief upsurge in the international demand for rubber during World War II - because the US had lost control of the Southeastern supplies – the rubber trade never regained its world-wide importance. The owners of the large rubber estates that had been established during the rubber boom abandoned their lands. Many rubber tappers, however, stayed in the forest, practising subsistence agriculture and collecting rubber now for local and regional markets.

In the 1970s, the then military government of Brazil set up to 'develop" Amazonia by opening highways across the region, fostering the colonisation of Amazonia by landless peasants from other regions of Brazil, and giving incentives for cattle ranching, large scale agriculture and mining. This model of development gave rise to high levels of deforestation in the region – with its accompanying local and global consequences. Furthermore, the government policies developing Amazonia provoked a massive increase in land demand, which in turn led to further deforestation and to violent conflicts between the traditional populations of the region and the new comers. One of these conflicts took place between the rubber tappers and cattle ranchers who cleared the former rubber estates for the creation of pasture.

Although the exact extent of deforestation in Amazonia is difficult to ascertain with exactitude[2], there is virtual consensus that in the 1970s and especially in the 1980s deforestation rates in the Amazon soared (Goodman and Hall, 1990; Browder, 1988; Mahar, 1989) and some estimates suggest that by 1980, 125 thousand sq. km of forest had been cleared (Myers, 1989). The extent of forest clearing became, in the 1980s, a concern of the international community. In 1983, US and international NGOs had initiated a campaign to change the existing development model that paid scant attention to the conservation of natural resources and highlight the importance of the global environment to the general public (Bramble and Porter, 1992; Rich, 1994). NGOs focused their attention on the project lending policy of the Multilateral Development Bank. The MDBs financed different projects in the developing world that apart from leading to deforestation and other environmental problems, were having disastrous impacts on the local population. One such project was Polonoroeste, which involved paving BR-364 highway in Brazilian Amazonia and an accompanying colonisation project. As a result of the MDB campaign in 1985 funding for the project was temporarily stopped until mitigating measures to cope with the environmental and social impacts of the project were taken[3].

International NGOs, however, did not only obtain the suspension of one specific project. Their campaign also contributed to make deforestation in Amazonia become an international political issue and by the end of the decade, the burning of the rainforest became a recurrent issue in Brazil's foreign policy negotiations. Other factors contributed as well to the the international interest in Amazonia, such as the sheer size of the rainforest and the mythical role that the region had always played in the minds of outsiders (Hecht and Cockburn, 1989). Moreover, deforestation "lent itself to dramatic and extremely effective media presentation" (Hurrell, 1992) and it provided the scope for doing something without high costs at home (Gross, 1990; Kolk, 1996).

While international concern with deforestation in the Amazon was mounting, the political situation in Brazil had changed. In 1985, the military dictatorship ended. Social movements within the country gained strength especially those, like the tappers, who in their struggle against the cattle ranchers had made alliances with the international environmental community. Internal criticisms of government policies for Amazonia acquired more political leverage and the new 1988 Constitution included a whole chapter and several sections on the environment, listing specific measures for protecting the natural resource base (Arnt, 1992).

In 1988 international pressure on Brazil attained a peak. Several factors contributed to this: a particular dry summer in the US that year, mounting evidence linking deforestation to climate change and a report by the INPE, the agency responsible for presenting deforestation data, stating that until then 80 000 square kilometres of tropical forest had been cleared. This value

[2] Different scholars use different definitions of forests as well as of deforestation, the political agenda of the organisations presenting the data influences the figures they give and the techniques used to calculate deforestation vary. A comprehensive and up to date bank of information on deforestation levels and rates does not exit. According to Myers (1989), by 1988 400 thousand square Kilometres of forest had been cleared. Mahar (1989) estimated that up to that date deforestation had reached 600 000 kilometres or 12% of the region. Recent estimates by Fearnside (1997), conclude that until 1988 9.5% of the forest had been cleared and that by 1991, this percentage was 10.7%.

[3] The program attracted a much larger number of migrants than expected. Local populations in the areas saw their lands invaded by the new comers and the latter, faced with lack of institutional support and the poverty of the soils (apart from a range of diseases and other shortcomings of tropical environments) were not able to make a living in their allocated plots, moving thus deeper into the forest and clearing new areas. Deforestation in the region raised from 1.7% in 1978 to 16.1% in 1991 (Rich, 1994).

was later reviewed but at the time it played an important political role. Furthermore, one of the rubber tappers leaders, Chico Mendes, that had become international known in the context of the MDB campaign, was murdered in December 1988. His assassination, ordered by a cattle rancher, gave a human face to the negative impacts that the government policies for the 'development' of Amazonia were having on the local population (Kolk, 1996; Goldenberg and Durham, 1990).

By the end of the decade, the combination of international pressure with changes within the country, led the Brazilian government to adopt a different attitude towards Amazonia and the environmental issue in general. In 1988 President Sarney created IBAMA, Brazilian Institute for the Environment, set up the Program Our Nature, aimed at the conservation of Amazonia, and offered to host the forthcoming United Nations Conference on Environment and Development. In 1990, the new elected President, Fernando Collor, began his mandate with a number of environmental measures, among which stand out the creation of the Secretariat for the Environment and the appointment of Jose Lutzenberg, a world-known environmentalist to direct it. Finally, in the context of the international concern with deforestation and the new environmental front of the Brazilian government, the G7 countries and Brazil agreed in a US $ 250 million program for protecting the rainforest, the G7 – Pilot Program for the Protection of the Brazilian Rainforests.

The 'external context' of our case study, that is the national and international developments in relation to Amazonia has changed considerably since the time of the rubber boom, when the tapper population formed. After an initial period of working for the rubber barons, the tappers were left to their own devices, in an political environment that could be termed 'indifferent'. Later, the same 'indifferent' context meant that they had no protection against the occupation of their lands by the cattle ranchers. Influenced by the development of international concern with deforestation, however, government policies for the region changed and the conservation of the rainforest became the object of several government policies. The impact of these new policies on the rubber tappers was, as we shall see below, that their usufuct rights to the former rubber estates were acknowledged by the state. In the remainder of this paper, the evolution of the tappers land tenure system and how they obtained recognition for their landed property are examined.

Recognition of common property rights: the creation of extractive reserves

At the time of the rubber boom, tappers worked in large estates - between 130 and 700 sq. km - under the control of the owner of the estate, the rubber baron or patron. Rubber estates (*seringais*) were not defined according to land surface but to the resources existing in that land, especially the number and quality of rubber trees. The delimitations were given by rivers and neighbouring estates (Duarte, 1986; Basilio, 1992; Weinstein, 1983).

A *seringal* was formed by the rubber tappers' stands (*colocações),* and the warehouse, house and other dependencies of the patron. The rubber stand, still the basic unit of production of rubber tapping, is formed by: an average of two or three rubber trails, some of them lying fallow; the allotment designated for agriculture; areas for fishing, hunting and gathering; the tapper's house; and the site for the processing of rubber. The rubber tappers' holdings are on average 5 sq. km (Allegretti, 1989) and their shape is determined by the rubber trails. The trails of one *colocação* are generally intertwined with the trails of other rubber stands, thus the latter are better defined according to the trails, rather than the land area they occupy. The

rubber tapper's work has not changed since the time of the rubber boom: the tapper walks along rubber trails, making cuts in the trees, he[4] then puts small pots underneath the cuts and later collects the accumulated latex.

During the rubber boom, and still today in more remote and isolated areas (Schwartzman, 1990; Allegretti, 1989), the control of labour is maintained through a debt peonage system[5] known as *aviamento*. Since the collapse of the Amazonian rubber trade, *aviamento* has undergone gradual change, leading to the development in the 1960s-70s of the autonomous rubber tapper. 'Autonomous' rubber tapper is the term used to define the extractivist who does not depend on the patron and who is free to sell his product to other social agents, as well as to practice complementary activities such as subsistence agriculture and collection of Brazil nuts (*Bertholia Excelsea*).

In the 1970s many rubber tappers in the Acre River Valley were working as autonomous tappers in a political context that was largely unaware of their existence. They lived in former rubber estates that had been abandoned by the rubber barons or in public lands. Legally, they had individual usufruct rights to their rubber stands because they had been living there for over a year but these rights were not automatic. Their informal property rights system may be described as a fragile common property regime. Each rubber tapper family worked in their own rubber stand and respected the boundaries between the rubber trails of the different tappers. Common paths and rivers, although used by all the inhabitants of the area, were not cleared in common; this work was done either by the middlemen who bought the produce from the tappers, or the latter would clear only the track of path next to his house. Although there were unwritten rules to prevent the deterioration of the rubber trees, it is not known whether the tappers had mechanisms for dealing with members of the group who would break these rules, nor to solve conflicts between neighbours, apart from the social constraints usually present within small communities. Nevertheless, while there was no external interference in their management system - neither state control over their resources nor non-owners encroaching in their lands - rubber tappers sustainably used their forests. Once left to their own devices, they did not fall into the 'tragedy of the commons'.

The situation of the autonomous rubber tappers was drastically changed in the mid-1970s, when ranchers and land speculators bought the former rubber estates and tried to expel the extractivists living in their recently acquired lands. Initially, the tappers abandoned their rubber stands and migrated to nearby cities, but the latter did not have the necessary infrastructure to deal with such an increase in population, nor the tappers the necessary skills to make a living outside the forest. Many extractivists came back and settled in areas not yet occupied by the ranchers, but when these lands were subsequently bought, a major conflict developed over landed property rights between the cattle ranchers and the extractivist population.

The new owners used various devices to expel the tappers: they obstructed roads and forest paths, destroyed cultivated fields and expelled the families with the help of gunmen (de Paula, 1991; Duarte, 1986). The rubber tapper's resistance against eviction began as isolated movements, such as refusing to leave their stands when the ranchers' employees arrived in their houses. Initially, the only help extractivists had was from the Catholic Church. In the

[4] Although some women also tap rubber this work is generally done by men.

[5] Debt peonage systems are those that involve the near-slavery of the worker because of debt. In general the transactions are made in kind and there is no cash involved.

1970s, priests and nuns from various orders organised literacy courses in the former rubber estates, denounced the violence that ranchers were using against the tappers and informed the extractivist population of their legal rights in relation to the rubber stands. In the second half of the 1970s, CONTAG, National Confederation of Agricultural Workers established rural workers' unions in the state of Acre, and these provided the organisational know-how for the tappers, especially for those who, already before the arrival of the ranchers, were trying to get the tappers together to improve their social conditions (Mendes, 1989). On the one hand the unions provided the tappers with the organisational structure behind the rubber tappers movement against land eviction; on the other hand, the land issue was the motor behind the development of the rural workers' unions in Acre, whose members at the time were mostly extractivists.

The role of external agents was not limited to providing information and legal support for the tappers. They also encouraged the extractivists to organise. As mentioned earlier, users of a common resource have usually to deal with two types of problem: how to harmonise their own use of the resource and how to prevent access to their resources by outsiders. In the first case, autonomous solutions may develop if the group is small, relatively homogenous, has a good knowledge of the resource, all members share a common understanding of the problem and are highly dependent on the resource. In the second case, even if these conditions are met, the users may not have the necessary knowledge of the external context, of political and legal aspects of their situation in relation to wider social structures (e.g. legal system) to be able to fight off more powerful agents. This was the case of the isolated rubber tapper communities.

One of the main resistance devices used by the tappers were the staging of *empates* or 'stand-offs'. The tappers rallied in an area of the forest about to be cleared, confronted the workers due to cut down the trees and hindered their work. Due to the stand-offs, the usufruct rights of the tappers were acknowledged. Rubber tappers began receiving compensation for their rubber stands, namely for the improvements made to the stand: the house, the animals and the vegetable plot. Compensation was first in the form of monetary indemnities, but soon the tappers realised that there was not much they could do with the indemnity, apart from moving to a city where they could not find work.

Later the rubber tappers began receiving compensation in land: either the rancher provided them with plots in another area of the estate, or INCRA, the state land agency, would establish them in their traditional settlements. These settlements were formed by plots of land, similar to those small farmers had - thus not delineated according to the rubber trails as the rubber stands were, and considerably smaller than the latter. After some time, many tappers sold their plots and moved away. The agricultural plots did not have the necessary conditions for production - e.g. technical assistance, credit and transportation of goods - nor for commercialisation of the goods, namely the existence of roads for taking out the produce, warehouses and minimum prices. Besides, the spatial distribution and the social organisation in the agricultural settlements were difficult for them to adapt to. The space was much smaller than they were accustomed to, and the neighbours far too near. Finally, the cultural knowledge needed in the agricultural settlements was very different from that learned in the forest - from a work and social perspective (de Paula, 1991; Allegretti, 1994).

As the stand-offs did not provide a long-term solution to their problems, in 1985 the tappers from Acre decided to organise a national meeting of rubber tappers. During this meeting they

set up a national organisation to defend their interests, the National Rubber Tappers' Council (CNS). This organisation was crucial in articulating the rubber tappers demands with the government agencies. It was also during this meeting that the concept of "extractive reserves" was officially launched. Finally, from the 1985 meeting onwards the "rubber tappers' struggle began to get known all over the world" (Mendes, 1989:36).

The core features of the extractive reserve proposal was that: first, the rights of extractivist populations to the lands they had traditionally inhabited should be recognised, i.e. they should be allowed to remain in the forest areas where they had been living for generations. And second, their land tenure system should not be disrupted. INCRA settlement projects were based on plots that did not consider the distribution of natural resources in the forest and so the rubber trails, for instance, were 'broken'. The tappers thus demanded that the state should recognise the set of rubber stands delineating a perimeter around them.

The National Meeting of Tappers was attended by representatives of the NGOs involved in the MDB campaign and an alliance formed between these organisations and the rubber tappers. This alliance was based on both the similarity of some of their interests and the political strategies of the two groups.

In support of the environmental movement, the tappers provided, first, proof that the development policies for Amazonia they were attacking not only caused environmental destruction – and issue often presented as a concern of the North – but they also had serious social repercussions for the local population. Second, the tappers' demands for the standing forest clearly indicated that the conservation of Amazonia was not merely a concern of foreigners and the urban middle classes of the South of Brazil, but that local populations also had environmental concerns. And third, the concept of extractive reserves could be seen as an alternative model of development of the region, in the sense that it provided for the economic development of the population while at the same time being based on the conservation of the natural resource base.

In support of the rubber tappers, the environmental NGOs represented powerful allies in the extractivists' struggle for recognition and establishment of extractive reserves and on this account the tappers switched their political strategy to the environmental arena. Although from the beginning their demands had included that deforestation in the former rubber estates should stop, their political strategy had been within the context of land reform and had focused on the importance of wild rubber for the economy. Many tappers descended from those workers who had gone to collect rubber during World War II, where they had been attracted to the Amazon region as 'rubber soldiers' to participate in the war effort, and they still believed in the importance of rubber for the economy. However, the role of wild rubber in the national economy had, since the end of the war, become quite minor and in the 1980s was not a powerful bargaining card (Allegretti, 1989; Revkin, 1990).

From 1985 onwards the tappers' struggle began to be played at three different levels: at the local level stand-offs continued, but now they were more widely reported; at the national level rubber tappers' representatives began discussing the extractive reserve concept with government officials; and at the international level they received more and more media coverage, being portrayed as victims of deforestation and the defenders of the Amazon rainforest. The same three levels that exist in relation to the ecological features of the

rainforest were in this way transposed to the socio-political process of users of a local resource fighting for recognition of their landed property rights.

International coverage of the rubber tappers' struggle was particularly enhanced on account of two visits that one of their leaders, Chico Mendes, made to the US in 1987. The purpose of these visits was to ask for support for the extractive reserve concept and present evidence against the extension of the highway BR-364 to the capital of Acre. This highway was part of the Polonoroeste project that had been temporarily stopped in 1985 and that the Inter-American Bank of Development was now going to fund - with little consideration for the social and environmental impacts that this could bring. Chico Mendes presented evidence at the US Congress on the impacts that this project had already had on the rubber tappers from Rondônia and on the likelihood that the Acrean tappers would suffer similar problems. The project was stopped a second time and later in that year Chico Mendes received two international awards on account of his role in defending the rainforest. When in December 1988 he was murdered because of his political role as leader of the tappers' movement, his death was, as we saw before, widely reported in the international media, together with issues of climate change and the INPE report on deforestation.

The first legislative response to the tappers demands for extractive reserves occurred in 1987, when INCRA issued an internal decree creating 'extractivist settlement projects'(PAEs). The PAEs met the core demands of the tappers: their common property regime was not disrupted since the rights were officially granted to groups of rubber tappers and the area was formed by a set of rubber stands. However, INCRA did not always follow the established procedures (Environmental Law Institute, 1994). Property rights were sometimes granted on an individual basis and not only for the traditional members of the groups living in the area. The PAEs also presented some legal and political deficiencies. The decree creating them could be easily revoked by any new director of the land agency, their establishment required the a priori disapropriation of the lands – a lengthy process that could involve several years – and finally, they were set up in the context of land reform, a political item that had lost substantial leverage since 1985 when the new civilian government had presented a new plan for Agrarian reform.

In 1990, in the context of the changes in Brazil's environmental policy and the mounting international interest in the fate of the tappers, the extractive reserve concept was established in a presidential decree as part of the National Environmental Program. According to this decree, the land is owned by the state, which grants usufruct rights to the community of inhabitants of the area through a contract between IBAMA and the entity representing the extractivists. This contract must include an Utilisation Plan stating the rules to be followed by the extractive reserve population to secure the sustainable use of the resource and the mechanisms for monitoring those rules and for solving conflicts among users or with outsiders. Once the contract between IBAMA and the entity representing the inhabitants of the reserve is concluded, this entity can grant individual usufruct rights to the inhabitants of the reserve (Murieta and Rueda, 1995).

State ownership of extractive reserves and usufruct rights for their inhabitants was an arrangement decided on by the rubber tappers' organisations, such as CNS and the rural workers' unions, together with their advisors and the government agencies. Private ownership was not feasible because it involved the delineation of the plots according to traditional division of land thus disrupting the rubber trails. Apart from this argument, state ownership

had the advantage of providing more land security. There was the risk that tappers could be convinced (or forced) into selling their rubber stands, as had often occurred with peasants in agricultural settlements. Defecting, in the form of selling the stand to outsiders, has also occurred among the tappers themselves while they were campaigning against expulsion from their lands. In rubber estate Cachoeira for instance, the inhabitants of the area had informally agreed that they would not sell their usufruct rights to outsiders to increase their political leverage with the government. One tapper, however, sold the usufruct rights to his stand to the rancher who had bought the estate. This rancher began to clear the rubber stand and try to encroach on the neighbouring stands. State ownership was thus a mechanism to prevent this type of defection.

State ownership also increased the possibility of logistic support from the state – a long standing demand of the tappers had been to have schools, health posts and technical support for their produce. Finally, as the extractive reserves were established in the context of the environmental policy of the country, it was argued that if the lands were owned by the state, the later could more easily monitor the conservation of the natural resource base than if ownership was granted to a private entity such as the organisation representing the reserve inhabitants.

The state agency responsible for extractive reserves since 1992 is the National Centre for Traditional Populations (CNPT), which is part of the Institute for the Environment, IBAMA. CNPT was specifically set up to deal with all matters related to extractive reserves such as regularisation of the lands in the reserve and co-administration of the each reserve with its inhabitants. Since 1995 four reserves, including the Chico Mendes reserve that will be examined in the next few pages, have also received some support from the G7, in the context of the Pilot Program.

The Extractive Reserve Chico Mendes

The Extractive Reserve Chico Mendes (ERCM), established in 1990, is located in the west of Acre and it includes many of the areas where the initial conflicts between rubber tappers and cattle ranchers took place[6]. It is the largest of all reserves covering an area of 10 000 sq. km and inhabited by 2 000 families. These families are spread among approximately 50 former rubber estates and their houses are on average one hour's walk away from each other.

The basic unit of production in the reserve is, as before, the family rubber stand. Families neither share the production nor the work in the rubber stand with other members of the community, although they do help each other by exchanging work days. The delimitation of the family plots is based on customary rights – the same rights that existed at the time of the rubber barons and of the autonomous rubber tapper. The tappers know what belongs to one rubber stand or to the other, although there are no fences dividing the stands. Only one interviewee, out of nearly 100 could recall a case when there had been a dispute over rubber trails belonging to neighbouring rubber stands.

The property rights to the stand have been traded among the tappers since the barons left. The prices are based on the quality and quantity of resources in the stand, e.g. number of rubber

[6] The struggle of the tappers from the west of Acre was the origin of the tappers' movement and from 1985 onwards the policy of CNS has been to establish reserves in all extractivist areas. Each reserve has its own specific history and not all had problems with cattle ranchers.

trees, how productive they are, and on the work involved in the stand, such as the house, the number of rubber trails cleared and ready to work, the fruit trees (which are planted by the tapper), the agricultural plot, a cleared field, animals and work utensils. Rubber stands are only traded among rubber tappers and interviewees from areas with or without strong community ties mentioned that they would not sell the plot to someone who did not "fit" into the community.

At the time of the interviews the individual usufruct rights to the rubber stands were still based only on the informal agreement of the tappers themselves. However, once usufruct rights are granted by the entity representing the reserve, the trading of rubber stands may become more difficult. Given the large size of the reserve and the distances between the inhabitants, the common property regime is structured as a federal system of two nested layers, the organisations that manage the reserve as a whole and the local groups that live in a former rubber estate. On account of this, the relation between the owner of a rubber stand and the entity granting the individual usufruct rights is not direct.

The reserve as a whole is managed by three organisations representing the inhabitants of the reserve in cooperation with the state agencies IBAMA and CNPT. Until 1995, the organisations that represented the tappers were the rural workers' unions from Xapuri, Brasileia and Assis Brasil that had organised the struggle against the cattle ranchers[7]. These unions, however, represent not only the inhabitants of the reserve but also tappers and other rural workers living outside the ERCM and, in political terms, their interests go beyond those of the reserve strictly speaking. On this account, the tappers' leaders and the state agencies decided that it was necessary to establish organisations representing exclusively the inhabitants of the reserve. This was not a unanimous decision, but in the second half of 1995 the new Associations of Inhabitants of the Reserve began to be formed.

Former rubber tappers now leading the extractivists organisations, "liderancas", have a major role in the management of the ERCM. They, together with the state agency officials are the ones taking most of the decisions concerning the reserves as a whole, that is enforcing and regulating the norms governing the reserve, as well as implementing development projects of various kinds. However, both the former rubber tappers and government officials strongly encourage the participation of the general population when taking these decisions.

The observed difference between the "general population" and the "liderancas" is related to the fact that, upon the establishment of the reserve, the tappers' aim was to include as many extractivist areas inside the reserve as possible. This was partly because although the tapper's movement had began mainly as a struggle to defend their landed property rights, it had later developed into a political movement with wider objectives; from 1985 onwards the aim of the tappers' movement had become to defend the rights of extractivist populations in general, and the establishment of extractive reserves in all extractivist areas was one means to achieve this. The other reason for including in the ERCM a larger area than the one where the fight for land had taken place, was that the tappers were aware that if they became surrounded by ranchers this would impose a social and ecological strain on the their own areas.

[7]Xapuri, Brasileia and Assis Brasil are three of the five municipalities where the area of the ERCM is located. The other two municipalities are Rio Branco, which for reserve purposes is usually included in the Xapuri area, and Sena Madureira , included together with Assis Brasil.

On account of all these factors, approximately only 30% of the population of the reserve had actually participated in the struggle for land. Moreover, among those who did participate in the struggle, especially by taking part in the stand-offs, many did not follow the bureaucratic and political process that later led to the establishment of the reserve. A common remark of the expert interviewees was that once the threat of land expulsion was over, the sense of community that had developed among the tappers during the stand-offs vanished.

The interviews with the rubber tappers living in the forest showed that most of them were not aware that the reserve was owned by the state - let alone of the reasons why state ownership had been chosen. However, all tappers interviewed knew that living in the reserve meant that they could not longer be expelled from their rubber stands by cattle ranchers or by anybody else. Many knew the nearby reserve boundaries, and those who lived far away from the boundaries of the reserve knew well which areas belonged to them and which to their neighbours. All interviewees were fully aware of the existence of stand-offs, and of how important they had been in securing their rubber stands. They were ready to participate if the need would arise a second time.

The common areas of the reserve such as forest paths, lakes and common streams are managed by smaller groups living within one single rubber estate, or on the border between two estates, depending on the history of socialisation of the area. These groups, or second nested layer, are generally formed by 10 to 25 families. All the members of the group are at most 5 hours' walk from a meeting point. The rubber tappers consider themselves as belonging to a community. However, it was often difficult to identify who the members of this community were. Some considered the community to be all the inhabitants of the former rubber estate, others considered themselves to be part of a sub-group of inhabitants of the same rubber estate. Others still saw their community as formed by all the members of a co-operative that had been established in the area, others as part of one of the smaller gospel communities.

Nevertheless, there are communities in the sense of groups of tappers working together and meeting together to discuss community business. A community business may be taking somebody in the hammock to the nearest city, in which everybody tends to help. Another activity that showed a high level of participation was clearing of forest paths, although in one of the former rubber estates visited, only recently forest dwellers had began to clear paths in common, and the large majority of them were in fact covered with vegetation. Depending on the nature of the business the group involved will be larger or smaller, and it will encompass one or another of the existing communities. Recently, at the initiative of leaders and development workers, rubber tappers in some estates have began to get organised to build a bridge or participate in a common agricultural plot.

The level of participation varies among the rubber estates. The differences observed in level of participation and initiative is related to three interrelated factors: the traditional structure of the rubber estate, the presence of outsiders and the accessibility of the area. The reliance of tappers on leaders and outsiders is, as several key informants pointed out, related to the '*aviamento*' system. The patron, apart from being the employer performed a social role, in many cases he was the god-father of the tappers' children, and in case of illness it was to the patron or his wife that the extractivists went to ask for help.

The areas that have stronger community ties, and consequently present higher levels of initiative and participation in common works, were those that were more accessible. More accessible rubber estates were most affected by the arrival of the ranchers, who usually bought the lands that were nearer to a road. Most stand-offs, an important factor in the formation of communities among the rubber tappers, took place in these areas. Priests and nuns visiting or living in the forest also tended to stay in relatively more accessible estates. The rubber estate that had stronger community ties among its inhabitants and the oldest cooperative of the reserve, Icuriã, had had a priest living in the area for many years. According to the Icuriã inhabitants this priest, Padre Paulino, was the one who had proposed establishing the co-operative and forming groups to clear forests paths. In the neighbouring estate, where this priest had not stayed long, tappers had only began to clear forest paths together in 1994 encouraged by CNPT development workers.

There are rules specifically designed to conserve the forest. Their adequacy to local conditions is relative: there is one specific set of rules for each reserve, but in the case of such a large reserve as the ERCM, the same rules apply to all rubber estates. However, the large majority of the interviewees agreed with the rules in place. Many of them were based on the tappers' own unwritten rules but the forest dwellers considered that the rules were made by IBAMA. Most rules are reasonably clear as it could be gathered from the interviewees' explanation of them. The rubber tappers' awareness of the importance of conserving the resource also suggests that there is a certain degree of internalisation of the rules.

The interviewees' appreciation of the forest could be noticed in several instances. First, in their observations that the regulations of the reserve for the conservation of the natural resources were appropriate because otherwise they could not tap rubber nor collect Brazil nuts. Second, in the rubber tappers' comments regarding the importance of the forest for agriculture. For instance, many of the tappers explained that, to obtain the same amount of vegetables it was necessary to clear a larger area of forest in an agricultural settlement than in the reserve, because in the former there is mostly secondary vegetation. Third, in the fact that the majority of the interviewees stated that they would not exchange their rubber stands for money because money is something that disappears while the rubber stand stays forever. Unless they can buy another stand there is not much more they can do with money. A common comment was that in the city they would not be able to make a living, while in the forest they could grow their own food. Many of them had lived in the city for a while, or knew some tappers who had gone there when expelled by the ranchers, and who had had to come back to the forest. Finally, some people mentioned factors such as tranquillity, clean water, and having being brought up in the forest all their lives, as reasons for valuing the forest[8].

According to the Utilisation Plan, which is an integral part of the contract between IBAMA and the representatives of the reserve, the users can change the rules if necessary. However, for this to happen a proposal must be presented by at least 10% of the families inhabiting the reserve, that is, 200 families, and the proposed change needs to be approved by a minimum of 400 families. As the groups tend to be formed by at most 25 families, and usually only 10 families, a change in the rules would be likely to be a lengthy process.

[8] These comments were made when I asked them to enumerate the good and bad aspects of living in the city and in the forest. It should be noted that while some people genuinely preferred the forest, others were trying to justify their "choice". When the comments were "from the heart" and when they were not, is very difficult to explain, and as it is not particularly relevant to the present research I just mention those values to give a better overall picture of the rubber tappers perceptions.

In the Utilisation Plan there are also regulations on monitoring compliance with the rules. All rubber tappers living in the reserve should monitor compliance with the rules; in addition the forest dwellers should establish a Commission for the Protection of the Reserve formed by five tappers living in the reserve. If a forest dweller breaks a rule, the Commission after two admonitions will contact the newly formed Associations representing the inhabitants of the ERCM. If the situation is not solved they should contact IBAMA.

These regulations were not fully in place by the time of the fieldwork, and the large majority of the interviewees stated that they preferred IBAMA to enforce the regulations rather than doing it themselves. On rubber estate São Pedro, an interviewee explained that he preferred it that IBAMA should implement the regulations because the government had more capacity than the rubber tappers themselves to impose the regulations. “The man from the state comes and goes, while a member of the community has to go on living/interacting with the person who broke the law". In case of direct conflict between forest dwellers, e.g. interference with each other’s rubber trails, the tappers also preferred one of the ‘first layer’ organisations to solve the dispute. A technician from IBAMA who has been working with the rubber tappers for a number of years commented that "rubber tappers do not like to give their trust to another rubber tapper, they prefer to give it to an outsider that already has a bit of knowledge, someone that they think has more knowledge than them".

Summary and concluding remarks

This paper has sought to examine the role that international concern with deforestation interacting with national and local/internal factors has had in shaping a common property regime, the Extractive Reserves Chico Mendes in Brazilian Amazonia. It has argued that the process that led to the establishment of the reserve was nested in the wider developments that were taken place at the time in the national and international arenas. The trigger that led the tappers to organise was the result of the government policies for the region; the international concern provided them with crucial political leverage in the national sphere, and finally, the change in government policies – partly related to international pressure – has made the recognition of their rights more stable.

These factors not only led to the official recognition of and support for the common property rights of the tapper population, they also influenced the characteristics of the management system. State ownership of the land is a consequence of external threats that tappers face, such as pressures for selling their plots, as well as the role of environmental concerns in the establishment of the reserve. The differences in the management of common areas such as forests paths and the existence of schools and health posts in the former rubber estates is also related to external factors. All groups in the estates are relatively small, homogenous and highly dependent on the resource. The difference between the level of organisation of the groups was related to the amount of external contact they had had either with individuals trying to help them (such as the case of the priest in Icuriã) or by individuals trying to expel them, namely the cattle ranchers. The common threat faced by all tappers was a strong incentive to organise, and participation in the stand-offs set the basis of community ties in all areas affected.

The important role that external factors have had in the development and characteristics of extractive reserves may be related to two factors. One is that tappers had the necessary autonomy to set up their own arrangements for managing their forest resources for a relatively

short time, and many of the reserve inhabitants never had this autonomy. During the transition period from the *aviamento* system into the extractive reserve regime many tappers were dependent on middlemen or on 'softer' patrons. The rubber barons when they abandoned the areas, sometimes left appointed managers to administer the tappers' work. These managers were not so strict on the tapper's work as the patrons at the time of the rubber boom had been, but nevertheless their presence meant that the extractivists were not completely autonomous in managing their resources.

The second factor that can explain the importance of external agents in the development of extractive reserves is that the rubber tapper's main problem to date has been the destruction of their resource by outsiders, and not by themselves. Their struggle has been to protect themselves against external agents and for this they needed external help. Internal threats, such as 'free-riding' has not been a very common problem and so tappers have not been faced with a long standing need to deal with this matter.

Now that tappers have solved their problems concerning occupation of their lands by outsiders, will they be able to prevent the depletion of the resource by themselves? In recent years, there have been cases of tappers selling wood from their stands. Also, there is now more potential scope for free riding, for instance, by not participating in the clearing of forest paths and construction of common facilities, such as bridges, schools or health posts but using them nevertheless. These are important because the social sustainability of the reserve depends on the standard of living of the tappers, otherwise they will be tempted to abandon the area and make the entrance of outsiders more likely.

The fact that the autonomous tappers have used their resources sustainably for some decades suggests that they can devise their own mechanisms for dealing with issues of free riding, for monitoring compliance with the rules and for solving conflicts among themselves. Although generalised norms of reciprocity and trust do not exist in all rubber estates, the fact that the 'second layer' groups are small and relatively homogenous indicates that they are likely to be equally affected by the potential depletion of the resource and thus share a common judgement on the need to prevent this from happening. The forest dwellers' ecological knowledge and high dependency on the resource base and the other common facilities will provide a further incentive for them organising monitoring and conflict resolution mechanisms. Finally, the development of cooperation among the rubber tappers is related to their realising that to co-operate in certain issues is advantageous. One of the leaders of the smaller groups commented that there were fellow member of the group who were using facilities that they had not help to build, e.g. a site for the processing of Brazil nuts, but that these individuals, now that they had seen the advantages of the site, had began to participate in other common works.

The resilience of extractive reserves, i.e. the capacity of these regimes to conserve the forest resources in the area will depend not only on the characteristics of the tapper population but also on external context. The state has moved from being an indifferent state that left tappers enough autonomy to organise but not enough protection against external incursion in their areas, into being a 'facilitative' state. In addition, the tappers now have the support of an international program (the G7-Pilot Program) and a national entity representing their interests as a specific class of rural workers. While the tappers do need outside support in terms of protection of their common rights, provision of technical advice, information and education, and wider national and international policies that have positive impacts on their economy, there is a risk that the 'facilitative' political context turns into a 'controller' context. As we

saw, the changing of rules is now dependent on higher hierarchies than the small groups within the former estates. Transfer of rights is also becoming a more bureaucratic process.

An 'indifferent' political context could lead to the destruction of the resource because the conservation of the forest does not only depend on the conservation of small protected areas. Also, the robustness of the reserve is related to the economic and social conditions of its inhabitants – a matter that is not wholly dependent on the action of local actors. But a balance must be achieved between local groups' need for external help and the crucial requirement of autonomy in managing their own resources. The jurisdictions of international, national and local actors interested in the conservation of forest resources should have clear boundaries.

REFERENCES

Acheson J M 1989 "Where have all the Exploiters Gone? Co-Management of the Maine Lobster Industry" in *Common Property Resources: Ecology and community-based sustainable development* ed. F Berkes, Belhaven Press, London.

Allegretti 1989 "Reservas extrativistas: uma proposta de desenvolvimento da floresta amazônica" *Pará Desenvolvimento*, No.25 jan/dez 1989.

Allegretti M A 1994 "Reservas Extrativistas: Parametros para uma Politica de Desenvolvimento Sustenatável na Amazonia" in *O Destino da Floresta: Reservas Extrativistas e desenvolvimento sustentável na Amazônia* ed. Anthony Anderson et al Ricardo Arnt Relume-Dumará, Rio de Janeiro.

Arnt R A 1992 "The Inside out, the Outside in: Pros and Cons of Foreign Influence on Brazilian Environmentalism" *Green Year Book*, 1992.

Baines G B K 1989 " A Traditional Resource Management in the Melanesian South Pacific: A Development Dilemma" in *Common Property Resources: Ecology and community-based sustainable development* ed. F Berkes, Belhaven Press, London.

Basilio S T C 1992 *Seringueiro de Xapuri na luta pela Terra e Defesa da Floresta: projecto seringueiro, cooperativismo e educação popular* PUC, São Paulo.

Berkes F 1987 "Common-Property Resource Management and Cree Indian Fisheries in Subarctic Canada" in *The Question of the Commons: the culture and ecology of communal resources* ed B J McCAy, J M Acheson, The University of Arizona Press, Tucson.

Bramble B J and G Porter 1992 "Non-Governmental Organisations and the Making of US International Environmental Policy" in *The International Politics of the Environment* ed. Hurrell A and B Kingsbury, Clarendon Press, Oxford.

Bromley D W 1991 *Environment and Economy: Property Rights and Public Policy*, Basil Blackwell, Oxford.

Bromley D W and M M Cernea 1989 *The Management of Common Property Natural Resources: some conceptual and operational fallacies* World Bank Discussion Papers 57.

Browder J O 1988 “Public Policies and Deforestation in the Brazilian Amazon” in *Public Policies and the Misuse of Forest Resources* ed. Repetto R and M Gillis, Cambridge University Press, Cambridge.

Ciriacy-Wantrup S V and R C Bishop 1975 “‘Common Property’ as a Concept in Natural Resource Policy” *Natural Resources Journal* 15:713-27.

de Paula E A 1991 *Seringueiros e Sindicatos: Um povo da floresta em busca da liberdade* Tese submetida como requisito parcial para a obtenção do grau de mestre em Desenvolvimento Agricola. Universidade Federal do Rio de Janeiro, Instituto de Ciencias Humanas e Sociais, Departamento de Letras e Ciencias Sociais. Itaguai, Rio de Janeiro.

Duarte E G 1986 *Conflitos pela Terra no Acre: a resistência dos Seringueiros de Xapuri*, Campinas.

Environmental Law Institute 1994 *As Reservas Extrativistas do Brasil: Aspectos Fundamentais de sua Implantação*, Washington D. C.

Fearnside P 1997 “Greenhouse Gases from Deforestation in Brazilian Amazonia: Net Committed Emissions” *Climatic Change* 35:321-360.

Gadgyl M and P Iyer 1989 “On the Diversification of Common-Property Resource use by Indian Society” in *Common Property Resources: Ecology and community-based sustainable development* ed. F Berkes, Belhaven Press, London.

Goldemberg J and E R Durham 1990 “Amazônia and National Sovereignty” *International Environmental Affairs* 2-1:22-39.

Goodland R, G Ledec and M Webb 1989 “Meeting Environmental Concerns Caused by Common-Property Mismanagement in Economic Development Projects” in *Common Property Resources: Ecology and community-based sustainable development* ed. F Berkes, Belhaven Press, London.

Goodman D and A Hall 1990 “Introduction” in *The Future of Amazonia: Destruction or Sustainable Development* ed. Goodman D and A Hall, MacMillan, London.

Gross A 1990 “Amazonia in the Nineties: Sustainable Development or another Decade of Destruction” *Third World Quaterly* 12(3) July 1990.

Hames R 1987 “Game Conservation or Efficient Hunting” in *The Question of the Commons: the culture and ecology of communal resources* ed B J McCAy, J M Acheson, The University of Arizona Press, Tucson.

Hardin G 1968 “The Tragedy of the Commons” *Science* 162:1243-8.

Hecht S and A Cockburn 1989 *The Fate of the Forest: Developers, Destroyers and Defenders of the Amazon* Penguin London.

Hilton R M 1992 “Institutional Incentives for Resource Mobilization: an analysis of irrigation systems in Nepal” *Journal of Theoretical Politics* 4(3):283-308.

Hurrell A 1992 “Brazil and the International Politics of Amazonian Deforestation” in *The International Politics of the Environment: Actors, Interests, and Institutions* ed. A Hurrell and B. Kingsbury, Clerendon Press, Oxford.

Kolk A 1996 *Forests in International Environmental Politics - International Organisations, NGOs and the Brazilian Amazon* International Books, Utrecht.

Lovejoy T E and E Salati 1983 “Precipitating Change in Amazonia” in ed. Moran E F *The Dilemma of Amazonian Development* Westview Press, Boulder Colorado.

Mahar D J 1989 *Government Policies and Deforestation in Brazil’s Amazon Region* World Bank, Washington.

Martin K O 1979 “Play by the Rules or Don’t Play at All: Space Division and Resource Allocation in a Rural Newfoundland Fishing Community” in ed R Andersen and C Wadel *North Atlantic Maritime Cultures: Anthropological Essays on Changing Adaptations*, Mourton, The Hague.

McKean M 1992 “Success in the Commons - a Comparative Examination of Institutions for Common Property Resource Management” *Journal of Theoretical Politics* 4(3):247-281.

Mendes C 1989 *Fight for the Forest: Chico Mendes in his own words* Ed. Latin American Bureau, London (Adapted from *O Testamento do Homem da Floresta* edited by Candido Grzybowski, FASE, São Paulo, 1989).

Murrieta J R and P Rueda (Ed) 1995 *Reservas Extrativistas* CNPT and UICN, Cambridge.

Myers N 1989 *Deforestation Rates in Tropical Forests and their Climatic Implications* Friends of the Earth , London.

Ostrom E 1990 *Governing the Commons: the Evolution of Institutions for Collective Action* Cambridge University Press, Cambridge.

Pinkerton E 1992 “Translating Legal Rights into Management Practice: Overcoming Barriers to the Exercise of Co-Management” *Human Organisation* vol 51, 4:330-341.

Revkin A 1990 *The Burning Season - The Murder of Chico Mendes and the Fight for the Amazon Rain Forest* Collins, London.

Rich B 1994 *Mortgaging the Earth - The World Bank, Environmental Impoverishment and the Crisis of Development* Beacon Press, Boston.

Richards M 1997 “Common Property Resource Institutions and Forest Management in Latin America” *Development and Change* 28:95-117.

Schwartzman S 1992 “Social Movements and Natural Resource Conservation in the Brazilian Amazon” in *Rainforest Harves: Sustainable strategies for saving tropical forests?* Friends of the Earth, London.

Singeton S and M Taylor 1992 “Common Property, Collective Action and Community” *Journal of Theoretical Politics* 4:309-24.

Sioli 1985 “The effects of deforestation in Amazonia” in *Change in the Amazon basin, vol I: Man’s impact on Forests and Rivers*, ed Hemming, Manchester University Press, Manchester.

Stevenson G 1991 *Common Property Economics: a General Theory and Land Use Applications* Cambridge University Press, Cambridge.

Weinstein B. 1983 *The Amazon Rubber Boom 1850-1920* Stanford University Press, Stanford, California.