Conservation Units and the Protection of Atlantic Forest Lion Tamarins

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Tropical forests are rapidly being destroyed throughout Brazil, and most particularly those of the Atlantic forest (Teixeira and Câmara, 1988; Câmara, 1991). In Amazonia, the rate of destruction is more than 1,000,000 ha per year, while less than 10% of the Atlantic forest, which once far exceeded 1,000,000 km^2 throughout eastern Brazil along the coast and inland as far west as the basin of the Rio São Francisco, remains today. The large majority is highly fragmented and degraded through logging and destruction. In the long term (centuries or millennia) the preservation of the biodiversity of these biomas will depend almost entirely on conservation units, and most particularly those which guarantee complete protection of the ecosystems they contain (Nogueira Neto and Carvalho, 1979; Pádua and Quintão, 1984; Rylands, 1991; Câmara, 1991; Nogueira Neto *et al.*, 1992). If these areas are properly chosen, based on a knowledge of species' distributions, richness and diversity, and criteria including socioeconomic aspects of land use, it will still be possible to preserve a high proportion of the biological diversity so threatened in these rain forests. There are serious problems still facing the current system of conservation units in Brazil (see, for example, Rylands, 1991), but many are now reasonably well maintained.

There are currently 41 species and subspecies of callitrichids recognized for the Amazon, three north of the Amazon in Colombia and Central America, and 10 species in the Atlantic forest region of Brazil (Mittermeier *et al.*, 1992; Rylands *et al.*, 1993). All except two of the Atlantic forest species are endemic and considered threatened (Groombridge, 1993).

The four lion tamarins, *Leontopithecus*, are endemic to the Atlantic forest, they have very restricted distributions, and the number of protected areas for each is insufficient in both number and size (see Table 1) (Seal *et al.*, 1990). Heltne (1978) argued that an area of at least 10,000 ha is necessary to maintain viable populations of callitrichids, and this is being gradually confirmed through improved knowledge of the population dynamics and ecology of the species, and through the Population Viability Analyses (PVA) and Population and Habitat Viability Analyses (PHVA) now widely used in conservation biology, and which call for an understanding of population parameters, effects of small population size, isolation (migration), and rates and causes of population decline (Seal *et al.*, 1990; Caughley, 1994).

The situation concerning the population sizes and the possibilities remaining for the establishment of further reserves, or for increasing the size of those already existing, is different for each of the lion tamarin species (Table 1). Possibilities remain for *L.chrysomelas* in southern Bahia, where populations still survive throughout a fair portion of its original distribution (Pinto and Tavares, 1994). The area of forest effectively protected in the Una Biological Reserve was recently expanded due to the acquisition of 1,717 ha of adjacent forests (Coimbra-Filho *et al.*, 1993). However, the Reserve, which now totals 7,059 ha, will unfortunately remain as the largest single conservation unit for the species, and is still below the minimum size required for a viable population (see Dietz *et al.*, 1994). Further reserves are urgently needed for this species.

The possibilities for the creation of new conservation units are practically zero for *L.rosalia* in the lowland areas of the state of Rio de Janeiro (Kierulff, 1993), and *L.chrysopygus* in the western and central part of the state of São Paulo (see Valladares-Padua *et al.*, 1994). Although the Morro do Diabo State Park (34,156 ha) is more than three times the size of any other reserve containing lion tamarins, studies have indicated that *L.chrysopygus* have very large home ranges and the population there is very low (between 80 and 450; see Valladares-Padua *et al.*, 1994) not exceeding the potential population size for *L.rosalia* in the Poço das

Antas Biological Reserve (5,500 ha). The principal options remaining for these species include the creation of some few, small private reserves, but will involve mainly active management of the few remaining populations, including the use of reintroductions, translocations, and reforestation (Valladares-Padua *et al.*, 1994: Kierulff and Oliveira, 1994; Pessamílio, 1994).

The recently discovered black-faced lion tamarin, *L.caissara* Lorini and Persson 1990, is relatively privileged in relation to the amount of habitat remaining within and around its known distribution in the extreme north-east of the state of Paraná and south-east São Paulo, along the coastal lowlands. However, it is also extremely rare and populations are minimal (Martuscelli and Rodrigues, 1992; Lorini and Persson, 1994), and it is probably the most endangered primate in South America. This emphasizes the need to consolidate the protection of the Superagüi National Park (see Câmara, 1994) and also the urgent need for the establishment and maintenance of further reserves in areas where populations are still surviving. Marcia Rodrigues, a doctoral student from the University of São Paulo carrying out studies on the distribution and ecology of species, and the Environmental Secretariat of the State of São Paulo, have drafted separate but similar proposals for an Ecological Station in the lowland region of Ariri in the state of São Paulo, both of which have been submitted to the State Government (see Rodrigues *et al.*, 1992). Hopefully this will bear fruit, but further research on the distribution of this species in the state of São Paulo is required in order to confirm its distribution there (especially the northern limits to its range), with the possibilities still remaining of the discovery of new populations. The establishment and protection of conservation units is undoubtedly the key strategy for the species' survival.

Table 1. Protected areas for the Lion Tamarins, *Leontopithecus*. Sources: [1]Kierulff (1993), [2]Dietz *et al.* (1994), [3]Valladares-Padua *et al.* (1994), [4]Lorini and Persson (1990, 1994), [5]Martuscelli and Rodrigues (1992).

Leontopithecus rosalia[1]	
Distribution	Rio de Janeiro
Protected Area	Poço das Antas Biological Reserve (5,500 ha)
	Population = *c.*360 individuals
Other Areas	5 (privately owned) + 12 isolated groups
Leontopithecus chrysomelas[2]	
Distribution	Bahia
Protected Area	Una Biological Reserve (7,059 ha)
	Population = *c.*450
Other Areas	Numerous
Leontopithecus chrysopygus[3]	
Distribution	São Paulo
Protected Areas	Morro do Diabo State Park (34,156 ha)
	Population = 80-450
	Caitetus State Ecological Station (2,178 ha)
	Population = 8-30
Other Areas	3 (privately owned)
Leontopithecus caissara[4,5]	
Distribution	Paraná, São Paulo
Protected Areas	Superagüi National Park (21,400 ha)
	Population = *c.*160
	Jacupiranga State Park? (150,000 ha)
	Population unknown
Other Areas	Uncounted

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