

AFRICA

RAINFORESTS OF THE ATSINANANA

MADAGASCAR



WORLD HERITAGE NOMINATION – IUCN TECHNICAL EVALUATION

RAINFORESTS OF THE ATSIANANA (MADAGASCAR) – ID No. 1257

1. DOCUMENTATION

- i) **Date nomination received by IUCN:** April 2006
- ii) **Dates on which any additional information was officially requested from and provided by the State Party:** IUCN requested supplementary information on 19 December 2006 after the IUCN Evaluation Mission and the first IUCN World Heritage Panel Meeting. The State Party response was submitted on 26 February 2007, including revised boundaries and responses to all the issues raised by IUCN.
- iii) **UNEP-WCMC Data Sheet:** 11 references (including nomination)
- iv) **Additional literature consulted:** ANGAP 2001. **Madagascar Protected Area System Management Plan.** ANGAP. Brady, L.D. and Griffiths, R.A. (1999). **Status Assessment of Chameleons in Madagascar.** IUCN. Ganzhorn, J.U. et al. (2000). **Vertebrate species in fragmented littoral forests of Madagascar.** In: W.R. Lourenço and S.M. Goodman (eds). *Diversité et Endémisme à Madagascar.* Mémoires de la Société de Biogéographie Edition. Museum Histoire Naturelle, Paris: 155-164. Ganzhorn, J.U. et al. (2003). **Biogeographic relations and life history characteristics of vertebrate communities in littoral forests of Madagascar.** In: A. Legakis et al. (eds). *The New Panorama of Animal Evolution. Proceedings of the 18th International Congress of Zoology.* Pensoft Publishers, Sofia: 377-385. Goodman, S.M. (ed.) (2000). **A Floral and Faunal Inventory of the Parc National de Marojejy, Madagascar: With Reference to Elevational Variation.** Fieldiana Zoology New Series No. 97, Field Museum of Natural History, Chicago. Goodman, S.M. and Benstead, J.P. (eds) (2003). **The Natural History of Madagascar.** Chicago University Press, Chicago. Hilton-Taylor, C. (compiler) (2000). **2000 IUCN Red List of Threatened Species.** IUCN. Mittermeier, R.A. et al. (2004). **Hotspots Revisited: Earth's Biologically Richest and Most Endangered Terrestrial Ecoregions.** Conservation International. Mittermeier, R.A. et al. (2006). **Lemurs of Madagascar.** Conservation International. Rabetaliana, H. et al. (1999). **The Andringitra National Park in Madagascar.** Unasylva No. 196, FAO. Wilmé, L., Goodman, S.M. and Ganzhorn, J.U. (2006). **Biogeographic evolution of Madagascar's microendemic biota.** *Science* 321, 5776, 1063-1065.
- v) **Consultations:** 3 external reviewers. Extensive consultations were undertaken during the field visit including with representatives of relevant government agencies, local communities, representatives of NGOs, researchers and other stakeholders.
- vi) **Field visit:** Peter Hitchcock and Geoffroy Mauvais, August - September 2006
- vii) **Date of IUCN approval of this report:** April 2007

2. SUMMARY OF NATURAL VALUES

The island of Madagascar is a fragment of the original great southern continent of Gondwana. Originally sandwiched between Africa and India at the breakup of Gondwana, Madagascar was initially in contact with Africa when it split from Antarctica. Madagascar, still attached to India, in turn separated from the continent of Africa around 160 million years ago. Madagascar remained attached to India until India split away around 60 million years ago with the result that Madagascar has remained essentially isolated from other land masses ever since.

The eight nominated national parks are geographically distributed along the eastern margins of the island of Madagascar over the length of the Atsinanana region. The greater part of the nominated areas is located on granitic rocks, the crustal basement of the main plateau that dominates much of Madagascar. Whereas Masoala National Park is

located on a peninsula on the north east coast, all of the other nominated areas are associated with the rugged main eastern escarpment and mountainous hinterland of Madagascar which separates the extensive plateau of the interior and the eastern coastal lowlands. Almost the entire remaining areas of rainforest in Madagascar are found along the higher rainfall eastern escarpment and northern highlands. Much of the rainfall in these regions is derived from topographic interception of moisture laden winds off the Indian Ocean, in stark contrast to the extensive semi-arid and arid interior and western regions of the island. Tropical cyclones occasionally impact on the north eastern coastal forests such as those in Masoala National Park.

By any measure, the biodiversity of Madagascar is globally exceptional. The long isolation of this 'mini continent', sometimes referred to as the 'seventh continent' in terms of biodiversity, has resulted in a truly exceptional proportion of endemic plant and animal species; approximately

80 to 90 percent for all groups, and endemic families and genera are commonplace. Madagascar is the core of Conservation International's "megadiverse" region known as 'Madagascar and the Indian Ocean Islands', a feature being the extraordinary large number (circa 12,000) of endemic plant species. Madagascar has also been claimed to be in the top 5-6 of the world's 18 "megadiversity" countries.

"Madagascar's privileged position in terms of biodiversity is based on its geological history and geographic placement. The world's largest oceanic island and the fourth largest island overall, it has been separated from all other land masses for at least 60-80 million years, meaning that most of its plant and animal life has evolved in isolation. This has resulted in very high levels of endemism, both at the species level and, more importantly, at higher taxonomic levels, with Madagascar having numbers of endemic plant and animal genera and families rivalled only by Australia, which is 13 times larger." (Mittermeier et al. 2004)

All five families of Malagasy primates, all endemic lemur families, seven endemic genera of Rodentia, six endemic genera of Carnivora, as well as several species of Chiroptera are represented in the rainforests. Of 25 endemic and near-endemic mammal species in the rainforests, 22 are threatened: 8 are critically endangered, 9 endangered, and 5 vulnerable (Hilton-Taylor 2000).

Madagascar's moist and sub-humid forests, together with its ericoid thickets, also constitute one of WWF's Global 200 priority ecoregions for conservation. (The Global 200 list actually contains 238 eco-regions, made up of 142 terrestrial, 53 freshwater and 43 marine eco-regions). The moist lowland forests of eastern Madagascar are the most diverse forests in the country and contain exceptionally high levels of endemism. However, decades of deforestation have left eastern Madagascar with only 8.5 percent of its original forests.

The mid-altitude moist forest, the most common rainforest type in the nomination, is as rich in species as the lowland forest, but tends to have a shorter canopy of 20 to 25 m. Some of the canopy species are common to the lower-elevation forest and some are unique to mid-elevation forest such as the *Weinmannia* (Cunoniaceae) and *Schefflera* (Araliaceae). Except for the extensive lowland rainforest of Masoala National Park, little lowland rainforest is represented in the nomination, nor remains elsewhere in Madagascar.

In prehistoric times, and in relatively recent historic times, the rainforests of Madagascar were much more extensive than at present. The last ice age pushed the rainforests to a series of disjunct refugia on and below the eastern escarpment, the east coast and deep valleys in the northern highlands region. Given the topographic characteristics of Madagascar, it is likely that at least some of the nominated areas coincide with those Pleistocene refugia.

The present day distribution of rainforest is an artefact of relatively recent human activity. There is evidence of numerous species of animals (probably plants also) having become extinct since the relatively late arrival of humans in Madagascar due to massive deforestation, including at

least 17 lemur species, almost all of which were forest adapted species. The remaining rainforests are therefore of critical importance to the surviving species, many of which now occupy greatly reduced habitat areas than previously available. Notwithstanding the great loss of rainforest on the main plateau and eastern lowlands in recent historic times, there remains a more or less continuous narrow tract of rainforest along the eastern escarpment and across the northern highlands.

The nominated areas represent circa 20-25% of the total area of rainforests remaining in Madagascar, which in turn are just a fraction of the pre-settlement extent of rainforests. The nominated areas are broadly representative of the geographic spread of the rainforests over almost the full latitudinal range down the eastern margin of the island, but less representative of their altitudinal range.

Whereas several of the nominated national parks comprise major parts of regional forest remnants (Marojejy, Masoala, Midongy, Andohahela), others are embedded in or intimately linked to more extensive tracts of rainforest (Zahamena, Mantadia, Ranomafana, Andringitra). These larger core tracts of non-national park are in general much less known and understood than the nominated areas, such that it is not possible to reliably compare their biodiversity with that of the nominated areas. Indeed, the possibility exists that some of the recently (temporarily) protected core tracts have equal or greater biodiversity values than some of the nominated protected areas.

Recent research provides evidence of the importance of three particular mountain massifs in the evolutionary history of the rainforests of Madagascar. (Wilmé et al. 2006). Of those, only one (Andringitra) is included in the nomination, one has been extensively cleared of surrounding rainforests, and a third (Tsaratanana) is a puzzling omission from the nomination. Due to the extensive fragmentation of the rainforest by human activity, the remaining rainforests on and below the eastern escarpment, including at least some, but not all, of the nominated areas, have become critically important refugia for future evolutionary processes. Those areas containing continuous tracts of rainforest over the greatest altitudinal range will be of greatest significance. Of the nominated protected areas, those that appear to be of greatest significance for ongoing evolutionary processes are Marojejy, Zahamena, Andringitra, Andohahela and parts of Midongy.

Geographically, the eight nominated parks are widely separated. Notwithstanding, there remain substantial tracts of rainforest outside the nomination, including major habitat corridors between pairs of the nominated areas (North: Marojejy, Masoala; Central: Zahamena, Mantadia. South: Ranomafana, Andringitra. Far South: Midongy, Andohahela). There are significant discontinuities in habitat between the northern and southern groups such that connectivity has essentially been permanently lost; however habitat connectivity still exists within the northern and southern groups, albeit not yet permanently protected.

Several of these larger tracts of forest have recently been given temporary protection and are being actively processed as future protected areas. However, it is reported that none of these areas are likely to be given national park status or added to the nominated national parks, and that proposed protection and management will only corre-

spond to IUCN Category III, V or VI protected areas. Further, they will not be managed by ANGAP. As such, none of these areas can at present be confidently considered as potential future addition to the nominated property. This reinforced the necessity for the evaluation to only consider the contribution of each component of the nominated property on its stand-alone merit.

3. COMPARISONS WITH OTHER AREAS

The one existing natural World Heritage property in Madagascar, Tsingy de Bemaraha Strict Nature Reserve, is located in the semi-arid western lowlands and features karst landscape. As such it is a totally different environment to that of the nominated property and does not warrant comparison.

The most biogeographically analogous of the existing World Heritage properties to the nominated property are the Central Eastern Rainforest Reserves of Australia. These Australian rainforests are associated with a well defined eastern escarpment which provided refugia for the mainly Gondwanan biota during the last ice age. The continuity of the eastern Australian rainforests had been broken into natural 'islands' by pre-historic climate change and was further truncated by modern human settlement. In contrast, the nominated property consists mostly of 'islands' of protected land in a still largely intact, albeit narrow continuous tract of relict rainforest along the eastern escarpment and into the northern highlands. The biological sieving and divergent evolution recognized between the protected land islands of the Australian rainforests is much less apparent in the nominated property, probably because of the much greater degree of connectivity maintained.

Whereas the serial Australian rainforest property and the serial Tropical Rainforest Heritage of Sumatra property include the greater part of the largest remaining rainforest tracts in Australia and Sumatra, most of the nominated property comprises only smaller parts of the extensive tracts of remaining rainforest in Madagascar. This made it difficult to establish the context and hence relative importance of the nominated areas; more so given the relatively poor documentation of the more extensive temporary reserves outside the nominated parks.

However, given the exceptional diversity and endemism of the biota of Madagascar, most native species of plants and animals in the nominated areas are clearly of global significance for science and conservation. In particular, the wholly endemic Malagasy primates, the lemurs, are clearly of outstanding universal value from the point of view of science and conservation. (The lemurs on the adjacent Comoros Islands are believed to have been introduced from Madagascar.) Future research can be expected to reveal many more new species of plants and animals. To illustrate, since 1994, at least 10 new species of lemur have been recognized in Madagascar (Mittermeier et al. 2006).

Table 1 below provides a comparison of biodiversity between the nominated property and some comparable existing World Heritage properties.

In summary, the features of the nominated property that make it globally and regionally distinct from other existing World Heritage properties in biodiversity terms are:

- ◆ Very high biodiversity, both in plants and animals, but especially primates;
- ◆ Exceptionally high level of endemism, both in plants and animals;
- ◆ Critically important habitat for many rare and threatened faunal species (e.g., of the 123 species of non-flying mammals in Madagascar, 72 of which are on the IUCN Red List of Threatened Species, 78 occur within the nomination), including at least 25 species of lemur; and
- ◆ Critically important climatic refugia for unique rainforest biota.

4. INTEGRITY

4.1 Legal status

All eight components of the nominated serial property are formally protected as national parks by the Government of Madagascar. The managing authority of all eight nominated areas is Parcs Nationaux Madagascar - Agence Nationale pour la Gestion des Aires Protégées (PNM-ANGAP).

Table 1: Comparison of biodiversity (species numbers) between the nominated property and some comparable existing World Heritage properties

Name and size of World Heritage property	Criteria	Mammals	Birds	Amphibians	Plants
Rainforests of the Atsinanana (Madagascar) 672,003 ha	ix, x	78	173	160	2,984
Central Eastern Rainforest Reserves (Australia) 370,000 ha	viii, ix, x	74	270	45	1,625
Noel Kempff Mercado National Park (Bolivia) 1,523,446 ha	ix, x	139	620	62	4,000 (1,500 in rainforest)
Tropical Rainforest Heritage of Sumatra (Indonesia) 2,595,124 ha	vii, ix, x	180	450	200	10,000

ANGAP is described as being a “private association recognized to be of public interest, operating under the supervision of the Ministry of Environment, Water and Forests in Madagascar”.

4.2 Boundaries

A short assessment of the boundaries of each nominated park is provided below. This is based on the boundaries as proposed in the nomination. Subsequently, these boundaries were changed following IUCN communications with the State Party (see sections 5.2 and 7).

a) Marojejy National Park

Based on documentation and confirmed by aerial inspection, the boundaries of Marojejy, most of which are forest edges, appear well defined and stable. With one important exception, the forests of Marojejy are essentially surrounded by cleared agricultural land, the park being almost an ‘island’ in an agricultural landscape. The important exception is a well defined intact forest corridor to the west, a well studied, critically important corridor that links to the Anjanaharibe Sud Special Reserve, the only habitat connection between Marojejy and the much larger tract of rainforest that extends across the width of Madagascar from Masoala National Park on the east coast to Ambanja on the west coast.

b) Masoala National Park

Largest of the nominated protected areas, the main block of Masoala is relatively compact and most boundaries are marked, manageable and being managed. Of some concern is the inclusion in the nomination of several small outliers of the park, located on the east coast some distance from the park. Two of these small outliers, although small in area, are valued as relicts of littoral rainforest.

c) Zahamena National Park

The boundaries of Zahamena are relatively well defined. The north eastern and southern boundaries were inspected during an over-flight and found to be well respected by adjoining farming communities, at least in terms of farming activities.

d) Mantadia National Park

Most of the boundaries of Mantadia are adjoined by forest. Although boundaries could not be readily recognized from aerial inspection, threatening activities such as mining (existing and new) outside the park to the west were evident.

e) Ranomafana National Park

Most of the boundaries of Ranomafana are well defined and respected, at least in terms of agricultural encroachments. Aerial inspection revealed a major active encroachment and recent slash and burn activity in the northern section of the park.

f) Andringitra National Park

The western grassland boundary of Andringitra is not clearly defined. The eastern rainforest boundary, a river, has a history of encroachment which was evident from aerial inspections with significant encroachments remaining inside the park.

g) Midongy National Park

The very long and convoluted boundary of Midongy is in many places not evident from the air and there are many

agricultural and grazing / burning encroachments. Some grazing / burning encroachments effectively extend the full width of the western arm of the park.

h) Andohahela National Park

Most of the eastern rainforest boundary of Andohahela is clearly defined and respected in terms of clearing and therefore appears stable. The western boundary of the main park block is ill-defined and problematic from a management perspective, especially with ongoing threats from grazing and associated burning.

4.3 Management

Madagascar has an interesting and apparently quite effective management system for protected areas including the nominated areas. The managing authority of all eight nominated areas is ANGAP, which is a “private association ... under the supervision of the Ministry of Environment, Water and Forests” and as such appears to have some advantages over direct government management, such as being able to employ on a contract and performance basis. ANGAP appears as an efficient and professional organization. Strong support of ANGAP by NGO's is an important factor in its continued effectiveness.

ANGAP staff is stationed at all eight nominated parks. Overall the staff numbers assigned by ANGAP to manage the nominated parks is very modest, although indications are that this is adequate given the nature of their duties and the high motivation of staff. Motorised transport is of limited use for accessing many parts of the parks and boundaries, requiring commitment and concerted effort for staff to access park perimeters and remote communities. In Masoala National Park, the Wildlife Conservation Society is co-located with ANGAP to provide technical advice and assistance.

Overall management of protected areas in Madagascar is guided by the Madagascar Protected Area System Management Plan (2001). Management plans are in place for all eight nominated parks. The general structure and format of the management plans is appropriate and commendable. Threat maps contained in the management plans proved accurate and very helpful during the assessment. A short assessment of the management of each nominated park is provided below.

a) Marojejy National Park

Management of Marojejy is well established, organized, professional and with significant support from the local community.

b) Masoala National Park

Management of Masoala faces considerable difficulties, particularly given the remoteness and access difficulties of the eastern boundary. Notwithstanding, management is professional and appears to be effective in providing an adequate level of protection. The Wildlife Conservation Society is an official collaborator in relation to the management of the park.

c) Zahamena National Park

Conservation International actively participates in the management of Zahamena. Progress is being made in reducing encroachments and other threatening activities.

d) Mantadia National Park

Management of Mantadia is professional, however, threats in and around the park are considerable (mining, poaching, tourist pressure, invasive species, timber extraction) and require ongoing and effective management and control.

e) Ranomafana National Park

Management of Ranomafana is professional but the park still faces ongoing threats from agricultural encroachment, logging and hunting. There is significant tourism associated with the park and the park shares the income from entrance permits with local communities living adjacent to the park.

f) Andringitra National Park

Management of Andringitra is appropriate and strongly supported by local communities through a local "win-win" agreement: the park contains a "zone d'utilisation contrôlée" which gives a benefit to local communities (cattle grazing) in exchange for a voluntary based participation in the monitoring and protection of the park. However, the appropriateness in the long term of the grazing in the montane and alpine environments is questionable and should be assessed. There is some encroachment and associated hunting on the eastern rainforest boundary of the park which requires greater efforts to more effectively control. There is reportedly ongoing hunting inside the park.

g) Midongy National Park

Staff have only recently been deployed to Midongy and still face major challenges associated with agricultural encroachment (rice paddies and slash-burn), fire, grazing and poaching. The temporary forest reserve connecting the south-east section of Midongy with Andohahela National Park, taken in combination with the south eastern section of Midongy, appears to offer greater natural values and integrity than Midongy alone.

h) Andohahela National Park

This park faces significant threats from fire and grazing on the dry western side of the dividing range. The well defined topography of the dividing range provides some natural protection from fire from the west but there is evidence of some fires crossing the divide into the rainforest.

There seems to be relatively close cooperation between park managers and the national police (or Water and Forest Administration) that are responsible for law enforcement within protected areas. It appears that there is a high degree of compliance with the law and intercepted breaches are subject to the full force of the law, including gaoling of offenders. Joint patrols involving the police appear limited to several operations per year. Enforcement would be more efficient and effective if park rangers had greater delegated enforcement powers rather than rely on police alone.

ANGAP is financed in a range of ways (government funds, tourism taxes and fees, donors support). The level of auto-financing is low (around 5%), so to ensure the financing of protected areas in the long term, the Government of Madagascar has created a trust fund called Fondation Pour les Aires Protégées et la Biodiversité de Madagascar. A large part of the necessary funds have already been secured and it is planned that at least core funding of ANGAP's protected areas network will in the future be financed by interest from the trust fund. Priority will be given to the most

important sites including the eight nominated parks and should therefore contribute to the long-term viability of those parks. However, the trust fund does not cover temporary protected areas (corridors) which are presently not proposed to be managed or financed by ANGAP. At present, financial resources are minimal but adequate for all nominated parks, albeit still strongly dependant on donors.

The Government of Madagascar has for some years received significant international assistance for its protected areas, particularly through the various NGOs active in the country. This often takes the form of management partnerships in the protected areas. Such partnerships are still in place for Masoala and Zahamena National Parks where the Wildlife Conservation Society and Conservation International respectively have been actively involved in day to day management as well as strategic planning of these parks. However, despite this continued and considerable support by international NGOs in the past, further investment by the international donor community is required to ensure the adequate protection and management of the nominated parks.

All of the parks in the nomination practice the policy of tourism revenue sharing with neighbouring communities, with ANGAP and local communities sharing 50:50 in the tourism income. The generally low level of tourism in most parks means, however, that the funding flow to communities from this source is relatively small. The policy is useful for developing partnerships with communities, but this should not be relied upon as the only flow of benefits to the community, given uncertainties associated with tourism. A more proactive community development programme needs to be developed, particularly for those parks that receive little tourism visitation.

4.4 Threats and human use

Most communities neighbouring the nominated parks are characterized by a high level of poverty. Agricultural productivity is often very low with the result that the increasing populations view the parks as sources of food (hunting), land (slash and burn) and marketable products (poaching and illegal logging). The main human threats to the nominated areas are agricultural encroachment, particularly by slash-and-burn, fire, grazing, hunting and poaching. There is also some illegal harvesting of precious woods such as rosewood and ebony, and widespread, small scale gem mining.

4.4.1 Encroachment

Encroachment into the nominated protected areas for agricultural purposes is a serious threat to the natural heritage values and integrity of the property. The threat often arises as sporadic encroachment of slash and burn activity but can also be of a more permanent nature unless there is management intervention. The incidence of new agricultural encroachment in the longer established parks appears low and there was evidence that old clearings were now regenerating with forest (e.g. Marojejy National Park). Some more recent incidents of slash and burn were noted within several of the protected areas (e.g. Midongy and Ranomafana National Parks).

4.4.2 Fire

Fire is used extensively in the agricultural landscapes adjoining many sections of the nominated protected areas,

particularly as an adjunct of cattle grazing. Fire is clearly allowed to escape, usually upslope into the parks. This is particularly apparent on the drier western approaches to Andohahela, Andringitra and Midongy National Parks. In the case of Midongy, where there is much less topographic protection, grassland well within the park is still maintained by fire. Fire induced invasive plant species such as Eucalypts are a potential problem on the higher altitude western side of Ranomafana National Park.

4.4.3 Hunting and poaching

Hunting is a definite threat to the wildlife in all the forests of Madagascar, especially for lemur species. Hunting of animals, particularly lemurs, for food is a widespread and a significant threat to the biodiversity of the nominated protected areas. The loss of two lemur species from the Special Reserve adjacent to Mantadia National Park is attributed by some to illegal hunting. Some park managers are confident that the threat from hunting is being reduced; some wildlife researchers are, however, much less optimistic. Madagascar in general, including the rainforests, is a target of poachers supplying the illegal global trade in fauna, in particular in reptiles. Chameleons are especially vulnerable to the collector trade. There are reports of tortoises being poached for supply of livers for the Oriental medicinal market.

4.4.4 Roads

Roads are presently not a serious threat to the nominated protected areas. Most of the nominated areas have the advantage of being closely associated with rugged mountainous terrain where there are few demands or opportunities for roads. A regional road traverses Ranomafana National Park but there appears to be good management of the roadside sections of the park. Some routes used for travelling of cattle across parks are a threat, particularly as a result of associated fire and hunting (e.g. western section of Midongy National Park). There are reports of a possible future road being constructed across the linking corridor of forest between Andringitra National Park and Pic d'Ivohibe Special Reserve.

4.4.5 Mining

Informal/illegal mining for gemstones is widespread and represents localized threats to most of the nominated protected areas. Small scale gem mining is difficult to detect and suppress. Existing graphite mining already impacts (water pollution) on Mantadia National Park and other mining (nickel to west of park) and mining related development (slurry pipeline between park and special reserve) could further impact on that park.

4.4.6 Illegal logging

Madagascar has been fortunate to date to have escaped the wholesale destruction of forest as a consequence of commercial logging which occurs in South East Asia. None of the nominated protected areas has ever been the subject of large scale commercial logging. Highly selective small scale logging of precious woods such as rosewood and ebony may occur at any time in the protected areas. Whilst such timber removal per se may not have a serious ecological impact overall, associated fire, hunting and poaching amplify the impacts.

Taking into consideration the boundary changes outlined in sections 5.2 and 7, IUCN considers that the nominated property meets the conditions of integrity as required un-

der the Operational Guidelines.

5. ADDITIONAL COMMENTS

5.1 Justification for serial approach

When IUCN evaluates a serial nomination it asks the following questions:

a) What is the justification for the serial approach?

The protection and management of the rainforests in Madagascar are in process of comprehensive review, with a strong emphasis on additional protection, and major changes including major new protected areas are planned. This process is driven by the President's Durban Declaration, presented to the Vth IUCN World Parks Congress held in Durban, South Africa, in 2003, with a very commendable commitment to greatly extend the system of protected areas. This situation has however complicated the nomination and evaluation process and prompted the fundamental question: 'To what extent are the nominated protected areas truly the 'best of the best' of these rainforests, or are they 'artefacts of history', being the only areas already protected and available for nomination?'. Based on the nomination document and discussions held during the field visit, the nominated series of sites appears to be a combination of both processes, some being clearly recognizable as being biologically the 'best of the best' and others being more 'artefacts of history'. Further, the extent to which the nominated areas truly represent an 'integrated whole' to qualify as a serial nomination proved difficult to establish from the nomination document.

The main justification for the serial approach seems limited to the eight national parks simply being broadly 'representative' of a (single) biome of outstanding universal value. The nominated areas certainly provide a broadly representative geographic spread over almost the full latitudinal range of the rainforests of Madagascar. It proved more difficult, however, to establish whether each of the components is truly outstanding or is dependent on simply being part of the series, as the nomination does not strongly argue complementary nature of the components. There is also no claimed functional linkage between the individual sites although the existence of wildlife corridors between pairs of nominated areas is emphasized. These important corridors between the national parks, several of which are much more extensive than the nominated areas themselves, are in part poorly known and presently only temporarily protected; so their permanent protection for biodiversity conservation and/or addition to the national parks is not assured. The IUCN evaluation made no assumptions about potential future protection and took into account only the level of protection at present.

For example, Mantadia National Park, a small park of some 15,500 ha, represents perhaps only around 5% of a very much larger tract of rainforest of which it is an integral part. The probability is that this only temporarily protected large tract of rainforest, with Mantadia National Park at its southern end and Zahamena National Park at its northern end, is equally or more important for biodiversity conservation than Mantadia itself. It is therefore questionable if Mantadia, considered independently of the adjacent areas, represents

'the best of the best' and contains 'the most important and significant natural habitats' compared with other areas and considering its deficiencies in terms of integrity.

In conclusion, the main justification for the serial nomination of the eight protected areas appears to be that they offer outstanding and representative examples of Madagascar's distinctive rainforest biota and that together they include critically important habitat, especially for the unique primates.

b) Are the separate components of the property functionally linked?

The eight separate components of the nomination are functionally linked only to a limited extent. No substantive evidence is presented for seasonal wildlife migration (e.g. birds) between the components. Existing habitat connectivity between pairs of the nominated areas presently maintains the opportunity for wildlife movement but only between the respective pairs. Much of the connecting habitat is now temporarily protected and in process of being considered for permanent protection though not as additions to the nominated parks per se. For example, action is underway to protect the habitat corridor linking Marojejy National Park with Anjanaharibe Sud Special Reserve. In turn, the large tract of rainforest between Anjanaharibe Sud Special Reserve and Masoala National Park has reached the stage of temporary protection.

The future permanent protection of tracts of rainforests linking a number of the nominated protected areas raises the question of the relevance of those areas to the nomination given that they may be soon subsumed into much larger and probably more valuable protected areas. Concerns remain that, had the nomination been delayed a few years, it might well take on a somewhat different form to that now being evaluated, particularly if several of the larger tracts of rainforest are permanently protected and included. However, present indications are that the proposed new protected areas will neither be IUCN Category I or II protected areas nor be managed by ANGAP.

c) Is there an overall management framework for all the components?

The nominated areas do not presently constitute a single management entity. There is presently no overall coordinated management framework for the eight national parks per se but rather they are embedded in the national system of protected areas managed by ANGAP. As a World Heritage property, the sites would continue to be managed by ANGAP, and therefore management policies can at least be expected to be consistent throughout.

Greater cooperation and coordination between the components would be beneficial for effective management of each of the sites and to present them as a single integrated World Heritage property. What is equally or more important from a conservation perspective is that there be close cooperation, coordination and, ideally, integration in the planning and day to day management of the nominated areas and the adjacent and adjoining wildlife corridors and proposed new protected areas, some of which are likely to be of at least equal or greater conservation importance.

5.2 Changes to the boundaries of the nominated property

IUCN communicated with the State Party in relation to the potential for changing the boundaries of the nominated property. In this communication, IUCN noted that there are some important areas which would add significant value to the nominated area, but which are not currently included within the nomination. These could potentially be considered as part of a subsequent phase of a World Heritage nomination. IUCN further noted that some areas face integrity issues and could logically be excluded from the nominated area until these issues have been addressed. The reply from the State Party noted their agreement with the proposals from IUCN.

In particular it was agreed that the nominated property should be amended by exclusion of: (a) the marine extensions on the east coast of Masoala National Park; (b) the whole of Mantadia National Park (and associated Special Reserve) pending review of future protection of the adjoining more extensive tract of rainforest to the north; (c) the whole of Midongy National Park pending review of the western half of the park and the corridor linking to Andohahela National Park; and (d) the outlier semi-arid/arid zone parcels of Andohahela National Park (parcels 2 and 3).

Further it was agreed that a larger nomination would be brought forward for consideration by the World Heritage Committee in due course when conditions of integrity are adequately met, and that subsequent phases should be based on a review of potential future addition of appropriately protected areas of high nature conservation value to the property, with priority to those major tracts of land presently forming corridors of natural forest between existing reserves within the property.

Based on the information available, no less than four major tracts of rainforest not included in the nomination, well exceeding the total area of the nominated property, can be expected to be revealed as important habitat for rainforest species, being:

- ◆ Tsaratanana to Masoala, including Tsaratanana Integrated Reserve and the Makira Temporary Reserve, in the northern highlands. The Makira Forest of around 500,000 ha represents the largest remaining contiguous forest in eastern Madagascar;
- ◆ Zahamena-Ankeniheny, the large tract of forest between and much larger than Zahamena and Mantadia National Parks;
- ◆ Fandriano Vondrozo, the linking habitat corridor between Ranomafana and Andringitra; and
- ◆ Midongy to Andohahela linking habitat corridor.

6. APPLICATION OF CRITERIA / STATEMENT OF OUTSTANDING UNIVERSAL VALUE

The property has been nominated under criteria (ix) and (x). IUCN considers that the nominated property meets these criteria and proposes the following Statement of Outstanding Universal Value:

The Rainforests of the Atsinanana are a serial property comprising six components. They contain globally outstanding biodiversity and have an exceptional proportion of endemic plant and animal species. The level of endemism within the property is approximately 80 to 90 percent for all groups, and endemic families and genera are common. The serial property comprises a representative selection of the most important habitats of the unique rainforest biota of Madagascar, including many threatened and endemic plant and animal species.

Criterion (ix): Ecological and biological processes

The Rainforests of the Atsinanana are relict forests, largely associated with steeper terrain along the eastern escarpment and mountains of Madagascar. The protected areas included in this serial property have become critically important for maintaining ongoing ecological processes necessary for the survival of Madagascar's unique biodiversity. This biodiversity reflects the Madagascar's geological history and geographic placement. It is the world's fourth largest island and has been separated from all other land masses for at least 60-80 million years and thus most of its plant and animal life has evolved in isolation. These forests have also offered important refuge for species during past periods of climate change and will be essential for the adaptation and survival of species in the light of future climate change.

Criterion (x): Biodiversity and threatened species

The level of endemism within the property is approximately 80 to 90 percent for all groups, and endemic families and genera are common. Madagascar is one of the world's top "megadiversity" countries and features an extraordinary large number (circa 12,000) of endemic plant species. The property is also globally significant for fauna, especially primates, with all five families of Malagasy primates, all endemic lemur families, seven endemic genera of Rodentia, six endemic genera of Carnivora, as well as several species of Chiroptera represented. Of the 123 species of non-flying mammals in Madagascar (72 of which are on the IUCN Red List of Threatened Species), 78 occur within the property. The critical importance of the property is underlined by the fact that deforestation has left eastern Madagascar with only 8.5 percent of its original forests and the property protects key areas of this remaining habitat.

Conditions of Integrity, Protection and Management

All components of the serial property are formally protected as national parks and have management plans in place. Key management issues include effective control of agricultural encroachment and resource exploitation from logging, hunting, and gem mining. These issues require the implementation of clear and coordinated management strategies to manage the components of this serial property as a single entity. Also, coordinated planning and management of this serial property with adjacent protected areas and forest corridors is required, for which additional financial and human resources need to be obtained. There is potential for further extension of the property to include adjacent protected areas and forest corridors once they meet the conditions of integrity.

7. RECOMMENDATIONS

IUCN recommends that the World Heritage Committee **inscribe** the Rainforests of the Atsinanana, Madagascar, on the World Heritage List on the basis of natural criteria (ix) and (x).

IUCN recommends that the World Heritage Committee commends the State Party for its significant and encouraging efforts to protect the rainforests of Madagascar.

IUCN notes that a number of boundary changes have been proposed by IUCN on the basis of integrity issues and that the following boundary changes have been accepted by the State Party:

Exclusion from the original nomination of: (a) the marine extensions on the east coast of Masoala National Park; (b) the whole of Mantadia National Park (and associated Special Reserve) pending review of future protection of the adjoining more extensive tract of rainforest to the north; (c) the whole of Midongy National Park pending review of the western half of the park and the corridor linking to Andohahela National Park; and (d) the outlier semi-arid/arid zone parcels of Andohahela National Park (parcels 2 and 3).

IUCN recommends that the State Party be requested to submit a detailed topographic map showing the revised boundary of the property following the exclusion of these components.

IUCN also recommends that the State Party be requested to:

- a) Consider this as Phase 1 of a larger World Heritage nomination which could be brought forward when conditions of integrity are adequately met. Subsequent phases should be based on a review of potential future addition of appropriately protected areas of high nature conservation value to the property, with priority to those major tracts of land presently forming corridors of natural forest between existing reserves within the property;
- b) Progressively increase the level of staffing and resources within all reserves within the property and also develop a long term strategy for financing of all reserves within a larger World Heritage nomination, as well as adequate financing for management of corridors between existing reserves within the property;
- c) Develop a proactive community development programme, which would support socio-economic activities outside of the existing reserves to reduce pressures for resource exploitation within the property; and
- d) Develop and implement strategies to reduce the impact of illegal logging and small scale gem mining within the property.

Map 1: Location and boundaries of the nominated property

