

Survival Blueprint

Red Ruffed Lemur, Varecia rubra



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1. STATUS REVIEW

1.1 Taxonomy:

Kingdom	: Animalia
Phylum	: Chordata
Class	: Mammalia
Order	: Primates, Linnaeus, 1758
Sub-order	: Prosimians, Haeckel, 1866
Infra-order	: Lemuriforms, Gregory, 1915
Super-family	: Lemuridea, Gill, 1872
Family	: Lemuridae, Gray, 1821
Sub-family	: Lemurinae, Gray, 1821
Genus	: <i>Varecia</i> , Gray, 1863
Species	: <i>rubra</i> , E. Geoffroy, 1812
Common name	: Red Ruffed Lemur

1.2 Distribution and population status:

1.2.1 Global distribution:

Country	Population estimate (plus references)	Distribution	Population trend (plus references)	Notes
Madagascar	Not known	The geographic range of Red Ruffed Lemur is restricted to Masoala Peninsula in the North-East of Madagascar. It inhabits the remaining largest primary forests remaining in Madagascar.	Decreasing (The IUCN Red List of Threatened Species, 2014)	Last assessed: 11 July 2012

1.2.2 Local distribution:

Country	Region / province	Site	Level of Protection	Population size	Reference(s)	Notes
Madagascar	SAVA Region (East)	District of Antalaha	Masoala National Park	Not known	Mittermeier et al., 2010.	Its geographical range is the northern part of the Antainamb-alana River
Madagascar	ANALANJOROFO Region (West)	District of Maroantsetra	Masoala National Park	Not known	Mittermeier et al., 2010	



1.3 Protection status:

The Red-ruffed lemur is a flagship, umbrella, keystone and indicator species. Conservation status reassessment of *Varecia rubra* in 2012 classified the species as Critically Endangered. It occurs only in the forests of Masoala, North-east of Madagascar. Masoala National Park, selected a UNESCO World Heritage site in 2007, includes all of the remaining forest used by the species – it is one of the few large forests remaining in the country. Every year, the region is heavily impacted by cyclones that are intensifying with climate change. Moreover, climate change projections show that cyclones will be mostly landing in the north-east part of Madagascar. In addition to intense cyclones, the park has suffered degradation from extensive illegal logging of precious woods. Following the 2009 political crisis, 1.27 % of the forest in Masoala was lost between 2008-2011 (Allnutt *et al.*, 2013). This deforestation rate is higher than the most recent annual deforestation across all of Madagascar. This situation is worrying and threatens the survival of many endemic species. Red ruffed lemur is only protected as other species within the national park and has not received any formal protection at the species level.

1.4 Ecology, behaviour and habitat requirements:

The Red-ruffed lemur is a high canopy dwelling, diurnal lemur species. They sleep, feed and rest in large trees with an average DBH of 59.8 cm. They are mainly frugivorous and supplement their diet with leaves and flowers, which means they play an important role as a seed disperser and pollinator of big trees in the forests of Masoala. They have a home range of 100m to 500m (Vasey, 1997), and the size and use of this home range is related to the location of large fruit trees (Rigamonti, 1993). They require pristine and tall forests. Our earlier study of the Masoala population before and after a cyclone showed that the Red-ruffed lemur is vulnerable to habitat disturbances (Ratsisetraina, 2004).

Red ruffed lemur reach adult size at about 2 years of age and start reproducing at about 3 years of age. Their breeding season takes place towards the end of the dry season (May to July) and they give birth in the wet season (November to December) when more food is available. Gestation period lasts 102 to 107 days and females may give birth to one, to three offspring (Vasey, 20016). Females keep their infants in nests until they are three months old.

The species is polygamous and lives in groups that are usually multi-male and multi-female. Social organisation is described as fission-fusion (Vasey, 1997). This is the change in the size of groups by means of the fission and fusion of subgroups according to both activity (e.g reproduction) and the availability and distribution of resources. This is typical of some primate and other mammalian species (e.g. bats, dolphins, elephants, etc.) (Filipo *et al.*, 2008).



1.5 Threat analysis:

Threat	Description of how this threat impacts the species	Intensity of threat (low, medium, high, critical or unknown)
Restricted geographical range	Risks of limited gene flow in case of forest/habitat fragmentations.	High
Habitat loss	Slash and burn, illegal logging, forest conversion into agricultural field (vanilla, rice): habitat degradation, risks of habitat fragmentation, habitat range shrinking.	Critical
Human population growth	Surrounding national parks: increasing birth rate of human communities in the area, immigration following rosewood loggings and high demands of vanilla crops due to its skyrocketing price increasing need of land and food for growing population.	Critical
Hunting and poaching	For food and pet trade. Rich people (vanilla entrepreneurs, rosewood barons, etc.) consider bushmeat of red ruffed lemurs as a luxury food. This increases the population decline already resulting from habitat loss and degradation.	High
Climate change	Intensifying Cyclone with climate change, projected to land in the north-eastern part of Madagascar where Masoala is locate that would aggravate habitat loss and degradation. Ex: canopy cover change will expose nesting babies to predators. Temperature rising, change in rainfall patterns: change in plant phenology: that will affect food availability that have impacts on the species reproduction and other biological and ecological activities.	Critical



1.6 Stakeholder analysis:

Country	Stakeholder	Stakeholder's interest in the species' conservation	Current activities	Impact (positive, negative or both)	Intensity of impact (low, medium, high or critical)
Madagascar	Ministry of the ecology and the environment, Regional office	No particular interest in the species. The protection of forest is the priority of the government.	They manage the buffer zone outside the national park. Management of the national park area is entirely managed by MNP.	positive	medium
Madagascar	Madagascar National Parks (MNP)	Among target species for conservation.	National park management: patrol, environmental education and sensitization, development, ecological and population monitoring.	positive	critical
Madagascar and US	Wildlife Conservation Society (WCS)	Among target species for conservation.	Embrace conservation with social development: * Revenue generator activities to increase household income. * Sensitization and raising awareness. * Carbon storage project.	positive	high
Madagascar	Association Nosy Maitso	Primary target species	EDGE project. Research, population assessment monitoring, vegetation/habitat study. Awareness raising and stakeholder engagement in the species conservation.	positive	high
Madagascar and US	Care international	Sustainable development through	Care works on areas surrounding the park	positive	critical



		ecosystem services improvement that would have positive impacts on human well-being and livelihoods. Forest protection (natural habitat of many species).	(buffer zone) Current Activities consist of: * Food security * Risks and catastrophes Reductions. * Climate change adaptation and mitigation of CC impacts (ex. Sustainable and adaptive agriculture, governance restructure, catchment management like promoting cash-crop agriculture: vanilla, cloves, pepper, etc.) * Awareness raising through communications to stop precious wood exploitation.		
Madagascar	Vanilla exportation operators (company Symrise)	No particular interest in the species. But they are convinced that red ruffed lemur conservation contributes to the forest conservation, that is the best condition for a best quality of vanilla crops.	All around vanilla business. They participate in the development of the vanilla farmers' livelihoods: they buy in priority vanilla crops from farmers in the proximity of the Masoala Park under the condition they respect the preservation of the forest (not to practice forest clearing to farm vanilla). They work in collaboration with Helvetas, WWF (Marojejy) and WCS and Antongil conservation (Antongil bay)	positive	low
Madagascar and France	ONG Graine de vie	Biodiversity conservation	Work in 10 sites surrounding Masoala	positive	Medium



		and natural habitat restoration.	park (park belt) in collaboration with Madagascar National Parks: reforestation with native species, fruit trees, and cash crops, and monitoring. Research in plant consumed by lemurs (in the Marojejy National park) and train local community in seed collection and plant nursing.		
Madagascar	The University of Antalaha	Research, and education	Teaching and training programme on research, environment and development. Activities includes reforestation, raising awareness, and capacity building. Collaboration with foreign universities.	positive	medium
Madagascar	Environmental club at the High public school of Antalaha	Educational as most people in town have never seen the Red ruffed lemur.	All activities around environmental protection: pollutions (cleaning the town, beach, etc.) awareness on radio channels. Student sensitization on the importance of the biodiversity conservation (reconcile students with nature.). Collaborate with the NGOs: Macolline and Graine de vie.	positive	Medium
Madagascar	District school office of the Ministry of the National education	Educational.	Participation in the reforestation programme. Include environmental	positive	medium



			education in the school programme.		
Madagascar	local Malagasy famers Cooperative (CLAM)	Conservation of the forest will improve climate stabilisation and reduce cyclone impacts on the agriculture (vanilla and clove crops as they are the primary source of income of the community in the SAVA Region)	<ul style="list-style-type: none"> * Agroforestry * Reforestation with energy woods (Acacia for charcoal) * Securing the vanilla chain. * Establish regional fund for members. * Collaboration with ONG Graine de vie, association of women. 	positive	Low
Madagascar	ONG Macolline	Ecological roles and importance. All existing lemurs in the region.	<ul style="list-style-type: none"> * Environmental education with schools, in collaboration with GIZ using Kit MADER. and training of teachers on using the tool kit. * Elaboration of curriculum for schools in collaboration with IST. * Fight against pollutions. 	positive	low
Madagascar	Local committee of the park	Livelihoods and ecosystem services.	<p>In close collaboration with the MNP:</p> <ul style="list-style-type: none"> * Sensitisation on reducing forest clearance and biodiversity conservation. * Population monitoring of target species of conservation. * Guard the park. 	positive	medium
Madagascar	Local authority: Mayor	Yes and no No because of poverty. Poor people rely	* Development of the rural commune (municipality) and its surrounding villages	both	low



		entirely on natural resources to survive. Yes, for the development: tourism, education, emblematic of the region.	(construction of infrastructures such as school, dams, job creation for youths). * Control use and exploitation of natural resources.		
Madagascar	Association of Tourist guides.	Tourism	Tourist guiding across the national park	positive	low
Madagascar	Local authority: chief of the District	No interest	Security and control. Work in collaboration with the Gendarmerie nationale.	positive	low
Madagascar	Local service Center of Agriculture of the Ministry of Agriculture	No particular interest in the species.	Objective: improve rural community livelihoods in 18 communes of the Antalaha District (including those surrounding the park). * Work in 3 sectors: farming, livestock and fishing. * Provide training in new technics (beekeeping, aviculture, climate smart agriculture)	positive	low
Madagascar and Germany	Gesellschaft fur Internationale Zusammenarbeit GmbH (GIZ), Madagascar	No interest	Natural resources management	positive	low
Madagascar	Association Of fishers and farmers (Association AVO)	Protection of the forest. No particular interest in the species.	Increase livelihoods, and incomes of the local community.	positive	low



1.7 Context and background information that will affect the success of any conservation action for this species:

	Description	Barriers to conservation	Opportunities for conservation
Socio-cultural effects and cultural attitudes	<ul style="list-style-type: none"> * As a charismatic and iconic species of the Region, the Red ruffed lemur is one of the principal attraction species for tourism. * Seed disperser of big trees and pollinators, they help maintain the forest ecosystem equilibrium and therefore key services such as water cycling and provision soil formation, tourism, climate change mitigation, etc. * Zurich zoo has an exhibit aiming to replicate the Masoala ecosystem. The Masoala kely (Small Masoala) project aims to promote tourism internationally. * It is considered as a luxury food by wealthy people usually from towns surrounding Masoala. * Traditional rice farming using slash and burn method causing habitat loss. 	<ul style="list-style-type: none"> * Pet trade. * Hunting for food. * Habitat loss. <p>Rich people from town buy this lemur species at a very expensive price. They pay some people from the local community or from town just to hunt them for food or for pet. During the rosewood logging, loggers also hunt them for food during their stay in the forest. Likewise, household farmers whose fields are away from their villages hunt lemurs during their stay at their farmland, usually near forest. Some local communities including immigrants eat them like other species as sources of proteins during food scarcity periods. These result in a population decline. Habitat loss is also occurring from forest conversion into rice fields.</p>	<ul style="list-style-type: none"> * More funding for conservation actions from current (Zurich zoo, MacArthur, etc.) and other potential donors. * Involve more people from local community in conservation: research, tourist guiding, etc. * Source of income of the local community from tourism and research, and also from development projects.
Economic implications	<ul style="list-style-type: none"> * Aggravation of poverty on rural community. * Skyrocketing of the Vanilla price internationally. 	<ul style="list-style-type: none"> * Forest conversion into vanilla field, farming etc. * High demand of food (bushmeat, rice that will need more land) 	<ul style="list-style-type: none"> * Direct income from tourism, research. * Job creation from the vanilla industry and farming that generate



	<ul style="list-style-type: none"> * Lack of financial and budget: management skills of the vanilla farmers. * Population growth surrounding the protected area: lack of reproductive health and education programme to young girls. Early motherhood in young girls is very common and has caused a baby boom in the region. * People immigrate from other locations to settle to find new opportunities. * Illiteracy is a barrier to young people from rural locations to find job. In addition, job creation is lacking in the region. 	<ul style="list-style-type: none"> * Overexploitation of natural resources. 	<p>revenue and would alleviate poverty of the population within and around the protected areas.</p> <ul style="list-style-type: none"> * Consideration of gender dimensions by involving women and girls in conservation. * More people will be targeted for CEPA. * Illiteracy issues is an opportunity to strengthen collaboration with stakeholders dealing with development aspect of the conservation, and to set up partnerships with those working on sectors other than environment such as education, professional trainings, tourism, public health, communications, etc. * Potential new funding for youth and women empowerment women as they can drive development.
<p>Existing conservation measures</p>	<ul style="list-style-type: none"> * Masoala National park managed by the Madagascar National Parks. * UNESCO site. * Biodiversity conservation of the complex landscape composed by the Makira and Masoala forest and the Antongil bay by WCS. 	<p>Climate change: intensifying cyclones. Human activities (slash and burn, wildfire, loggings, hunting etc.) owing to:</p> <ul style="list-style-type: none"> * Insufficient number of rangers and patrol agents at MNP compared to the surface of the protected area. * Lack of budget. 	<ul style="list-style-type: none"> * Opportunity to enforce law at all levels and to strengthen cooperation between the Ministry of the Environment, police, justice and court. * WCS, Nosy Maitso and USAID projects are complementary that can enhance and improve conservation of the species.



<p>Local expertise and interest</p>	<ul style="list-style-type: none"> * Local tourist guides * Local research assistants: they assist national and international researchers that enhance the local knowledge of the species, the biology and ecology and the importance of its existence. * Elder people. 	<ul style="list-style-type: none"> * In some case these assistants or guides become poachers and hunters as they are familiar with the species (their locations, activities, behaviour, etc). Or they are in collusion with them. * Low educational and training level. 	<ul style="list-style-type: none"> * As local competencies are crucial, involving them in conservation actions give them responsibilities in the protection of the species. * Local expertise is a valuable source of additional information on biology and ecology of the species, sociocultural, their needs in terms of social development that would help in addressing human pressure in the species and the biodiversity. * Employing local community would improve their income and revenue and encourage them to protect the species.
<p>Resources</p>	<ul style="list-style-type: none"> * <u>Sources of funding</u>: thanks to the EDGE project funded by ZSL, the species benefits from particular conservation attention. In addition, it is amongst target species for conservation of the WCS and MNP. Their programme is mainly funded by international donors, with small contribution from the government (case of MNP) * <u>Human resources</u>: the region is rich in human resource in terms of number of jobs that do not need high level of skills. * <u>Material means</u>: donations from partners and foundations. 	<ul style="list-style-type: none"> * <u>Funds</u>: Insufficient and restricted budget to implement activities. Seeking for funding is challenging and projects/programmes are susceptible to fail in case of political incidence. * <u>Human resources</u>: lack of local competent personnel in terms of technical, administrative and governance skills. Insufficient number of competent staff due to low level of education of the population (rangers, environmental educators, managers, etc.). 	<ul style="list-style-type: none"> * Past and ongoing funding allow short-term and long-term conservation of the species. Successful results from these funding would encourage funders to allocate more funding for the protection of the species. * Local human resource is cheaper and would save money to implement miscellaneous conservation activities.



		<p>* <u>Equipment</u>: Lack of equipment for: patrolling, ecological monitoring, research, outdoor equipment, computers and software. Internet connection is very limited slowing or limit communication and access to information.</p>	
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2. ACTION PROGRAMME

Vision (30-50 years)	
<i>Varecia rubra</i> (Red-ruffed-lemur) escaped from extinction.	
Goal(s) (5-10 years)	
Population decline of Red ruffed lemur is prevented	
Objectives	Prioritisation <i>(low, medium, high or critical)</i>
Habitat restoration	critical
Set up long-term population and ecological monitoring	critical
Strengthen stakeholder's capacity and skills	critical
Alleviate local community poverty	high
Control human population growth surrounding the park	critical
Increase raising awareness efforts	critical
Lobbying for Law enforcement	critical



Activities	Country / region	Priority (low, medium, high or critical)	Associated costs (currency)	Time scale	Responsible stakeholders	Indicators	Risks	Activity type
Objective 1: Habitat restoration								
Identify forest patches that need restoration to prevent habitat fragmentation by performing satellite image analysis.	Madagascar	High	£5,000	1-2 months	Consultants	Surfaces/areas	Availability of the images required	Analysis
Train local communities in seed collection, plant nursery and monitoring	Madagascar	Critical	£1,500	1-2 months	ONG Graine de vie, Kew Royal botanical gardens, Missouri Botanical Garden.	* number of people trained * number of plant nurseries established * number of tree species collected * number of successful seedlings	Weather Lack of materials	Theoretical and practical
Restoration of degraded forest patch and monitoring.	Madagascar	High	£10,000	1-2 years	Local community, ONG Graine de vie, other stakeholders to be identified, MNP Nosy Maitso	* number of seedlings planted * number of successful seedlings planted. * surface restored number of species successfully recovered.	* Weather (cyclone, drought, etc.) * Wildfire	Technical, habitat restoration



Objective 2: Set up long-term population and ecological monitoring								
Purchase equipment (GPS, Laptop and desktop, outdoor equipment, compass, binoculars, range finder, etc.).	Madagascar	High	£6,000	6 months	MNP, Nosy Maitso.	* Type * Number	Damages	Purchase
Implement similar project to the previous one with EDGE in two other sites.	Madagascar	High	£20,000	5 years	MNP, Local communities, Nosy Maitso.	Data collected	Extreme weather	Data collection
Objective 3: Strengthen stakeholder's capacity and skills								
Design of syllabus	Madagascar	High	£500	3 months	REPC, Nosy Maitso, WCS, MNP, Ministry of Education.	Topics included	Unavailability of other stakeholders	Conception work
Training in: ✓ principles of ecology, ✓ principles of conservation, ✓ population monitoring, and data analysis. ✓ CEPA technics	Madagascar	High	£3000	1-2 month	REPC, Nosy Maitso, WCS, MNP, Ministry of Education, Ministry of the Environment	* Number of trainings held * Number of participants evaluations/ assessments	* Unavailability of stakeholders and participants. weather	Training and teaching



<p>Targets: park agents, selected members of local community, staff from the Regional office of the ministry of the environment, staff from other institutions working in conservation and environmental protection, educational staff (teachers, technical advisors in education and responsible at different level, etc.).</p>								
<p>Objective 4: Alleviate poverty of the local community</p>								
<p>Professional training for youth in: guiding tourists, entrepreneurship, crafts, budget and financial management.</p>	<p>Madagascar</p>	<p>High</p>	<p>£10,000</p>	<p>1 year</p>	<p>Ministry of Education, Ministry of Youth and Sports, Ministry of labour, Ministry of culture and art, MNP, Ministry of the environment, Local community</p>	<ul style="list-style-type: none"> * Number of trainees * Evaluation and assessment * Number of people recruited or find a job * Success story 	<ul style="list-style-type: none"> * Unavailability of stakeholders and trainees. * Weather. * Political instability 	<p>Training, coaching and teaching.</p>



Conduct survey to identify needs to empower women and girls	Madagascar	High	£3,000	5 months	MNP, WCS, Nosy Maitso Care international	* Number of women and girls surveyed.	* Reluctance of people. * Political instability. * Weather	Survey
Implement three priority selected requirements to empower women and girls	Madagascar	High	£15,000	3 years	Local community, MNP, Ministry of the environment, care international, Nosy Maitso, other stakeholders concerned	* Number of women and girls engaged in activities * Number of requirements proposed.	* Unavailability of fund	implementation
Construction of dams and other agriculture infrastructure	Madagascar	High	£30,000	3 years	Local community, MNP, Enterprise in charge	Number of dams constructed	* Extreme weather event. * Durability	construction
Train local community in new agricultural technics: climate smart agriculture, etc., and other technics.	Madagascar	High	£3,000	2-3 months	FAO, SAF FJKM, Ministry of Agriculture, CSA, JICA (Japanese Intranational Cooperation)) etc.	* Number of people trained * Evaluation and assessment	Weather	training and teaching



Objective 5: Control human population growth surrounding the park								
Conduct reproduction health campaign in villages surrounding the protected areas.	Madagascar	High	£8,000	6 months	Ministry of health, USAID- PSI (population services International), FISA (Fianakaviana Sambatra means Happy family), MNP, Nosy Maitso, WCS	<ul style="list-style-type: none"> * Number of campaigns conducted * Number of people reached * Number of villages reached. * Assessments. * Birth rate after campaigns * Number of women, girls practicing family planning and contraceptive methods. 	Reluctance of people concerning the topic	Sensitisation, campaign
Campaign on family planning and contraception methods	Madagascar	High						
Conduct sexual education to youths.	Madagascar	High						
Lobbying for human immigration regulation inside and outside the park.	Madagascar	High	£2,000	3 months	local political and administrative leaders, court, police and gendarmerie, ministry of the environment, MNP, WCS, USAID Hay tao, UNMigration, search for common ground, Nosy Maitso. Local community	* Immigration rate	Social conflicts	lobbying



Objective 6: Increase raising awareness efforts								
Production of short movie on the species highlighting its ecological roles, conservation status, benefits on conserving the species (ecosystem services).	Madagascar	High	£15,000	8 months	MNP, Nosy Maitso, local community	* Number of people watching the movie, * Number of CDs dispatched. * Behaviour change	Cost of the film production. Availability of material and equipment needed.	Awareness raising
Organise events: international lemur festival, the movie launch	Madagascar	High	£15,000	5 months	MNP, Nosy Maitso, local community, WCS, USAID Hay tao.	Number of people reached	Weather	Awareness raising and communication
Dispatch of the movie to stakeholders and broadcasting in TVs.	Madagascar	High	£2,000	4 months	Ministry of communication, ministry of the environment, MNP, Nosy Maitso, local community, WCS, USAID Hay tao.	Number of release (TV, newspapers, radio, social network.)	Damage of the products	Awareness raising and communication
Production of different communication materials like posters, kakemonos, goodies, etc. conveying different	Madagascar	High	£2,000	6 months	Ministry of communication, ministry of the environment, MNP, Nosy Maitso, local community, WCS,	* Number of copies * Number of location where they are visible. * Documented increase in awareness	Damage of the products	Awareness raising and communication



messages and topics.					USAID Hay tao, ministry of tourism, ministry of education, etc..			
Objective 7: Lobbying for Law enforcement								
Lobbying with: local political and administrative leaders, court, police and gendarmerie	Madagascar	High	£2,500	1 year	MNP, Nosy Maitso, Ministry of justice, Ministry of the public security, Ministry of the environment.	Application of laws	* Corruptions * Political instability. Reluctance of stakeholders.	lobbying



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