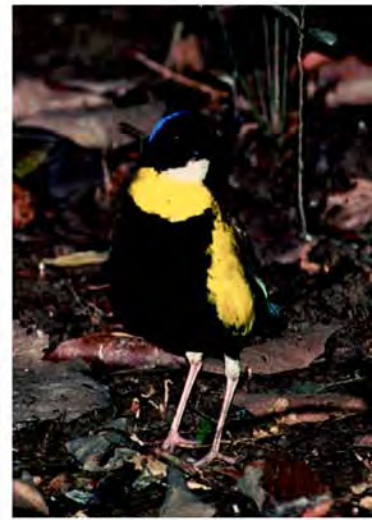


Myanmar

Investment Opportunities in Biodiversity Conservation

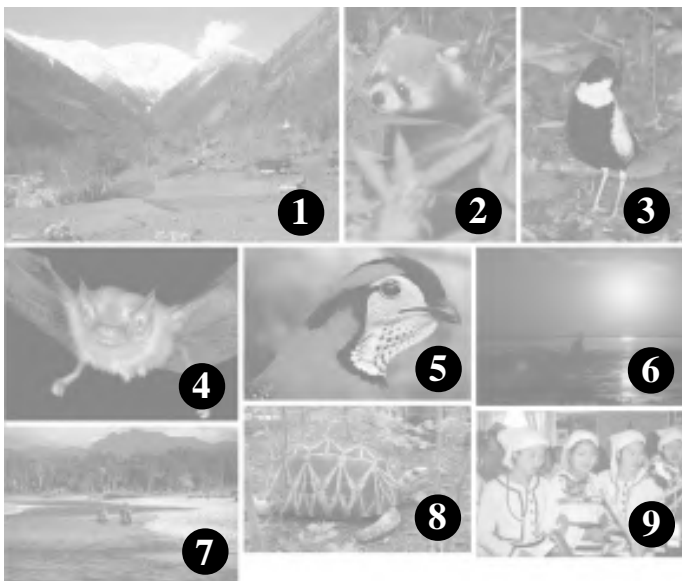


CRITICAL ECOSYSTEM
PARTNERSHIP FUND


BirdLife[®]
INTERNATIONAL
in Indochina



Cover photo credits



Photos 1, 7 and 9: WCS Myanmar Program.

Photos 2 and 6: J. C. Eames.

Photo 3: L. Bruce Kekule.

Photo 4: Paul Bates/Harrison Institute.

Photo 5: Jean Howman/World Pheasant Association.

Photo 8: Douglas Hendrie.

MYANMAR
INVESTMENT OPPORTUNITIES IN BIODIVERSITY CONSERVATION

YANGON, NOVEMBER 2005

Prepared by:
BirdLife International

with the support of:
CARE Myanmar,
Center for Applied Biodiversity Science - Conservation International,
Critical Ecosystem Partnership Fund,
The Office of the United Nations Resident Coordinator, Yangon,
United Nations Development Programme

Drafted by:
Andrew W. Tordoff,
Jonathan C. Eames,
Karin Eberhardt,
Michael C. Baltzer,
Peter Davidson,
Peter Leimgruber,
U Uga,
U Aung Than

in consultation with the following stakeholders:

Bates, Paul
Bowman, Vicky
Brunner, Jake
Daw Khant Khant Chaw
Daw Khin Ma Ma Thwin
Daw Mya Thu Zar
Daw Nila Shwe
Daw Pyu Pyu Myint
Daw Si Si Hla Bu
Daw Tin Nwe
Elkin, Chantal
Fang Fang
Ferraris, Jr, Carl
Grimmett, Richard
Hill, Glen
Kullander, Sven
Lee, Eugene
Lynam, Anthony
Marsden, Rurick
Martinez, Carmen
Mather, Robert

McGowan, Phil
Mills, Judy
Momberg, Frank
Ocker, Donnell
Peters, James
Petrie, Charles
Potess, Fernando
Rabinowitz, Alan
Rao, Madhu
Sale, John
Songer, Melissa
Stimson, Hugh
Stone, Chris
Tajima, Makoto
Tang Zhengping
U Aung Myint
U Gyi Maung
U Htin Hla
U Khin Maung Zaw
U Kyi Maung
U Nay Myo Zaw

U Ohn
U Sai Than Maung
U Saw Hla Chit
U Saw Lwin
U Saw Tun Khaing
U Shwe Thein
U Sit Bo
U Than Myint
U Thet Zaw Naing
U Tin Than
U Tin Tun
U Tint Lwin Thaung
U Win Maung
U Win Myo Thu
U Win Sein Naing
Wemmer, Chris
Wikfalk, Anna
Wikramanayake Eric
Wild, Klaus Peter
Wohlauer, Ben
Zug, George

Note: the above stakeholders comprise representatives of NGOs, academic institutions, government institutions and donor agencies active in Myanmar who participated at stakeholder workshops held in Yangon in August 2003 and July 2004, and/or who provided written feedback on the draft document.

CONTENTS

FOREWORDS	iv
EXECUTIVE SUMMARY	viii
INTRODUCTION	1
Structure of the document	1
Background	1
BIOLOGICAL IMPORTANCE	3
Geography, climate and history	3
Habitats and ecosystems	3
Species diversity and endemism	6
Globally threatened species	8
CONSERVATION OUTCOMES	24
Species Outcomes	26
Site Outcomes	27
Corridor Outcomes	28
Priority Outcomes for conservation investment	31
SOCIO-ECONOMIC FEATURES	43
Introduction and historical context	43
Demographic and social trends	43
Economic trends	44
Infrastructure development	44
Government frameworks	44
Non-governmental frameworks	45
Legislative and protected area frameworks	55
Regional agreements	56
Global conventions	57
SYNOPSIS OF CURRENT THREATS	63
Over-exploitation of natural resources	63
Habitat degradation and loss	65
Invasive species	70
Pollution	71
Root causes	71
SYNOPSIS OF CURRENT INVESTMENT	79
Major sources of investment	79
Thematic distribution of investment	81
Geographical distribution of investment	87
INVESTMENT OPPORTUNITIES	94
INVESTMENT PRIORITIES AND STRATEGIC DIRECTIONS	95
Sustainability	105
CONCLUSION	106
ABBREVIATIONS USED IN THE TEXT	108
LIST OF MAPS	108
LIST OF TABLES	109
LIST OF ATTACHMENTS	109
REFERENCES	110

FOREWORDS

Our planet is a web of interconnected life, a cornucopia of plants, animals, natural communities and ecosystems. At least 5 million species of plants and animals coexist on our planet. This delicate balance of nature - essential for our planet's functioning - provides us and our rapidly expanding population with countless valuable economic and cultural services, including food, shelter and medicine.

For more than 15 years, Conservation International has focused its expertise and resources on "biodiversity hotspots", the biologically richest and most threatened areas on Earth. Conserving biodiversity within these hotspots has globally significant consequences: helping maintain climatic equilibrium; preserving species that may cure cancer and other fatal diseases; and protecting the world's remaining watersheds.

The hotspots also represent a targeted and cost efficient way to direct scarce resources into conservation strategies and investments where it matters most. Scaling up those resources is also paramount.

Conservation International, the Global Environment Facility, the Government of Japan, the John D. and Catherine T. MacArthur Foundation and the World Bank are partners in the first funding mechanism of its kind. The Critical Ecosystem Partnership Fund (CEPF) provides direct support to non-governmental organisations, community groups and other partners helping to conserve the hotspots. We share a common vision that economic prosperity and biodiversity conservation are intrinsically linked.

In 2004, CEPF supported BirdLife International in spearheading the extensive process that led to this publication, *Myanmar: Investment Opportunities in Biodiversity Conservation*. Myanmar harbours the most extensive natural habitats and species communities in all of mainland South-East Asia. CEPF was pleased to support this effort and the resulting strategy, which is sharply focused, scientifically defensible and demonstrates broad stakeholder consensus.

Myanmar is the exception, not the rule, in conservation: harboring significant blocks of pristine forests. Indeed, the full biological wealth of the country has not yet been realised. This publication comes at a critical time when we have the ability to ensure significant biodiversity and forest tracts remain intact. Now is the time for all of us, locally and globally, to help conserve this rich natural heritage before it is lost forever.

Jorgen B. Thomsen
Senior Vice President, Conservation International
Executive Director, Critical Ecosystem Partnership Fund



This report is a valuable resource for donors, researchers, NGOs and anyone interested in conservation and environmental issues. It appears at a time when the international donor community, and in particular the European Union, has recognised both the need and the opportunity to promote conservation in Myanmar. In October 2004, the EU adopted a revised policy on assistance to Burma/Myanmar, broadening its scope beyond 'humanitarian' aid to include projects and programmes in support of "environmental protection, and in particular programmes addressing the problem of non-sustainable, excessive logging resulting in deforestation....to be implemented through UN agencies, non-governmental organisations and through decentralised cooperation with local civilian administrations". The opportunities for conservation investment are almost unlimited. This report is valuable both for prioritising the needs, and for promoting coordination so that best practice can be shared. In addition to identifying the opportunities, this report outlines the challenges and threats such as population pressure, poverty, land use policies, undervaluation of the environment, and a lack of knowledge and understanding of existing biodiversity. These are problems common to many countries in the region, and there is the scope to learn from good and bad experiences elsewhere. Those working on conservation in other countries may, by reading this report, be prompted to share successful strategies that could be applied here.

Britain is currently funding several conservation projects in Myanmar. These include support to the Wildlife Conservation Society's work with the Forest Department to promote conservation in and around the three protected areas of the Northern Forest Complex: Hkakaborazi National Park; Hukaung Valley Wildlife Sanctuary; and Hponkanrazi Wildlife Sanctuary. The goal is to conserve biological and cultural diversity in the northern forests region of Myanmar, and in particular the Tiger population, working on a management plan which reflects the needs of the local population.

The British Government's Darwin Initiative has supported the joint work of the Harrison Institute and Yangon University's Zoology Department to study limestone-karst-dependent bats in Kayin and Mon States. This has identified several new species and strengthened the research capacity of the department. Darwin funding has also supported Birdlife International's work with Myanmar NGO, the Biodiversity and Nature Conservation Association (BANCA), to carry out field research, which has identified significant new populations of the endangered Gurney's Pitta in Tanintharyi, and BANCA's work with the Forest Department and the local population to promote conservation at Natmataung (Mount Victoria) National Park. The British Embassy and Council have also included environmental issues in their training programmes, including for local journalists, to raise public awareness and support for conservation.

Some have questioned spending on conservation at a time when many in Myanmar face a humanitarian crisis. But conservation, whether it is focussed on protecting species, or on biodiversity corridors and hotspots, has a positive knock-on effect on human livelihoods. To take just one example, bats are pollinators for many forest trees, including fruit trees such as durian, as well as for mangroves, which provide the essential breeding ground for fish and shrimp species, as well as protecting the land from erosion. By cataloguing, albeit briefly, the wealth of the biodiversity in Myanmar, this report presents an opportunity to increase interest, pride and understanding of its value amongst the people of Myanmar, from the top levels of government to the local grassroots communities. This can only help promote conservation.

Vicky Bowman
British Ambassador



Forests worldwide are being threatened by several factors, such as agricultural expansion, unsustainable harvesting of forest products for ever-increasing human populations, and sensitive issues of land-use conflict. The impact of forest destruction leads to the gradual degradation of biodiversity with the result that the life-support system of all beings is impaired.

It is transparent that, due to extreme poverty in many developing countries and high consumerism in the developed world, the process of ecological change is taking place in a negative direction at national, regional and global levels.

Fortunately, Myanmar is a country endowed with a wealth of natural forest resources, and different types of forests still exist in different ecosystems. Myanmar could be considered as one of the last frontiers of pristine forests in the South-East Asia region.

In spite of Myanmar's good forest-cover, there is no room for complacency, since all forests are under pressure from internationally well-known issues like expanding population, increased demand and major land-use changes for the economic development of the country.

Serious thoughts should, therefore, be given to protecting the remaining forests, including its biodiversity and endangered ecosystems, through different conservation measures. In other words, the cooperation and collaboration of the government institutions, international NGOs, national NGOs and both local and international donor agencies are called for, to mitigate the causes of habitat destruction and fragmentation.

With a vision of the pressing need to analyse the current status of biodiversity in Myanmar and to identify investment priorities for conservation measures, the researchers have collectively presented this invaluable, comprehensive document for the natural environment sector of the country.

It is the pleasure of the Forest Resources, Environment, Development and Conservation Association (FREDA) to have participated in the relevant stakeholder workshops and to endorse this document, in order to further facilitate biodiversity conservation actions in Myanmar.

U Sein Maung Wint
Chairman
Forest Resources, Environment, Development
and Conservation Association (FREDA)
Myanmar



Two decades ago, external financing for conservation was almost non-existent in Myanmar. Even at the present time, relative to other countries in the Indo-Myanmar (Indo-Burma) Hotspot, existing conservation investment in Myanmar is very limited, while opportunities for additional investment are almost unlimited. Myanmar is in urgent need of additional external support if its biodiversity is to be properly conserved. Environmental boycotts are not valid and international donor agencies need to be more positive and give financial assistance for conservation activities to dedicated governmental agencies, NGOs and academic institutions, rather than refrain because of political stances in Myanmar.

This document is vital for the conservation of threatened species, critical sites and habitats, and wider biodiversity throughout the country, and may serve as a foundation for a future conservation agenda in Myanmar. It proposes high priority actions that could be taken by NGOs and academic institutions over the next five years to conserve globally important biodiversity. This document gives due consideration and priority to areas that are nationally important, regionally significant and globally outstanding. Importantly, the document highlights 48 Priority Species, 37 Priority Sites and eight Priority Corridors (landscapes) for conservation investment over the next five years. Strategic Directions and Investment Priorities for Myanmar recommended by this document should be strictly followed and well implemented.

The need for additional conservation investment in Myanmar is great and pressing. Myanmar still supports extensive natural habitats, as well as species communities that have disappeared from most other parts of mainland South-East Asia. The conservation issues of South-East Asian countries, including ill-advised land-use, are quite common and Myanmar is no exception. As economic growth continues to advance upon and replace natural habitats, there are important policy decisions that need to be made. The forces driving biodiversity loss in other parts of this region are already at play in Myanmar. However there is still time to plan and introduce conservation measures to mitigate their impacts. We all must do something before all is too late.

This document identifies opportunities for investing in biodiversity conservation in Myanmar, via NGOs and academic institutions, to address immediate conservation needs and build a solid foundation for future efforts. The time to take these opportunities is now. I strongly encourage everyone who cares for Myanmar to act on the analysis and recommendations well presented in this valuable document.

I am always looking forward to seeing our country having a mechanism for combining economically sustainable growth with ecologically sustainable development.

U Uga
Chairman
Biodiversity and Nature Conservation
Association (BANCA)
Myanmar



EXECUTIVE SUMMARY

Unique opportunity

Due in part to decades of economic and political isolation, the Union of Myanmar (hereafter Myanmar) supports some of the most intact natural habitats and species communities remaining in the Indo-Myanmar (Indo-Burma) Hotspot, as well as many endemic and globally threatened species. The full biological importance of the country is still being realised, however, as illustrated by the recent discoveries of a number of species new to science.

In addition to Myanmar's importance from a biological perspective, there is a facilitating environment for biodiversity conservation in the country, which is enabling increasing engagement by non-governmental organisations (NGOs) and academic institutions. However, the political climate has discouraged engagement by donors, and a chronic shortage of funding opportunities remains a major obstacle to conservation efforts in the country. Consequently, Myanmar represents a unique opportunity to invest in a country at a stage when it is still possible to avoid the patterns of degradation and loss of natural ecosystems that have been witnessed elsewhere in the region.

Purpose of the document

This document is based upon the results of two stakeholder workshops held in Yangon on 4-5 August 2003 and 9 July 2004. Over 30 stakeholders from NGOs, academic institutions, government institutions and donor agencies attended each workshop. These workshops were the first attempt to reach multi-stakeholder consensus on geographic, taxonomic and thematic priorities for biodiversity conservation in Myanmar.

In recognition of Myanmar's biological importance and in response to the chronic shortage of conservation investment, the stakeholders at the two workshops requested BirdLife International to synthesise the results into a document presenting investment opportunities in biodiversity conservation by NGOs and academic institutions in Myanmar. Preparation of this document was supported by the Critical Ecosystem Partnership Fund. Publication of the document was supported by the United Nations Development Programme. Additional support was provided by the Darwin Initiative project *Building Constituencies for Site-based Conservation in Myanmar*. CARE Myanmar and the Office of the United Nations Resident Coordinator, Yangon provided in-country assistance, while the Center for Applied Biodiversity Science at Conservation International provided technical support.

The document was drafted by a team of eight researchers, and incorporates programmatic contributions from stakeholders from the following organisations: the Biodiversity and Nature Conservation Association; the California Academy of Sciences; Conservation International; the Department for International Development of the UK Government; the Economic and Development Association; Fauna & Flora International; the Food and Agriculture Organisation; the Forest Resources, Environment, Development and Conservation Association; Friends of Rainforests in Myanmar; the Global Conservation Fund; the Harrison Institute; the Japan International Cooperation Agency; Mangrove Service Network; Myanmar Bird and Nature Society; Myanmar Floriculturist Association; the National Commission for Environmental Affairs; the Nature and Wildlife Conservation Division; the People, Resources and Conservation Foundation; the Renewable Energy Association Myanmar; the Smithsonian Institution; Swiss AID; the United Nations Development Programme; the Wildlife Conservation Society; the World Pheasant Association; World Wide Fund for Nature/World Wildlife Fund; Yangon University; and the Embassies of Germany, the UK and the USA. The document will be placed in the public domain, with the intention that it is used to leverage support for biodiversity conservation in Myanmar. In the absence of a National Biodiversity Strategy and Action Plan for Myanmar, it is intended that this document serve to partially fill that gap, until such time as one is produced.

Targets for conservation success

In order for conservation investments to make the maximum contribution to global biodiversity conservation, it is essential that they use effective mechanisms to target the species, sites and corridors (landscapes) of greatest conservation concern. Through a participatory, consultative process, facilitated by the drafting team, the stakeholders set biological targets at the species, site and corridor levels, which can be used to guide conservation investments in Myanmar.

Species-level targets (called Species Outcomes) were set for each globally threatened species in Myanmar. The stakeholders prepared a preliminary list of 144 globally threatened species occurring in Myanmar, of which nine are thought to be endemic to the country.

Site-level targets (called Site Outcomes) were set for each Key Biodiversity Area (KBA) in Myanmar. KBAs are internationally important sites for the conservation of globally threatened species, restricted-range species and/or congregatory species. The stakeholders defined 76 KBAs, 23 of which are designated or officially proposed as protected areas.

Corridor-level targets (called Corridor Outcomes) were set for each conservation corridor in Myanmar. Conservation corridors are landscapes of inter-connected sites sufficient to facilitate long-term conservation of landscape species, such as Asian Elephant *Elephas maximus* or Irrawaddy Dolphin *Orcaella brevirostris*, or maintain evolutionary and ecological processes, such as migration of fish species. The stakeholders defined 15 conservation corridors, covering a total area of 293,400 km², equivalent to 43% of Myanmar's land area.

Priorities for conservation investment

Over the next five years, it is highly unlikely that sufficient resources will be available to enable all of the Conservation Outcomes set for Myanmar to be addressed. Therefore, the stakeholders selected a focused set of Priority Outcomes from among the full suite of Conservation Outcomes. The Priority Outcomes represent a consensus among stakeholders on the Priority Species, Sites and Corridors for conservation investment over the next five years.

Table I. Priority Corridors and Priority Sites for conservation investment in Myanmar

Priority Corridor	Priority Sites	Area (km ²)
Priority Corridors and the Priority Sites they contain		
Central Myanmar Dry Forests	Chatthin; Shwesettaw	15,000
Central Myanmar Mixed Deciduous Forests	Alaungdaw Kathapa; Mahamyaing	7,600
Chin Hills Complex	Bwe Pa; Kennedy Peak; Kyauk Pan Taung; Natmataung (Mount Victoria); Zeihmu Range	23,900
Lower Chindwin River	Uyu River	8,400
Northern Mountains Forest Complex	Hkakaborazi; Hponkanrazi; Khaunglanpu	25,800
Rakhine Yoma Range	Kaladan Estuary; Nat-yekan; Ngwe Taung; Northern Rakhine Yoma; Rakhine Yoma	53,000
Sundaic Subregion (Tanintharyi)	Central Tanintharyi Coast; Chaungmon-Wachaung; Htaung Pru; Karathuri; Kawthaung District Lowlands; Lampi Island; Lenya; Ngawun; Pachan; Pe River Valley (Mintha Ext RF); Tanintharyi National Park; Tanintharyi Nature Reserve	44,200
Upper Chindwin Lowlands	Bumphabum; Htamanthi; Hukaung Valley; Tanai River	24,400
Additional Priority Sites		
none	Minzontaung	22
none	Myaleik Taung	50
none	Shwe U Daung	326

The stakeholders employed four criteria to select Priority Corridors from among the preliminary list of conservation corridors in Myanmar: (i) importance for the conservation of Critically Endangered and Endangered animal species; (ii) importance for the conservation of landscape species; (iii) importance for the conservation of unique or exceptional ecological and evolutionary processes; and (iv) need for additional conservation investment. Eight Priority Corridors were selected, covering a total area of 202,300 km², equivalent to 30% of the country's land area (Table I).

The stakeholders employed three criteria to select Priority Sites from among the preliminary list of KBAs in Myanmar: (i) occurrence within a Priority Corridor; (ii) importance for the conservation of globally threatened species endemic to Myanmar; and (iii) need for additional conservation investment. The eight Priority Corridors contain 34 KBAs, all of which were selected as Priority Sites. Three additional Priority Sites were also selected because they support Burmese Star Tortoise *Geochelone platynota*, a Critically Endangered species endemic to Myanmar, bringing to 37 the total number of Priority Sites (Table I).

The stakeholders employed three criteria to select Priority Species from among the preliminary list of globally threatened species in Myanmar: (i) global significance of the Myanmar population; (ii) need for species-focused conservation actions; and (iii) need for additional conservation investment. Forty-eight Priority Species were selected, comprising 20 mammals, 11 birds and 17 reptiles (Table II). The stakeholders also selected eight provisional Priority Species, comprising three mammals, one reptile and four plants. None of these species is currently assessed as globally threatened but all were considered to be potentially of global conservation concern.

Table II. Priority Species for conservation investment in Myanmar

Priority Species	Species-focused Action(s) Required
MAMMALS	
Kitti's Hog-nosed Bat <i>Craseonycteris thonglongyai</i>	Status survey
Joffre's Pipistrelle <i>Pipistrellus joffrei</i>	Status survey
Anthony's Pipistrelle <i>Pipistrellus anthonyi</i>	Status survey
Capped Leaf Monkey <i>Trachypithecus pileatus</i>	Status survey; control of hunting
Hoolock Gibbon <i>Bunipithecus hoolock</i>	Status survey
Asian Black Bear <i>Ursus thibetanus</i>	Status survey; control of hunting
Red Panda <i>Ailurus fulgens</i>	Status survey; control of hunting
Asian Golden Cat <i>Catopuma temminckii</i>	Status survey
Marbled Cat <i>Pardofelis marmorata</i>	Status survey
Clouded Leopard <i>Neofelis nebulosa</i>	Status survey
Tiger <i>Panthera tigris</i>	Control of hunting
Asian Elephant <i>Elephas maximus</i>	Status survey; control of hunting; mitigation of human-elephant conflict
Asian Tapir <i>Tapirus indicus</i>	Status survey
Lesser One-horned Rhinoceros <i>Rhinoceros sondaicus</i>	Status survey
Hairy Rhinoceros <i>Dicerorhinus sumatrensis</i>	Status survey
Eld's Deer <i>Cervus eldii</i>	Status survey; control of hunting
Black Muntjac <i>Muntiacus crinifrons</i>	Status survey
Wild Water Buffalo <i>Bubalus bubalis</i>	Status survey; control of hunting
Takin <i>Budorcas taxicolor</i>	Status survey
Red Goral <i>Naemorhedus baileyi</i>	Status survey

Priority Species	Species-focused Action(s) Required
BIRDS	
Green Peafowl <i>Pavo muticus</i>	Control of hunting
White-winged Duck <i>Cairina scutulata</i>	Control disturbance and habitat loss across range
Pink-headed Duck <i>Rhodonessa caryophyllacea</i>	Status survey
Sarus Crane <i>Grus antigone</i>	Control disturbance and habitat loss across range
Masked Finfoot <i>Heliopais personata</i>	Control disturbance and habitat loss across range
White-rumped Vulture <i>Gyps bengalensis</i>	Control disturbance across range
Slender-billed Vulture <i>Gyps tenuirostris</i>	Control disturbance across range
White-bellied Heron <i>Ardea insignis</i>	Control disturbance and habitat loss across range
Lesser Adjutant <i>Leptoptilos javanicus</i>	Control disturbance and habitat loss across range
Gurney's Pitta <i>Pitta gurneyi</i>	Status survey
White-browed Nuthatch <i>Sitta victoriae</i>	Status survey
REPTILES	
Siamese Crocodile <i>Crocodylus siamensis</i>	Status survey
Burmese Star Tortoise <i>Geochelone platynota</i>	Status survey; control of hunting
Elongated Tortoise <i>Indotestudo elongata</i>	Status survey; control of hunting
Asian Giant Tortoise <i>Manouria emys</i>	Status survey; control of hunting
Impressed Tortoise <i>Manouria impressa</i>	Status survey; control of hunting
Mangrove Terrapin <i>Batagur baska</i>	Status survey; control of hunting
Arakan Forest Turtle <i>Heosemys depressa</i>	Status survey; control of hunting
Spiny Turtle <i>Heosemys spinosa</i>	Status survey; control of hunting
Yellow-headed Temple Turtle <i>Hieremys annandalii</i>	Status survey; control of hunting
Burmese Roofed Turtle <i>Kachuga trivittata</i>	Status survey; control of hunting
Burmese Eyed Turtle <i>Morenia ocellata</i>	Status survey; control of hunting
Keeled Box Turtle <i>Pyxidea mouhotii</i>	Status survey; control of hunting
Big-headed Turtle <i>Platysternon megacephalum</i>	Status survey; control of hunting
Asiatic Softshell Turtle <i>Amyda cartilaginea</i>	Status survey; control of hunting
Burmese Frog-faced Softshell Turtle <i>Chitra vandijki</i>	Status survey; control of hunting
Burmese Peacock Softshell <i>Nilssonina formosa</i>	Status survey; control of hunting
Asian Giant Softshell Turtle <i>Pelochelys cantorii</i>	Status survey; control of hunting

Threats to biodiversity

After describing the definition of Conservation Outcomes and the selection of Priority Outcomes, this document summarises the socio-economic context for biodiversity conservation in Myanmar, and reviews the major threats to biodiversity in the country and their root causes.

The two main direct threats to Myanmar's biodiversity are over-exploitation, and habitat degradation and loss. Over-exploitation takes several forms, including over-exploitation of animals, over-exploitation of plants and over-fishing. Similarly, habitat degradation and loss take several forms, including logging, agricultural expansion, conversion of forest to plantations and shifting cultivation. Pollution and invasive species are also significant direct threats to biodiversity, and their effects are most clearly discerned in relation to freshwater ecosystems. The root causes of biodiversity loss in Myanmar include economic growth and increasing consumption, poverty, capacity constraints, lack of environmental safeguards, lack of comprehensive land-use policies and plans, undervaluation, lack of grassroots support for conservation, and global climate change.

Existing conservation investment

To identify investment opportunities in biodiversity conservation by NGOs and academic institutions in Myanmar, this document presents a synopsis of current conservation investment in the country. By analysing current investments by source, thematic area and geographical focus, the drafting team was able to identify geographical and thematic gaps. In consultation with the stakeholders, the team also evaluated which approaches to conservation are achieving results, and identified the greatest opportunities to engage NGOs and academic institutions in conservation.

The political and economic sanctions imposed on Myanmar have had major repercussions for investment in all sectors, including conservation. Many bilateral and multilateral donor agencies do not invest in the country on account of these sanctions, and most of the investment that is made is focused on humanitarian issues. The European Union has recently revised its position on provision of development assistance to Myanmar, however, and for the first time now explicitly supports NGO projects addressing tropical deforestation. Restrictions on funding government forestry and fisheries staff limit their ability to tackle serious environmental problems, and undermine protected area management. These constraints on conservation investment are compounded by the limited resources made available for conservation by the Government of Myanmar, although some protected areas do receive moderate amounts of funding from the national budget. As a result, many major and critical opportunities for conservation are currently being missed, and additional conservation investment is urgently needed to prevent biodiversity losses that will have dramatic consequences beyond Myanmar.

Investment opportunities

Relative to other countries in the Indo-Myanmar (Indo-Burma) Hotspot, existing conservation investment in Myanmar is very limited, while opportunities for additional investment are almost unlimited. However, given that resources available for conservation are finite globally, and that there is limited absorptive capacity for conservation investment in Myanmar, there is a need to focus additional investment on the highest priorities. Therefore, this document does not present a comprehensive list of all conservation actions required in Myanmar but, rather, a realistic suite of high priority actions that could be taken by NGOs and academic institutions over the next five years to conserve globally important biodiversity.

This document proposes that conservation investment over this period should concentrate on putting in place a foundation for future conservation efforts in Myanmar. Ideally, this foundation should ensure that: (i) baseline scientific information on the status and distribution of biodiversity is available and informs decisions about conservation planning and allocation of resources; (ii) all species and habitats of global importance for which formal protected area management is appropriate are represented within the national system of protected areas; (iii) locally appropriate approaches to site-based conservation (both formal and non-formal) have been developed and demonstrated to be effective; (iv) conservation initiatives are not undermined by incompatible initiatives of other sectors; and (v) local NGOs, academic institutions and grassroots organisations are strong, well coordinated and actively engaged in biodiversity conservation.

Through a participatory, consultative process, facilitated by the drafting team, the stakeholders selected a set of 16 Investment Priorities, representing the major thematic priorities for investment in conservation by NGOs and academic institutions in Myanmar. To be selected, an Investment Priority had to meet five criteria: (i) it must support the conservation of one or more Priority Species, Site or Corridor; (ii) it must address an urgent threat to biodiversity; (iii) it must fill a gap in conservation investments by national governments and donors; (iv) it must provide an opportunity for effective engagement of NGOs and academic institutions in conservation; and (v) it must be cost effective. The Investment Priorities were grouped into five Strategic Directions (Table III).

Table III. Strategic Directions and Investment Priorities for Myanmar

Strategic Direction	Investment Priorities
1. Strengthen conservation of Priority Sites	1.1 Review and support the expansion of the national protected area system to address gaps in coverage of globally threatened species and Key Biodiversity Areas
	1.2 Strengthen protected area management at Priority Sites
	1.3 Pilot alternative approaches to formal protected area management at Priority Sites
	1.4 Support strengthening of the legislative framework for protected area management and species conservation
2. Mainstream biodiversity into other policy sectors	2.1 Integrate biodiversity into decision-making processes for land-use and development interventions in the Priority Corridors
	2.2 Conduct targeted advocacy and awareness raising for decision makers in government, donor agencies and the corporate sector
	2.3 Forge partnerships between biodiversity conservation and rural development initiatives, maximise synergies and mitigate risks
3. Implement focused conservation actions for Priority Species	3.1 Establish a wildlife trade monitoring system for Priority Species and use results to strengthen and better target enforcement at national and regional levels
	3.2 Take range-wide conservation actions for certain widely dispersed Priority Species
	3.3 Conduct status surveys of Priority Species, where there is a need for greatly improved information on their status, distribution and ecology, and link results to conservation management
	3.4 Conduct baseline biodiversity surveys for selected freshwater taxa, and apply results to conservation planning
4. Support local NGOs and academic institutions to engage in biodiversity conservation	4.1 Strengthen the capacity of local NGOs and academic institutions to develop and implement conservation projects
	4.2 Develop mechanisms for coordination and information sharing among NGOs and academic institutions active in Myanmar
	4.3 Support the development of conservation curricula at local academic institutions
5. Create capacity to coordinate conservation investment in Myanmar	5.1 Initiate standardised monitoring programmes for Conservation Outcomes
	5.2 Establish a mechanism to manage information on Conservation Outcomes and Investment Priorities, coordinate conservation actions, and leverage additional funding

Conclusion

The need for additional conservation investment in Myanmar is great and pressing. Partly as a result of its relatively undeveloped infrastructure and relative isolation from international markets, Myanmar still supports extensive natural habitats, as well as species communities that have disappeared from most other parts of mainland South-East Asia. There is, however, no room for complacency. The forces driving biodiversity loss in other parts of the region are already at play in Myanmar. While it is unlikely that the country will avoid these forces, there is still time to plan and introduce conservation measures to mitigate their impacts. This document identifies opportunities for investing in biodiversity conservation in Myanmar, via NGOs and academic institutions, to address immediate conservation needs and build a solid foundation for future efforts. The time to take these opportunities is now.

Figure 1. Location of Myanmar on the Indochinese Peninsula

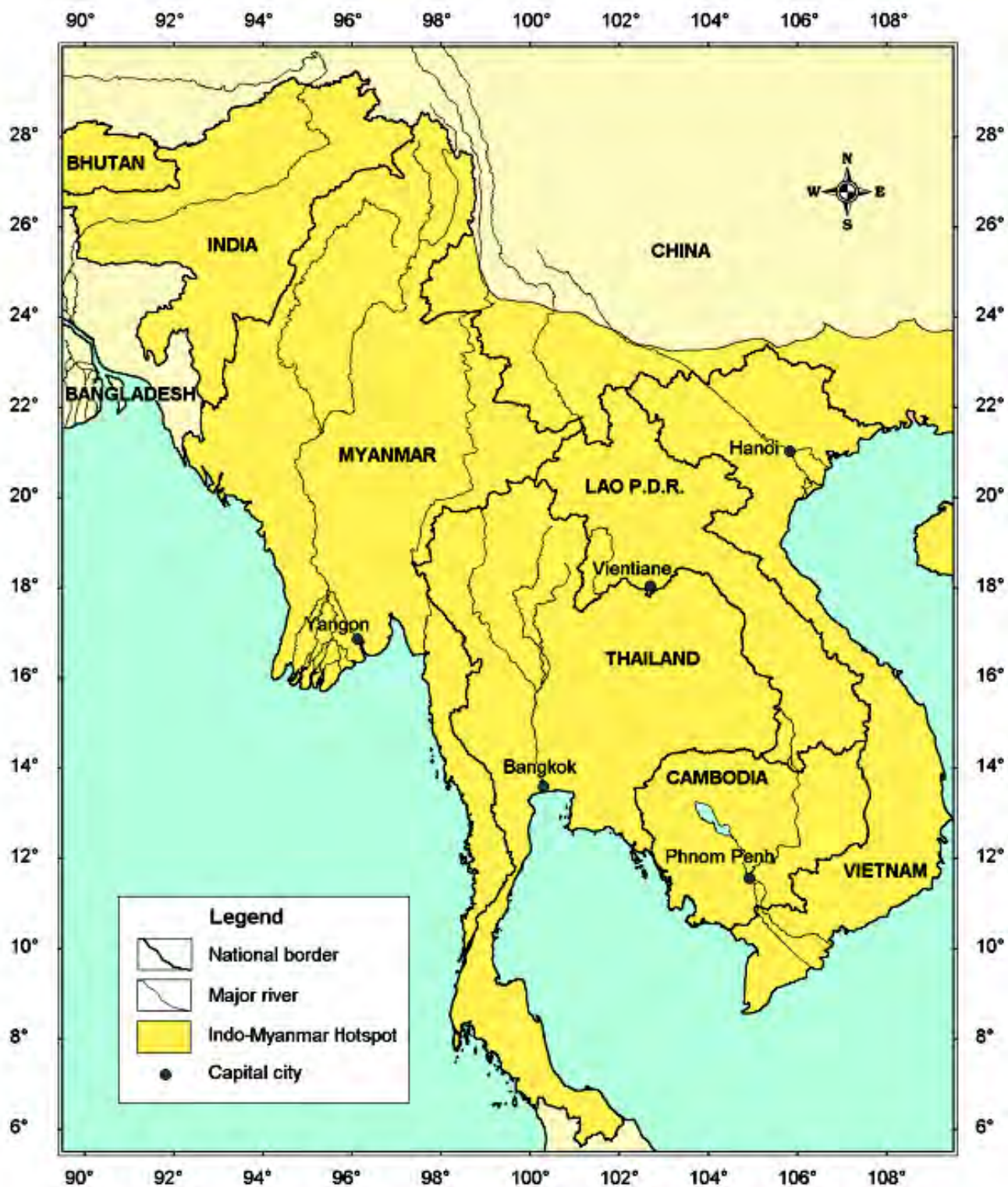


Figure 2. Endemic Bird Areas and Secondary Areas in Myanmar

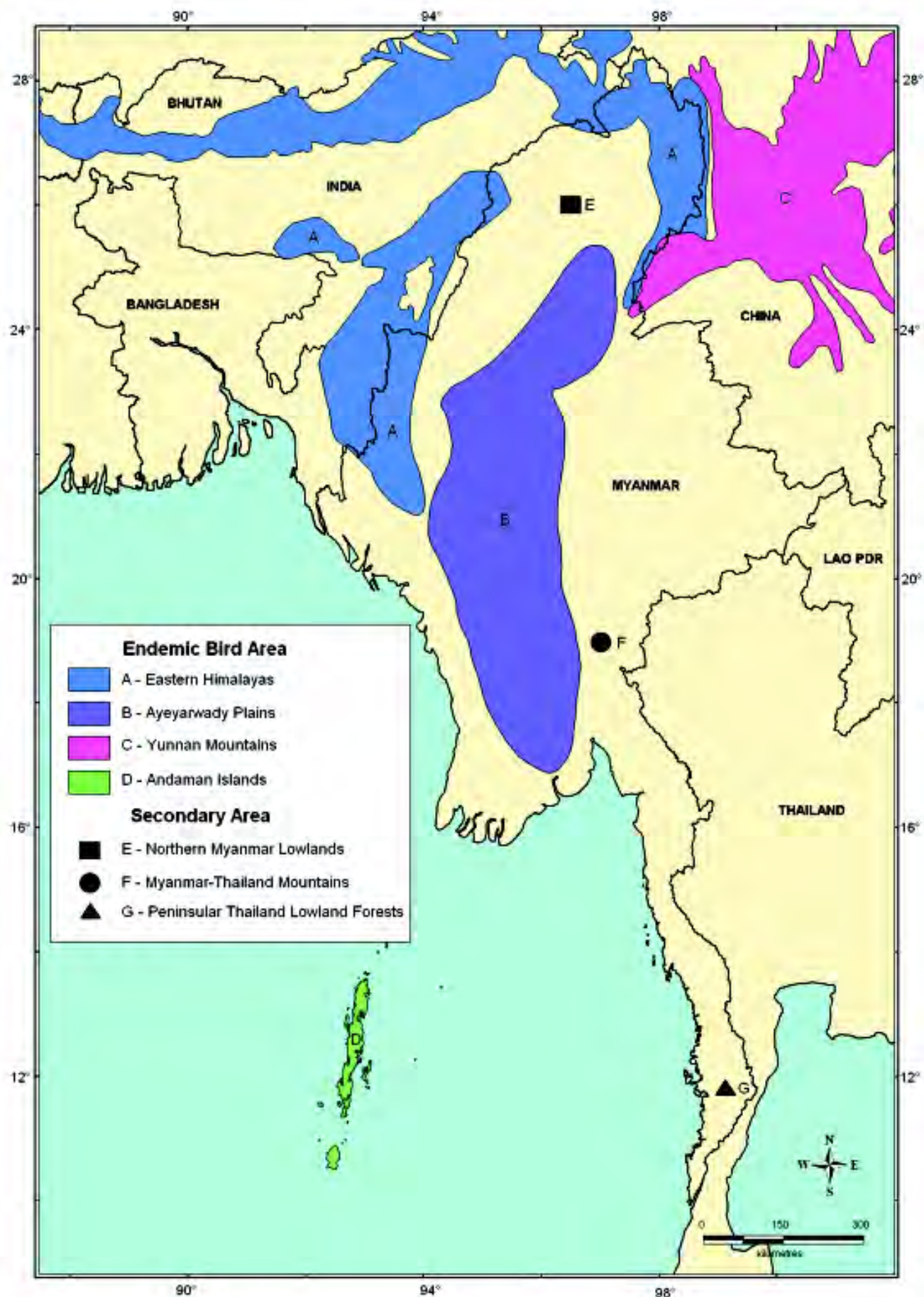


Figure 3. Site and Corridor Outcomes in Myanmar

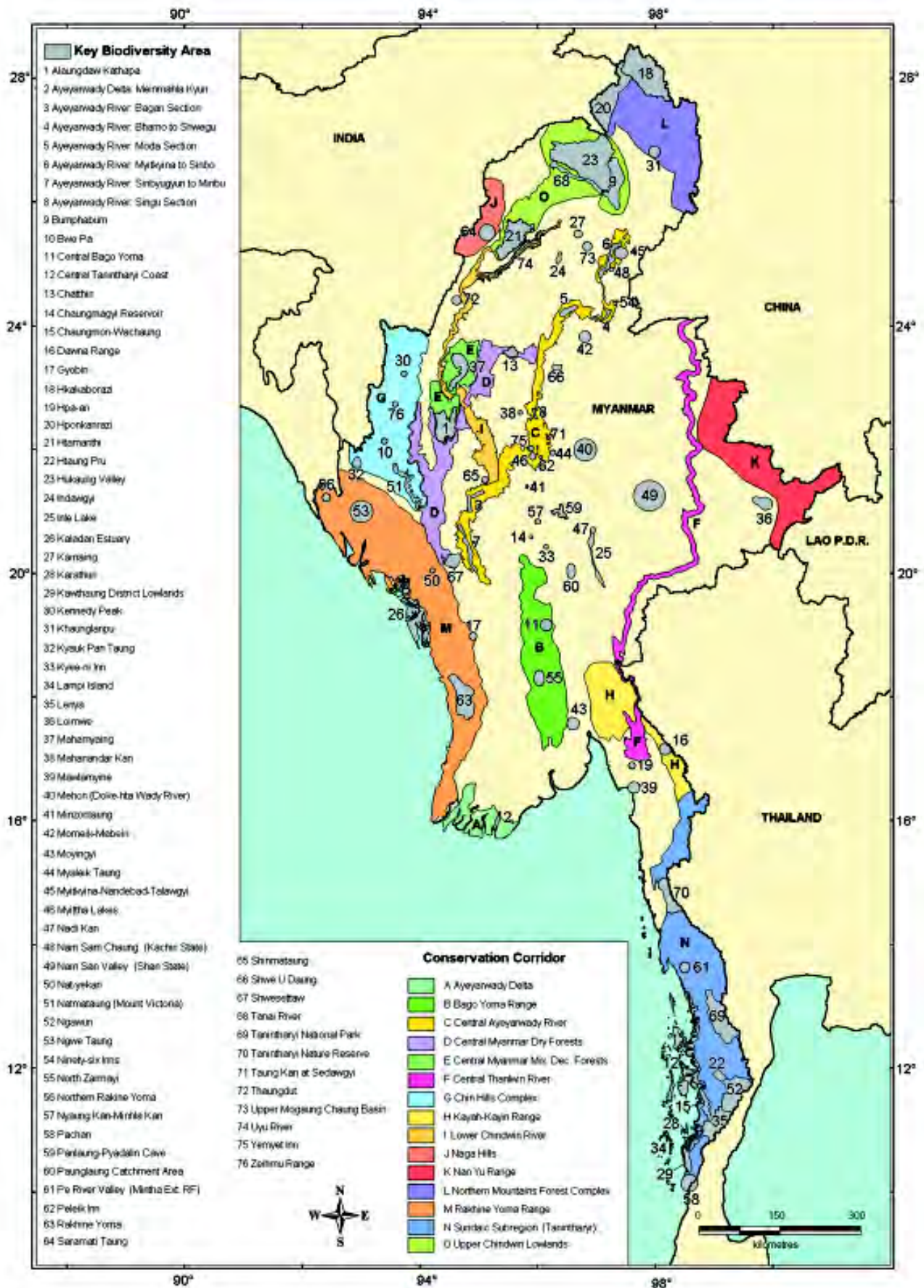
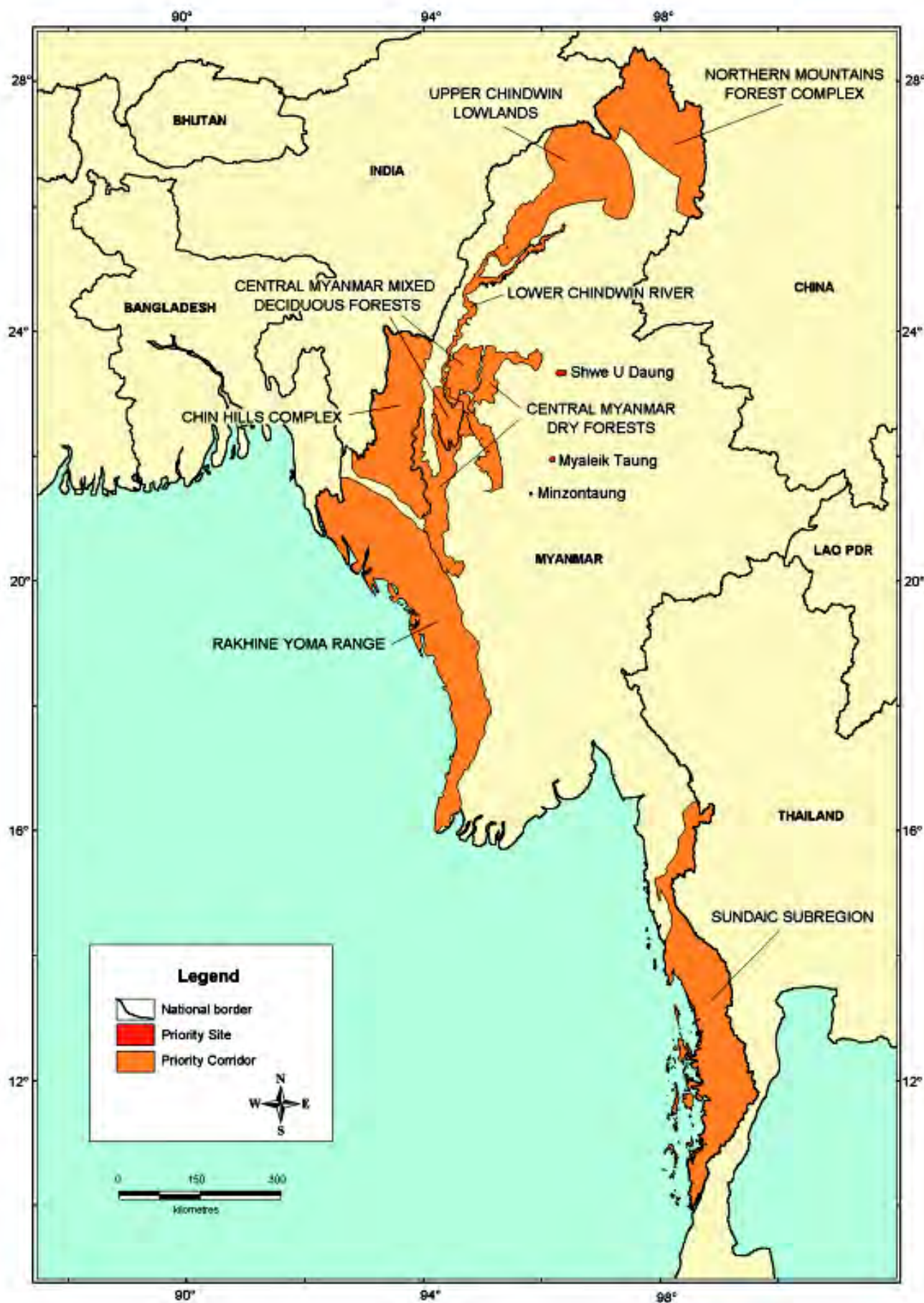


Figure 4. Priority Corridors and additional Priority Sites for conservation investment in Myanmar



မြန်မာနိုင်ငံတွင် ဇီဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်နိုင်ရန်အတွက် ဦးစားပေးသင့်သည့် ရင်းနှီးမြှုပ်နှံမှု အခွင့်အလမ်းများ

စာတမ်းအနှစ်ချုပ်

ရတောင့်ရခဲ ထူးခြားသည့်အခွင့်အလမ်း

ပင်ကိုသဘာဝ မပျက်စီးသေးသော တောတောင်ဒေသများ မြန်မာနိုင်ငံတွင်သာ တွေ့ရသော သားငှက်တိရစ္ဆာန်များတို့ ကြောင့် ကမ္ဘာ့အတိုင်းအတာဖြင့် ထိန်းသိမ်းရန် အလွန် အရေးကြီးသည့် ဦးစားပေးဒေသတွင် မြန်မာနိုင်ငံ ပါဝင်နေပါသည်။ များမကြာသေးမီကပင် သိပ္ပံလောကတွင် မှတ်တမ်းမဝင်သေးသော အပင်နှင့် သားငှက်တိရစ္ဆာန်တို့ကို ထပ်မံ တွေ့ရှိခဲ့ပါသည်။ ယခုအခါ အစိုးရ မဟုတ်သော အဖွဲ့စည်းများနှင့် ပညာရပ်ဆိုင်ရာတက္ကသိုလ်၊ ကောလိပ်ကျောင်း စသည်တို့ သည် ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးလုပ်ငန်းများကို ဆက်တိုက်လုပ်ကိုင်နိုင်သည့် အခြေအနေတွင် ရှိပါသည်။ သို့သော် ပြင်ပငွေကြေး ထောက်ပံ့သည့် အဖွဲ့အစည်းများသည် မိမိနိုင်ငံတွင် လက်ရှိ ဖြစ်ပေါ်နေသော အခြေအနေအရ ထောက်ပံ့ရန် တွန်းဆုတ်နေမှုကြောင့် သဘာဝ ထိန်းသိမ်းရေးလုပ်ငန်းများကို ထိရောက်စွာ လုပ်ကိုင်နိုင်ရန် ငွေကြေး မလုံလောက်ပါ။ ပြောင်းလဲ ဖြစ်ထွန်းနေသော မည်သည့် အခြေအနေတွင်မဆို ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးလုပ်ငန်း ဆောင်ရွက်နိုင်ရန်အတွက် အားပေးကူညီ ပံ့ပိုးသင့်ပါသည်။

ဒေသတွင်းရှိ အခြားနိုင်ငံများတွင် ကြုံတွေ့နေရသော သဘာဝထိန်းသိမ်းရေး ပြဿနာများသည်လည်း ဖွံ့ဖြိုးဆဲ နိုင်ငံတစ်ခုဖြစ်သည့် မြန်မာနိုင်ငံတွင်းဖက်သို့ ဝင်ရောက်လာနေပါပြီ။ ထို့ကြောင့် မပျက်စီးသေးသော ဂေဟစနစ်များ၊ ပင်ကို ပကတိ သစ်တောများနှင့် သားငှက် တိရစ္ဆာန်တို့၏ မှီခိုရင်းဒေသများ ပျက်စီးမည့် အခြေအနေအပြင် မျိုးတုန်းရန် အန္တရာယ် ရှိသော တိရစ္ဆာန်များလည်း မျိုးတုန်း ပျောက်ကွယ်နိုင်သည့် အခြေအနေသို့ ရောက်ရှိနေပါသည်။

ထို့ကြောင့် မြန်မာနိုင်ငံ ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးလုပ်ငန်းအတွက် ရင်းနှီးမြှုပ်နှံ ပံ့ပိုးမှုပေးခြင်းသည် ငွေကြေး ထောက်ပံ့သည့် အဖွဲ့အစည်းများအတွက် ရတောင့်ရခဲ ထူးခြားသည့် အခွင့်အလမ်းပင် ဖြစ်ပါတော့သည်။

စာတမ်း၏ရည်ရွယ်ချက်

ဤစာတမ်းသည် ရန်ကုန်မြို့တွင် ၂၀၀၃-ဩဂုတ် ၄-၅ နှင့် ၂၀၀၄-ဇူလိုင် ၄ရက်တို့တွင် ကျင်းပခဲ့သည့် အလုပ်ရုံ ဆွေးနွေးပွဲ၏ရလဒ်များ ဖြစ်ပါသည်။ အစိုးရဌာနများ၊ အစိုးရ မဟုတ်သော အသင်းအဖွဲ့များ၊ ပညာရပ်ဆိုင်ရာ တက္ကသိုလ်များ နှင့် ပုဂ္ဂလိက ကျွမ်းကျင်သူ (၂၀)ယောက် တက်ရောက်ခဲ့ကြပြီး ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး ထိရောက်စွာ ထိန်းသိမ်းနိုင် ရေးအတွက် အကြံကောင်း ဉာဏ်ကောင်းများ ဖော်ထုတ်နိုင်ခဲ့ကြပါသည်။ ထိုဆွေးနွေး အကြံပေးချက်များကို စာတမ်းတစ်ခု ပြုစုရန် BirdLife International အား မေတ္တာရပ်ခံခဲ့ပါသည်။ ဤစာတမ်းပြုစုရာတွင် Critical Ecosystem Partnership Fund(CEPF) မှ ငွေကြေးပံ့ပိုးပြီး ပုံနှိပ်ထုတ်ဝေရေးကို United Nations Development Programme (UNDP) မှ ငွေကြေး ထောက်ပံ့ပါသည်။ ငွေကြေး ထပ်မံလိုအပ်သည်ကို Conservation International (CI) မှ ဖြည့်ဆည်းပေးပါသည်။ CARE Myanmar ရုံးနှင့် ကုလသမဂ္ဂ ညှိနှိုင်းပေါင်းစပ်ရေးရာရုံးတို့သည် ရုံးလုပ်ငန်းဆိုင်ရာတို့ကို အကူအညီပေးပြီး ဘာသာရပ်ဆိုင်ရာ ကျွမ်းကျင်မှု အကူအညီကို Center for Applied Biodiversity Science of Conservation International မှ ပံ့ပိုးပေးပါသည်။

ဤစာတမ်းမူကြမ်းကို သုတေသန ပညာရှင်(၆)ဦးမှ ပါဝင်ဆွေးနွေးသည့်အသင်းအဖွဲ့များ၏ အောက်ပါ အကြံပေးချက် များကို အခြေခံ၍ ပြုစုခဲ့ပါသည်။ ဤစာတမ်းကို အများပြည်သူတို့ကို သိရှိခွင့်ပေးပြီး မြန်မာနိုင်ငံ ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး လုပ်ငန်းတွင် ၎င်းတို့၏ထောက်ပံ့မှု ရရှိရေးကို ဦးတည်ပါသည်။ နိုင်ငံတော်၏ ဇီဝမျိုးစုံမျိုးကွဲ မဟာဗျူဟာ (National Biodiversity Strategy) မပေါ်ပေါက်သေးသည့် ကြားကာလတွင် ဤစာတမ်းသည် အထောက်အကူ ဖြစ်လိမ့်မည်ဟု ယုံကြည်ပါသည်။

ထိန်းသိမ်းရေးလုပ်ငန်းအောင်မြင်ရေးရည်ရွယ်ချက်များ

ကမ္ဘာ့ဇီဝ မျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးကို အထောက်အကူပြုစေရန် အောက်ပါ အလွှာ(၃)ရပ် ပေါ်တွင် မူတည်ပါသည်။

- ဇီဝမျိုးရင်းမျိုးစိပ်များ
- ဘေးမဲ့တော၊ အမျိုးသားဥယျာဉ်စသည့် သာမန် သဘာဝထိန်းသိမ်းရေးနယ်မြေများ
- သားငှက်တိရစ္ဆာန်ပေါင်းကူးလမ်းကြောင်းများ၊ ဂေဟစနစ်မျိုးစုံ၊ တောအမျိုးအစားမျိုးစုံ ပါဝင်သည့် ကြီးမား ကျယ်ပြန့်သည့် သဘာဝထိန်းသိမ်းရေး နယ်မြေများ

ဇီဝမျိုးရင်း မျိုးစိပ်အလွှာတွင် ကမ္ဘာ့အတိုင်းအတာအားဖြင့် မျိုးတုံးပျောက်ကွယ်ရန် အလားအလာရှိသည့် မျိုးစိပ် (၁၄၄)ကို ရည်မှန်းချက်ထားပါသည်။ ထိုအရေအတွက်၌ မျိုးစိပ် (၉)ခုသည် မြန်မာနိုင်ငံတွင်သာ တွေ့ရှိနိုင်ပါသည်။

အဓိက ဇီဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းရေး နယ်မြေများအလွှာတွင် သော့ချက်ကျသော ဇီဝမျိုးစုံမျိုးကွဲ နယ်မြေ (၇၆)ခုကို ရည်မှန်းချက်ထားပါသည်။ (၂၃)ခုမှာ ကြေငြာပြီးဖြစ်သော သဘာဝထိန်းသိမ်းရေး နယ်မြေများ ဖြစ်ပါသည်။

သားငှက်တိရစ္ဆာန်များအတွက် ရှည်လျားသော ပေါင်းကူးလမ်းများ၌ ကျယ်ပြန့်ကြီးမားသည့် သဘာဝထိန်းသိမ်းရေး နယ်မြေများ အလွှာ၏ရည်မှန်းချက်တွင် နယ်မြေကြီး (၁၅)ခုပါဝင်ပြီး ဧရိယာအားဖြင့် ၂၉၃၄၀၀ စတုရန်း ကီလိုမီတာ (၀၁) မြန်မာနိုင်ငံဧရိယာ၏ ၄၃%ဖြစ်ပါသည်။ ဆင်၊ ဧရာဝတီလင်းပိုင်တို့သည် ကြီးမားကျယ်ပြန့် ရှည်လျားသည့် နေရင်းဒေသများ လိုအပ်ပါသည်။ အလွန်ရှည်လျားသော မြစ်ကြီးများနှင့် ပင်လယ်သမုဒ္ဒရာတို့တွင် ငါးများ ရွေ့လျား၊ ကူးလူး သွားလာမှုတို့သည် လည်း ဤသဘောပင်ဖြစ်ပြီး သတ္တဝါများ ဖြစ်စဉ်တိုးတက်မှုကို ရောင်ပြန်ဟပ်စေပါသည်။

ထိန်းသိမ်းရေးအတွက် ရင်းနှီးမြှုပ်နှံရန်ဦးစားပေးမှုများ

မြန်မာနိုင်ငံတွင် လုပ်သင့်လုပ်ထိုက်သော ဇီဝမျိုးစုံမျိုးကွဲ လုပ်ငန်းအားလုံးကို လာမည့် (၅)နှစ်အတွင်း အပြီးဆောင်ရွက် ရန် မဖြစ်နိုင်ပါ။ လူ့အရင်းအမြစ် ငွေအရင်းအမြစ် စသည်တို့ မပြည့်စုံခြင်းကြောင့်ဖြစ်ပါသည်။ ထို့ကြောင့် ဦးစားပေး လုပ်ငန်းစဉ်များကို ရွေးချယ်ကြပါသည်။ အောက်ပါတို့သည် လာမည့်(၅)နှစ်အတွင်း ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရာ တွင် ဦးစားပေးမျိုးစိပ်၊ ဦးစားပေးသာမန်၊ သဘာဝထိန်းသိမ်းရေး နယ်မြေများနှင့် ဦးစားပေး ကြီးမားကျယ်ပြန့်သော သဘာဝထိန်းသိမ်းရေး နယ်မြေများ ဖြစ်ပါသည်။

❖ ဦးစားပေး သားငှက်တိရစ္ဆာန် ပေါင်းကူးလမ်းကြောင်းများ သို့မဟုတ် ကြီးမားကျယ်ပြန့်သော သဘာဝထိန်းသိမ်းရေး နယ်မြေများကို ရွေးချယ်ရာတွင် အောက်ပါတို့ကို အခြေခံ၍ ရွေးချယ်ပါသည်။

- (၁) မျိုးတုံးပျောက်ကွယ်ရန် အလွန် အန္တရာယ်ရှိသော သို့မဟုတ် မျိုးတုန်းပျောက်ကွယ်ရန် အန္တရာယ်ရှိသော သားငှက် တိရစ္ဆာန်များ မှီခိုနေထိုင် ကျက်စားရာဒေသ ဖြစ်ခြင်း။
- (၂) ကြီးမားကျယ်ပြန့်သော သဘာဝမပျက် နေရင်းဒေသ သို့မဟုတ် မှီခိုဒေသ လိုအပ်သည့် သားငှက်တိရစ္ဆာန်များ ပါဝင်ခြင်း။
- (၃) ထူးခြားသည့် ဂေဟဖြစ်စဉ်များ၊ ပြောင်းလဲမှု ဖြစ်စဉ်များကို အရေးတကြီး ထိန်းသိမ်းရန် လိုအပ်ခြင်း။
- (၄) ထိန်းသိမ်းရေး ရန်ပုံငွေ ထပ်မံ ဖြည့်ဆည်းရန်လိုအပ်ခြင်း။

ဦးစားပေး သားငှက်ပေါင်းကူး လမ်းကြောင်း သို့မဟုတ် ကြီးမားကျယ်ပြန့်သော သဘာဝ ထိန်းသိမ်းရေး ဒေသကြီး (၈)ခု ရွေးချယ်ထားပြီး ဧရိယာအားဖြင့် ၂၀၂၃၀၀ စတုရန်း ကီလိုမီတာ ဖြစ်ပါသည်။ နိုင်ငံဧရိယာ၏ ၃၀% ဖြစ်ပါသည်။

❖ ဦးစားပေး အဓိက ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး နယ်မြေများ ရွေးချယ်ရာတွင် အောက်ပါ အချက်အလက်တို့ကို အခြေခံပါသည်။

- (၁) ဖော်ပြပါနယ်မြေသည် ဦးစားပေးသားငှက် တိရစ္ဆာန်ပေါင်းကူးလမ်းကြောင်း သို့မဟုတ် ဦးစားပေး ကြီးမား ကျယ်ပြန့်သော သဘာဝထိန်းသိမ်းရေး နယ်မြေတစ်ခုအတွင်း ပါဝင်ခြင်း။
- (၂) ကမ္ဘာ့ အတိုင်းအတာအရ မျိုးတုံးရန် အန္တရာယ်ရှိပြီး မြန်မာနိုင်ငံ၌သာ တွေ့ရှိသည့် မျိုးစိပ်များပါဝင်ခြင်း။
- (၃) ထိန်းသိမ်းရေး ရန်ပုံငွေ ထပ်မံဖြည့်ဆည်းရန် လိုအပ်ခြင်း။

ဦးစားပေးအဓိက ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး နယ်မြေ (၃၄)ခု ရွေးချယ်ထားပါသည်။ မြန်မာ့ကြယ်လိပ် တွေ့ရှိရသော နေရာ(၃)ခုကို ထပ်မံရွေးချယ်လိုက်ရာ ဦးစားပေးအဓိက ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး နယ်မြေ (၃၇)ခု ဖြစ်လာပါသည်။

❖ ထိန်းသိမ်းကာကွယ်ရန် ဦးစားပေး မျိုးစိပ်များကို အောက်ပါတို့ကို အခြေခံ၍ ရွေးချယ်ပါသည်။

- (၁) မြန်မာနိုင်ငံတွင်တွေ့ရှိရသော မျိုးစိပ်တို့သည် ကမ္ဘာ့အတိုင်းအတာအရ ထူးခြား ထင်ပေါ်မှုရှိခြင်း။
- (၂) မျိုးစိတ်တစ်ခုခြင်းအလိုက် ထိန်းသိမ်းကာကွယ်ရန် လိုအပ်ခြင်း။
- (၃) ထိန်းသိမ်းရေးရန်ပုံငွေ အရေးပေါ် ဖြည့်ဆည်းရန် လိုအပ်ခြင်း။

ဦးစားပေး မျိုးစိပ်(၄၈)ခု ရွေးချယ်ထားပါသည်။ နို့တိုက်သတ္တဝါ(၂၀)၊ ငှက်သတ္တဝါ(၁၁)၊ တွားသွားသတ္တဝါ (၁၀) နှင့် လောလောဆယ် လေ့လာမှု မပြုရသေးသော်လည်း ကမ္ဘာ့ အတိုင်းအတာအရ ထိန်းသိမ်းရန် အလားအလာရှိမည့် နို့တိုက် သတ္တဝါ(၃)နှင့် အပင်မျိုးစိပ်(၄) တို့ကို ရွေးချယ်ထားပါသည်။

❖ ဇီဝမျိုးစုံမျိုးကွဲနှင့် ခြိမ်းခြောက်မှုများ

လူမှုစီးပွားရေး ရှုထောင့်ကို အခြေခံ၍ ဇီဝမျိုးစုံမျိုးကွဲတို့အား ခြိမ်းခြောက်မှုတို့၏ အခြေအမြစ် အကြောင်းရင်းများကို သုံးသပ်မိပါသည်။ ဇီဝမျိုးစုံမျိုးကွဲကို အလွန်အလွန် ထုတ်ယူသုံးစွဲခြင်း၊ သားငှက်တိရစ္ဆာန်တို့၏ မှီခိုတောများ ဆုံးရှုံးပျောက် ကွယ်ခြင်းနှင့် မှီခိုတောများ ယိုယွင်းပျက်စီးခြင်းတို့သည် အဓိကခြိမ်းခြောက်မှုများဖြစ်ပါသည်။ သားငှက်တိရစ္ဆာန်၊ အပင်နှင့် ငါးများကို အလွန်အကျွံ ထုတ်ယူသုံးစွဲခြင်း၊ သစ်ထုတ်ခြင်း၊ လယ်ယာမြေ ချဲ့ထွင်ခြင်း၊ သဘာဝသစ်တောများကို စိုက်ခင်းများ ပြုလုပ်ခြင်း၊ တောင်ယာခုတ်ခြင်း၊ ပတ်ဝန်းကျင် ညစ်ညမ်းမှုနှင့် ပြည်ပတိုင်းပြည်များမှ ဝင်ရောက်လာသော မျိုးစိပ်များသည် လည်း ခြိမ်းခြောက်မှုဖြစ်ပြီး အထူးသဖြင့် ရေချိုဂေဟစနစ်ကို ထိခိုက်စေပါသည်။ ဇီဝမျိုးစုံမျိုးကွဲ ဆုံးရှုံးပျောက်ကွယ်ခြင်း အရင်းအမြစ် အကြောင်းရင်းမှာ စီးပွားရေးဖွံ့ဖြိုး တိုးတက်မှု၊ သဘာဝ အရင်းအမြစ်များကို ပိုမိုအသုံးပြုမှု၊ ဆင်းရဲမွဲတေမှု၊ လုပ်ရည်ကိုင်ရည်ကျဆင်းမှု၊ ပတ်ဝန်းကျင် ယိုယွင်းမှုမရှိစေရန် ကြိုတင်ကာကွယ်မှု မပြုလုပ်ခြင်း၊ ပြီးပြည့်စုံ၍ တိကျပြတ်သား သော မြေအသုံးပြုမှု မူဝါဒမရှိခြင်း၊ သဘာဝရေမြေ ထိန်းသိမ်းအသုံးချမှုကို တန်ဖိုးမထားခြင်း၊ လျော့တွက်ခြင်း၊ ထိန်းသိမ်းရေး လုပ်ငန်းများတွင် အခြေခံ လူတန်းစား၏ ထောက်ခံမှု မရရှိခြင်းနှင့် ကမ္ဘာကြီး ပူနွေးလာမှုတို့ ဖြစ်ပါသည်။

❖ ဦးစားပေး ရင်းနှီးမြှုပ်နှံမှု (၁၆) ခု ပြုလုပ်ရန် ရွေးချယ်ထားပါသည်။ အောက်ပါ အချက် (၅) ချက်အပေါ် အခြေခံ၍ ရွေးချယ်ပါသည်။

- (၁) ရင်းနှီးမြှုပ်နှံမှုသည် ဦးစားပေး မျိုးစိတ်၊ အဓိက ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး နယ်မြေများ သို့မဟုတ် ကျယ်ပြန့် ကြီးမားသည့် ထိန်းသိမ်းရေးနယ်မြေများကို အထောက်အကူ ဖြစ်ရပါမည်။
- (၂) ရင်းနှီးမြှုပ်နှံမှုသည် ဇီဝမျိုးစုံမျိုးကွဲအား လောလောဆယ် ခြိမ်းခြောက်မှုများကို ရင်ဆိုင် ဖြေရှင်းနိုင်ရပါမည်။

- (၃) ရင်းနှီးမြုပ်နှံမှုသည် အစိုးရနှင့် အလှူရှင်များ၏ လောလောဆယ် ရင်းနှီးမြုပ်နှံမှုများကို အထောက်အကူပြု ဖြည့်ဆည်းပေးရာ ရောက်စေရပါမည်။
- (၄) အစိုးရမဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာ အဖွဲ့အစည်းများကို ထိရောက်သော သဘာဝ ထိန်းသိမ်းရေး လုပ်ငန်းများ လုပ်ကိုင်နိုင်ရန် အခွင့်အလမ်းများ ရစေရပါမည်။
- (၅) လုပ်အားခနှင့် လုပ်ငန်း အချိုးကျစေရမည်ဖြစ်ပြီး ဈေးနှုန်းသက်သာစေရပါမည်။

မြန်မာနိုင်ငံအတွက် မဟာဗျူဟာမြောက် လမ်းညွှန်မှုများနှင့် ဦးစားပေးရင်းနှီးမြုပ်နှံမှုများ

မဟာဗျူဟာမြောက်လမ်းညွှန်မှုများ	ဦးစားပေးရင်းနှီးမြုပ်နှံမှုများ
<p>(၁) ဦးစားပေးမျိုးစိပ်များ ထိန်းသိမ်းရေး လုပ်ငန်း များကို အားဖြည့်ပေးခြင်း</p>	<p>(၁. ၁) သဘာဝ ထိန်းသိမ်းရေး နယ်မြေများ ကွန်ယက်ကို ပြန်လည် စီစစ်၍ မျိုးတုံးရန် အန္တရာယ်ရှိသည့် မျိုးစိပ်များနှင့် အဓိက ဇီဝမျိုးစုံမျိုးကွဲ ဧရိယာများကို ရွေးချယ်၍ ကွက်လပ် ဖြည့်ပေးရန်</p> <p>(၁. ၂) ထိန်းသိမ်းရေး ကွန်ယက်တွင် ပါဝင်သည့် ဦးစားပေးနှင့် သာမန် ထိန်းသိမ်း နယ်မြေများကို အုပ်ချုပ်ရာတွင် အင်အား ဖြည့်ပေးခြင်း</p> <p>(၁. ၃) လက်ရှိသဘာဝထိန်းသိမ်းရေးကွန်ယက်တွင် မပါဝင်သည့် ထိန်းသိမ်းရန် သင့်တော်သည့် ဧရိယာများကို အုပ်ချုပ်ရန် အခြားနည်းလမ်းများ ရှာ ဖွေခြင်း</p> <p>(၁. ၄) သဘာဝထိန်းသိမ်းရေးနယ်မြေများ အုပ်ချုပ်ခြင်းနှင့် မျိုးစိပ်များ ထိန်း သိမ်း ကာကွယ်ရန် ဥပဒေသက်ရောက်မှု ရှိရေးအတွက် အားပေး ကူညီခြင်း</p>
<p>(၂) ဇီဝမျိုးစုံမျိုးကွဲ မူဝါဒကို အခြား မူဝါဒများ ရေးဆွဲရာ၌ ပေါင်းစပ်ပေးခြင်း</p>	<p>(၂. ၁) ကြီးမား ကျယ်ပြန့်သော ထိန်းသိမ်းရေး ဒေသများအဖြစ် သတ်မှတ်ထိုက် သော နေရာများတွင် အခြားမြေ အသုံးချမှုနှင့် ဖွံ့ဖြိုးရေး လုပ်ငန်းများ ပြုလုပ်လိုပါက ဇီဝမျိုးစုံ မျိုးကွဲ ထိန်းသိမ်းရေး၏ အရေးပါမှုကို ထည့်သွင်း စဉ်းစားရန်</p> <p>(၂. ၂) လုပ်ပိုင်ခွင့်ရှိ အဆုံးအဖြတ် ပေးနိုင်သူများ၊ ငွေကြေး ထောက်ပံ့မည့် အဖွဲ့ အစည်းများနှင့် စီးပွားရေးလုပ်ငန်းရှင်ကြီးများအား ထိန်းသိမ်းရေး အသိ စိတ်ဓာတ် မြှင့်တင်ပေးရန်</p> <p>(၂. ၃) ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးနှင့် ကျေးလက်ဖွံ့ဖြိုးတိုးတက်မှုတို့ကို ပေါင်း စပ် ဆောင်ရွက်ရန်</p>
<p>(၃) ဦးစားပေး မျိုးစိပ်များအတွက် ထိန်းသိမ်းရေး လုပ်ငန်းများကို ဦးတည်ချက်ရှိရှိ အကောင်အ ထည် ဖော်ပေးခြင်း</p>	<p>(၃. ၁) ဦးစားပေး မျိုးစိပ်များ ရောင်းဝယ်ဖောက်ကားမှုကို ထိန်းချုပ်သည့်စနစ် တည်ဆောက်ပြီး ပြည်တွင်းနှင့် ဒေသဆိုင်ရာအတွင်း ဥပဒေသက်ရောက် မှု ရှိရေးအား ဖြည့်ပေးရန်</p> <p>(၃. ၂) ကျယ်ကျယ်ပြန့်ပြန့်သွားလာနေထိုင်တတ်သော အချို့ ဦးစားပေး မျိုးစိပ် များကို ၎င်းတို့ကို တွေ့ရှိနိုင်သော နေရာအားလုံးတွင် ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရန်</p> <p>(၃. ၃) သိပ္ပံဆိုင်ရာ သတင်းအချက်အလက် လိုအပ်နေသော ဦးစားပေး မျိုးစိပ် များကို ကွင်းဆင်း စာရင်းကောက်ယူရန်</p> <p>(၃. ၄) ရေချို ဇီဝမျိုးစုံမျိုးကွဲ စာရင်းကောက်ယူပြီး ထိန်းသိမ်းရေးစီမံချက်တွင် ထည့်သွင်းရန်</p>

မဟာဗျူဟာမြောက်လမ်းညွှန်မှုများ	ဦးစားပေးရင်းနှီးမြှုပ်နှံမှုများ
<p>(၄) ပြည်တွင်း အစိုးရမဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာ တက္ကသိုလ်များကို ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးလုပ်ငန်းများတွင် ပါဝင်ဆောင်ရွက်နိုင်ရန် အကူအညီပေးခြင်း</p>	<p>(၄. ၁) ပြည်တွင်းအစိုးရ မဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာ တက္ကသိုလ်များကို ဇီဝမျိုးစုံမျိုးကွဲ စီမံကိန်းများ ဆောင်ရွက်နိုင်ရန် အရည်အသွေး မြှင့်တင်ပေးခြင်း</p> <p>(၄. ၂) အစိုးရ မဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာတက္ကသိုလ်တို့အား မိမိတို့ရရှိသည့် သုတေသနတွေ့ရှိချက်နှင့် အခြားသတင်းအချက်အလက်များကို မျှဝေ အသုံးပြုကြရန် ပေါင်းစပ်ညှိနှိုင်းပေးခြင်း</p> <p>(၄. ၃) ပြည်တွင်းပညာရပ်ဆိုင်ရာ တက္ကသိုလ်ကောလိပ်များတွင် သဘာဝထိန်းသိမ်းရေး သင်ရိုးညွှန်းတမ်းများ ပါဝင်နိုင်ရေးအတွက် အကူအညီပေးရန်။</p>
<p>(၅) ထိန်းသိမ်းရေး ရင်းနှီးမြှုပ်နှံမှုများ ပေါင်းစပ်ညှိနှိုင်းရေးနှင့် ထိန်းသိမ်းရေးရလဒ်ကောင်းများ ပေါ်ထွက်ရေးအတွက် စဉ်ဆက်မပြတ် ကွပ်ကဲသည့်စနစ် ဖန်တီးခြင်း</p>	<p>(၅. ၁) ထိန်းသိမ်းရေး ရလဒ်ကောင်းများ ပေါ်ထွက်ရေးအတွက် ကွပ်ကဲရေးအစီအစဉ်များတွင် စံထားရှိခြင်း</p> <p>(၅. ၂) ထိန်းသိမ်းရေး ရလဒ်များနှင့် ဦးစားပေးရင်းနှီးမြှုပ်နှံမှုများဆိုင်ရာ အချက်အလက်များကို ထိန်းသိမ်းရေးလုပ်ငန်းများအတွက် ရယူအသုံးပြုရေးနှင့် နောက်ထပ် ရန်ပုံငွေရရှိရေးအတွက် စနစ်တစ်ခု တည်ထောင်ရန်။</p>

နိဂုံး

မြန်မာနိုင်ငံတွင် ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး လုပ်ငန်းများအတွက် နောက်ထပ် ရင်းနှီး မြှုပ်နှံမှု အကြီးအကျယ် လိုအပ်နေကြောင်း လက်ရှိ အခြေအနေက တွန်းအားပေးနေကြပါသည်။ တည်ဆောက်ရေး လုပ်ငန်းကြီးများ မဖွံ့ဖြိုးသေးသည်က တစ်ကြောင်း၊ အပြည်ပြည်ဆိုင်ရာ ဈေးကွက်နှင့် ကင်းလွတ်နေခြင်းကြောင့်လည်းကောင်း၊ မြန်မာနိုင်ငံသည် အခြားကုန်းတွင်း အရှေ့တောင် အာရှနိုင်ငံများတွင် မရှိတော့ပြီ ဖြစ်သော ပျက်စီးယိုယွင်းမှုမရှိသေးသည့် သဘာဝ တောတောင်ရေမြေနှင့် ဇီဝမျိုးစုံမျိုးကွဲ ပိုင်ဆိုင်လျက် ရှိပါသည်။ သို့သော် ထိုအခြေအနေကို ကျေနပ် အားရနေ၍ မဖြစ်ပါ။ အဘယ့်ကြောင့်ဆိုသော် အခြားနိုင်ငံများတွင် ကြုံတွေ့ခဲ့ရသော ထိန်းသိမ်းရေး ပြဿနာများသည် ယခုအခါ မြန်မာနိုင်ငံသို့ ထိုးဖောက် နေရာယူလာခြင်း ကြောင့် ဖြစ်ပါသည်။ ထိုထိုးဖောက် နေရာယူလာသော ပြဿနာများကို ရှောင်လွှဲ၍ မရစေကာမူ ထိုပြဿနာများ နည်းနိုင်သမျှ နည်းစေရန် စီမံကိန်းချ၍ ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရန် အချိန်မီပါသေးသည်။

အစိုးရ မဟုတ်သော အဖွဲ့အစည်းများ ပညာရပ်ဆိုင်ရာ တက္ကသိုလ်၊ ကောလိပ်များမှတစ်ဆင့် မြန်မာနိုင်ငံတွင် ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးအတွက် ဆောင်ရွက်နိုင်သည့် အခွင့်အရေးများနှင့် နည်းလမ်းအသွယ်သွယ်ကို ပီပီပြင်ပြင် တိကျစွာ လမ်းညွှန် ဖော်ပြထားပါသည်။ ထို့အပြင် ဤစာတမ်း လောလောဆယ် ဖြေရှင်းရမည့် ထိန်းသိမ်းရေး ပြဿနာများကို ဖြေရှင်းနိုင်စေပြီး အနာဂတ် ထိန်းသိမ်းရေးလုပ်ငန်းများအတွက် အားထုတ်မှုများ ပြုလုပ်ရာတွင် အခြေခံ အုတ်မြစ် ဖြစ်ပါသည်။ မြန်မာနိုင်ငံတွင် ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရန် အခွင့်အရေးနှင့် အခွင့်လမ်းများရှိနေပါသည်။ ထိုအခွင့်အရေးနှင့် အခွင့်လမ်းများကို ရယူရန် ယခုအချိန်သည် အသင့်တော်ဆုံးအချိန် ဖြစ်ပါသည်။

INTRODUCTION

The Indo-Myanmar (Indo-Burma) Hotspot comprises most or all of Cambodia, the Lao People's Democratic Republic (PDR), Myanmar, Thailand and Vietnam, parts of north-eastern India and south-eastern Bangladesh, a small fraction of peninsular Malaysia, and parts of tropical southern China (van Dijk *et al.* 2004). The wide variation in land form, climate, and latitude within the hotspot has led to the development of diverse natural habitats, which support a high diversity of plant and animal species, including many endemics (van Dijk *et al.* 2004).

The Union of Myanmar (hereafter Myanmar) supports some of the most intact natural habitats and species communities remaining in the Indo-Myanmar (Indo-Burma) Hotspot, including many globally threatened species that are found in few or no other places in the world. However, largely because of the sanctions imposed by some foreign governments, current levels of conservation investment in Myanmar are insufficient to ensure the conservation of globally important elements of biodiversity. This major investment gap urgently needs to be filled.

The Critical Ecosystem Partnership Fund (CEPF) requested BirdLife International to coordinate a multi-stakeholder consultation process to address the investment gap, by identifying investment opportunities in biodiversity conservation in Myanmar for international and local non-governmental organisations (NGOs) and academic institutions. This document presents the results of this process. The document will be placed in the public domain, with the intention that it is used by NGOs and academic institutions to seek support for conservation initiatives in Myanmar, and by donor agencies to help target their conservation investments at the highest priorities.

Structure of the document

The document presents an overview of Myanmar, in terms of its importance for global biodiversity conservation, major threats to biodiversity and root causes, socio-economic context, and patterns of conservation investment. It defines biological priorities at the species, site and corridor levels, evaluates funding gaps, and identifies investment opportunities. The document ends by outlining a five-year strategy for donor investment in biodiversity conservation by NGOs and academic institutions. This strategy includes a series of Investment Priorities, grouped into five Strategic Directions, which outline the types of activities that should be funded. The document does not, however, include specific project concepts, nor does it propose particular organisations as project implementers.

Background

This document was developed through an inclusive, participatory process, coordinated by BirdLife International, with in-country assistance provided by CARE Myanmar and the Office of the United Nations Resident Coordinator, Yangon, and with technical support provided by the Washington DC-based Center for Applied Biodiversity Science of Conservation International (CI). The investment opportunities presented in the document are based on the results of two stakeholder workshops, held in Yangon on 4-5 August 2003 and 9 July 2004. Over 30 stakeholders attended each workshop, comprising representatives of local and international NGOs and academic institutions active in biodiversity conservation in the country, plus government and donor representatives. The results of the two workshops were synthesised by a drafting team of eight researchers, and supplemented by a review of published and unpublished data on biodiversity, socio-economic conditions and on-going and pipeline conservation investments in Myanmar, plus additional consultations with stakeholders.

Local NGOs represented at the stakeholder workshops comprised the Biodiversity and Nature Conservation Association (BANCA), the Economic and Development Association (EcoDev), the Forest Resources, Environment, Development and Conservation Association (FREDA), Friends of Rainforests in Myanmar, Mangrove Service Network, Myanmar Bird and Nature Society (MBNS), Myanmar Floriculturist Associa-

tion, and the Renewable Energy Association Myanmar. International NGOs represented comprised BirdLife International, CARE Myanmar, CI, Fauna & Flora International, the People, Resources and Conservation Foundation (PRCF), the Wildlife Conservation Society (WCS), and World Wide Fund for Nature/World Wildlife Fund (WWF). Academic institutions represented comprised the Smithsonian Institution and Yangon University. Government institutions represented included the National Commission for Environmental Affairs (NCEA), and the Nature and Wildlife Conservation Division (NWCD) of the Forest Department. Finally, donor agencies represented comprised CEPF, the Department for International Development (DFID) of the UK Government, the Food and Agriculture Organisation (FAO), the Global Conservation Fund (GCF), the Japan International Cooperation Agency (JICA), Swiss AID, the United Nations Development Programme (UNDP), and the Embassies of Germany, the UK and the USA. Other stakeholders consulted during the preparation of the document included staff at the California Academy of Sciences (CAS), the Harrison Institute and the World Pheasant Association.

BIOLOGICAL IMPORTANCE

Geography, climate and history

Myanmar is situated in the north-west of the Indochinese peninsula, and is bordered to the west by the People's Republic of Bangladesh and the Republic of India, to the north-east by the People's Republic of China, and to the east by Lao PDR and the Kingdom of Thailand (Figure 1). Myanmar is the largest country in mainland South-East Asia, with a land area of 676,553 km² and a coastline of 2,832 km.

Myanmar exhibits extraordinary topographical diversity. The country spans an elevational range of nearly 6,000 m, from the summit of Hkakaborazi, South-East Asia's highest mountain, at 5,881 m asl, to the shores of the Andaman Sea and the Bay of Bengal. Between these two extremes, the country encompasses several mountain ranges, extensive lowland plains, and one of Asia's largest river deltas. The country also includes all or part of five major rivers: the Ayeyarwady (Irrawaddy), Thanlwin (Salween), Chindwin, Sittaung and Mekong. The major mountain ranges in the country comprise: the Eastern Himalayas, which dominate the topography of the far north of the country; the Chin Hills, which extend south from the international border with India; the Rakhine Yoma Range, which extends south from the international border with Bangladesh, between the Ayeyarwady River and the Bay of Bengal; the Bago Yoma Range, which lies between the Ayeyarwady and Thanlwin Rivers; and the Tanintharyi Range, which runs along the international border with Thailand in the south of the country. The topography of the north-east of the country is dominated by the Shan Plateau, which averages around 1,000 m asl. The Ayeyarwady Plains dominate the topography of the centre of the country.

Myanmar has a tropical monsoon climate. During the rainy season (May to September), most parts of the country experience a wet, humid climate, dominated by the south-west monsoon. During the dry season (October to April), drier conditions prevail throughout much of the country, under the influence of the north-east monsoon. This general pattern disguises extreme variation in climate within the country, with mean annual rainfall ranging from under 500 mm in the centre of the country up to a high of 6,000 mm in Tanintharyi Division and northern Rakhine State.

The Ayeyarwady floodplain, sheltered from south-west and north-east monsoons by a horseshoe of mountain ranges, has an extremely dry and seasonal climate, which has given rise to specialised vegetation types, including thorn scrub and deciduous dipterocarp forest. These dry scrub and forest landscapes have been isolated from similar landscapes in South-East Asia and the Indian Sub-continent for significant periods of geological history. As a result, the area, termed the Central Dry Zone, supports a number of endemic species. This area has also experienced extensive and prolonged anthropogenic modification. Other centres of endemism in Myanmar include the mountain ranges in the north and south of the country. However, the montane forest habitats of these mountains have not been isolated from similar habitats in the main Himalayan chain for as long as those of certain other mountain ranges in mainland South-East Asia, such as the Annamite Mountains. Perhaps as a result, these mountain ranges appear to support only moderate levels of vertebrate endemism. Several freshwater systems in the country, such as Inle Lake, have also been isolated for significant periods of geological history, resulting in the evolution of endemic taxa.

Habitats and ecosystems

The major ecosystems in Myanmar can be grouped into forest, freshwater, coastal and marine, although this report does not cover marine ecosystems. In the early 2000s, Myanmar had a forest cover of about 429,000 km² (equivalent to 66% of the country's land area), placing it among the countries with the largest remaining forest cover in mainland South-East Asia (Leimgruber *et al.* 2004). Forest types range from lowland wet evergreen forest in the south of the country, to sub-alpine forest at high elevations in the far north.

One of the most species-rich forest types in the country is lowland wet evergreen forest, which is distributed in areas of high mean annual rainfall and low seasonality, predominantly close to the coast. This forest type is characterised by a species-rich tree flora, dominated by members of the Dipterocarpaceae. Good accessi-

bility and the availability of high-value timber species have made lowland wet evergreen forests a major focus of commercial logging throughout mainland South-East Asia, and large areas have been degraded or cleared. Some of the most extensive intact areas remaining in the region are in Tanintharyi Division, in the south of the country, although these areas are under severe and immediate threat of conversion to oil palm.

Another lowland forest type is freshwater swamp forest. This forest type develops in permanently or seasonally inundated lowlands, and, in Myanmar, is distributed in the Ayeyarwady Delta and in the floodplains of the Chindwin and other rivers. Because of its coincidence with areas of high human population and suitability for conversion to agricultural land, freshwater swamp forest has been extensively cleared throughout mainland South-East Asia. Myanmar supports some of the largest remaining examples of this highly threatened habitat in the region.

In contrast with the wetter coastal lowlands, the lowlands of the Central Dry Zone support thorn scrub, thorn forest and deciduous dipterocarp forest. Thorn scrub and thorn forest are characterised by low-stature trees, including *Terminalia oliveri*, *Tectona hamiltoniana* and *Acacia catechu*. Invasive species, such as *Prosopis juliflora* and *Euphorbia* spp. are widespread, particularly in more open areas. Deciduous dipterocarp forest, known locally as *indaing* forest, is dominated by *Dipterocarpus tuberculatus* and characterised by a low, open canopy, a grassy understorey and low tree species richness. In the surrounding hill region and around the periphery of the Central Dry Zone, the dominant lowland forest type is mixed deciduous forest. As this forest type is characterised by the presence of Teak *Tectona grandis*, it is of high economic importance, and has been the focus of commercial logging operations. At higher elevations around the Central Dry Zone, moist semi-evergreen forest is distributed. An analysis of forest cover change in Myanmar between 1990 and 2000 has revealed the northern edge of the Central Dry Zone and adjacent hill forests to be a deforestation hotspot, with at least 7% of the forest cover being lost over this period (Leimgruber *et al.* 2004). It is presumed that fuelwood extraction and agricultural expansion were the main causes of this habitat loss.

At elevations above 900 m asl, evergreen forest types are the most widespread natural habitats, with hill evergreen forest up to around 1,800 m asl and montane evergreen forest above this elevation. Montane evergreen forest is characterised by the presence of members of the Fagaceae, Lauraceae and Magnoliaceae, together with members of the Ericaceae, such as *Rhododendron* spp. At high elevations in the north of the country, montane oak forest and coniferous forest are found, while the highest elevations support sub-alpine forest and alpine meadows, with some peaks having a permanent covering of snow and ice. In Myanmar, hill and montane evergreen forest types are generally less threatened than lowland forest types.

Myanmar supports a diversity of freshwater ecosystems, from fast-flowing mountain streams to wide, slow-flowing lowland rivers, as well as lakes and other non-flowing wetlands. Forested streams and rivers in the upper catchment of the country's rivers may support high levels of endemism. However, the freshwater biodiversity of these ecosystems, as with most other freshwater ecosystems in the country, remains largely unknown. Large, slow-flowing, lowland rivers support a number of important wildlife habitats, including deep pools, sandbanks, sandbars, and braided, fast-flowing sections with emergent vegetation. Other important habitats are associated with lowland rivers, including ox-bow lakes and alluvial grasslands. Such habitats have been extensively lost throughout the rest of mainland South-East Asia. Other freshwater ecosystems include large, freshwater lakes, such as Indawgyi and Inle. As elsewhere in the region, freshwater ecosystems in Myanmar support the livelihoods of significant proportion of the human population. As a result, they are frequently subjected to high levels of human use, often with negative implications for biodiversity.

Box 1: History of orchid study in Myanmar

U Saw Lwin, Myanmar Floriculturist Association

Myanmar is endowed with a great diversity of wild orchid species due to varied climatic conditions, diverse habitats and wide altitudinal variation. Myanmar lies within the Indo-Malayan Realm and contains three ecological subregions: the Indian sub-region in the west, along the international borders with Bangladesh and India; the Indochinese subregion in the north, along the international border with China; and the Sundiac subregion in the south, along the international border with Thailand. The three subregions contain diverse geographical features, which are among the richest biological reservoirs in Asia according to World Bank Technical Paper Number 193.

Myanmar possesses a vast wealth of orchid species in its seven states and seven divisions. The Myanmar orchid belt encompasses Himalayan temperate forests, tropical rain forests, evergreen forests and deciduous forests on mountain ranges. Orchids can also be found in the mangrove and tidal forests of delta and coastal regions.

The history of orchid hunting and exploration in Myanmar can be traced back to 1829. Orchidologists, orchid enthusiasts, orchid hunters and traders have been interested in Myanmar's orchids since the 19th Century. In the first half of the 20th Century, well-known botanist and naturalist Frank Kingdon-Ward conducted several floristic surveys in northern Myanmar, discovering many new orchid species, including *Paphiopedilum wardii*, which is endemic to Myanmar. After the country gained independence in 1948, Kingdon-Ward again visited Myanmar to search for and collect orchids in the northern parts of Kachin and Chin States, in 1953 and 1956 respectively. Myanmar foresters U Tha Hla and U Chit Ko Ko also participated in the above trips.

After that period, no foreign orchidologists were allowed to enter Myanmar's forests. However, orchidologist U Kyaw Nyunt and his staff at the Burma Orchid Nursery made many orchid-collecting expeditions, and rediscovered *P. wardii* in the Naung Mung area of Kachin State in 1978. Between 1997 and 2005, orchidologists from the Myanmar Floriculturist Association participated in a number of biological expeditions to northern Myanmar jointly arranged and sponsored by the Myanmar Forest Department and the Wildlife Conservation Society.

In the 1960s, several organizations, including IUCN, took the initiative to promote an international agreement on trade in threatened species. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) was signed in 1973. CITES regulates trade in wild animal and plant species to prevent extinction of any species. Myanmar is party to CITES, having signed in 1997. Since this time, Myanmar has been conserving rare orchids according to the rules and regulations of CITES.

The whole orchid family is included in CITES because it is very difficult to distinguish threatened from non-threatened species when studying plants without flowers. Orchids native to Myanmar listed on CITES Appendix I include *Dendrobium cruentum*, *Renanthera imschootiana* and all *Paphiopedilum* species.

Myanmar supports some of the most extensive and least disturbed coastal ecosystems in mainland South-East Asia. However, these ecosystems have not escaped the threats that have resulted in their extensive degradation and loss in other parts of the region, including conversion to aquaculture and fuelwood collection. Mangrove is one of the most widespread habitats in coastal regions, particularly near estuaries. Some of the most extensive areas of mangrove are in the coastal zones of Rakhine State and Tanintharyi Division. The Ayeyarwady Delta also supports significant areas of mangrove, although rates of net forest loss there are the highest in the country, with over 20% of forest cover being lost over the period 1990-2000 (Leimgruber *et al.* 2004). Other coastal habitats include intertidal mud and sandflats, which are very important for migratory waterbirds, as well as sand dunes and beach forest.

The biological values of Myanmar's natural habitats and ecosystems have been recognised by a number of global conservation priority setting exercises. For instance, the country includes all or part of seven Global 200 Ecoregions defined by WWF (Olson and Dinerstein 1998, Dinerstein *et al.* 1999): the Eastern Himalayan Alpine Meadows; the Eastern Himalayan Broadleaf and Conifer Forests; the Kayah-Kayin/Tenasserim Moist Forests; the Northern Indochina Subtropical Moist Forests; the North-eastern India and Myanmar Hill Forests; the Mekong and Salween Rivers; and Inle Lake.

Species diversity and endemism

Because of the very wide variation in latitude, altitude and climate within the country, Myanmar supports a high diversity of habitats, and is extremely rich in plant species. The country is located at the convergence of four major floristic regions: the Indian, Malesian (Sundaic), Sino-Himalayan and Indochinese. Northern Myanmar, in particular, is one of the floristically richest and most diverse areas in mainland Asia. As long ago as the 1940s, this area was recognised to support at least 6,000 vascular plant species, of which perhaps 25% are endemic (Kingdon-Ward 1944-5). The plant diversity of the country as a whole is even higher: a recent revision of the checklist of gymnosperms and angiosperms in Myanmar contains 11,800 species in 273 families and 2,371 genera (Kress *et al.* 2003). When ferns and non-vascular plants are added, the total plant diversity of the country is higher still.

The available information on species diversity and endemism indicates that Myanmar supports extraordinary plant and vertebrate diversity, plus levels of endemism comparable to other countries in the Indo-Myanmar (Indo-Burma) Hotspot. However, detailed baseline data are still lacking for many taxonomic groups, and new species for science are still being regularly discovered in the country. These include Leaf Deer *Muntiacus putaoensis*, a species of muntjac discovered in the Northern Mountains Forest Complex in 1997 (Amato *et al.* 1999), which is believed to be the smallest species of deer in the world. In addition, a new species of bat, Kachin Woolly Bat *Kerivoula kachinensis*, was recently described from collections made by the Harrison Institute and Yangon University (Bates *et al.* 2004). Regarding reptiles and amphibians, 14 new species have been described from collections made by the Myanmar Herpetological Survey, comprising: two species of frog, *Chirixalus punctatus* (Wilkinson *et al.* 2003) and *Bufo crocus* (Wogan *et al.* 2003); two species of snake, *Lycodon zawi* (Slowinski *et al.* 2001) and *Naja mandalayensis* (Slowinski and Wuster 2000); and 10 species of lizard, *Calotes chincolium* (Vindum *et al.* 2003) and *Cyrtodactylus* spp. (Bauer 2002, 2003). Furthermore, recent studies have discovered many new species of freshwater fish, including *Danio kyathit* (Fang 1998), *Botia kubotai* (Kottelat 2004) and *Batasio elongatus* (Ng 2004). The continued discovery of new species and new records for the country, are likely to further increase levels of known species diversity and endemism in Myanmar.

Forest ecosystems support the highest levels of plant species richness, among which montane forests and lowland evergreen forests are the most species-rich. Plant families particularly notable for their high species diversity in the country include the Orchidaceae, Zingiberaceae and Dipterocarpaceae. An analysis by the World Conservation Union (IUCN) identified four Centres of Plant Diversity in Myanmar (Davis *et al.* 1995). These comprise Northern Myanmar (with an estimated 6,000 species), Tanintharyi (with an estimated 3,000), Natmataung National Park and the Chin Hills (with an estimated 2,500), and the Bago Yoma Range (with an estimated 2,000).

Myanmar supports at least 251 mammal species (Groombridge and Jenkins 1994), although a number of these species have not been confirmed to occur in recent years. Seven mammal species are thought to be endemic to Myanmar (Groombridge and Jenkins 1994, Bates *et al.* 2004), including Anthony's Pipistrelle *Pipistrellus anthonyi* and Joffre's Pipistrelle *P. joffrei*. Several other mammal species have very restricted global ranges that include parts of neighbouring countries. These include Kitti's Hog-nosed Bat *Craseonycteris thonglongyai*, one of the smallest mammal species in the world, which is known only from southern Myanmar and a small area of western Thailand, and the recently described Leaf Deer, which is only known from northern Myanmar and north-eastern India.

Myanmar supports at least 1,027 bird species (Smythies 1986), a greater diversity than any other country in mainland South-East Asia (Duckworth *et al.* 1999, Wells 1999, Robson 2000, Round 2000). Despite its high species richness, Myanmar's avifauna contains only four national endemics: Hooded Treepie *Crypsirina cucullata*, White-browed Nuthatch *Sitta victoriae*, White-throated Babbler *Turdoides gularis* and Burmese Bushlark *Mirafra microptera* (Alström 1998, Stattersfield *et al.* 1998). White-browed Nuthatch is restricted to the southern Chin Hills, while the other three endemic species are concentrated on the Central Dry Zone. In addition, Myanmar supports numerous endemic subspecies, several of which may warrant full species status, for example White-bellied Minivet *Pericrocotus erythropygus albifrons*.

In addition to the four nationally endemic bird species, Myanmar supports at least 19 other restricted-range bird species (species with a global breeding range of less than 50,000 km²), most of which have distributions that include parts of other countries. These restricted-range species define four Endemic Bird Areas (EBAs) and three Secondary Areas (SAs) (Figure 2). EBAs are areas to which the global ranges of at least two restricted-range species are entirely restricted, while SAs are areas that support one or more restricted-range species but do not qualify as EBAs (Stattersfield *et al.* 1998).

The Northern Mountains Forest Complex and Chin Hills of Myanmar comprise part of the Eastern Himalayas EBA. At least 14 of the restricted-range species found in this EBA occur within Myanmar: Blyth's Tragopan *Tragopan blythii*; Sclater's Monal *Lophophorus sclateri*; Ward's Trogon *Harpactes wardii*; Rusty-bellied Shortwing *Brachypteryx hyperythra*; Striped Laughingthrush *Garrulax virgatus*; Brown-capped Laughingthrush *G. austeni*; Wedge-billed Wren Babbler *Sphenocichla humei*; Snowy-throated Babbler *Stachyris oglei*; Streak-throated Barwing *Actinodura waldeni*; Grey Sibia *Heterophasia gracilis*; Beautiful Sibia *H. pulchella*; White-naped Yuhina *Yuhina bakeri*; Broad-billed Warbler *Tickellia hodgsoni*; and White-browed Nuthatch. In addition, Yellow-vented Warbler *Phylloscopus cantator* may breed in the country, and Dark-rumped Swift *Apus acuticauda* may occur as a migrant, although there is no confirmation of breeding. Many of the restricted-range species in the Eastern Himalayas EBA are altitudinal migrants, breeding at higher elevations and spending the non-breeding season at lower elevations.

The Central Dry Zone of Myanmar comprises the Ayeyarwady (Irrawaddy) Plains EBA. Three restricted-range species occur in the EBA, all of which are national endemics: Hooded Treepie; White-throated Babbler; and Burmese Bushlark. Parts of extreme north-eastern Myanmar are included within the Yunnan Mountains EBA, which is centred on northern Yunnan and central Sichuan provinces of China. Only one of the restricted-range species that define this EBA is currently known to occur in Myanmar: Brown-winged Parrotbill *Paradoxornis brunneus*. The Table and Cocos islands of Myanmar, which lie in the Andaman Sea, are included within the Andaman Islands EBA. Two of the restricted-range bird species endemic to the Andaman archipelago occur on these islands: Brown Coucal *Centropus andamanensis* and Andaman Drongo *Dicrurus andamanensis*.

Myanmar includes all or part of three SAs. The Northern Myanmar Lowlands SA, which contains the upper Chindwin and Mali Hka catchments of northern Myanmar, supports a single restricted-range species, Chestnut-backed Laughingthrush *Garrulax nuchalis*, which also occurs in India. The Myanmar-Thailand Mountains SA, which includes parts of east-central Myanmar, plus parts of north-western Thailand, also supports a single restricted-range species: Burmese Yuhina *Yuhina humilis*. Finally, the Peninsular Thailand Lowland Forests SA, which includes parts of Tanintharyi Division, Myanmar, plus part of peninsular Thailand, also supports a single restricted-range species: Gurney's Pitta *Pitta gurneyi*.

Based on the results of the Myanmar Herpetological Survey, conducted by the Forest Department, CAS and the Smithsonian Institution, Myanmar supports at least 361 reptile and amphibian species, comprising 279 species of reptile and 82 species of amphibian. These figures do not include 12 new species records for the country that are awaiting publication, and up to 52 possible new species from collections made in the country. Therefore, the total number of reptile and amphibian species known from Myanmar may be as high as 425. A number of these species are thought to be national endemics, including seven species of turtle: Burmese Frog-faced Softshell Turtle *Chitra vandijki*; Burmese Star Tortoise *Geochelone platynota*; Arakan Forest Turtle

Heosemys depressa; Burmese Roofed Turtle *Kachuga trivitatta*; Burmese Flapshell Turtle *Lissemys scutata*; Burmese Eyed Turtle *Morenia ocellata*; and Burmese Peacock Softshell *Nilssonina formosa*.

The freshwater fish fauna of Myanmar is one of the least known in South-East Asia (Kullander *et al.* 2004). Myanmar is estimated to support at least 350 freshwater fish species, a significant fraction of which may be national endemics (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004). Since 1997, 27 new species of freshwater fish have been described from Myanmar, all of them endemic (e.g. Kullander and Britz 2002), and at least 10 more new species are in press (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004). National endemics include the miniature fish *Danionella translucida* and *D. mirifica*, the world's smallest freshwater vertebrates (Britz 2003). Considerable local endemism is thought to have gone unnoticed, as a result of fish species in Myanmar being misidentified as better-known species from the Indian Sub-continent (Kullander *et al.* 2004). Moreover, because of patchy collecting effort, it is difficult to assess local endemism away from Inle Lake, which supports several national endemics (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004).

Globally threatened species

A significant number of the plant and animal species that occur in Myanmar have been assessed as globally threatened, following the global threat criteria of IUCN/SSC (1994). However, in the Indo-Myanmar (Indo-Burma) Hotspot, comprehensive global threat assessments are only available for mammals, birds, amphibians and some groups of reptiles. Baseline data on species diversity in Myanmar is incomplete for most, if not all, major taxonomic groups, and the country almost certainly supports significantly more globally threatened species than are currently listed in the 2004 IUCN Red List of Threatened Species (IUCN 2004).

Box 2: Conservation status review of Hoolock Gibbon in Myanmar

L. Fernando Potess, People, Resources and Conservation Foundation

Hoolock Gibbon *Bunipithecus hoolock* is a globally Endangered species, which ranges in forested areas from eastern India and Bangladesh to Myanmar and southern China. Found in thick evergreen, mixed evergreen and scrub forest throughout their natural range, Hoolock Gibbons usually prefer undisturbed forested areas at elevations ranging from about 150 to 1,370 m asl. Previously found throughout the forests of its present range; deforestation and hunting have exterminated the species from many areas.

From an original ranging habitat of about 168,000 km², available habitat in 1987 was estimated at no more than 56,378 km², representing a 67% loss of habitat. Reasons for this decline include rapid deforestation, lack of environmental awareness and education, and the absence of conservation measures in Bangladesh, conversion of forest to agriculture, including tea plantations, in Assam and China, and shifting cultivation in the Chin Hills and Nagaland of Myanmar and India. Intense hunting of gibbons by local tribes is reported in Assam and Myanmar. Gibbon meat and bones are valuable as a tonic in some traditional Asian medicines.

As a result of hunting and habitat destruction, Hoolock Gibbon has experienced a drastic population decline. The 1971 and 1972 Zoological Survey of India census of primates determined that the population of the species in Assam was between 78,000 and 80,000 individuals. Shockingly, the present population of Hoolock Gibbon in the state does not exceed 5,000 animals. Population estimates for other countries within the species's range include less than 200 individuals in Bangladesh, and 100 to 200 individuals in Yunnan province, China.

A present, Myanmar still has large intact areas of habitat suitable for Hoolock Gibbon, with potentially the largest remaining population of the species in the world. However, beyond some presence/absence data from a few general biodiversity surveys in protected areas, no additional data exist. A comprehensive conservation status review is needed to identify, prioritise and plan conservation interventions to boost options for the long-term survival of the Myanmar population of the species.

In response to this need, the People, Resources, and Conservation Foundation (PRCF) and Fauna & Flora International (FFI) have submitted a proposal to the US Fish and Wildlife Service Great Ape Conservation Fund for a project entitled *Hoolock Gibbon Conservation Status Review for Myanmar*. This research project has been endorsed by the US Department of Treasury Office of Foreign Assets Control.

The aim of this project is to assess accurately the conservation status of Hoolock Gibbon in Myanmar, while strengthening the capacity of the Zoology Department of Yangon University in primate surveying, monitoring, and conservation. The project will help initiate Hoolock Gibbon conservation efforts in Myanmar by increasing the knowledge on the species. Through surveys and the analysis of gibbon population status, the project will identify major threats to gibbon populations in Myanmar and raise awareness among stakeholders with regards to conservation needs for the species.

Mammals

Thirty-nine globally threatened non-marine mammal species have been recorded in Myanmar, of which two are endemic: Anthony's Pipistrelle and Joffre's Pipistrelle. Myanmar also supports an endemic subspecies of Eld's Deer *Cervus eldii thamin* (Vulnerable). This subspecies, which is known as Thamin, occurs in the Central Dry Zone (McShea *et al.* 1998, Wemmer 1998). Myanmar also supports a large number of globally threatened species with wide distributions in the Indo-Myanmar (Indo-Burma) Hotspot and elsewhere, including Asian Elephant *Elephas maximus*, Tiger *Panthera tigris* (both Endangered), Gaur *Bos gaurus*, Clouded Leopard *Neofelis nebulosa*, Asian Golden Cat *Catopuma temminckii*, Dhole *Cuon alpinus* and Asian Black Bear *Ursus thibetanus* (all Vulnerable). Most of these species are threatened by hunting in Myanmar, as elsewhere.

High mountains in northern Myanmar support a number of mammal species characteristic of the Eastern Himalayas, including Red Panda *Ailurus fulgens* (Endangered), Takin *Budorcas taxicolor* and Red Goral *Naemorhedus baileyi* (both Vulnerable). For many of these species, the significance of the Myanmar population is poorly known and status surveys are a high priority.

A few globally threatened mammal species recorded in Myanmar have not been confirmed to occur in the country in recent years, including Lesser One-horned Rhinoceros *Rhinoceros sondaicus* and Hairy Rhinoceros *Dicerorhinus sumatrensis* (both Critically Endangered). Considering that no mammal species other than Tiger has been the focus of a national status survey, it is possible that populations of some or all of these species persist.

In addition to wild populations, Myanmar may manage the largest captive Asian Elephant herd in the world, with almost 2,000 animals managed by the government and many additional animals in private hands. These animals represent a major workforce, especially for extractive forestry in remote regions. In recent years, there has been concern that live-capture, although prohibited by law, may have had a significant impact on the remaining wild Asian Elephant populations.

Birds

Forty-four globally threatened bird species have been recorded in Myanmar. A large proportion of these species are characteristic of forest ecosystems, and most major forest types support a suite of globally threatened species. Hill and montane forests are important for a number of globally threatened passerines, including White-browed Nuthatch (Endangered), Beautiful Nuthatch *Sitta formosa* and Giant Nuthatch *S. magna* (both Vulnerable), as well as several galliforms, such as Hume's Pheasant *Syrnaticus humiae* and Blyth's Tragopan (both Vulnerable). These forests also support important populations of Rufous-necked Hornbill *Aceros nipalensis* (Vulnerable). Lowland semi-evergreen, mixed deciduous and deciduous dipterocarp forests support important populations of Green Peafowl *Pavo muticus* (Vulnerable), a species that has undergone dramatic declines across much of mainland South-East Asia (BirdLife International 2001). Lowland wet evergreen forests in southern Myanmar support a number of globally threatened bird species, including Gurney's Pitta (Critically Endangered), Storm's Stork *Ciconia stormi* (Endangered) and Plain-pouched Hornbill *Aceros subruficollis* (Vulnerable). For most globally threatened bird species characteristic of forest habitats, habitat

loss is the main threat. However, over-exploitation is also a major threat to a number of larger-bodied species, including hornbills, galliforms and pigeons.

Many of Myanmar's globally threatened bird species are characteristic of wetland ecosystems, including some of the most threatened bird species in the country. A number of these species are characteristic of coastal habitats, such as Spotted Greenshank *Tringa guttifer* (Endangered) and Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (Vulnerable), which breed in north-east Asia and occur as passage migrants and/or winter visitors to Myanmar. However, the majority are characteristic of freshwater habitats, including White-winged Duck *Cairina scutulata*, White-bellied Heron *Ardea insignis* (both Endangered), Indian Skimmer *Rynchops albicollis* and Masked Finfoot *Heliopais personata* (both Vulnerable). Across the Indo-Myanmar (Indo-Burma) Hotspot, wetland ecosystems generally receive less conservation investment and are under higher levels of threat than forest ecosystems. Myanmar supports some of the best remaining examples of these ecosystems remaining in the hotspot, most notably: networks of flowing and non-flowing wetlands within lowland forest; wide, slow-flowing, lowland rivers; and mangrove.

Box 3: Implementing a National Tiger Action Plan for Myanmar

Antony J. Lynam, Wildlife Conservation Society

Tiger *Panthera tigris* is declining across its range due to shrinking habitats, expanding human populations, and increasing demand for traditional medicines. Myanmar is an important country for Tiger conservation because it includes a large proportion of the range and diversity of the remaining Tiger habitats. Natural forests cover a third of the country, offering extensive blocks of unbroken and relatively undisturbed habitat for the species.

In 1997, the Government of Myanmar formally requested the assistance of the Wildlife Conservation Society (WCS) to help determine the status of Tiger across the country, and define a set of necessary management and conservation actions to preserve the species in its remaining natural habitats. The presence of Tiger may indicate places where mammal assemblages are intact, thus informing the selection of appropriate areas for incorporation into the system of protected areas. A team of Myanmar Forest Department staff was trained in field survey methods and recruited to form a national Tiger survey team. Information from local people, published historical records, habitat analyses and satellite imagery suggested the widespread former occurrence of Tiger in the country. To assess the current distribution of Tiger, presence-absence was recorded at 17 sites predicted to support the species, ranging from lowland rainforests in the south of the country to mid-high elevation temperate forests in the north. Field surveys using camera-traps and track and sign methods recorded Tigers at 4 of the 17 sites. Of the 13 sites where the species was not recorded, eight are sites where Tigers may occur at low density (i.e. ecological absence), whereas Tigers are thought to be absent (i.e. total absence) at five sites. The results suggest a widespread range contraction for the species within Myanmar.

Based on the survey results and an appraisal of current threats to the species, a nine-point *National Tiger Action Plan* was submitted to the Government of Myanmar in July 2003. In theory, with good management, the species could potentially rebound to its former abundance in all parts of its range in Myanmar where suitable conditions exist. In practice, however, full recovery in many places is unlikely because of the threats detailed elsewhere in this document. One area where threats to Tiger may be overcome with appropriate management interventions is the Upper Chindwin Lowlands Priority Corridor (Table 6 and Figure 4). Within this Priority Corridor, implementation of the *National Tiger Action Plan* is already progressing with the setting aside in March 2004 of Hukaung Tiger Reserve, which, at 21,890 km², is the largest of its kind in the world. In addition to supporting Tigers (possibly 35 to 70 individuals in the >6,000 km² core of the reserve), the reserve may also support significant populations of a number of other Priority Species (Table 7).

Low human density across Hukaung Tiger Reserve means that human impacts on Tiger habitats can be mitigated. In 2005, efforts to secure the reserve against the loss of Tiger prey species from poaching began in earnest, with the establishment of infrastructure, recruitment of forest rangers and implementation of anti-poaching patrols.

In addition to forest and wetland ecosystems, open country ecosystems are also important for globally threatened bird species, including two Critically Endangered vulture species: Slender-billed Vulture *Gyps tenuirostris*; and White-backed Vulture *G. bengalensis*. The populations of these species in Myanmar are of high global conservation significance, particularly because they do not appear to be affected by the factor(s) responsible for the precipitous decline of vulture populations in the Indian Sub-continent over the last decade (BirdLife International 2001, Pain *et al.* 2003, U Htin Hla *in litt.* 2003), believed to be toxicity from the veterinary pharmaceutical diclofenac (Oaks *et al.* 2004). Globally threatened species characteristic of open-country habitats potentially face a number of threats, including disturbance, and use of agrochemicals.

A number of globally threatened bird species recorded in Myanmar historically have not been confirmed to occur in the country in recent years. These include Jerdon's Babbler *Chrysomma albirostre* (Vulnerable), a species characteristic of tall riverine grasslands in Pakistan, Nepal, northern Indian and, at least previously, Myanmar, which has not been recorded in the latter country since 1941; and Pink-headed Duck *Rhodonessa caryophyllacea* (Critically Endangered), one of the most enigmatic bird species in the world, which previously inhabited secluded wetlands and marshes in the forests and grasslands of northern Myanmar and northern India, and of which there have been no confirmed records from Myanmar since 1910 or from anywhere in its range since 1949 (BirdLife International 2001, 2003).

Reptiles

Twenty globally threatened non-marine reptile species have been recorded in Myanmar, all of which are turtles. As elsewhere in Asia, the distribution and habitat requirements of most turtle species in Myanmar are incompletely known. Most recent records of these species are from wildlife markets. The main threat to wild populations is over-exploitation, driven in most cases by the high value of turtles in the wildlife trade. Many turtle species have naturally slow reproductive rates, and many wild populations may not be able to sustain high levels of exploitation. There is an urgent need to identify and secure wild populations of all globally threatened turtle species in the country.

One other non-marine reptile species, Siamese Crocodile *Crocodylus siamensis*, is also listed as occurring in Myanmar in the 2004 IUCN Red List of Threatened Species (IUCN 2004). Although there are no confirmed records of the species from Myanmar, it is likely to occur in areas bordering western Thailand, where it is known from Kaeng Krachan National Park (Platt *et al.* 2002).

Comprehensive global threat assessments have not been conducted for other reptile taxa occurring in Myanmar. A global reptile assessment has recently been initiated by IUCN-SSC but its results are not yet available. Myanmar may support a greater number of globally threatened reptile species than are currently recognised by IUCN (2004).

Amphibians

None of the amphibian species assessed as globally threatened during the Global Amphibian Assessment (IUCN-SSC and CI-CABS 2003) is known to occur in Myanmar. There are, however, unconfirmed reports of Yunnan Spiny Frog *Paa yunnanensis* (Endangered), a large-bodied stream frog known from northern Vietnam and south-western China, which is threatened by over-exploitation. The apparent lack of globally threatened amphibian species from Myanmar may reflect low levels of survey effort rather than the true conservation status of Myanmar's amphibians. A number of globally threatened species may occur but remain unrecorded to date. Further research and surveys may reveal that the country supports a number of endemic species that qualify as globally threatened. Collections made by the Myanmar Herpetological Survey are thought to contain a number of undescribed amphibian species and await further analysis.

Box 4: Conservation needs of Myanmar's galliforms

Phil McGowan, World Pheasant Association

The galliforms are among the most threatened groups of birds, with 25% of species (and 50% of pheasants) included on the IUCN Red List. The reason for the high level of threat appears to be direct exploitation, which often adds to threats posed by loss and fragmentation of habitat. As large ground-dwelling birds, galliforms are often sought for food and are also hunted for cultural reasons. Research throughout Asia over the last 25 years has yielded much information on the distribution, ecology and conservation needs of pheasants and partridges throughout much of the continent. This has informed conservation decisions in many different ways, including siting of protected areas and development of community-based conservation programmes.

However, there is little reliable knowledge upon which to base conservation action for galliforms in Myanmar. This is of concern because several species that inhabit the eastern end of the Himalayas have significant portions of their global distributions in Myanmar. Although there is information from adjacent areas of India, China and, for some species, Thailand, we know very little about the status of galliforms in Myanmar. Of particular concern are the globally threatened Blyth's Tragopan *Tragopan blythii* and Sclater's Monal *Lophophorus sclateri* from the mountains of northern Myanmar. The lowlands of Myanmar support another species of particular concern, the globally threatened Green Peafowl *Pavo muticus*, which was once widespread throughout South-East Asia but is now confined to a few isolated populations in most of its range. It is possible that Myanmar, together with Cambodia, may hold a significant proportion of the global population of this species. A reassessment of the global conservation status of all galliforms was undertaken by the World Pheasant Association and the Pheasant Specialist Group with BirdLife International for the *Pheasant Action Plan* and the *2005 IUCN Red List of Threatened Species*. This process highlighted the importance of Myanmar for these species and identified specific targets to be implemented within the five-year life of the action plan.

Surveys by the World Pheasant Association for Blyth's Tragopan in northern Kachin State in 2001 contributed to the establishment of Hponkanrazi Wildlife Sanctuary. Current priorities for this species and Sclater's Monal include assessing the contribution of the current protected area network to their long-term conservation. Outside protected areas, there is a need to better understand the impact of hunting and other socio-economic activities (such as trading in meat and other derivatives) on the status of these species. Green Peafowl is likely to require a blend of strict legal protection and community-based conservation measures. As there is virtually no detailed information upon which to make appropriate plans, gathering data on its landscape-scale habitat requirements and the extent of hunting (including for feathers) is urgently needed.

Conducting field surveys for and research on galliforms and then monitoring populations is not easy because the species are sometimes difficult to detect and often inhabit rugged terrain. Therefore, alongside these specific targets, it is important to assist Myanmar's conservationists develop the necessary skills to carry out this work to high standards. Every opportunity must be taken to assist Myanmar's field workers to join the community of skilled field ornithologists and conservationists that now exists elsewhere in Asia.

Fish

There is a need for a comprehensive global threat assessment of fish species, in order to identify global conservation priorities in Myanmar. The fish diversity of Myanmar's non-marine habitats is seriously threatened by destructive fishing practices, dam construction, pollution and invasive species. A number of fish species may be threatened with global extinction, particularly among the fauna of Inle Lake, which is extremely sensitive and supports national endemics. To date, however, no fish species confirmed to occur in non-marine habitats in Myanmar has been assessed as globally threatened. Giant Catfish *Pangasianodon gigas* (Critically Endangered) and Asian Arowana *Scleropages formosus* (Endangered) are both listed as occurring in Myanmar in the 2004 IUCN Red List of Threatened Species (IUCN 2004). However, neither species has been confirmed to occur in the country (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004).

Invertebrates

In the absence of comprehensive global threat assessments of invertebrate taxa in Myanmar, it is difficult to identify taxonomic priorities for global invertebrate conservation in the country. Only a single invertebrate species found in Myanmar has been assessed as globally threatened: Andaman Crow *Euploea andamanensis*. This butterfly species is endemic to the Andaman archipelago, and occurs on Myanmar's Table and Cocos islands.

Plants

Global threat assessments have only been conducted for a small proportion of Myanmar's plant species, principally gymnosperms and certain angiosperm families. Only 38 plant species recorded in Myanmar have been assessed as globally threatened, comprising 33 species of angiosperm and five species of gymnosperm. All the globally threatened angiosperms are trees, and over two thirds are members of the Dipterocarpaceae. The globally threatened gymnosperms comprise the cycad *Cycas siamensis*, and the conifers *Calocedrus macrolepis*, *Cephalotaxus mannii*, *Picea farreri* and *Taiwania cryptomerioides*. The major threats to globally threatened plant species in Myanmar are degradation and loss of forest. Species with a high economic value are also threatened by over-exploitation, for example *Aquilaria malaccensis*, a source of an aromatic non-timber forest product (NTFP) called agarwood.

SPECIES 1



Pink-headed Duck *Rhodonessa caryophyllacea* has not been recorded in Myanmar since 1910. It is considered Critically Endangered by IUCN and widely believed to be extinct. However, unsurveyed habitat remains in northern Myanmar and further field surveys are required to determine whether the species does in fact persist in the country. Its rediscovery would be a major scientific revelation. Photo: John Edwards.



"The only area in which [Hairy] rhinoceros is now fairly common is the Shwe-u-daung Game Sanctuary in the Mogok Sub-division of the Katha District. There are about 10 rhinoceros in this sanctuary, but in default of adequate protection, I should not be surprised to hear that they had been decimated by some enterprising gang of poachers." So wrote E. H. Peacock in *A Game Book for Burma and Adjoining Territories* published in 1933. The male Hairy Rhinoceros *Dicerorhinus sumatrensis* shown here was taken as a scientific specimen in 1930. A few globally threatened mammal species recorded in Myanmar have not been confirmed to occur in the country in recent years, including Hairy Rhinoceros. There remains the possibility that this species, considered Critically Endangered by IUCN, does survive in Tanintharyi Division. Photographer unknown.

SPECIES 2



The Central Myanmar Dry Forests Corridor supports the world's largest population of the endemic subspecies of Eld's Deer *Cervus eldii thamin*, also known as Thamin. Eld's Deer is found in Chatthin and Shwesettaw Wildlife Sanctuaries. Further status surveys are still required. Photo: J. C. Eames.



Myanmar supports at least 1,000 bird species, a greater diversity than any other country in mainland South-East Asia. Despite its high species richness, Myanmar's avifauna contains only four national endemics, including the White-browed Nuthatch *Sitta victoriae*, a restricted-range species confined to the southern Chin Hills. Photo: Jemi and John Holmes.

SPECIES 3



Hooded Treepie *Crypsirina cucullata* (top) and White-throated Babbler *Turdoides gularis* (bottom) are two of three endemic bird species concentrated on the Central Dry Zone. Each species varies in its habitat requirements and distribution. Photos: Jemi and John Holmes.

SPECIES 4



Burmese Bushlark *Mirafra microptera* is the third endemic species found in the Central Dry Zone. Photo: Jemi and John Holmes.

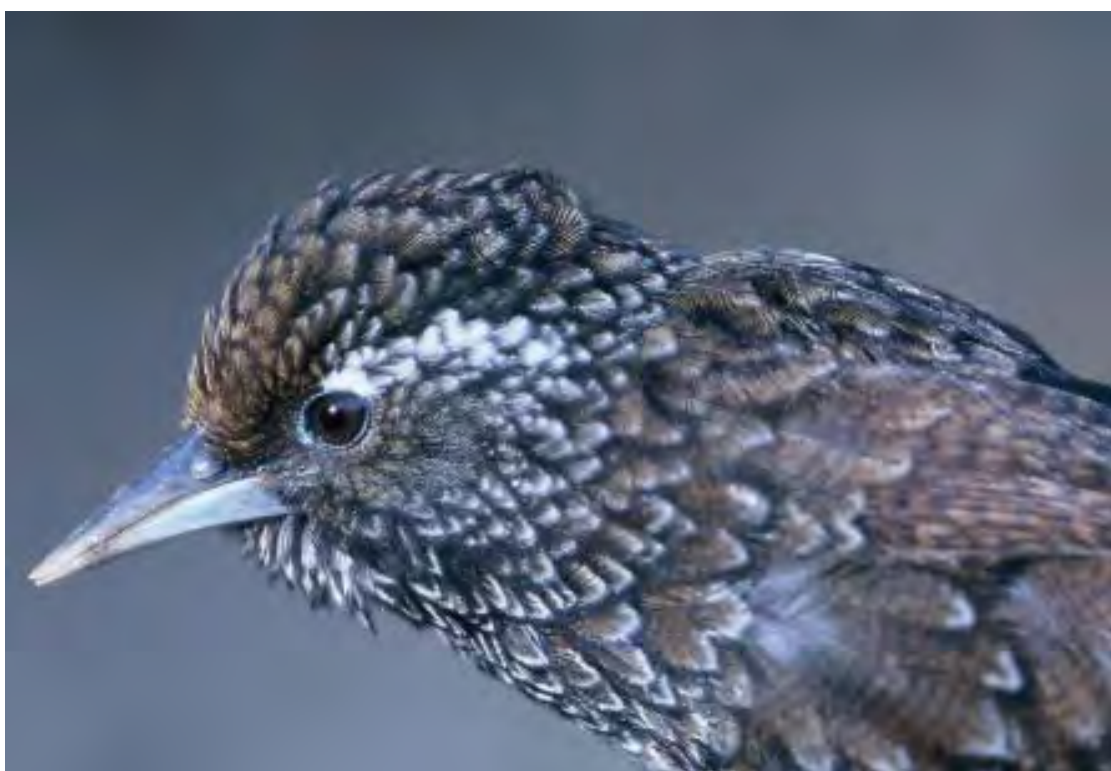


Myanmar supports numerous endemic subspecies, several of which may warrant full species status, for example White-bellied Minivet *Pericrocotus erythropygus albifrons*. Photo: K. C. Lee.

SPECIES 5



Brown-capped Laughingthrush *Garrulax austeni victoriae* is an example of an endemic subspecies confined to the Chin Hills Complex. It may warrant elevation to species level, further increasing the unique biodiversity attributes of this corridor and elevating its conservation importance. Photo: Jemi and John Holmes.



Wedge-billed Wren Babbler *Sphenocichla humei* is one of ten restricted-range species confined to the Northern Mountains Forest Complex, which lies within the Eastern Himalayas Endemic Bird Area defined by BirdLife International. The biology, ecology, distribution and status of all of these species are poorly known. Photo: J. C. Eames.

SPECIES 6



White-winged Duck *Cairina scutulata*, a globally Endangered species, occurs on ox-bow lakes in the Upper Chindwin Lowlands. This species has undergone a major decline in other countries in the region and the Myanmar population is, therefore, of increasing global significance. Photo: Morten Strange/Nature's Niche Pte. Ltd.



Recent survey data indicate that the Critically Endangered Slender-billed Vulture *Gyps tenuirostris* and White-rumped Vulture *G. bengalensis* still occur widely across Chin, Kachin and Shan States. The populations of these species in Myanmar are of high global conservation significance, particularly because they do not appear to be affected by the factor(s) responsible for the precipitous decline of vulture populations in the Indian Sub-continent over the last decade. Photo: U Htin Hla/Saw Moses/BANCA.

SPECIES 7



The Central Ayeyarwady River is an important wintering and staging area for migratory waterfowl from Tibet and other areas north of the Himalayas. Both Ruddy Shelduck *Tadorna ferruginea* and Bar-headed Goose *Anser indicus* find refuge on the sand-bars of the Ayeyarwady River. Photo: J. C. Eames.



Kitti's Hog-nosed Bat or Bumblebee Bat *Craseonycteris thonglongyai*, a globally Endangered species previously thought to be endemic to Thailand, was recently discovered in the limestone caves of Mon and Kayin States, Myanmar. This species is reputed to be the smallest mammal in the world and weighs just 2 g. Further status surveys are required for this species. Photo: Paul Bates/Harrison Institute.

SPECIES 8



Myanmar's four Critically Endangered reptile species comprise Siamese Crocodile *Crocodylus siamensis*, Mangrove Terrapin *Batagur baska*, Burmese Star Tortoise *Geochelone platynota* and Arakan Forest Turtle *Heosemys depressa* (pictured). The latter two are endemic to Myanmar, and all four are severely threatened by over-exploitation. Photo: Douglas Hendrie.



Burmese Roofed Turtle *Kachuga trivitatta* is one of seven species of turtle and tortoise that are thought to be national endemics. The other six species are: Burmese Frog-faced Softshell Turtle *Chitra vandijki*; Burmese Star Tortoise *Geochelone platynota*; Arakan Forest Turtle *Heosemys depressa*; Burmese Flapshell Turtle *Lissemys scutata*; Burmese Eyed Turtle *Morenia ocellata*; and Burmese Peacock Softshell *Nilssonina formosa*. Photo: Douglas Hendrie.

SPECIES 9



A prerequisite for maintaining intact biotic assemblages is the conservation of landscape species. Landscape species have wide home ranges, low natural densities, migratory behaviour and/or other characteristics that make them unlikely to be conserved by site-based interventions alone. Takin *Budorcas taxicolor* was one of the landscape species selected for Myanmar. Photo: WCS Myanmar Program.



The available information indicates that Myanmar supports extraordinary plant and vertebrate diversity, plus levels of endemism comparable to other countries in the Indo-Myanmar (Indo-Burma) Hotspot. However, detailed baseline data are still lacking for many taxonomic groups, and new species for science are still being regularly discovered in the country. These include Leaf Deer *Muntiacus putaoensis*, a species of muntjac discovered in the Northern Mountains Forest Complex in 1997, which is believed to be the smallest species of deer in the world. Photo: WCS Myanmar Program.

SPECIES 10



Tiger *Panthera tigris* is the only species for which a national status survey been attempted, and, even then, not all areas where the species potentially occurs were accessible for survey. For many species, there are no recent field records from Myanmar. Consequently, it was only possible to prepare preliminary lists of globally threatened species, key biodiversity areas and conservation corridors. As more information becomes available, it will be necessary to revise the Conservation Outcomes for Myanmar presented in this document. Photo: WCS Myanmar Program.



The endemic Rainbow Orchid *Paphiopedilum wardii* is named after the botanist and naturalist Frank Kingdon-Ward, who led several biological survey expeditions to northern Myanmar in the first half of the 20th Century. Rainbow Orchid is threatened by over-exploitation and is listed on CITES Appendix I. Photo: Myanmar Floriculturist Association.

CONSERVATION OUTCOMES

In this document, Conservation Outcomes are adopted as the basis for identifying biological priorities for conservation investment in Myanmar. Conservation Outcomes are the quantifiable suite of species, sites and corridors (landscapes of inter-connected sites) that must be conserved to maximise the long-term persistence of global biodiversity. Conservation Outcomes allow more effective targeting of conservation resources, by presenting quantitative and justifiable targets against which the success of investments can be measured. Conservation Outcomes are set at three levels: "Extinctions Avoided" (Species Outcomes), "Areas Protected" (Site Outcomes) and "Corridors Created" (Corridor Outcomes).

Conservation Outcomes are set sequentially, with Species Outcomes set first, then Site Outcomes, and, finally, Corridor Outcomes. Since Species Outcomes are extinctions avoided at the global level, they are set for globally threatened species (in the IUCN categories Critically Endangered, Endangered and Vulnerable). This definition excludes Data Deficient species, which are considered to be priorities for further research but not necessarily for conservation action *per se*. It also excludes species threatened locally but not globally. These are considered to be national or regional conservation priorities but not global priorities. Species Outcomes are met when a species' global threat status improves or, ideally, when it is removed from the Red List.

Because Conservation Outcomes are targets for the conservation of global biodiversity, it is essential that they be based on a global standard. The drafting team adopted the global threat assessments contained within the *2004 IUCN Red List of Threatened Species* (IUCN 2004) as the basis for defining Species Outcomes for Myanmar, because these represent the best available source of data on the global conservation status of species. The drafting team prepared draft lists of globally threatened species in Myanmar based on this source, and the stakeholders then reviewed them to confirm which species occur in the country.

Because many species are best conserved through the protection of a network of sites at which they occur, the next stage was to prepare a list of Key Biodiversity Areas (KBAs), important for the conservation of species. The most important criterion used to define KBAs was the regular occurrence of significant numbers of one or more globally threatened species. In the absence of detailed data on population size and minimum area requirements, it was usually necessary to make a provisional assessment of whether a particular species occurred regularly in significant numbers, based on a consideration of its ecological requirements, density and home-range size, and the availability of suitable habitat at the site.

KBAs were also defined on the basis of the occurrence of restricted-range and congregatory species. Sites regularly supporting significant populations of restricted-range species were considered to be global conservation priorities because there are few or no other sites in the world for which conservation action for these species can be taken. This criterion was only used to define KBAs for birds, as this is the only group for which the concept of restricted-range species has been quantitatively defined: species with a global breeding range of less than 50,000 km² (Stattersfield *et al.* 1998). Sites supporting a high proportion of the total population of one or more congregatory species at a particular time of year (for example, breeding, wintering and staging sites for migratory waterbirds) were considered to be global conservation priorities, because these species are particularly susceptible to threats at these sites. Again, this criterion was only used to define KBAs for birds, as this is the only group for which comprehensive population estimates for congregatory species are available (Wetlands International 2002); for congregatory waterbirds, a threshold of 1% of the Asian biogeographic population was used, while, for congregatory seabirds, a threshold of 1% of the global population was used.

A Site Outcome was set for each KBA in Myanmar. Site Outcomes are met when a KBA is protected, through improved management or expansion of an existing conservation area, or creation of a new conservation area. Improved management involves changing management practices for a KBA, to improve the long-term conservation of species' populations and the ecosystem as a whole. Expansion of an existing conservation

area involves increasing the proportion of a KBA under conservation management, to meet species' area requirements or include previously excluded species or habitats. Creation of a new conservation area involves designating all or part of a KBA as a conservation area, and initiating effective long-term management. Conservation areas are not limited to actual or potential protected areas but also include sites that could potentially be managed for conservation by local communities, private landowners, or other stakeholders.

The drafting team adopted the network of Important Bird Areas (IBAs) in Myanmar (BirdLife International 2004) as the starting point for defining KBAs. IBAs are internationally important sites for bird conservation, defined on the basis of their importance for globally threatened, restricted-range, biome-restricted and/or congregatory bird species. It was necessary to supplement the IBA network through the definition of additional KBAs for other taxonomic groups, and this was done through consultation with stakeholders, complemented by review of published and unpublished data. Due to data limitations, it was only possible to prepare a preliminary list of KBAs, based upon the stakeholders' best estimates of the sites most likely to meet the criteria.

The long-term conservation of all elements of biodiversity requires the protection of conservation corridors, which are landscapes of inter-connected sites. A Corridor Outcome was set for each conservation corridor in Myanmar. Corridor Outcomes are met when a conservation corridor maintains intact biotic assemblages and natural processes. A prerequisite for maintaining intact biotic assemblages is the conservation of landscape species. Landscape species have wide home ranges, low natural densities, migratory behaviour or other characteristics that make them unlikely to be conserved by site-based interventions alone (Sanderson *et al.* 2001). The stakeholders selected the following list of landscape species for Myanmar: Takin, Asian Elephant, Irrawaddy Dolphin *Orcaella brevirostris*, Tiger, Rufous-necked Hornbill, Plain-pouched Hornbill, White-bellied Heron, sandbar-nesting birds, vultures and large waterbirds. Maintaining natural processes involves achieving the long-term sustainability of intact ecological and evolutionary processes, such as migration and dispersal of species, and annual flooding cycles.

To facilitate the persistence of biodiversity, conservation corridors must be anchored on core areas, embedded in a matrix of natural and/or anthropogenic habitats (Soulé and Terborgh 1999). Based on this theory, conservation corridors are anchored on KBAs, with the remainder comprising areas that have the potential to become KBAs in their own right (through management or restoration) and/or areas that contribute to the ability of the corridor to support biodiversity in the long-term.

The stakeholders prepared a preliminary list of conservation corridors, using KBAs as the starting point. First, the stakeholders were asked to define conservation corridors wherever maintaining connectivity between two or more KBAs is necessary to facilitate long-term conservation of landscape species. Next, they were asked to define additional conservation corridors wherever maintaining a larger area of natural habitat is necessary to maintain evolutionary and ecological processes. Definition of conservation corridors was constrained by time and data limitations and the absence of detailed criteria. Because of these constraints, the stakeholders concentrated on defining large blocks of relatively contiguous natural habitat that they assessed as being potentially capable of sustaining populations of landscape species and full faunal and floral communities in the long term. The boundaries of the conservation corridors were initially sketched in draft by the stakeholders, and later defined more precisely through an analysis of land-cover data conducted by the Conservation and Research Center of the Smithsonian Institution.

In Myanmar, global threat assessments have only been conducted for mammals, birds, amphibians, some reptiles (turtles and crocodiles), some plants, a single invertebrate and a few marine species. Furthermore, recent information on the status of most globally threatened species in Myanmar amounts to a few survey records from a few sites where surveys were possible. For only one species (Tiger) has a national status survey been attempted, and, even then, not all areas where the species potentially occurs were accessible for survey. For many species, there are no recent field records from Myanmar. Consequently, it was only possible to prepare preliminary lists of globally threatened species, KBAs and conservation corridors. As more information becomes available, it will be necessary to revise the Conservation Outcomes for Myanmar.

Species Outcomes

Excluding species restricted to marine ecosystems, a total of 144 globally threatened species occur in Myanmar, of which 25 are Critically Endangered, 39 are Endangered and 80 are Vulnerable. The globally threatened species comprise 39 mammal species, 45 bird species, 21 reptile species, one invertebrate species and 38 plant species (Table 1 and Attachment 1); nine of these species are thought to be endemic to Myanmar (Table 2).

Table 1. Summary of globally threatened species in Myanmar

Taxonomic Group	Global Threat Status			
	Critically Endangered	Endangered	Vulnerable	Total
Mammals	4	9	26	39
Birds	4	8	33	45
Reptiles	4	10	7	21
Invertebrates	0	0	1	1
Plants	13	12	13	38
Total	25	39	80	144

For reptiles, fish, invertebrates and plants, the figures in Table 1 are probably significantly lower than the actual number of species threatened with global extinction in Myanmar, because global threat assessments are incomplete for these groups. For amphibians, although a comprehensive global threat assessment has recently been conducted (IUCN-SSC and CI-CABS 2003), no globally threatened species has been confirmed to occur in Myanmar. It is possible, however, that some species have gone unrecorded to date.

Myanmar's four Critically Endangered mammal species comprise Lesser One-horned Rhinoceros, Hairy Rhinoceros, Anthony's Pipistrelle and Joffre's Pipistrelle, all of which were found in the country historically, although there have been no confirmed records of any in recent years (Corbet and Hill 1992, P. Bates *in litt.* 2003). All four species are high priorities for surveys to establish their status and identify remaining populations.

Myanmar's four Critically Endangered bird species comprise: Gurney's Pitta, a species endemic to southern Myanmar and peninsular Thailand, which is highly threatened by clearance of its lowland forest habitat; Slender-billed Vulture and White-backed Vulture, two species that have undergone precipitous declines across their global ranges, although recent survey results indicate that significant populations persist in Myanmar; and Pink-headed Duck, a species that previously occurred in Myanmar and northern India, although there have been no confirmed records from anywhere in its range for over 50 years (BirdLife International 2003).

Table 2. Globally threatened species endemic to Myanmar

Species	Global Threat Status
Joffre's Pipistrelle <i>Pipistrellus joffrei</i>	CR
Anthony's Pipistrelle <i>Pipistrellus anthonyi</i>	CR
White-browed Nuthatch <i>Sitta victoriae</i>	EN
Burmese Star Tortoise <i>Geochelone platynota</i>	CR
Arakan Forest Turtle <i>Heosemys depressa</i>	CR
Burmese Roofed Turtle <i>Kachuga trivitatta</i>	EN
Burmese Eyed Turtle <i>Morenia ocellata</i>	EN
Burmese Frog-faced Softshell Turtle <i>Chitra vandijki</i>	EN*
Burmese Peacock Softshell <i>Nilssonina formosa</i>	EN

Note: * = this species has recently been split from the Endangered Narrow-headed Softshell Turtle *Chitra indica* (McCord and Pritchard 2002). However, there has been no re-assessment of the global threat status of *Chitra* spp. since this split.

Myanmar's four Critically Endangered reptile species comprise Siamese Crocodile, Mangrove Terrapin *Batagur baska*, Burmese Star Tortoise and Arakan Forest Turtle. The latter two are endemic to Myanmar, and all four are severely threatened by over-exploitation. Thirteen Critically Endangered plant species are also known to occur in Myanmar. All are members of the Dipterocarpaceae family: *Anisoptera scaphula*, *Dipterocarpus baudii*, *D. dyeri*, *D. gracilis*, *D. grandiflorus*, *D. kerrii*, *D. turbinatus*, *Hopea apiculata*, *H. helferi*, *H. sangal*, *Parashorea stellata*, *Shorea farinosa* and *Vatica lanceaefolia*. All of these are tree species, severely threatened by commercial logging and/or conversion of lowland forest.

Site Outcomes

A preliminary list of 76 KBAs was prepared (Attachment 2 and Figure 3). Twenty-nine of these KBAs (equivalent to 38% of the total) were defined for globally threatened mammal species, 55 (72%) were defined for globally threatened, restricted-range or congregatory bird species, 10 (13%) were defined for globally threatened reptile species and eight (11%) were defined for globally threatened plant species (Table 3).

The number of KBAs defined would probably be considerably higher if more detailed data were available on the distribution of the conservation status and distribution of species in Myanmar. Shan State represents an especially significant gap in the coverage of KBAs, in large part due to the lack of recent biological survey data from most parts of the state. Shan State should be considered a high priority for baseline biodiversity surveys, particularly areas along the international borders with China and Lao PDR.

Only 23 (30%) of Myanmar's KBAs are designated or officially proposed as protected areas, in whole or in part; the remaining 53 (70%) are unprotected. This suggests that there may be a need to review and, where necessary, extend the national protected area system, in order to increase the coverage of under-represented species and habitats. As well as extending the national protected area system, there may be opportunities to develop alternative site conservation approaches at some unprotected KBAs, such as community-based conservation or conservation concessions.

Eleven KBAs are known to support globally threatened species endemic to Myanmar (Table 4). In this context, Gurney's Pitta is considered to be endemic to Myanmar, since most (>90%) of the global population is found in the country and because the known Thai population is small, relict and possibly not viable. These KBAs should be considered particularly high conservation priorities, as there exist few or no other sites in the world at which conservation action for these species can be taken. Only five of these KBAs are designated or officially proposed as protected areas.

Table 3. Summary of KBAs in Myanmar

Taxonomic Group	No. of KBAs
Mammals	29
Birds	55
Reptiles	10
Plants	8
All KBAs	76

Table 4. KBAs known to support globally threatened species endemic to Myanmar

KBA	Species
Central Tanintharyi Coast	Burmese Eyed Turtle
Chaungmon-Wachaung	Gurney's Pitta
Kaladan Estuary	Burmese Roofed Turtle
Karathuri	Gurney's Pitta
Minzontaung*	Burmese Star Tortoise
Myaleik Taung	Burmese Star Tortoise
Natmataung (Mount Victoria)*	White-browed Nuthatch
Ngawun	Gurney's Pitta
Rakhine Yoma*	Arakan Forest Turtle
Shwe U Daung*	Burmese Star Tortoise
Shwesettaw*	Burmese Star Tortoise

Note: * = protected area

Corridor Outcomes

A preliminary list of 15 conservation corridors was prepared, covering a total area of 293,400 km², equivalent to 43% of the country's land area (Table 5 and Figure 3). These corridors range in size from 5,300 km² (Ayeyarwady Delta) to 53,000 km² (Rakhine Yoma Range). The full list of KBAs within each conservation corridor is presented in Attachment 3. The conservation corridors contain 52 KBAs (equivalent to 68% of the total). Two conservation corridors, Central Ayeyarwady River and Sundaic Subregion, support significantly greater numbers of KBAs than other corridors. In the former corridor, these KBAs are situated within a largely anthropogenic landscape, in contrast to the latter corridor, which constitutes a largely primary landscape.

Table 5. Summary of conservation corridors in Myanmar

Conservation Corridor	Area (km ²)	No. of KBAs
Ayeyarwady Delta	5,300	1
Bago Yoma Range	17,800	2
Central Ayeyarwady River	18,000	13
Central Myanmar Dry Forests	15,000	2
Central Myanmar Mixed Deciduous Forests	7,600	2
Central Thanlwin River	11,000	0
Chin Hills Complex	23,900	5
Kayah-Kayin Range	13,000	1
Lower Chindwin River	8,400	1
Naga Hills	5,500	1
Nan Yu Range	20,500	0
Northern Mountains Forest Complex	25,800	3
Rakhine Yoma Range	53,000	5
Sundaic Subregion (Tanintharyi)	44,200	12
Upper Chindwin Lowlands	24,400	4

The coverage of globally threatened species within the conservation corridors is very good: all but two of the globally threatened species for which reliable data on their distribution among sites are available are thought to regularly occur in significant numbers in one or more conservation corridor. The two species with available data that are not known to occur within the conservation corridors are Pallas's Fish Eagle *Haliaeetus leucoryphus* and Slender-billed Vulture; the former of which is not thought to have a globally significant population within Myanmar, while the latter is a priority for species-focused conservation and has been selected as a Priority Species.

Box 5: The most urgent global conservation priority for Myanmar

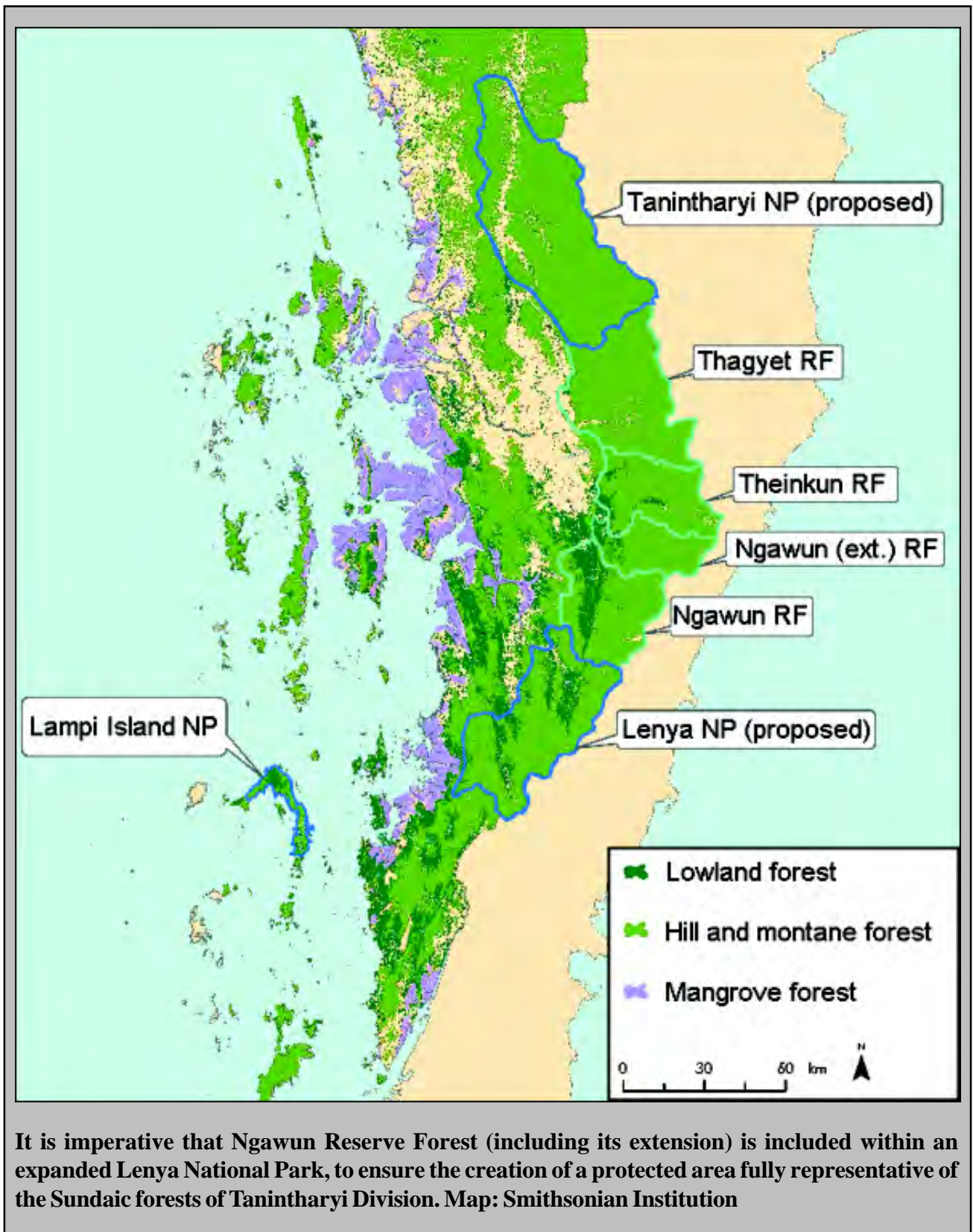
Jonathan C. Eames, BirdLife International *in Indochina*

The world's largest population of the Critically Endangered Gurney's Pitta *Pitta gurneyi* is known from Ngawun Reserve Forest, adjacent to the proposed Lenya National Park in the Sundaic Subregion (Tanintharyi) Priority Corridor. Surveys conducted in 2004 found around 150 pairs, although the actual population could be much higher. The 50,000 ha Ngawun Reserve Forest is the largest remaining block of level lowland forest in southern Myanmar, and the 2004 surveys found a further seven bird species in danger of global extinction, with evidence of threatened mammals including Asian Elephant *Elephas maximus*, Tiger *Panthera tigris* and Asian Tapir *Tapirus indicus*.

The surveys were conducted by a team of conservationists from the Biodiversity and Nature Conservation Association (BANCA), the Forest Department of Kawthaung district, Tanintharyi Division, and BirdLife International. The team identified the site using remote sensing data provided under a Government of Myanmar and Smithsonian Institution project. The fact that Ngawun Reserve Forest is adjacent to the proposed Lenya National Park presents the Government of Myanmar with a tremendous conservation opportunity: if the two areas were combined, through a modification of the proposed boundaries to Lenya National Park, they would protect an unrivalled example of the wildlife and forests that once cloaked southern Myanmar and neighbouring Thailand. Such a protected area would cover some 376,343 ha of mainly lowland Sundaic forest habitats, and be capable of supporting viable populations of *all* species representative of the area. This is ultimately what makes it so important from a global conservation perspective.

The Government of Myanmar showed tremendous foresight in designating the 2 million ha Hukaung Tiger Reserve in March 2004, and BirdLife hopes it can show a similar commitment towards conservation of this globally important area too. BirdLife has been invited to join the Ministry of Forestry, other NGOs and concerned organisations to promote and secure the conservation of Ngawun Reserve Forest and the proposed Lenya National Park. BirdLife has already obtained significant pledges of financial support from the British Birdwatching Fair and the Global Conservation Fund to assist in the establishment of an expanded Lenya National Park through a five year project.

Several existing and proposed protected areas are located along the Tenasserim Range, including the proposed Tanintharyi National Park, 50 km to the north of Lenya, and Tanintharyi Nature Reserve even further north (Figure 3). Tanintharyi Division also contains marine protected areas, like Lampi Island Marine National Park. Taken together, these protected areas provide possibilities of future landscape-scale conservation planning and management. If an expanded Lenya National Park could be established, BirdLife believes that there would be an opportunity to connect all the proposed and existing protected areas into a single conservation landscape, which could then be designated as a World Heritage Site.



Priority Outcomes for conservation investment

To maximise the impact of future conservation investment in Myanmar, it was necessary to refine the full suite of Conservation Outcomes into a focused set of Priority Outcomes. The Priority Outcomes represent a consensus among stakeholders on the Priority Species, Sites and Corridors for conservation investment over the next five years. Priority Sites and Corridors are used to target investments in site-based and landscape-level conservation at the highest geographical priorities. Priority Species are used to target investments in species-focused conservation at globally threatened species with conservation needs that cannot be addressed by site-based and landscape-level action alone.

The stakeholders employed four criteria to select Priority Corridors from among the preliminary list of conservation corridors in Myanmar: (i) importance for the conservation of Critically Endangered and Endangered animal species; (ii) importance for the conservation of landscape species; (iii) importance for the conservation of unique or exceptional ecological and evolutionary processes; and (iv) need for additional conservation investment. The application of the selection criteria to the conservation corridors is summarised in Attachment 3.

The stakeholders employed three criteria to select Priority Sites from among the preliminary list of KBAs in Myanmar: (i) occurrence within a Priority Corridor; (ii) importance for the conservation of globally threatened species endemic to Myanmar; and (iii) need for additional conservation investment. The application of the selection criteria to the KBAs is summarised in Attachment 2.

The stakeholders employed three criteria to select Priority Species from among the preliminary list of globally threatened species in Myanmar: (i) global significance of the Myanmar population (i.e. vagrants, rare winter visitors and species with very marginal occurrence could not be selected as Priority Species); (ii) need for species-focused conservation; and (iii) need for additional conservation investment. The application of the selection criteria to the globally threatened species is summarised in Attachment 1.

For all Priority Outcomes, the most important selection criterion was need for additional conservation investment. Only species, sites and corridors for which current or projected levels of investment (even if significant) were considered highly insufficient to meet their conservation needs were selected as Priority Outcomes. Given the currently very low levels of conservation investment in Myanmar relative to immediate conservation needs in the country, a very large proportion of Conservation Outcomes were assessed as having a high need for additional investment.

The participants at the first stakeholder workshop prepared draft lists of Priority Species, Sites and Corridors. The lists were then revised by the drafting team, through reference to published and unpublished data and further consultations with stakeholders. The revised lists were then fed back at the second workshop, where they were finalised in consultation with the stakeholders.

Eight of the 15 conservation corridors in Myanmar were selected as Priority Corridors (Table 6 and Figure 4). The Priority Corridors cover a total area of 202,300 km², equivalent to 30% of the country's land area.

By definition, all KBAs contained within Priority Corridors are Priority Sites. Additional Priority Sites were also selected, outside the conservation corridors, to increase the coverage of globally threatened species endemic to Myanmar that require site-based conservation. Of the 11 KBAs known to support globally threatened species endemic to Myanmar (Table 4), eight are included within a Priority Corridor. The remaining three support Burmese Star Tortoise (Critically Endangered), a species for which site-based conservation is a high priority. All three KBAs were assessed as having a high need for additional conservation investment, and were selected as additional Priority Sites (Table 6 and Figure 4).

Table 6. Priority Corridors and Priority Sites for conservation investment in Myanmar

Priority Corridor	Priority Sites	Area (km ²)
Priority Corridors and the Priority Sites they contain		
Central Myanmar Dry Forests	Chatthin; Shwesettaw	15,000
Central Myanmar Mixed Deciduous Forests	Alaungdaw Kathapa; Mahamyaing	7,600
Chin Hills Complex	Bwe Pa; Kennedy Peak; Kyauk Pan Taung; Natmataung (Mount Victoria); Zeihmu Range	23,900
Lower Chindwin River	Uyu River	8,400
Northern Mountains Forest Complex	Hkakaborazi; Hponkanrazi; Khaunglanpu	25,800
Rakhine Yoma Range	Kaladan Estuary; Nat-yekan; Ngwe Taung; Northern Rakhine Yoma; Rakhine Yoma	53,000
Sundaic Subregion (Tanintharyi)	Central Tanintharyi Coast; Chaungmon-Wachaung; Htaung Pru; Karathuri; Kawthaung District Lowlands; Lampi Island; Lenya; Ngawun; Pachan; Pe River Valley (Mintha Ext RF); Tanintharyi National Park; Tanintharyi Nature Reserve	44,200
Upper Chindwin Lowlands	Bumphabum; Htamanthi; Hukaung Valley; Tanai River	24,400
Additional Priority Sites		
none	Minzontaung	22
none	Myaleik Taung	50
none	Shwe U Daung	326

Only 17 of the 37 Priority Sites are designated as protected areas or official proposed for protection, equivalent to 46% of the total. The eight Priority Corridors cover a total area of 202,300 km², equivalent to 30% of Myanmar's land area. It is likely that the Priority Sites and Corridors do not contain all elements of globally important biodiversity for which site-based and/or landscape-level conservation actions are a high priority. Additional Priority Sites and Corridors need to be defined as additional information becomes available.

The eight Priority Corridors and three additional Priority Sites represent all of the major ecosystems and habitat types in Myanmar. They also include some of the best remaining examples of three of the most threatened ecosystems in the Indo-Myanmar (Indo-Burma) Hotspot as a whole: coastal; riverine; and lowland evergreen forest ecosystems. Across the hotspot, rates of natural habitat conversion in these ecosystems have been high in recent decades, largely because they coincide with areas of high human population density and/or are attractive for alternative land-uses, such as cash-crop cultivation in the case of lowland evergreen forest ecosystems, or shrimp aquaculture in the case of coastal ecosystems. The rate of habitat conversion has been compounded by the under-representation of these ecosystems within national protected area systems in the hotspot, partly because of the perception that designating protected areas in these ecosystems would mean foregoing economic development, and partly because of a limited appreciation of their biodiversity values (particularly in the case of coastal and riverine ecosystems). Priority Corridors that are particularly important for the conservation of representative examples of these ecosystems comprise the Lower Chindwin River (for riverine ecosystems), the Rakhine Yoma Range (for coastal ecosystems), the Sundaic Subregion (Tanintharyi) (for lowland wet evergreen forest and coastal ecosystems), and the Upper Chindwin Lowlands (for riverine ecosystems).

The Priority Corridors and additional Priority Sites also support some of the best remaining examples of three of the least protected and most threatened habitat types in Myanmar (albeit not necessarily highly threatened globally): deciduous dipterocarp forest; freshwater swamp forest; and mangrove. Priority Corridors that are particularly important for the conservation of these habitats include the Central Myanmar Dry Forests (for deciduous dipterocarp forest), the Sundaic Subregion (Tanintharyi) (for mangrove), and the Upper Chindwin Lowlands (for freshwater swamp forest).

The key biodiversity values of the eight Priority Corridors and three additional Priority Sites are briefly summarised below:

Priority Corridor 1 - Central Myanmar Dry Forests. The Priority Corridor includes some of the few remaining areas of natural habitat remaining within the Central Dry Zone, including isolated remnants of deciduous dipterocarp forest. The largest intact example of this habitat type may be that supported by Chatthin Wildlife Sanctuary and surrounding areas. The Priority Corridor supports several species endemic to Myanmar, most notably Burmese Star Tortoise (Critically Endangered), White-throated Babbler, Hooded Treepie and Burmese Bushlark. The Priority Corridor also supports the largest known wild population of Eld's Deer (Vulnerable) in the world. Major threats to biodiversity in the Priority Corridor include: agricultural expansion, including large-scale conversion of forests to commercial plantations by agribusinesses; loss of forest due to fuelwood consumption; trade-driven hunting; and infrastructure development.

Priority Corridor 2 - Central Myanmar Mixed Deciduous Forests. The Priority Corridor includes extensive areas of mixed deciduous forest on hills to the north and west of the Central Dry Zone, especially within Alaungdaw Kathapa National Park and Mahamyaing Wildlife Sanctuary. The Priority Corridor supports populations of several globally threatened species, including Hoolock Gibbon *Bunipithecus hoolock*, Capped Leaf Monkey *Trachypithecus pileatus*, Asian Elephant and Banteng *Bos javanicus* (all Endangered). Agricultural expansion, hunting for the wildlife trade, over-exploitation of NTFPs and livestock grazing are among the threats to biodiversity in the Priority Corridor.

Priority Corridor 3 - Chin Hills Complex. The Priority Corridor comprises the Chin Hills, a range of high mountains, which extends south from the international border with India. The Chin Hills contain large areas of hill and montane evergreen forest habitats, which support several globally threatened species, including important populations of Hume's Pheasant and Rufous-necked Hornbill (both Vulnerable). Most notably, the southern Chin Hills is the only place on Earth known to support White-browed Nuthatch (Endangered). There are two designated protected areas within the Priority Corridor: Natmataung National Park; and Kyauk Pan Taung Wildlife Sanctuary. The main threats to biodiversity in the Priority Corridor include hunting for subsistence and trade, over-exploitation of NTFPs, and shifting cultivation, which has transformed much of the landscape, especially below 2,000 m asl and throughout the southern Chin Hills.

Priority Corridor 4 - Lower Chindwin River. The Priority Corridor comprises the Lower Chindwin River and its flanking habitats, from Htamanthi Wildlife Sanctuary to the confluence with the Ayeyarwady River, as well as the Uyu River, a major tributary of the Chindwin. Apart from the lower section, which flows through the Central Dry Zone, the Chindwin River supports significant stretches of relatively undisturbed riverine habitats, including sandbars, sandbanks, ox-bow lakes and riverine forest. Although the Lower Chindwin River is less well studied than the more heavily disturbed Ayeyarwady River, it supports a number of species that have been lost from most other wide, slow-flowing, lowland rivers in mainland South-East Asia. The Priority Corridor is known to be important for White-rumped Vulture (Critically Endangered) and may also support a number of other globally threatened species, including the nationally endemic Burmese Frog-faced Softshell Turtle (Endangered). The Lower Chindwin River forms an ecological corridor, connecting the Central Ayeyarwady River, Central Myanmar Dry Zone and Upper Chindwin Lowlands conservation corridors. The Priority Corridor is entirely unprotected, and faces a number of significant threats to biodiversity, including dredging for gold, pollution from gold mining, disturbance to sandbars, hunting of birds, and degradation of riverine forest through timber and bamboo extraction.

Priority Corridor 5 - Northern Mountains Forest Complex. The Priority Corridor comprises the high mountains in the extreme north of Myanmar, along the international borders with India and China, and associated foothills and valleys to the south. The Priority Corridor contains an elevational gradient of over 5,000 m, from the summit of Hkakaborazi, Myanmar's tallest mountain, to the valleys of tributaries of the Ayeyarwady River. The Priority Corridor includes a correspondingly wide range of natural habitat types, from alpine meadows, through sub-alpine, montane and hill evergreen forest, to lowland evergreen forest. The Northern Mountains Forest Complex supports a very high floristic diversity, including a large number of species endemic to the

country (Kingdon-Ward 1944-5). The Northern Mountain Forest Complex also supports a number of animal species characteristic of the eastern Himalayas, including Red Panda (Endangered), Takin, Sclater's Monal and Blyth's Tragopan (all Vulnerable), as well as populations of the little-known Black Muntjac *Muntiacus crinifrons* (Vulnerable) (Rabinowitz *et al.* 1998) and the recently described Leaf Deer (Amato *et al.* 1999). In addition, the Priority Corridor supports important populations of Hoolock Gibbon and White-bellied Heron (both Endangered). The Northern Mountains Forest Complex represents one of the largest contiguous wilderness areas in the country, and the existence of contiguous forest areas in China and India, such as Namdapha National Park, present opportunities for transboundary conservation initiatives. The Northern Mountains Forest Complex contains two large protected areas: Hkakaborazi National Park; and Hponkanrazi Wildlife Sanctuary. Most of the area under protection lies in the north-western part of the corridor, and there is a need to establish protected areas in the north-eastern part, especially in areas close to the international border with China, which lie within the Yunnan Mountains EBA. The main threats to biodiversity in the Priority Corridor are shifting cultivation, hunting and timber extraction (including associated road construction). The latter two threats are driven by commercial demand from China.

Priority Corridor 6 - Rakhine Yoma Range. The Priority Corridor is centred on the Rakhine Yoma Range, which lies inland of the Bay of Bengal, between the international border with Bangladesh and the Ayeyarwady Delta. The mountains of the Rakhine Yoma Range support a large, contiguous block of semi-evergreen, evergreen and mixed deciduous forest. The Priority Corridor also includes a large stretch of coastline, with extensive areas of intertidal mudflats and mangrove, most notably in the Kaladan Estuary. The Priority Corridor supports important populations of two nationally endemic turtle species: Arakan Forest Turtle (Critically Endangered) and Burmese Roofed Turtle (Endangered). The Mehu area, in the north of the Priority Corridor, was identified as one of the most important areas in Myanmar for the conservation of Asian Elephant (Endangered) during a workshop in June 2004 (P. Leimgruber *in litt.* 2004). The Priority Corridor is also reported to support a number of other globally threatened mammal species, including Hoolock Gibbon, Tiger, Banteng (all Endangered), Asian Black Bear, Asian Golden Cat, Clouded Leopard and Gaur (all Vulnerable) (U Tin Than *in litt.* 2004). Part of the Priority Corridor is included within Rakhine Yoma Elephant Range, a designated protected area, although the majority is currently unprotected. The main threats to biodiversity in the Priority Corridor include timber extraction, trade-driven hunting, agricultural expansion and clearance of mangrove.

Priority Corridor 7 - Sundaic Subregion (Tanintharyi). The Priority Corridor comprises the Sundaic Subregion, an extremely large block of natural habitat, which includes small parts of Mon and Kayin States plus the vast majority of Tanintharyi Division. The Sundaic Subregion includes the largest areas of lowland wet evergreen forest remaining in the Indo-Myanmar (Indo-Burma) Hotspot. The Priority Corridor also includes a significant portion of coastline, a large number of offshore islands and significant areas of key wetland habitats, including mangrove and intertidal mudflat. Although the Priority Corridor has received little recent biological study, there are indications that it supports rich lowland evergreen forest communities, including such species as Asian Tapir *Tapirus indicus* and Plain-pouched Hornbill (both Vulnerable). Coastal habitats support Mangrove Terrapin (Critically Endangered) and are thought to be important for migratory waterbirds. Of greatest significance, the Priority Corridor supports the bulk of the world population of Gurney's Pitta (Critically Endangered), a species endemic to Tanintharyi Division and a small part of peninsular Thailand (Anon. 2003, Eames *et al.* 2005). Moreover, the Priority Corridor is thought to support a relatively large population (>50 individuals) of Tiger (Endangered) (Lynam 2003). The potential of the Sundaic Subregion for the long-term conservation of landscape species, such as Asian Elephant, Tiger and Plain-pouched Hornbill, is enhanced by the existence of significant areas of contiguous natural habitat in western and peninsular Thailand. Within the Indo-Myanmar (Indo-Burma) Hotspot, the Priority Corridor has unparalleled importance for the conservation of the wet evergreen forest ecosystem of the Sundaic lowlands. The lowland wet evergreen forests of the Sundaic Subregion are significantly under represented within the national protected area system, and are under severe immediate threat of conversion to oil palm plantations. The mangroves of the Sundaic Subregion are similarly under represented within protected areas, and are threatened by conversion to aquaculture, although their global significance is not so great as that of the corridor's lowland wet evergreen forests. Other threats to biodiversity in the Priority Corridor include hunting, mining, timber extraction and over-exploitation of NTFPs.

Priority Corridor 8 - Upper Chindwin Lowlands. The Priority Corridor comprises a large block of natural habitat in the upper catchment of the Chindwin River. The Priority Corridor contains the upper section of the Chindwin river plus several of its major tributaries, such as the Tanai, Tawang and Palaunglanbum Rivers. These rivers are important for a number of landscape species, including sandbar-nesting birds and, potentially, White-bellied Heron. Significant sections of these rivers have associated ox-bow lakes and other non-flowing wetlands, which are important for White-winged Duck (Endangered), Masked Finfoot and Lesser Adjutant *Leptoptilos javanicus* (both Vulnerable). In addition, these wetlands possibly support Pink-headed Duck (Critically Endangered), whose continued occurrence has been reported by local people (U Htin Hla verbally 2004). The Priority Corridor also supports extensive areas of lowland evergreen, semi-evergreen and mixed deciduous forest, which may support significant populations of several globally threatened species, including Asian Elephant and Capped Leaf Monkey, and certainly support significant populations of Hoolock Gibbon (all Endangered). Information from recent mark-recapture studies indicates that there could possibly be 35 to 70 Tigers (Endangered) in the core of Hukaung Tiger Reserve (Lynam *et al.* submitted). With appropriate management, the Priority Corridor has the potential to support a higher population still. The coverage of the Upper Chindwin Lowlands within the national protected area system is greater than that of any other Priority Corridor. The newly created Hukaung Tiger Reserve alone covers 21,890 km², making it the largest protected area in Myanmar, although only part of the site is intended to be placed under strict protection. The Priority Corridor also includes Bumphabum and Htamanthi Wildlife Sanctuaries. All three protected areas face severe shortages of personnel and resources, and threats to biodiversity within the Priority Corridor are steadily increasing, particularly hunting, mining, agricultural conversion and human settlement, which is a particular problem along the Ledo Road, which bisects Hukaung Tiger Reserve.

Priority Site 1 - Minzontaung. The Priority Site comprises Minzontaung Wildlife Sanctuary, which supports a relatively undisturbed example of the dry forest ecosystem characteristic of central Myanmar. The Priority Site supports several species endemic to Myanmar, including White-throated Babbler and Hooded Treepie. Most significantly, the site supports a significant population of Burmese Star Tortoise (Critically Endangered).

Priority Site 2 - Myaleik Taung. The Priority Site comprises an area of dry forest and agricultural habitats near Mandalay, which supports the largest known population of Burmese Star Tortoise. Although the Priority Site is not designated as a protected area, local beliefs that the tortoises are protected by spirits confer a significant level of protection on the species.

Priority Site 3 - Shwe U Daung. The Priority Site comprises Shwe U Daung Wildlife Sanctuary and the surrounding area. Like the previous two sites, Shwe U Daung also supports Burmese Star Tortoise (Critically Endangered), although further studies are required to evaluate the significance of the population.

In addition to the Priority Corridors and Sites, the stakeholders selected 48 Priority Species (Table 7), representing 33% of the preliminary list globally threatened species in Myanmar (Attachment 1). The Priority Species comprise 23 mammal species, 11 bird species and 16 reptile species, and include all nine globally threatened species endemic to Myanmar and all 11 Critically Endangered animal species known to occur in the country. Due to a lack of information on the status and conservation needs of globally threatened invertebrate and plant species in Myanmar, no Priority Species were selected among these taxonomic groups.

Table 7. Priority Species for conservation investment in Myanmar

Priority Species	Species-focused Action(s) Required
MAMMALS	
Kitti's Hog-nosed Bat <i>Craseonycteris thonglongyai</i>	Status survey
Joffre's Pipistrelle <i>Pipistrellus joffrei</i>	Status survey
Anthony's Pipistrelle <i>Pipistrellus anthonyi</i>	Status survey
Capped Leaf Monkey <i>Trachypithecus pileatus</i>	Status survey; control of hunting
Hoolock Gibbon <i>Bunipithecus hoolock</i>	Status survey
Asian Black Bear <i>Ursus thibetanus</i>	Status survey; control of hunting
Red Panda <i>Ailurus fulgens</i>	Status survey; control of hunting
Asian Golden Cat <i>Catopuma temminckii</i>	Status survey
Marbled Cat <i>Pardofelis marmorata</i>	Status survey
Clouded Leopard <i>Neofelis nebulosa</i>	Status survey
Tiger <i>Panthera tigris</i>	Control of hunting
Asian Elephant <i>Elephas maximus</i>	Status survey; control of hunting; mitigation of human-elephant conflict
Asian Tapir <i>Tapirus indicus</i>	Status survey
Lesser One-horned Rhinoceros <i>Rhinoceros sondaicus</i>	Status survey
Hairy Rhinoceros <i>Dicerorhinus sumatrensis</i>	Status survey
Eld's Deer <i>Cervus eldii</i>	Status survey; control of hunting
Black Muntjac <i>Muntiacus crinifrons</i>	Status survey
Wild Water Buffalo <i>Bubalus bubalis</i>	Status survey; control of hunting
Takin <i>Budorcas taxicolor</i>	Status survey
Red Goral <i>Naemorhedus baileyi</i>	Status survey
BIRDS	
Green Peafowl <i>Pavo muticus</i>	Control of hunting
White-winged Duck <i>Cairina scutulata</i>	Control disturbance and habitat loss across range
Pink-headed Duck <i>Rhodonessa caryophyllacea</i>	Status survey
Sarus Crane <i>Grus antigone</i>	Control disturbance and habitat loss across range
Masked Finfoot <i>Heliopais personata</i>	Control disturbance and habitat loss across range
White-rumped Vulture <i>Gyps bengalensis</i>	Control disturbance across range
Slender-billed Vulture <i>Gyps tenuirostris</i>	Control disturbance across range
White-bellied Heron <i>Ardea insignis</i>	Control disturbance and habitat loss across range
Lesser Adjutant <i>Leptoptilos javanicus</i>	Control disturbance and habitat loss across range
Gurney's Pitta <i>Pitta gurneyi</i>	Status survey
White-browed Nuthatch <i>Sitta victoriae</i>	Status survey
REPTILES	
Siamese Crocodile <i>Crocodylus siamensis</i>	Status survey
Burmese Star Tortoise <i>Geochelone platynota</i>	Status survey; control of hunting
Elongated Tortoise <i>Indotestudo elongata</i>	Status survey; control of hunting
Asian Giant Tortoise <i>Manouria emys</i>	Status survey; control of hunting
Impressed Tortoise <i>Manouria impressa</i>	Status survey; control of hunting
Mangrove Terrapin <i>Batagur baska</i>	Status survey; control of hunting
Arakan Forest Turtle <i>Heosemys depressa</i>	Status survey; control of hunting
Spiny Turtle <i>Heosemys spinosa</i>	Status survey; control of hunting
Yellow-headed Temple Turtle <i>Hieremys annandalii</i>	Status survey; control of hunting
Burmese Roofed Turtle <i>Kachuga trivittata</i>	Status survey; control of hunting
Burmese Eyed Turtle <i>Morenia ocellata</i>	Status survey; control of hunting
Keeled Box Turtle <i>Pyxidea mouhotii</i>	Status survey; control of hunting
Big-headed Turtle <i>Platysternon megacephalum</i>	Status survey; control of hunting
Asiatic Softshell Turtle <i>Amyda cartilaginea</i>	Status survey; control of hunting
Burmese Frog-faced Softshell Turtle <i>Chitra vandijki</i>	Status survey; control of hunting
Burmese Peacock Softshell <i>Nilssonina formosa</i>	Status survey; control of hunting
Asian Giant Softshell Turtle <i>Pelochelys cantorii</i>	Status survey; control of hunting

See Attachment 1 for justification for selection of Priority Species.

A large proportion of the Priority Species, including Tiger, Asian Black Bear and 16 species of turtle, were selected because conservation action is required to address the threat of trade-driven hunting. Other Priority Species, including two species of *Gyps* vulture and several species of waterbird, were selected because they occur at low densities over large areas (at least for part of the year) and require species-focused action throughout their ranges, in order to address such threats as disturbance and loss of key habitats. Many Priority Species were selected because they are high priorities for status survey. These include Lesser One-horned Rhinoceros, Hairy Rhinoceros, Pink-headed Duck and several other species with no recent confirmed records from Myanmar, for which greatly improved information on their status and distribution is required before conservation action can be taken in any meaningful way.

In addition to the Priority Species listed in Table 7, the stakeholders selected eight provisional Priority Species (Table 8). While none of these species is currently assessed as globally threatened by IUCN (2004), they were all considered to be potentially of global conservation concern and to require species-focused conservation. If any of these species is reassessed as globally threatened, it should immediately become a Priority Species.

The provisional Priority Species include four species of orchids listed in Appendices I or II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). All four species are highly threatened by over-harvesting for domestic sale and export to China. The provisional Priority Species also include the recently described Leaf Deer plus three species assessed as Data Deficient by IUCN (2003): Sun Bear *Helarctos malayanus*; Irrawaddy Dolphin; and Burmese Flapshell Turtle.

Table 8. Provisional Priority Species for conservation investment in Myanmar

Priority Species	Species-focused Action(s) Required
MAMMALS	
Sun Bear <i>Helarctos malayanus</i>	Status survey; control of hunting
Irrawaddy Dolphin <i>Orcaella brevirostris</i>	Status survey; control of incompatible fishing techniques
Leaf Deer <i>Muntiacus putaoensis</i>	Status survey
REPTILES	
Burmese Flapshell Turtle <i>Lissemys scutata</i>	Status survey; control of hunting
PLANTS	
Blood Red Dendrobium <i>Dendrobium cruentum</i>	Control of over-exploitation
Rainbow Orchid <i>Paphiopedilum wardii</i>	Control of over-exploitation
Fire Orchid <i>Renanthera imschootiana</i>	Control of over-exploitation
Blue Orchid <i>Vanda coerulea</i>	Control of over-exploitation

CORRIDORS 1



The Chin Hills Complex is one of eight Priority Corridors for conservation investment identified in Myanmar. Shown here is the view from Mount Bwe Pa in central Chin State. Photo: J. C. Eames.



Taken on Mount Bwe Pa, a Priority Site in the Chin Hills Complex, this photograph vividly illustrates how aspect and human influence have altered the vegetation. The drier, south-facing slopes are more prone to fire. Closed canopy montane evergreen forest remains on the wetter slope. Photo: J. C. Eames.

CORRIDORS 2



This photograph shows the Hukaung Valley, the largest Priority Site within the Upper Chindwin Lowlands Priority Corridor. Photo: WCS Myanmar Program.



The Northern Mountains Forest Complex Priority Corridor includes two recently established protected areas: Hkakaborazi National Park; and Hponkanrazi Wildlife Sanctuary. These protected areas include the highest mountains in South-East Asia. Only here are Palaeartic faunal influences found. Photo: Nicolas Cornet.

CORRIDORS 3



Although the protected areas coverage is good in the north and north-west of the Northern Mountains Forest Complex, it is poor in the north-east, where there are faunal and floral influences from China. Shown here are two views from Mount Ma Jed in the Imaw Bun Range. Photos: J. C. Eames.

CORRIDORS 4



The Sundaic Subregion contains 12 Priority Sites for conservation investment, the most within any Priority Corridor. The opportunity exists to link many of these sites to create a protected landscape covering many hundreds of thousands of hectares. Shown here is a view across Ngawun Reserve Forest, a critically important site for the conservation of Sundaic biodiversity, which supports a major population of Gurney's *Pitta pitta gurneyi*. Photo: U Htin Hla.



The Sundaic Subregion includes parts of Mon and Kayin States plus the vast majority of Tanintharyi Division. The Sundaic Subregion includes the largest areas of lowland wet evergreen forest remaining in the Indo-Myanmar (Indo-Burma) Hotspot. Shown here are the limestone hills of the Zwe-ga-bin Range, Kayin State. Photo: Paul Bates/Harrison Institute.

CORRIDORS 5



The Central Myanmar Dry Forests supports deciduous dipterocarp forest, known locally as *indaing* forest, which is dominated by *Dipterocarpus tuberculatus* and characterised by a low, open canopy, a grassy understorey and low tree species richness. Photo: U Uga.



This photograph, taken during the rainy season, shows a forest structure typical of the Central Myanmar Mixed Deciduous Forests. Photo: U Uga.

SOCIO-ECONOMIC FEATURES

Introduction and historical context

During the 19th and first half of the 20th Centuries, present-day Myanmar was under British colonial rule. The country gained independence from Great Britain in 1948. The post-independence period has been marked by long periods of military rule, and prolonged conflict between the central government and armed insurgent groups. Attempts at establishing a multi-party representative government have so far not been successful. The response of some foreign governments has been to impose sanctions on Myanmar, with the result that most Overseas Development Assistance (ODA) to the country has ceased, and private investment is severely restricted.

Today, Myanmar is paradoxically rich in natural resources yet remains one of the poorest countries in the region. On the Human Development Index, which ranks 175 countries in the world on a combined measure of per capita income, literacy and life expectancy, Myanmar is ranked 131st (UNDP 2003).

Demographic and social trends

Myanmar supports an estimated human population of 48.2 million (UNDP 2003). The average human population density is 73 people per km², although there is great variation across the country, with the flood-plains of the Ayeyarwady and other major rivers supporting the highest population density, and the mountainous regions of the north and south supporting population densities significantly below the national average. The population of Myanmar is predominantly rural, with only around 30% living in towns and cities, and, while this proportion is projected to increase steadily by 2015, it is still expected to remain well below the 60-80% levels typical of developed countries (Table 9). The most populous cities in the country are Yangon, the capital, and Mandalay.

The annual population growth rate of Myanmar is comparable to those of other countries in mainland South-East Asia. While the rate is forecast to fall, it is expected to remain relatively high in the short term, contributing to increased human pressure on natural resources. Already, most protected areas experience small-scale incompatibilities driven by economic necessity and lack of alternatives for local populations, and a large proportion contain permanent human settlements (Rao *et al.* 2002).

As a result of the complex topography of the country, and a long history of human migrations and cultural exchange, Myanmar supports a tremendous diversity of ethnic groups. Officially, the government lists 135 "national races", grouped into eight ethnic groups: Bamar, Chin, Kachin, Kayah (Karenni), Kayin (Karen), Mon, Rakhine and Shan. However, the real situation is more complicated, with many of the recognised ethnic groups comprising several subgroups, each with different dialects and traditions. The majority ethnic group is the Bamar, with 68% of the national population, while the largest ethnic minorities are the Shan and Kayin, with 9 and 7% of the national population respectively. Administratively, Myanmar is sub-divided into seven states and seven divisions, with the states being characterised by mountainous terrain and human populations dominated by minority ethnic groups, and the divisions being characterised by flat or rolling terrain and human populations dominated by majority Bamars.

The population of Myanmar is mostly Buddhist but a rich mix of religions can be found, including Christian, Muslim, Hindu and animist. The impacts of globalisation are less apparent in Myanmar than many other countries in South-East Asia, and even inhabitants of urban centres retain visible signs of traditional dress and customs.

Table 9. Demographic and social indicators for Myanmar

Indicator	Period	%
Annual population growth rate	1975-2001	1.8
	2001-15	1.0
Urban population	1975	23.9
	2001	28.2
	2015	36.7
Adult (age 15+) illiteracy rate	2001	15
Population without sustainable access to improved water source	2000	28

Source: UNDP (2003).

Economic trends

Myanmar's economy is predominantly based on agriculture and natural resources. In 2002, agriculture (including forestry) was estimated to comprise 60% of the national economy, services 31% and industry only 9%. The main agricultural products of the country are rice, pulses, sesame, peanuts, sugarcane, hardwood, and fish products, while the main industrial products include processed agricultural products, wood products, construction materials, clothing, and fertiliser. Myanmar's main exports are natural gas, wood products, pulses, rice and fish.

Despite efforts by the government to liberalise the economy in the 1990s, economic growth has been slow, and the economy is characterised by high levels of inflation and a well developed black market. At only US\$1,027, gross domestic product (GDP) per capita is the lowest in mainland South-East Asia (UNDP 2003, Table 10). A significant proportion of the population, particularly members of the ethnic minorities, relies largely on subsistence agriculture. Moreover, a large proportion of the population experiences low levels of food security and literacy, and high levels of preventable disease. Nevertheless, Myanmar currently receives some of the lowest levels of ODA in the region, both per capita and in aggregate, although this is more a reflection of the country's relations with multilateral and bilateral donors than of need.

Table 10. Economic indicators for Myanmar

Indicator	Period	US\$
Total GDP	2001	50 billion
GDP per capita	2001	1,027
Total ODA received	2001	127 million
ODA per capita	2001	2.6

Source: UNDP (2003).

Infrastructure development

The level of infrastructure development in Myanmar is generally low. There are few surfaced roads outside of the major cities, and, in many rural areas, ox-carts not motorised vehicles are the main form of transportation. The major towns and cities are linked by rail and air, and several of the major rivers are also used as communication arteries. Many rural communities lack telephones, electricity, piped water and other forms of basic infrastructure, and schools and clinics are scarce and severely under-resourced, particularly in remoter areas.

Partly as a result of limitations on the amount and type of foreign aid and investment, there are currently fewer large-scale infrastructure developments in Myanmar than neighbouring countries. Nevertheless, a number of major infrastructure projects have been undertaken or are planned, including roads, hydropower dams and gas pipelines. If levels of investment increase significantly in the future, it is likely that the rate of infrastructure development will increase, with major impacts on natural habitats and wildlife populations. However, several extensive natural landscapes are unlikely to be severely affected by infrastructure development in the immediate future, and, as such, have high potential for the long-term maintenance of intact ecosystems.

Government frameworks

The central authority in Myanmar is the State Peace and Development Council (SPDC), comprising high-ranking military officers. Under the SPDC, policy is developed by the relevant line ministries, with the support and oversight of the General Administration Department (GAD) of the Ministry of Home Affairs. At the local level, policies are implemented by the relevant line departments, with coordination provided by GAD. Regional military commanders have considerable influence over the way policies are implemented within their commands. In parts of the country that have come under government influence following "peace for development" agreements, further coordination and interpretation of national policies is provided by the Ministry for Progress of Border Areas, National Races and Development Affairs. Consequently, there is considerable variation in the implementation of many policies across the country, and there are opportunities for NGOs and academic institutions to engage in land-use and development planning processes at both central and local levels.

Overall responsibility for coordination and promotion of environmental protection in Myanmar lies with the recently established Environmental Conservation Committee. This new body is chaired by the Minister of Forestry, with the Minister for Mines as Vice-chairman. The creation of this committee is an effort on the part of the government to show a strengthened commitment to environmental protection. As one of its first activities, the committee is conducting a study on environmental problems and situations in different regions of the country.

Formed in 1990, the National Commission for Environmental Affairs (NCEA) is responsible for the development and coordination of environmental policy in Myanmar. NCEA is chaired by the Minister for Forestry, and its members comprise the heads of technical departments responsible for environmental management. NCEA has four specialist commissions, dealing with: conservation of natural resources; control of pollution; research, education and information; and international cooperation. Next to its policy function, NCEA is the principal institution responsible for international cooperation on the environment. With the assistance of the United Nations Environment Programme (UNEP), NCEA has drafted an Environmental Protection Law. This law has three main components: control of pollution; natural resource management; and integration of environmental considerations into economic development.

The government institution with principal responsibility for the implementation of key policies relating to biodiversity conservation is the Forest Department, under the Ministry of Forestry. The Forest Department, which was established in 1856, is one of the oldest in Asia (Das 2000). The department is primarily responsible for the protection of terrestrial forest biota and habitats. Within the Forest Department, the Nature and Wildlife Conservation Division (NWCD) has overall responsibility for wildlife conservation and protected area management, while the University of Forestry and the Forestry Research Institute are responsible for applied forestry research.

For the management of protected non-forest habitats, including freshwater and marine habitats, the Ministry of Forestry shares responsibility with the Ministry of Livestock and Fisheries and the Ministry of Agriculture and Irrigation. In natural habitats with security concerns, the Ministry of Forestry shares management responsibility with the Ministry of Defence. The division of responsibilities among different ministries is not always clear. Moreover, government institutions responsible for the management of natural habitats are often dependent upon other institutions, such as the police, armed forces and judiciary, to effectively discharge their responsibilities.

As elsewhere in mainland South-East Asia, inappropriate legislative frameworks, overlapping jurisdictions, inadequate funding and insufficient capacity are characteristics of government frameworks in Myanmar. As a result, the government institutions mandated to conserve biodiversity are unable to discharge their duties effectively. There is an urgent need for capacity strengthening for key institutions, improved coordination among institutions, and provision of accurate data on which informed management decisions can be made.

Non-governmental frameworks

In addition to government institutions, a number of other organisations are currently engaged in biodiversity conservation in Myanmar or have the potential to play a significant role. These organisations include local and international NGOs, local and international academic institutions, grassroots organisations and private businesses.

Local NGOs

In common with several other countries in mainland South-East Asia, relatively few local NGOs have been established in Myanmar to date. Of these, only a small number are currently engaged in biodiversity conservation. Most local conservation NGOs have been established by retired officials from the Ministry of Forestry, whose political connections enable them to operate with some degree of independence from government. At present, the ability of these NGOs to engage in biodiversity conservation is constrained by an unclear legal basis for local NGO establishment and operation, and severely limited funding opportunities.

Box 6: Organisational profile of BANCA

Khin Ma Ma Thwin, Biodiversity and Nature Conservation Association

The Biodiversity and Nature Conservation Association (BANCA) is a non-profit, non-political, non-religious and indigenous environmental NGO in Myanmar. BANCA was officially recognised by the Ministry of Home Affairs on 18 June 2004, with the registered charity number 1883, and is currently one of only a very few environmental NGOs functioning in the country. BANCA's mission is the "conservation of nature, primarily biological diversity, through actions based on research and surveys, advocacy, networking, partnership, education and public awareness". BANCA strongly believes in linking conservation programmes to community development.

Since its establishment, BANCA has carried out a number of conservation activities, often in close collaboration with BirdLife International. BANCA is now working towards becoming a member of the BirdLife International Partnership. BANCA is also looking forward to closer collaboration with other international scientific organisations and local environmental NGOs. BANCA's significant achievements to date include:

1. Surveying and investigating the status of endemic and other birds in the Eastern Himalayas Endemic Bird Area in 2004 and 2005.
2. Rediscovering Gurney's Pitta *Pitta gurneyi* in Tanintharyi Division in 2003.
3. Discovering the largest remaining patch of Gurney's Pitta habitat in the world - Ngawun Reserve Forest - in 2004.
4. Assisting the Forest Department of Myanmar to extend the notified Lenya National Park to include Ngawun Reserve Forest (on-going).
5. Identifying Important Bird Areas (IBA) in Myanmar, and preparing a preliminary national list.
6. Preparing a database of all Myanmar's birds, including both previous and new records.
7. Writing and publishing a comprehensive, local-language field guide to the birds of Myanmar.
8. Conducting, since 2002, annual surveys for Pink-headed Duck *Rhodonessa caryophyllacea*, a species feared to be globally extinct.
9. Building shelters to prevent wild fires at Natmataung National Park (with PRCF).
10. Helping rediscover and maintain weaving traditions in western Chin State (with PRCF).
11. Giving lectures to university teachers, postgraduate students and tour guides about birdwatching and bird conservation.
12. Building nurseries and water tanks, providing seedling and raising awareness in four villages around Natmatuang National Park, linked to community conservation actions.

Box 7: Organisational profile of FREDA

U Ohn, Forest Resources, Environment, Development and Conservation Association

The Forest Resources, Environment, Development and Conservation Association (FREDA) is a non-political, non-profit and non-government organisation founded in 1996. It is currently composed of over 350 members from various disciplines, comprising foresters, biologists, veterinary scientists, engineers, journalists, businessmen and students with an interest in community development and environmental conservation. FREDA is governed by a 15-member Central Committee, whose Executive Committee oversees day-to-day operations. The existing Executive Committee consists of retired Director Generals and Directors of the Forest Department, and a retired General Manager of Myanmar Timber Enterprise. Since FREDA is strictly a non-government organisation, all citizens of Myanmar over the age of 18 years who are not in active service with the government are eligible for membership.

FREDA is primarily a forestry-based environmental organisation. Its main objectives are to assist sustainable forest management, conservation of wildlife and the natural environment, capacity building and community development, through integrated community-participatory projects with emphasis on poverty alleviation and environmental restoration at grassroots levels.

In collaboration with international NGOs, FREDA is presently engaged in the implementation of the following activities:

1. The Surviving Together Programme to protect wildlife at Alaungdaw Kathapa National Park; supported by the David Shepherd Wildlife Foundation (DSWF), UK.
2. Study on Sustainable Forest Management based on Community Participation through Development of Economic Incentives and Capability of Community Organisations to help alleviate rural poverty and establish community forests in Kalaw township, Shan State; in collaboration with the Japan Overseas Forestry Consultants Association (JOFCA).
3. Mangrove Reforestation Project in Bogalay Township of Ayeyarwady Delta to restore depleted mangrove forest areas and improve livelihoods of local communities by establishing community forests with people's participation; in collaboration with Action for Mangrove Reforestation (ACTMANG), Japan.
4. Community Development Programme in Kalaw Township, Shan State to improve income, health, education and environment of the ethnic community; supported by Georg Kraus Stiftung of Germany.
5. Human Resource Development Programme to support outstanding scholars of local universities studying for BSc, MSc and PhD in various fields related to natural environment, supported by the Nagao Natural Environmental Foundation of Japan.

Box 8: Organisational profile of MBNS

Zar Yin Yin Win, Myanmar Bird and Nature Society

Myanmar Bird and Nature Society (MBNS) is a non-profit organisation dedicated to protection, research and education related to birds and nature for future generations. It was formed on 1 January 2000 and has since been officially registered with the charity number 1867. As of April 2005, MBNS had 470 members.

The objectives of MBNS are to:

- support the conservation aims of Myanmar;
- support the conservation of birds and their habitats;
- develop an interest in and love for birds and nature among the younger generation;
- cooperate internationally in the field of birds and nature;
- educate people about the conservation of birds and nature;
- conduct research on Myanmar's birds;
- build closer relationships among bird lovers;
- maintain Myanmar's heritage and improve Myanmar's development for the younger generation;
- improve birdwatching and ecotourism business.

Recent achievements of MBNS include the following:

1. Conducting an educational programme in 971 schools throughout the country, since 2002, with the cooperation of teachers and staff of the Ministry of Education, Ministry of Forestry and other ministries.
2. Coordinating Wetlands International's Asian Waterbird Census in Myanmar since 2001, and conducting avifauna surveys in many states and divisions.
3. Holding birdwatching activities to sites in Myanmar, since October 2004, as part of MBNS's public education activities.
4. Holding basic birdwatching courses (theoretical and practical) twice in a year since 2004.
5. Publishing educational handouts on birds, turtles, butterflies, flowers, wetlands and coral reefs.
6. Cooperating with the Department of Zoology of Yangon University to give a talk on "Knowledgeable Tips on Avifauna" in July 2000.
7. Inviting Mr Anthony Sebastian of Aonyx Environmental, Malaysia, to give a talk on "Using Barn Owls as a Biological Control Agent to Control Rat Damage in Rice Fields" at the Plant Protection Division, Ministry of Agriculture and Irrigation, in November 2001.
8. Inviting Dr Daniel Henning, former Professor Emeritus at Montana State University, to give a talk on "New Environmental Education" at the People's Park, Yangon, in December 2003.
9. Participating with the Nature and Wildlife Conservation Division for the "First Myanmar Bird Show" at the Forest Department in March 2002.
10. Organising a booth on "Correlation between Birds and Environment" using computer technology at the opening ceremony of the University of Maubin, in July 2003.
11. Organising a booth on "Bird and Nature Conservation" at the Myanmar Floriculturist Association's 10th Anniversary at the People's Park, Yangon, in December 2003.
12. Organising a booth on "Bird and Nature Conservation" at Education Fairs of the Ministry of Education in December 2003 and December 2004.
13. Organising an exhibition at the Diplomatic School in Yangon in March 2005.
14. Publishing regular newsletters since October 2002.

The local NGO with the largest programme of conservation activities in Myanmar is the Forest Resources, Environment, Development and Conservation Association (FREDA), which was established by retired staff from the Ministry of Forestry and Myanmar Timber Enterprise. FREDA is currently implementing a number of pilot projects on sustainable forest management, and mangrove protection and rehabilitation, in collaboration with several Japanese NGOs. In addition, FREDA is playing a leading role in the *Surviving Together Programme* at Alaungdaw Kathapa National Park, a collaborative project with the Forest Department, WildAid and the David Shepherd Wildlife Foundation (DSWF). FREDA's role in this project includes implementing conservation outreach activities and promoting alternative income generating activities for local communities.

Another local NGO engaged in biodiversity conservation is the Biodiversity and Nature Conservation Association (BANCA). BANCA's programme is focused on bird conservation, and includes a number of collaborative projects with BirdLife International, including the inventory and conservation of IBAs (including two Darwin-Initiative-funded projects), and the publication of a local-language field guide on the birds of Myanmar. Other recent activities of BANCA have included vulture surveys in Shan State. BANCA has recently applied to join the BirdLife International Partnership.

A third local NGO engaged in biodiversity conservation is Myanmar Bird and Nature Society (MBNS), which has a programme focused on protection, research and public education related to birds and nature. MBNS has implemented a number of conservation projects, including a study on the ecology of White-browed Nuthatch at Natmataung National Park, an environmental awareness programme for primary schools in Yangon, and a national bird festival.

There are a number of other local NGOs in Myanmar, many of which have a principal focus on rural development or health. Several of these organisations are active in the natural resources sector, for example: Friends of Rainforests in Myanmar, which is working on environmental protection, poverty reduction, education and health promotion, and promotion of renewable energy; and the Renewable Energy Association Myanmar, which is working on promoting renewable energy sources, including fuelwood substitution and biogas use. These organisations could make important contributions to biodiversity conservation, particularly by addressing threats arising from unsustainable natural resource use by local communities.

International NGOs

Compared with most other countries in mainland South-East Asia, relatively few international NGOs are active in Myanmar, and most of these are working on health and rural development. However, several of these NGOs are involved in natural resource management, including CARE Myanmar, which promotes community forestry, and World Concern, which works on agro-forestry and family forest projects. There are many opportunities to involve such NGOs in biodiversity conservation, including through promoting grassroots involvement in natural resource management.

In addition to international NGOs with a health/rural development focus, recent years have witnessed a gradual increase in the number of international conservation NGOs working in the country. The first international conservation NGO to establish a programme in Myanmar was WCS in 1993. Since its establishment, the WCS Myanmar Program has conducted wildlife surveys across the country, provided training for government staff in biodiversity survey techniques, and supported the conservation of selected species. The major achievements of the WCS Myanmar Program during this period have included preparing a *National Tiger Action Plan for the Union of Myanmar* (Lynam 2003), and promoting the establishment of new protected areas, including Hkakaborazi National Park, Htamanthi Wildlife Sanctuary, Hukaung Tiger Reserve and Lampi Island Marine National Park.

Box 9: Organisational profile of WCS in Myanmar

U Than Myint and Madhu Rao, Wildlife Conservation Society

The Wildlife Conservation Society (WCS) Myanmar Program was established in 1993, following the untiring efforts of Dr Alan Rabinowitz, who played a key role in obtaining the first Memorandum of Understanding between WCS and the Ministry of Forestry. At the time, WCS hoped primarily to achieve two goals. First, WCS hoped to help build capacity of the Nature and Wildlife Conservation Division (NWCD), the unit within the Ministry of Forestry responsible for protection and management of protected areas and wildlife in the country. Second, working in close collaboration with the Ministry of Forestry, WCS sought to assist in the expansion of the protected area system to cover 5 to 10% of the national land area, in fulfilment of an official mandate.

Extensive field expeditions, jointly implemented by WCS and NWCD, assisted the establishment of four protected areas: Lampi Island Marine National Park (204 km²), Hkakaborazi National Park (3,812 km²); Hponkanrazi Wildlife Sanctuary (2,704 km²); and Hukaung Tiger Reserve (21,890 km²). Thus, over a nine year period, the protected area system grew from previously covering less than 2% of the land area in 1995 to covering approximately 7% in 2004. Expeditions also led to the discovery of four new mammal species for Myanmar: Stone Marten *Martes foina*; Blue Sheep *Pseudois nayaur*; Black Muntjac *Muntiacus crinifrons*; and Leaf Deer *M. putaoensis*. Leaf Deer was a new species to science, and among the smallest, most primitive deer in the world.

In an attempt to enhance the effectiveness of the existing protected area system, WCS provided infrastructural support to selected sites, such as Htamanthi Wildlife Sanctuary and Meinmahla Kyun Wildlife Sanctuary, and trained park staff from throughout Myanmar in wildlife management techniques. The development of the *National Tiger Action Plan* in May 2003 was a significant outcome following a three-year project involving Tiger surveys throughout the country. Since 1998, WCS has focused on developing a network of four protected areas in northern Myanmar, resulting in the creation of one of the largest contiguous blocks of protected areas in mainland South-East Asia, covering an area of 30,269 km².

Over the years, in response to changing needs, WCS has diversified its portfolio of activities. Projects have focused on surveys for species of conservation concern, such as Tiger *Panthera tigris*, Hoolock Gibbon *Bunipithecus hoolock*, Irrawaddy Dolphin *Orcaella brevirostris* and various species of herpetofauna. Hunting for subsistence and wildlife trade is a critical threat to wildlife and habitats in many parts of Myanmar. WCS has begun studies in northern Myanmar to help design effective strategies to address this problem. In continuing efforts to help build capacity to manage biodiversity, WCS has implemented a small grants programme for conservation-related research, and recently initiated collaborations with Yangon University and the Department of Fisheries.

With high levels of biodiversity and some of the largest expanses of natural forest remaining in the region, Myanmar offers tremendous potential for proactive conservation. With continued support from the Ministry of Forestry, WCS will continue to forge new collaborations and use diverse approaches to help achieve effective conservation in Myanmar.

Box 10: Organisational profile of PRCF

L. Fernando Potess, People, Resources, and Conservation Foundation

The People, Resources, and Conservation Foundation (PRCF) is a non-government, non-profit, and non-membership organisation incorporated under Section 501(c)(3) of the United States Internal Revenue Code. Established in 1996, the goal of PRCF is to strengthen local participation in the conservation of biodiversity and ecosystem functions, through measures that address the protection and wise use of natural resources and the socio-economic development of affected communities.

PRCF endeavours to implement biodiversity conservation programmes that target particular species or habitats, and community-based programmes that target rural people in developing countries, particularly communities living adjacent to protected areas, remnant forests and degraded lands and grasslands. Through its conservation and development work, PRCF fosters activities with potential to sustain the natural environment and uphold the cultural or social identity of rural communities. PRCF programmes and policies, therefore, encourage local people to preserve and enhance their self-respect and identity.

PRCF maintains that the participation of local people will determine the success of nature conservation and community development programmes. Local communities are, therefore, strongly encouraged to participate in all aspects of PRCF projects, including surveys, planning, implementation, monitoring and evaluation. This participatory emphasis, combined with the long-term experience of PRCF personnel, enables the development and implementation of innovative and site-specific management strategies that involve, empower and benefit local stakeholders on the one hand, and conserve biological resources on the other.

Areas of work that are of particular interest to PRCF include:

1. Activities and research that focus on the conservation of target species (i.e. threatened species, poorly studied and supported species, and species of importance to rural livelihoods).
2. Activities and research that focus on the conservation and protection of key habitats.
3. Approaches that encourage and support community-based conservation efforts.
4. Measures that link resource conservation and management with community socio-economic development.
5. Efforts to develop and enhance environmental conscience among resource users.
6. Programmes that encourage community self-reliance and the maintenance or revitalisation of ancestral cultural arts and ethnic identities.

PRCF provides core technical and material support to individual PRCF Country Programmes, with a view to them becoming self-sustaining in the long-term. At present, the bulk of PRCF activities are in Indonesia and Vietnam, while field activities are being initiated in Myanmar and Cambodia. Envisioned expansions for 2005 include a Country Programme in Lao PDR.

PRCF's activities in Myanmar include:

1. Natmataung National Park fire control shelters (initiated in 2004).
2. Hoolock Gibbon conservation status review (planned for 2005).
3. Sustainable livelihoods through community-based ecotourism and conservation in the Natmataung National Park landscape (planned for 2005).
4. Cultural arts restoration and biodiversity conservation at Kyauk Pan Taung (planned for 2006).

Between 1994 and 2000, WCS implemented a programme of wildlife field research and conservation training for NWCD staff, using a Burmese translation of a training handbook (Rabinowitz 1997). A third of the division's staff were trained through this programme. WCS has also conducted 13 biological surveys and expeditions, including turtle surveys in the Central Dry Zone and crocodile surveys at Meinmahla Kyun Wildlife Sanctuary, and provided research grants to students, researchers and Forest Department staff.

Current activities of WCS in Myanmar include a programme of targeted research and protection at Hkakaborazi National Park, Hponkanrazi Wildlife Sanctuary and Hukaung Tiger Reserve. WCS is involved in research related to human influence especially hunting in forests, is assisting in the preparation of management plans for protected areas in northern Myanmar, and is promoting the establishment of a 2 million ha Tiger Reserve in the Hukaung Valley.

Another international conservation NGO active in Myanmar is WildAid, which has been supporting conservation activities in the country since 1996. Until its completion in 2003, the focus of WildAid's work in Myanmar was the *Surviving Together Programme* at Alaungdaw Kathapa National Park, a collaborative project with FREDa, DSWF and the Forest Department. This project combined strict law enforcement with environmental outreach activities among local communities outside the protected area, in order to strengthen the capacity of management staff, and address illegal hunting, logging and trade of wildlife.

BirdLife International has been active in Myanmar since 2002, as part of its Indochina Programme, and has a rapidly expanding project portfolio. BirdLife and BANCA are currently implementing a Darwin-Initiative-funded project promoting IBA identification and conservation in the Eastern Himalayas EBA and the Peninsular Thailand Lowland Forests SA. Efforts are currently focused on promoting the establishment of an enlarged Lenya National Park in Tanintharyi Division, with support from the GCF and the British Birdwatching Fair. In collaboration with BANCA, BirdLife has already published a local-language guide to the birds of Myanmar and a provisional list of IBAs. In 2005, BirdLife will embark on a second Darwin-Initiative-funded project to promote conservation research on Gurney's Pitta.

Other international conservation NGOs are also active in Myanmar, in collaboration with local NGOs, academic institutions and/or government institutions. The International Crane Foundation has conducted surveys for Sarus Crane in the Ayeyarwady Delta, and is currently supporting the graduate studies of a researcher from Myanmar at the Wildlife Institute of India. The Wild Bird Society of Japan (the BirdLife Partner in Japan) has been involved in a Government-of-Japan-implemented, five-year wetland conservation programme, and a now-completed project to promote Myanmar's accession to the Ramsar Convention.

Myanmar is one of the few countries in mainland South-East Asia where IUCN does not currently have a programme. However, a number of the specialist groups of the IUCN Species Survival Commission have been involved in conservation initiatives in the country, including the Asian Elephant Specialist Group, which has provided training for government staff in elephant biology and census techniques, and the Asian Rhinoceros Specialist Group, which has invited government staff to participate in regional training courses. Similarly, WWF does not currently have a programme in Myanmar, although the country has been included within a number of regional initiatives, including the development of a strategy for ecoregion-based conservation in the Eastern Himalayas, which was a collaborative project with the International Center for Integrated Mountain Development (ICIMOD) (WWF and ICIMOD 2001). ICIMOD has also been involved in a number of other conservation initiatives in Myanmar under its Biodiversity Conservation in the Eastern Himalayas Programme, including sponsoring a meeting on regional collaboration for the conservation of the Hkakaborazi mountain ecosystem.

In addition to conservation NGOs, a number of international NGOs with a principal focus on forestry are active in Myanmar, including the Japanese International Forestry Promotion and Cooperation Centre (JIFPRO), the Japanese Overseas Forestry Consultant Association (JOFCA) and Action for Mangrove Reforestation (ACTMANG). JIFPRO and JOFCA are collaborating with the Forest Department and FREDa to restore degraded forest lands and develop models for sustainable forest management, while ACTMANG is working in collaboration with FREDa to protect and rehabilitate mangrove ecosystems in the Ayeyarwady Delta.

Local academic institutions

Foremost among the local academic institutions active in biodiversity conservation in Myanmar are universities. Yangon University, for instance, is currently implementing a number of collaborative projects with international academic institutions. The staff and research students of universities are well positioned to make important contributions to biodiversity conservation, including conducting baseline biodiversity surveys and studying the ecology of globally threatened species. Presently, however, the contributions they are able to make are constrained by lack of technical capacity. There is an urgent need to modernise biodiversity conservation curricula at universities, through introduction of cutting-edge ideas and approaches. Without such investment, it will be difficult to develop a cadre of well trained individuals capable of managing the country's biodiversity.

In addition, there are a number of academic and scientific research institutes in Myanmar with a mandate to study forestry and wildlife, such as the University of Forestry and the Forest Research Institute. These institutes belong to the Ministry of Forestry and face similar constraints to those mentioned above.

Box 11: Supporting university-led conservation in Myanmar

Jake Brunner, Conservation International

In 2004, Conservation International (CI), with seed funding from the Blue Moon Fund and in collaboration with the Smithsonian National Zoological Park, started to engage potential partners in Myanmar on a university-led research and conservation programme focusing on Priority Species identified at the stakeholder workshops in August 2003 and July 2004. Of these priorities, the partners will concentrate on heavily hunted endemics, such as Burmese Roofed Turtle *Kachuga trivittata* and Burmese Star Tortoise *Geochelone platynota*. This activity forms part of a broader effort to train and nurture early career conservationists and future conservation leaders across the Indo-Burma Hotspot. Programme implementation in Myanmar requires a U.S. Government license, which CI has applied for.

International academic institutions

In addition to local academic institutions, a number of academic institutions based outside of Myanmar are also active in the country. The Smithsonian Institution, based in the US, has been active in Myanmar since 1994, in collaboration with government institutions and other partners. The main focus of the Smithsonian Institution's work in Myanmar has been biodiversity inventory and applied conservation research, including inventories of the botanical and herpetological diversity of Myanmar, ecological studies of Eld's Deer, baseline biodiversity surveys of Chatthin Wildlife Sanctuary, and a nationwide spatial analysis of forest-cover change. The Smithsonian Institution has also provided training in biodiversity survey for government staff, and is currently initiating a National Elephant Survey.

Another US academic institution active in Myanmar is CAS, which is involved in a number of biodiversity inventory projects, including an inventory of freshwater fish, in collaboration with individual researchers from the Swedish Museum of Natural History (Kullander *et al.* 2004). Other academic institutions active in Myanmar include the Harrison Institute, a UK-based academic institution specialising in the study of mammals and birds, which recently implemented a Darwin Initiative project in Myanmar. The objectives of this project were to describe and map the distribution of limestone-karst-dependent bats in Myanmar and build the capacity of Yangon University in bat research and conservation.

Box 12: Studying limestone-karst-dependent bats in Myanmar

Paul J. J. Bates, Harrison Institute, and Daw Tin Nwe, Yangon University

In June 2000, the Harrison Institute and Yangon University signed a Memorandum of Understanding to promote collaborative biodiversity studies and help increase scientific capacity within Myanmar. In 2002, the two organisations were awarded a Darwin Initiative grant, funded by the UK Government, to undertake a programme of bat studies. The first phase was completed in March 2005.

The purpose of the programme was to ensure that Myanmar fulfilled its potential in conserving its rich bat fauna, including globally threatened species. The principal objectives were to describe and map the distribution of karst-dependent bat taxa and establish, within Yangon University, a centre of expertise in bat research and conservation. Over the three years, project outputs included: seven field surveys; training eight Myanmar students to PhD level; hosting an international bat workshop at Yangon University; participating in six international conferences; facilitating Mandalay University to develop a second centre of bat expertise; and writing eight scientific papers. Four of these papers have been published with the remainder in preparation or submitted.

The programme added greatly to the knowledge of Myanmar's bat fauna. Nine species previously not recorded from the country were collected, including one, Kachin Woolly Bat *Kerivoula kachinensis*, new to science. A number of sites, habitats and species were identified as priorities for conservation. A study of echolocation by cave-dwelling bats has been used to help develop an identification system based on acoustic signals. This has the potential to become a useful tool for future biodiversity assessments both within Myanmar and elsewhere in South-East Asia. Data have been gathered on the diet, morphology and taxonomy of bats and on their relationship with man.

So what of the future? The programme established that Myanmar can play a significant role in bat conservation, including for species that are globally threatened. Funds have been secured for several follow-up activities:

- a study of the Endangered Kitti's Hog-nosed Bat *Craseonycteris thonglongyai*;
- an analysis of the social and economic role of the free-tailed bat *Tadarida plicata* in the guano industry; and
- development of a regional network of bat taxonomists in South-East Asia.

Perhaps the greatest limitation remains on how to translate research results into active conservation in the field. Currently, in Myanmar, most bats are not immediately threatened with extinction. Nevertheless, it is clear that increased economic activity, for example the extraction of limestone for the cement industry, may be a particular threat in the future. There is also a threat from rapid deforestation in many areas. In addition, increasing human activity is a problem at some roosting sites. This activity includes the hunting of bats for sport and food, and the disturbance of bats by pilgrims and tourists visiting the caves. At some stage, difficult compromises will need to be made between the aspirations of man and the needs of wildlife, if the conservation of bats and the other rich but fragile biodiversity associated with Myanmar's limestone karst is to be achieved.

Grassroots organisations

Various grassroots organisations in Myanmar have the potential to make a significant contribution to biodiversity conservation, particularly through engaging and empowering local communities. Many grassroots organisations have been established by the government and, in effect, represent extensions of government institutions. Other grassroots organisations have been established with the support of donor-funded projects or are indigenous institutions, and have varying degrees of autonomy from government. Grassroots organisations established through donor-funded projects include groups that have formed for common livelihood activities, such as savings and loans, income generation, extension of agricultural technologies, and establishment of tenure for community forests under the Community Forest Instructions. The self-reliance groups established under UNDP's integrated community development projects are an example of such organisations. Indigenous grassroots organisations include village councils and traditional natural-resource-user groups, and are particularly important in certain ethnic minority communities.

Another category of grassroots organisation in Myanmar is faith-based organisations. These organisations can provide strong focal points for discussion of attitudes about environment, and actions to promote biodiversity conservation. For example, Buddhist monks have been engaged in conservation activities at Alaungdaw Kathapa National Park, while Young Men's Christian Association leaders have been trained in and are promoting environmental conservation, including the application of community forestry.

Private businesses

To date, there has been limited engagement in biodiversity conservation by the private sector in Myanmar. There is some involvement of local businesses in conservation, however, in the form of small-scale support to local NGOs by tourism companies, for example the support provided to MBNS by SST Tourism. In the future, as the private sector in Myanmar develops, it is likely that opportunities to engage local businesses in conservation will increase. One private company with a direct involvement in the environment sector is the Economic and Development Association (EcoDev), a local consultancy firm that provides a link between donor agencies and rural communities. EcoDev is a service provider to both UNDP and FAO, and has been involved in the implementation of community-based natural resource management and environmentally sustainable food security activities in the Central Dry Zone.

Legislative and protected area frameworks

Myanmar has a long history of formal protected area management, dating back to the designation of a wildlife sanctuary near Mandalay in 1859 (Clarke 1999). The present national protected area system dates from 1918, when Pidaung, Shwe U Daung and Pyin Oo Lwin Wildlife Sanctuaries were designated (Clarke 1999).

For most of the 20th Century, the Forest Act of 1902 and the Wildlife Protection Act of 1936 provided the legal basis for wildlife protection and protected area management in Myanmar. In 1994, wildlife protection and protected area management regulations were overhauled with the passing of the Protection of Wildlife and Protected Areas Law. The objectives of this law included to protect wild animals and plant, conserve natural areas, and fulfil Myanmar's obligations under international agreements. The law recognised seven categories of protected area: scientific nature reserve; national park; marine national park; nature reserve; wildlife sanctuary; reserve of geophysical significance; and other nature reserve designated by the minister (Clarke 1999). However, the existing protected area network does not include any examples of three of these categories.

Another piece of recent legislation related to biodiversity conservation is the Forest Act of 1992, which explicitly links forestry management with social and environmental considerations. The Forest Act is complemented by the 1995 National Forest Policy, which emphasises the need to integrate the goals of timber production, and wildlife and environmental conservation (Rao *et al.* 2002).

In line with the National Forest Policy, a number of new protected areas have been designated or formally proposed over the last decade, including Bumphabum and Hponkanrazi Wildlife Sanctuaries, Hukaung Tiger Reserve, and Lenya and Tanintharyi National Parks. These additions have brought the number of sites in Myanmar designated or officially proposed for protection to 38 (Lynam 2003), covering 7% of the national land area (M. Rao *in litt.* 2004). The proportion of Myanmar's national land area included within protected areas is relatively low compared with Cambodia, Lao PDR, Thailand and Vietnam, which, collectively, have more than 13% of their area in national protected area systems (ICEM 2003). However, the National Forest Policy sets a target to expand the national protected area system to eventually cover 10% of the national land area.

The 38 designated and officially proposed protected areas comprise five national parks, one marine national park, 20 wildlife sanctuaries, six bird sanctuaries, one wildlife park, one mountain park, one elephant range, one tiger reserve and two uncategorised protected areas. Apart from mountain park, elephant range and tiger reserve, the management regulations for each protected area category are fairly restrictive, with no human settlement or natural resource use permitted. In addition, there remains a lack of clarity on precisely which activities are allowed and prohibited in different protected area categories, representing a significant weakness in the legislation (Pant 1998).

The sizes of Myanmar's protected areas are broadly distributed. Some of the smaller protected areas may not be large enough to support long-term viable populations of key species or maintain full biotic communities. The larger protected areas, with their small resource bases, also present multiple management difficulties. Several protected areas contain large degraded areas of little conservation importance. There are a number of significant gaps in the national protected area system with regard to coverage of species and habitats. Coastal, riverine, deciduous dipterocarp forest and lowland wet evergreen forest ecosystems are severely under represented, while none of the extensive areas of limestone karst in the country are represented in the protected area system. Of the 15 conservation corridors in the country, only the Northern Mountains Forest Complex and the Upper Chindwin Lowlands are relatively well represented within protected areas.

In addition to weaknesses in protected areas legislation and gaps in the coverage of the system, there are major shortcomings in protected area management. An analysis of 20 designated protected areas in Myanmar by Rao *et al.* (2002) revealed that 40% had some management infrastructure but insufficient on-site personnel to adequately perform management activities. Only 35% of the protected areas studied had around half of their staff trained in basic field techniques. Other factors contributing to weak protected area management include insufficient commitment of protected area managers, local authorities and other enforcement agencies towards enforcement of management regulations, failure to effectively engage local communities in protected area management, and shortages of detailed biological and socio-economic information required to guide management. These problems can, however, be seen as investment opportunities. NGOs and academic institutions can make important contributions to strengthening protected area management in Myanmar, through capacity building, research, monitoring and promotion of community participation. There is also an important role for NGOs and academic institutions in promoting greater support for protected areas among key decision makers.

Regional agreements

Myanmar is a member of the Association of South-East Asian Nations (ASEAN). Although regional collaboration through ASEAN is increasing markedly, it is primarily related to economic development and international trade. In 1985, ASEAN adopted the Agreement on the Conservation of Nature and Natural Resources, which commits member states to: integrate conservation into development planning at all levels; integrate natural resource conservation into land-use planning processes; establish a coordinated network of protected areas; and promote the conservation of natural areas by private owners, communities or local authorities. This agreement presents an opportunity to forge further links among ASEAN member states for biodiversity conservation. To date, however, it has only been signed by Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand, and has not yet entered into force. A separate ASEAN agreement, the Declaration on Heritage Parks and Reserves, provides for the designation of ASEAN Heritage Parks and Reserves, a designation that recognises priority sites for regional conservation and management action.

With the support of the Governments of Japan and Australia, Wetlands International is coordinating the Asia-Pacific Migratory Waterbird Conservation Strategy (Asia-Pacific Migratory Waterbird Conservation Committee 2001). This strategy provides for the designation of networks of flyway sites of international importance for migratory shorebirds, cranes and Anatidae. These networks currently include 74 sites in 12 Asian countries, with new sites continually being added. To date, however, no sites in Myanmar have joined any of these networks.

Global conventions

Myanmar is signatory to a number of international agreements concerning biodiversity conservation and sustainable natural resource use. For the most part, however, Myanmar's commitments under these agreements have yet to be fully translated into effective conservation action.

Convention on International Trade in Endangered Species of Wild Fauna and Flora

CITES has been in operation since 1975 and, as of December 2004, had 167 parties globally. It was established to ensure that trade in wildlife and wildlife products is managed sustainably. It aims to regulate international trade in wildlife products through international cooperation, while recognising national sovereignty over wildlife resources. Two main Appendices list species that cannot be traded commercially (Appendix I) and species that can only enter international trade under specific controlled circumstances (Appendix II). Myanmar's accession to CITES on 13 June 1997 was highly significant, in light of the significance of the wildlife trade as a driving force for over-exploitation of wildlife populations in the country.

Convention on Biological Diversity (CBD)

The CBD has been effective since 1993, and, as of December 2004, had 188 contracting parties globally. Its objectives are the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources. It seeks to promote conservation of biological diversity in the wild, through requesting contracting parties to identify regions of biodiversity importance, establish a system of protected areas, restore degraded ecosystems, maintain viable populations of species in natural surroundings, and develop or maintain necessary legislation and/or other regulatory provisions for the protection of threatened species and populations. Myanmar ratified the CBD on 25 November 1994 but has not yet prepared an National Biodiversity Strategy and Action Plan, a commitment under Article 6 of the Convention.

World Heritage Convention (WHC)

The WHC has been effective since 1975, and, as of December 2004, had 178 contracting parties globally. The WHC's aim is to identify and conserve cultural and natural monuments and sites of outstanding universal value, implemented through the nomination of World Heritage Sites by national governments. Myanmar acceded to the WHC on 29 April 1994. To date, no sites in Myanmar have been inscribed on the list of World Heritage Sites, despite the fact that a number of sites clearly meet the criteria for nomination.

Ramsar Convention

Effective since 1975, the Ramsar Convention, officially known as the Convention on Wetlands of International Importance especially as Waterfowl Habitat, currently has 144 contracting parties. It provides a framework for international cooperation for the conservation and wise use of wetlands. As of December 2004, the contracting parties had nominated 1,401 Ramsar sites globally, covering a total area of 123 million ha. Myanmar acceded to the Ramsar Convention on 17 March 2005, nominating Moyingyi Bird Sanctuary as the country's first Ramsar Site. In addition to Moyingyi, Myanmar supports a large number of other wetlands that could also be nominated as Ramsar Sites.

Man and the Biosphere (MAB) Programme

The MAB Programme operates through National Committees and Focal Points among the United Nations Educational, Scientific and Cultural Organisation (UNESCO) member states. It aims to develop the basis, within the natural and the social sciences, for the conservation and sustainable use of biological diversity, and for the improvement of the relationship between people and their environment. An essential tool for the MAB programme is the network of Biosphere Reserves, which are areas of terrestrial and coastal ecosystems where solutions are promoted to reconcile biodiversity conservation with its sustainable use. Although Myanmar has established a National MAB Committee, it has yet to designate any Biosphere Reserves.

Convention on Migratory Species of Wild Animals (CMS)

The CMS, also known as the Bonn Convention, has been implemented since 1983, and, as of December 2004, had 88 contracting parties. Its objective is to protect migratory species that cross international borders, and it includes two lists of species (Appendices I and II). The convention requires parties to prohibit the taking of species on Appendix I, to reach agreements with other range states for the conservation and management of species on Appendix II, and to conserve and restore important habitats, remove impeding activities or obstacles, and tackle other factors that endanger Appendix I species. In common with many other countries in South-East Asia, Myanmar has yet to become a party to the convention or participate in any CMS agreement.

SITES 1



Shwesettaw Wildlife Sanctuary is a Priority Site in the Central Myanmar Dry Forests. It is notable for its populations of Eld's Deer *Cervus eldii thamin* and Burmese Star Tortoise *Geochelone platynota*. The site faces a number of threats, including conversion to cotton. Photo: J. C. Eames.



Natmataung National Park includes Mount Victoria (3,340 m asl), the highest mountain in the Chin Hills Complex. Deforestation due to shifting cultivation and associated forest fires is acute in many parts of this Priority Corridor, and threatens the integrity of this internationally important site. Photo: J. C. Eames.

SITES 2



Hponkanrazi Wildlife Sanctuary in the Northern Mountains Forest Complex is important because it supports largely intact vegetation over a wide altitudinal range, together with unspoiled riverine habitats supporting globally threatened species, such as White-bellied Heron *Ardea insignis*. Photos: J. C. Eames (top) and Nicolas Cornet (bottom).

SITES 3



Ngawun Reserve Forest and the adjacent (proposed) Lenya National Park are the two most important sites for the conservation of Sundaic fauna and flora now remaining in the Sundaic Subregion. Photo: J. C. Eames.



The conservation importance of the ox-bow lakes along the Tanai and Chindwin Rivers in the Upper Chindwin Lowlands Priority Corridor has only recently been revealed. They support one of the most important remaining populations of the globally Endangered White-winged Duck *Cairina scutulata*. Photo: J. C. Eames.

SITES 4



Rakhine Yoma Elephant Range is one of five Priority Sites located in the Rakhine Yoma Range Priority Corridor. The site supports a number of globally threatened species, including the Critically Endangered Arakan Forest Turtle *Heosemys depressa*, which is endemic to the corridor. Photo: U Tin Than/WWF Thailand.



Three Priority Sites were selected outside of the Priority Corridors because they support Burmese Star Tortoise *Geochelone platynota*, a Critically Endangered species endemic to Myanmar, bringing to 37 the total number of Priority Sites in Myanmar. Photo: Douglas Hendrie.