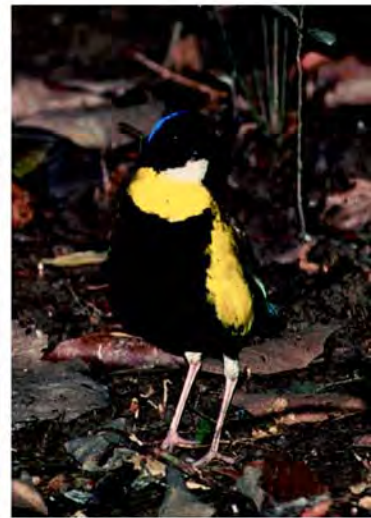


Myanmar

Investment Opportunities in Biodiversity Conservation

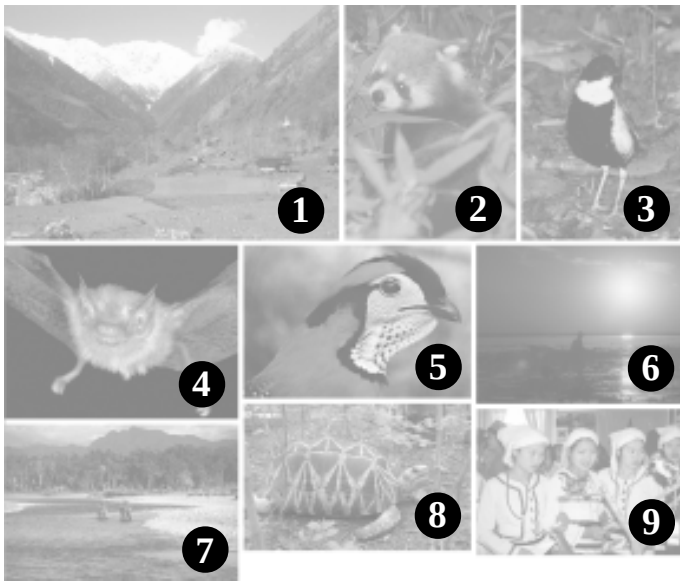


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MYANMAR

INVESTMENT OPPORTUNITIES IN BIODIVERSITY CONSERVATION

YANGON, NOVEMBER 2005

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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; Shweseztaw	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

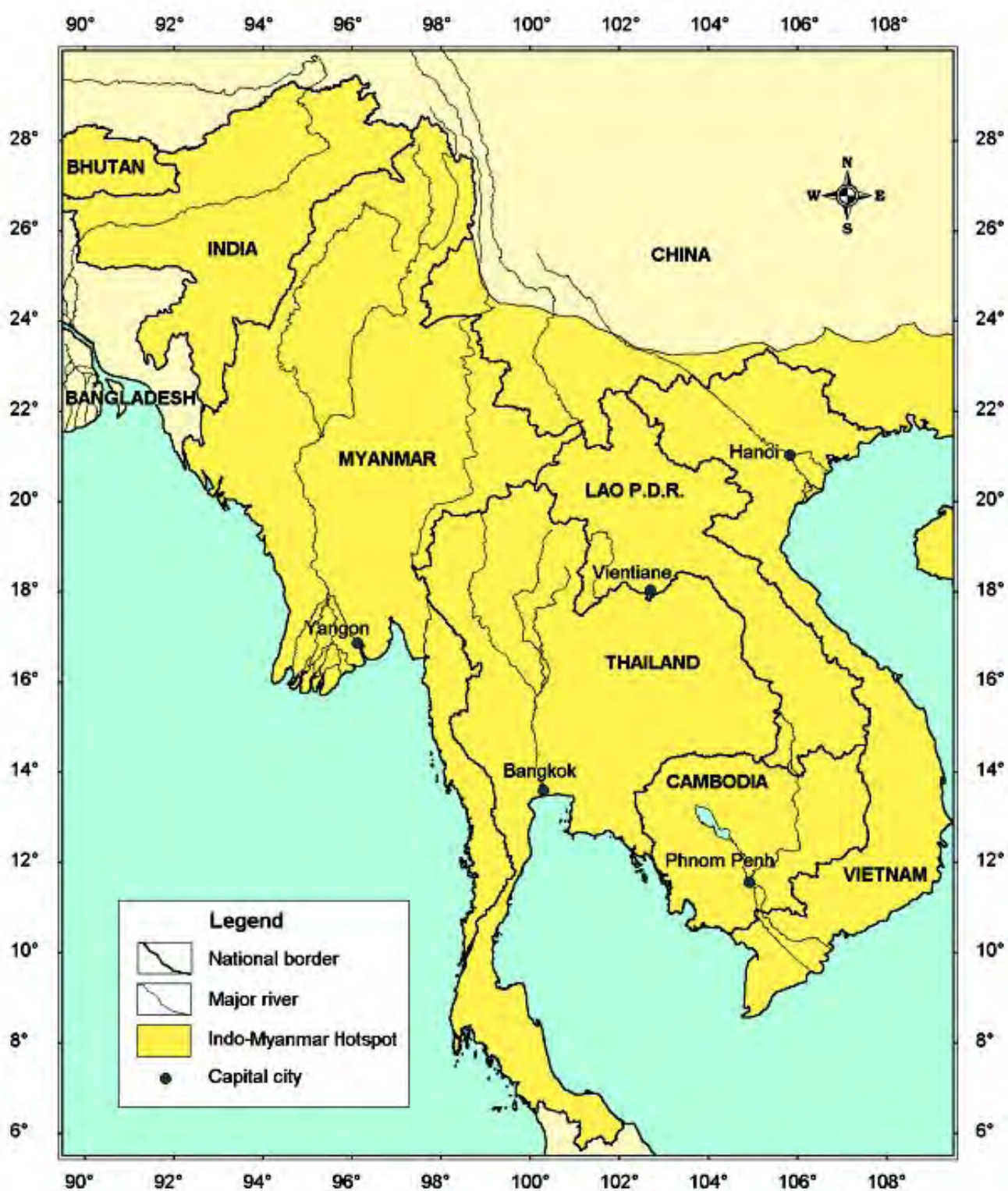


Figure 2. Endemic Bird Areas and Secondary Areas in Myanmar

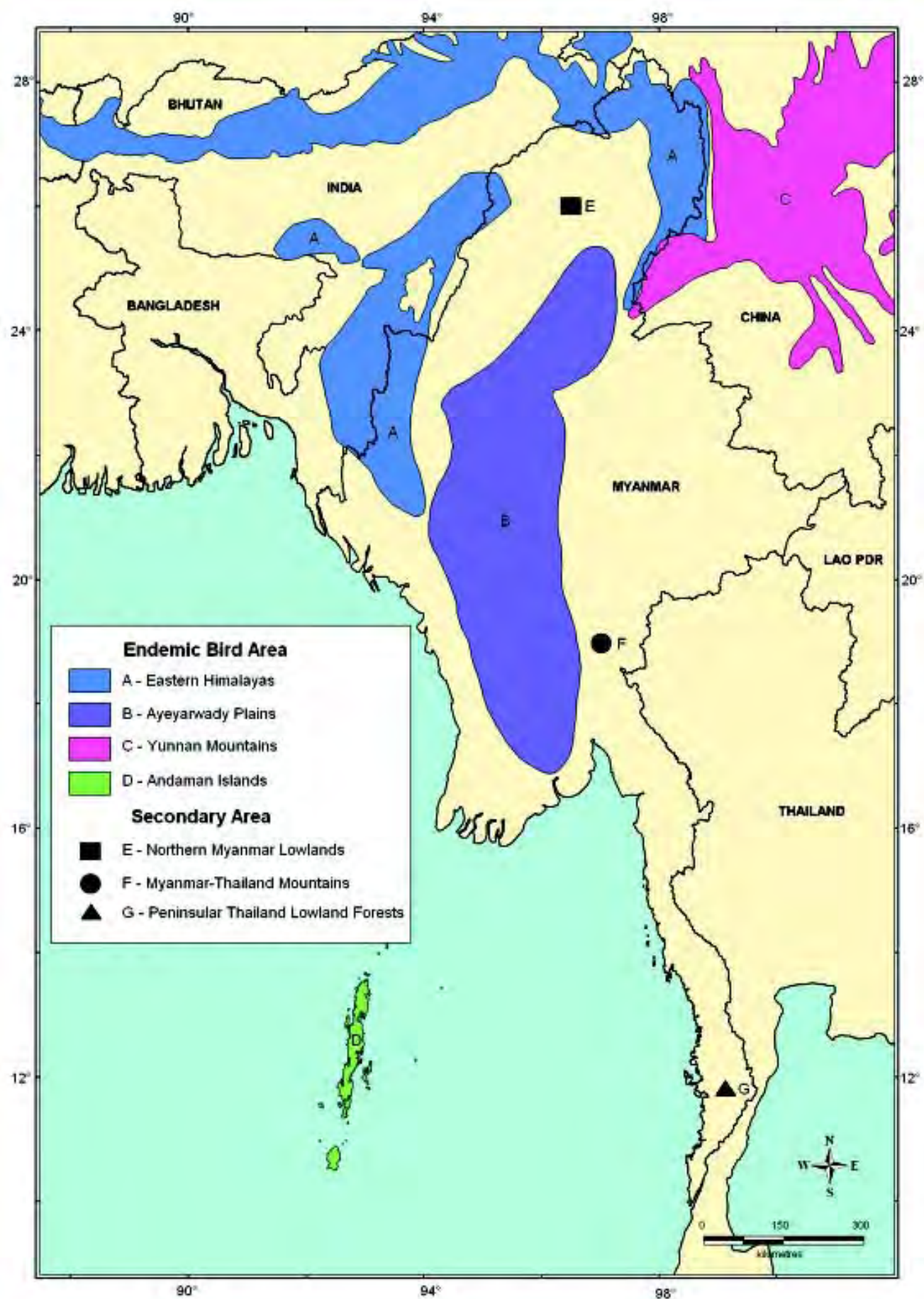


Figure 3. Site and Corridor Outcomes in Myanmar

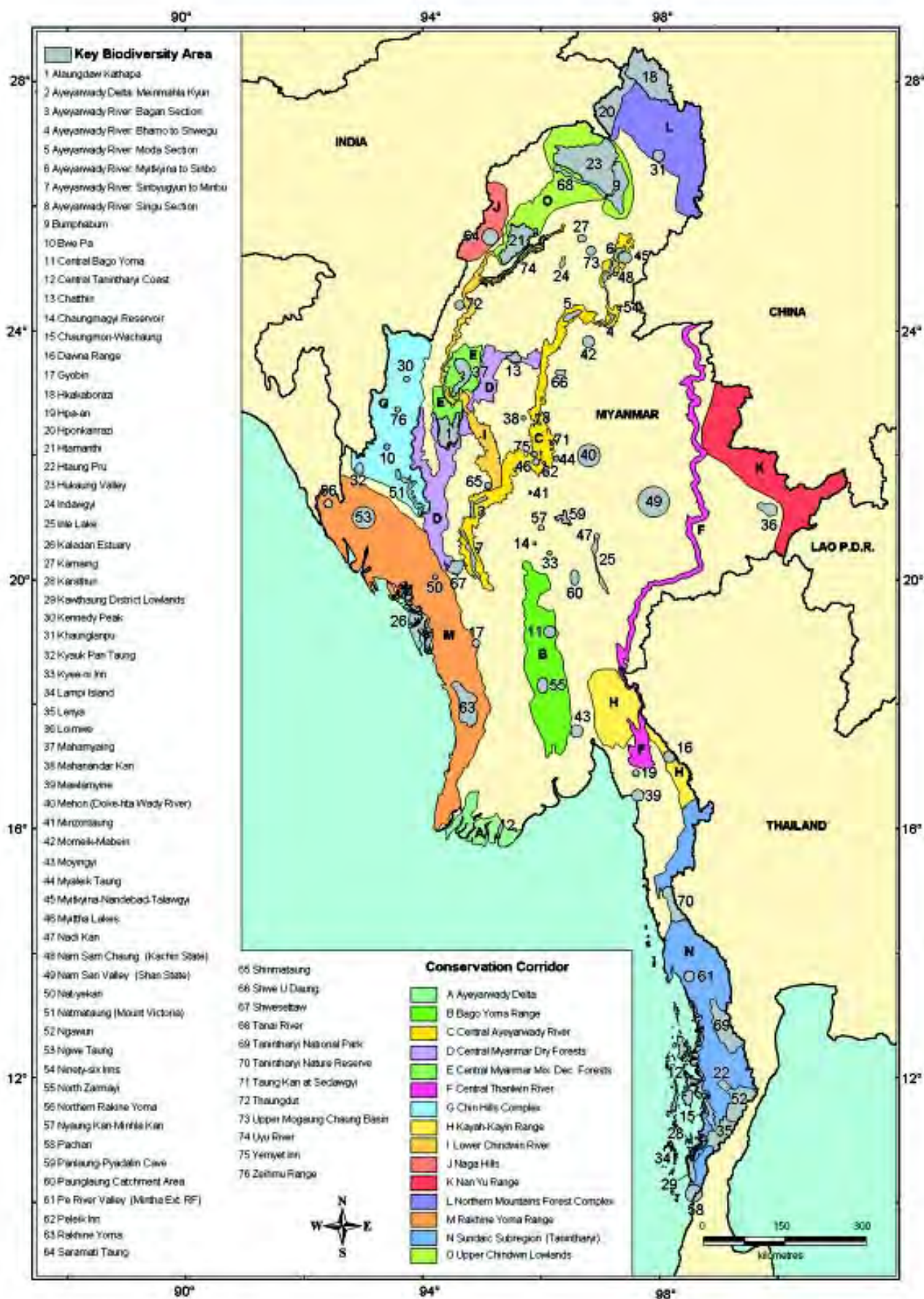
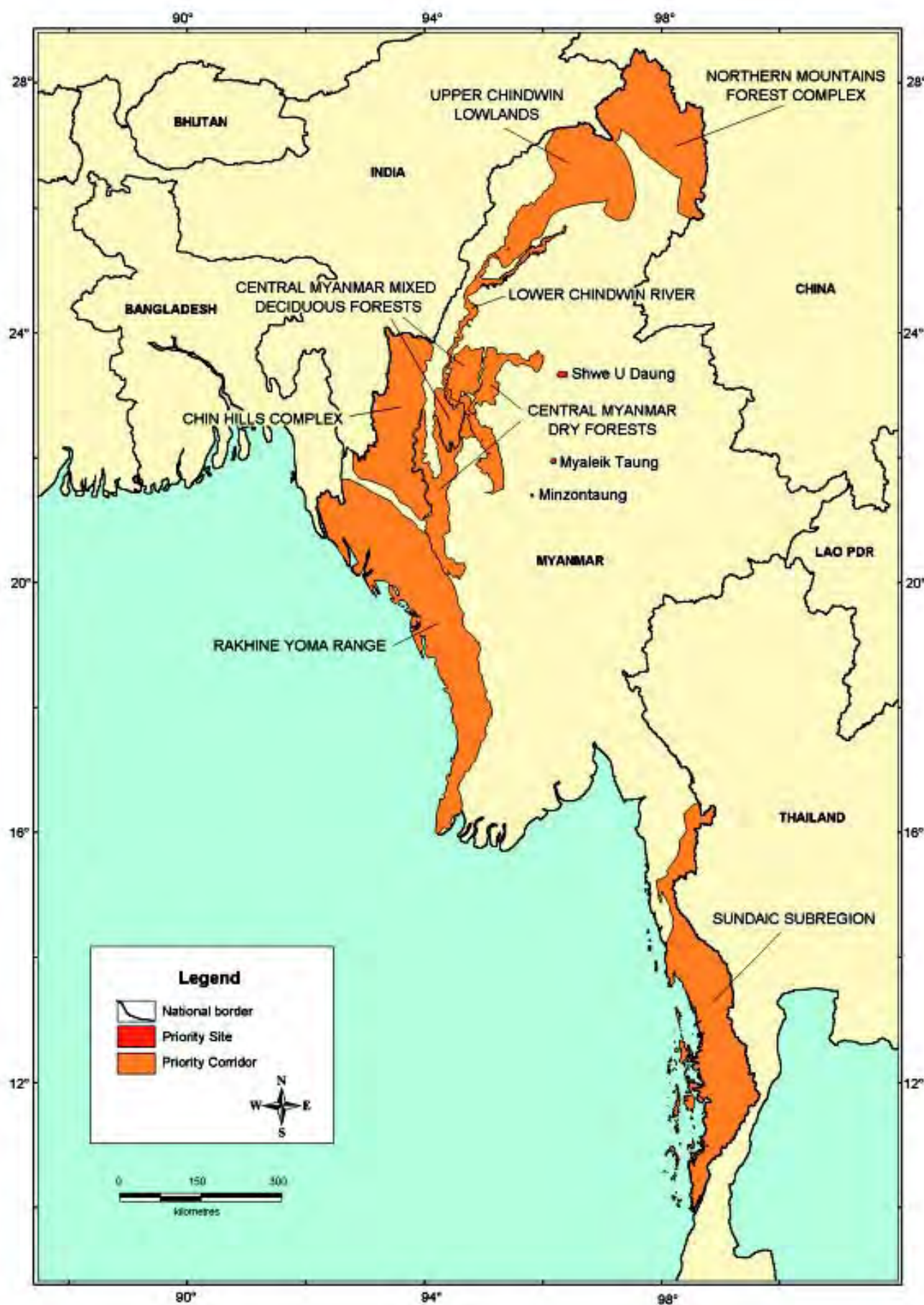


Figure 4. Priority Corridors and additional Priority Sites for conservation investment in Myanmar



မြန်မာနိုင်ငံတွင် ဇီဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်နိုင်ရန်အတွက် ဦးစားပေးသင့်သည့် ရင်းနှီးမြှုပ်နှံမှု အခွင့်အလမ်းများ

စာတမ်းအနှစ်ချုပ်

ရတောင့်ရဲခဲ ထူးခြားသည့်အခွင့်အလမ်း

ပင်ကိုသဘာဝ မပျက်စီးသေးသော တောတောင်ဒေသများ မြန်မာနိုင်ငံတွင်သာ တွေ့ရသော သားငှက်တိရစ္ဆာန်များတို့ကြောင့် ကမ္ဘာ့အတိုင်းအတာဖြင့် ထိန်းသိမ်းရန် အလွန် အရေးကြီးသည့် ဦးစားပေးဒေသတွင် မြန်မာနိုင်ငံ ပါဝင်နေပါသည်။ များမကြာသေးမီကပင် သိပ္ပံလောကတွင် မှတ်တမ်းမဝင်သေးသော အပင်နှင့် သားငှက်တိရစ္ဆာန်တို့ကို ထပ်မံ တွေ့ရှိခဲ့ပါသည်။ ယခုအခါ အစိုးရ မဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာတက္ကသိုလ်၊ ကောလိပ်ကျောင်း စသည်တို့ သည် ဇီဝမျိုးစုံမျိုးကွဲ ထိန်းသိမ်းရေးလုပ်ငန်းများကို ဆက်တိုက်လုပ်ကိုင်နိုင်သည့် အခြေအနေတွင် ရှိပါသည်။ သို့သော် ပြင်ပငွေကြေး ထောက်ပံ့သည့် အဖွဲ့အစည်းများသည် မိမိနိုင်ငံတွင် လက်ရှိ ဖြစ်ပေါ်နေသော အခြေအနေအရ ထောက်ပံ့ရန် တွန့်ဆုတ်နေမှုကြောင့် 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 ရတောင့်ရဲခဲ 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 ရွှေ့လျား၊ 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 တန်ဖိုးထားခြင်း၊ လျော့တွက်ခြင်း၊ ထိန်းသိမ်းရေး လုပ်ငန်းများတွင် အခြေခံ လူတန်းစား၏ ထောက်ခံမှု မရရှိခြင်းနှင့် ကမ္ဘာကြီး ပူဇွန်လာမှုတို့ 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) ရင်းနှီးမြှုပ်နှံမှုသည် အစိုးရနှင့် အလှူရှင်များ၏ လောလောဆယ် ရင်းနှီးမြှုပ်နှံမှုများကို အထောက်အကူပြု ဖြည့်ဆည်းပေးရာ ရောက်စေရပါမည်။
- (၄) အစိုးရမဟုတ်သော အဖွဲ့အစည်းများနှင့် ပညာရပ်ဆိုင်ရာ အဖွဲ့အစည်းများကို ထိရောက်သော သဘာဝ ထိန်းသိမ်းရေး လုပ်ငန်းများ လုပ်ကိုင်နိုင်ရန် အခွင့်အလမ်းများ ရစေရပါမည်။
- (၅) လုပ်အားခနှင့် လုပ်ငန်း အချိုးကျစေရမည်ဖြစ်ပြီး ဈေးနှုန်းသက်သာစေရပါမည်။

မြန်မာနိုင်ငံအတွက် မဟာဗျူဟာမြောက် လမ်းညွှန်မှုများနှင့် ဦးစားပေးရင်းနှီးမြှုပ်နှံမှုများ

မဟာဗျူဟာမြောက်လမ်းညွှန်မှုများ	ဦးစားပေးရင်းနှီးမြှုပ်နှံမှုများ
(၁) ဦးစားပေးမျိုးစိပ်များ ထိန်းသိမ်းရေး လုပ်ငန်း များကို အားဖြည့်ပေးခြင်း	<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>
(၂) ဇီဝမျိုးစုံမျိုးကွဲ မူဝါဒကို အခြား မူဝါဒများ ရေးဆွဲရာ၌ ပေါင်းစပ်ပေးခြင်း	<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>
(၃) ဦးစားပေး မျိုးစိပ်များအတွက် ထိန်းသိမ်းရေး လုပ်ငန်းများကို ဦးတည်ချက်ရှိရှိ အကောင်အ ထည် ဖော်ပေးခြင်း	<p>(၃. ၁) ဦးစားပေး မျိုးစိပ်များ ရောင်းဝယ်ဖောက်ကားမှုကို ထိန်းချုပ်သည့်စနစ် တည်ဆောက်ပြီး ပြည်တွင်းနှင့် ဒေသဆိုင်ရာအတွင်း ဥပဒေသက်ရောက် မှု ရှိရေးအား ဖြည့်ပေးရန်</p> <p>(၃. ၂) ကျယ်ကျယ်ပြန့်ပြန့်သွားလာနေထိုင်တတ်သော အချို့ ဦးစားပေး မျိုးစိပ် များကို ၄င်းတို့ကို တွေ့ရှိနိုင်သော နေရာအားလုံးတွင် ထိန်းသိမ်းရေး လုပ်ငန်းများ ဆောင်ရွက်ရန်</p> <p>(၃. ၃) သိပ္ပံဆိုင်ရာ သတင်းအချက်အလက် လိုအပ်နေသော ဦးစားပေး မျိုးစိပ် များကို ကွင်းဆင်း စာရင်းကောက်ယူရန်</p> <p>(၃. ၄) ရေချို့ ဇီဝမျိုးစုံမျိုးကွဲ စာရင်းကောက်ယူပြီး ထိန်းသိမ်းရေးစီမံချက်တွင် ထည့်သွင်းရန်</p>

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

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 Kitt'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 erythropygius 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 *Syrmaticus 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 Shweseettaw 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 erythropygius 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 m 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

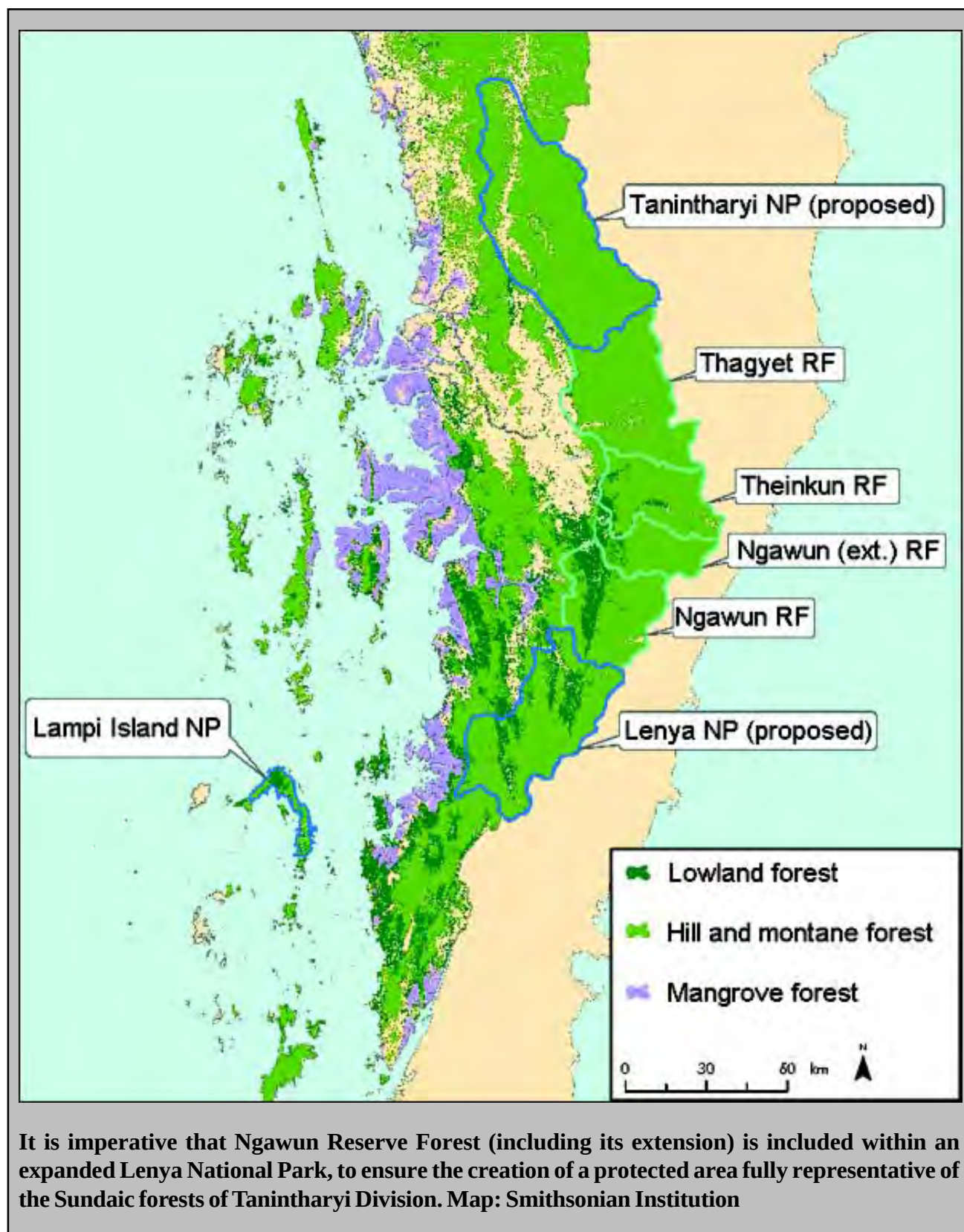
Jonathan C. Eames, BirdLife International in Indochina

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; Shweseztaw	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
Joffe'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 eldi</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.

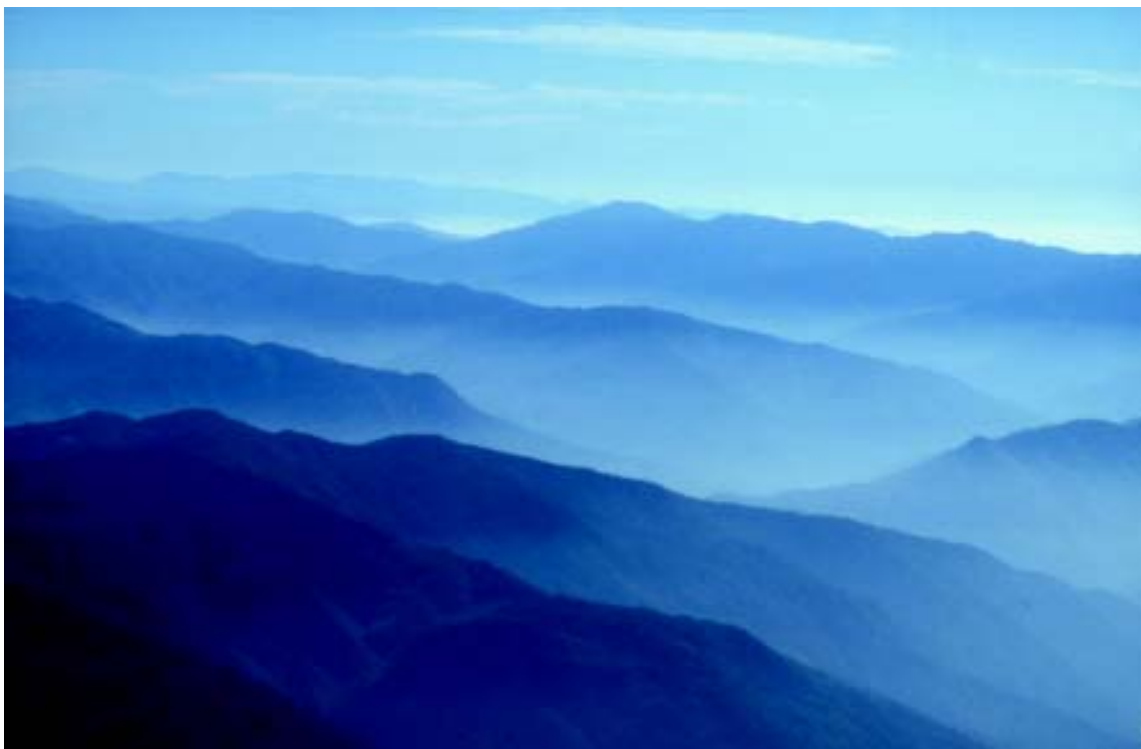
In addition to the Priority Species listed in Table 7, the stakeholders selected eight provisional Priority Species (Table 8). While none of these species is currently assessed as globally threatened by IUCN (2004), they were all considered to be potentially of global conservation concern and to require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

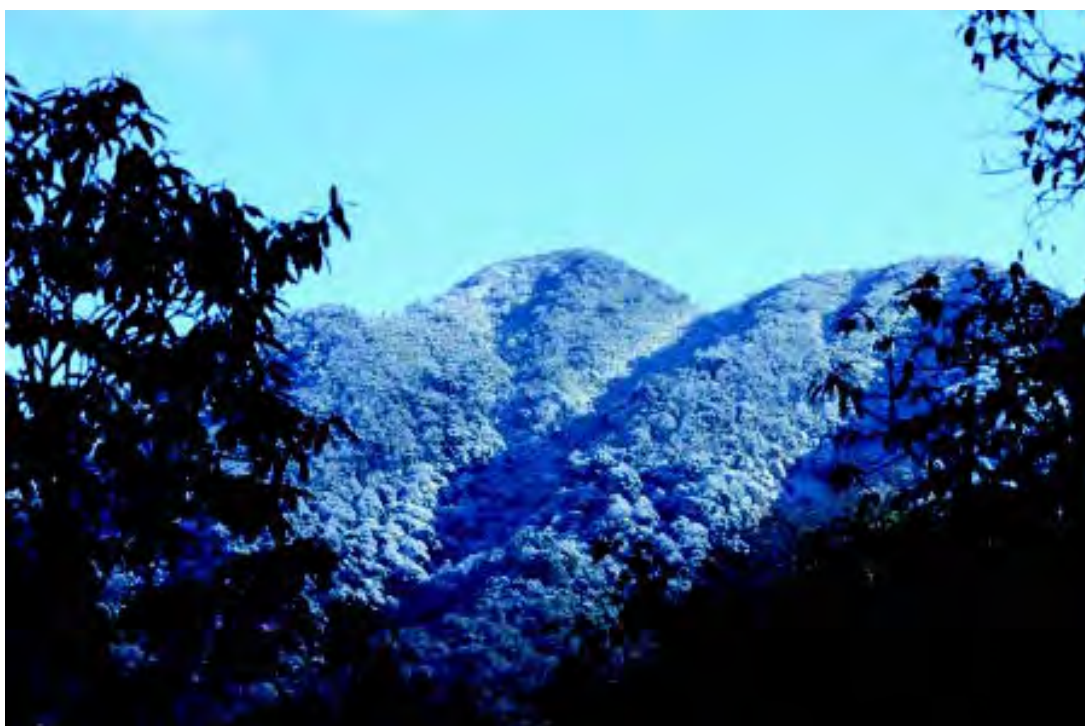
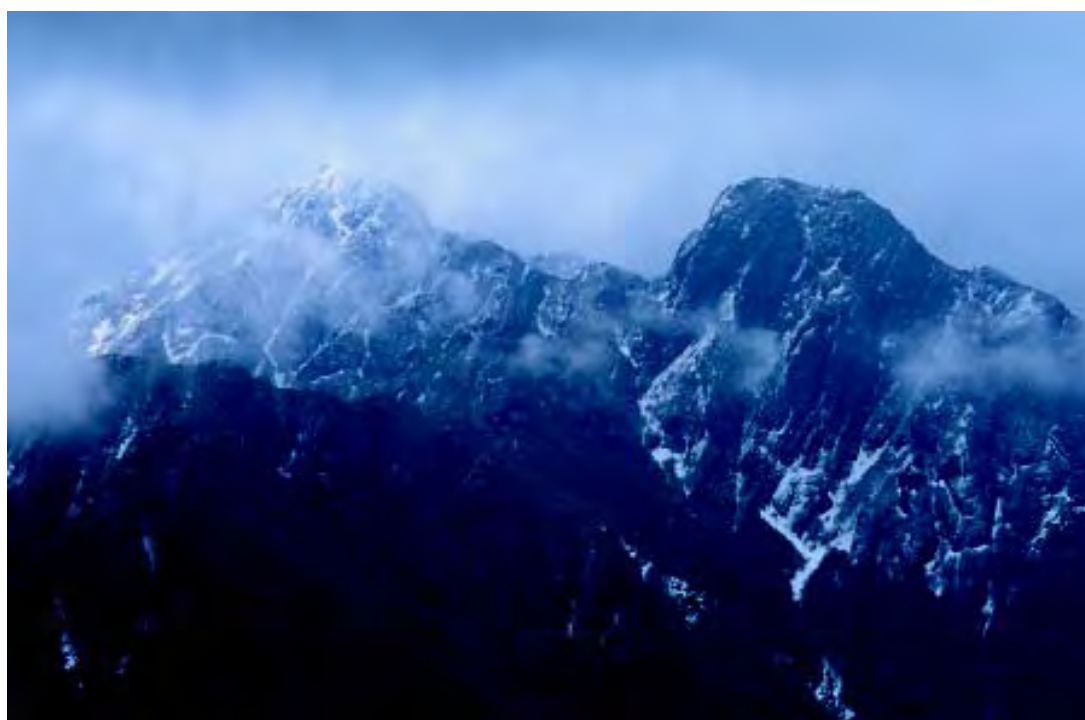
CORRIDORS 2



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 Palaearctic faunal influences found. Photo: Nicolas Cornet.



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).

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).

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 Bamar.

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.

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 FRED A

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

The Forest Resources, Environment, Development and Conservation Association (FRED A) 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. FRED A 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 FRED A 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.

FRED A 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, FRED A 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 unspoilt 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.

SYNOPSIS OF CURRENT THREATS

The Indo-Myanmar (Indo-Burma) Hotspot is one of the most threatened hotspots globally: it ranks among the eight hotspots likely to lose most plants and vertebrates as a result of forest loss continuing at its current rate (Brooks *et al.* 2002). Throughout the hotspot, a combination of population growth, economic development, increasing consumption and integration into the global economy is placing increasing pressure on natural habitats and species populations. Partly because of the political situation, these forces are not currently as pronounced in Myanmar as in many other countries in the hotspot. However, it is highly unlikely that the country will avoid these forces indefinitely. Indeed, Myanmar is already becoming increasingly exposed to external economic forces, including demand for timber and wildlife products, while domestic policies are promoting land-use change on an extensive scale.

The two main direct threats to biodiversity in Myanmar are over-exploitation, and habitat degradation and loss. Pollution and invasive species are also significant threats, 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.

Over-exploitation of natural resources

Over-exploitation of animals

Throughout the Indo-Myanmar (Indo-Burma) Hotspot, unregulated, unsustainable, unreported and generally illegal over-exploitation has driven many animal species to the verge of extinction in the wild, and severely suppressed populations of others (e.g. Nash 1997, Nooren and Claridge 2001, Oldfield 2003). This is very much the case in Myanmar, where hunting occurs in around 70% of protected areas (Rao *et al.* 2002), and threatens to drive a number of species to national extinction (e.g. Lynam 2003).

There are several inter-related causes of over-exploitation of animals in Myanmar, including subsistence needs, recreation, and opportunistic exploitation. Trade demand, from both domestic and international markets, is often a key factor driving over-exploitation, and is particularly significant in the case of species used in the manufacture of traditional medicines, such as Tiger (Rabinowitz 1998, Lynam 2003) and turtles (Jenkins 1995, Platt *et al.* 2000). While large volumes of wildlife and wildlife products are transported from Myanmar to Yunnan province, China, significant amounts are also sold on the domestic market or exported to Thailand (Clarke 1999).

The dynamics of the wildlife trade in Myanmar are not known in detail. However, extrapolating from other countries in South-East Asia, trade pressure on Myanmar's wildlife populations can be expected to increase, as wildlife populations in other countries become depleted. Limited resources, manpower, capacity and motivation among enforcement agencies mean that there are few effective controls on exploitation of animals, even within protected areas. Incentives to hunt animal species are often high for rural people, particularly where there is an actual or perceived trade demand.

Over-exploitation of plants

Although few detailed data are available on the issue, the threat posed by over-exploitation to plant species in Myanmar is potentially as massive as that to animal species. Plants have numerous human uses, including as a source of food, construction materials, ornaments and medicines. As a result, they are exploited for local consumption and/or trade. Although human population densities in the mountainous areas of Myanmar are lower than those in most neighbouring countries, the level of human impact on the landscape is increasing (Eberhardt 2003).

In many parts of the country, exploitation of plants is taking place on a commercial scale. Myanmar's forests support a great diversity of commercially valuable timber species, including Teak and various members of the Dipterocarpaceae and Leguminosae, and the impacts of commercial logging on these forests have been documented (e.g. Brunner *et al.* 1998). Other economically valuable plant species threatened by over-exploitation include *Aquilaria malaccensis*, which is a source of agarwood, rattans *Calamus* spp., which are used in furniture handicraft manufacture, and orchids, which are harvested for domestic sale and export to China, in response for demand from the traditional medicine trade.

Box 13: Conservation of orchids in Myanmar

U Saw Lwin, Myanmar Floriculturist Association

Today, Myanmar's native orchid species face a number of threats to their survival, including logging, shifting cultivation, collection for trade, and forest conversion to agriculture and plantations. Some people use wild orchids for making herbal medicines. Bulbs of *Eulophia* spp., *Habenaria* spp. and some terrestrial orchids are used as ingredients in some folk medicines. Some indigenous traditional medical practitioners use *Pecteilis sagarikii*, a species of orchid found in central Myanmar. Paste from the pounded leaves and bulbs of *Cymbidium* spp. is used by traditional orthopaedists. Other orchid species are used as herbal remedies for diarrhoea and dysentery.

In Myanmar, the volume of orchids collected by local rural people to prepare traditional medicines is currently very small compared with the volume of dried orchids exported to neighbouring countries each year. The population numbers of some of Myanmar's native orchids (both epiphytes and terrestrials) are decreasing due to over-collection for export to neighbouring countries. It is said that some orchid parts have very high medicinal value, and can cure some diseases. Collection takes place on a variety of scales, from amateur to commercial collection. The Forest Department takes strict action on orchid collection, selling and smuggling cases, according to the Forest Law.

Having regained independence in 1948, the government listed all orchids as a forest product, and promulgated a law to control the collection, production and sale of native orchids. According to this law, all of Myanmar's orchid species were considered to be state property. Thus, it was only permitted to collect orchid species for research and educational purposes.

At present, the Ministry of Forestry, in collaboration with Myanmar Floriculturist Association, has collected native orchid varieties from different regions of country, and a collection of orchids is on display at the National Botanic Gardens for the public and local and foreign orchid enthusiasts. The National Botanic Gardens, government and private orchid nurseries, government and private orchid culture laboratories, and systematic amateur collections play a very important role in *ex-situ* conservation of Myanmar's native orchids. Orchids have been propagated and conserved by means of seed, ovule and tissue culture techniques in the orchid research laboratories of the Ministry of Forestry, the Ministry of Agriculture and Irrigation, Yangon University, other universities and some private orchid enthusiasts. Myanmar's native orchids are also conserved *in-situ* in the country's protected areas, which are still rich in orchid biodiversity.

The diversity, ecology, population and distribution of Myanmar's orchids have not been fully studied. To conduct such studies, it is necessary to cooperate with experienced scientists from around the world. Myanmar Floriculturist Association, a prominent NGO in the field of horticulture and floriculture in cooperation with other local and international NGOs and concerned government departments, carries out research and holds exhibitions on Myanmar's native orchids. Myanmar Floriculturist Association studies and researches Myanmar's orchids with the help of its members.

Over-fishing

A significant proportion of Myanmar's human population is dependent on freshwater fish as a source of food and/or income. Small-scale, artisanal fishing is practiced throughout the country, particularly along major rivers and at large lakes. Although there is little information available about the impacts of such practices on fish populations, they are potentially sustainable at current levels. Transition from a subsistence to a market economy and use of improved fishing gear are likely to increase pressure on fish resources. Other countries in this situation have tended to introduce some form of aquaculture, resulting in profound changes in local cash flow, habitat modification and control of water resources, and this pattern could be repeated in Myanmar.

The use of poison for fishing has been identified as a threat to biodiversity at several sites in Myanmar. At Alaungdaw Kathapa National Park and Htamanthi Wildlife Sanctuary, for example, liquid pesticides are poured into pools in seasonal streams; as well as affecting aquatic fauna, such practices can result in the poisoning of wild animals that drink from the pools, and have negative impacts on the health of humans and livestock (CARE Myanmar 2003). The use of poison and explosives for fishing is frequently associated with intensified infrastructure development, particularly as road workers often have access to dynamite (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004).

Habitat degradation and loss

Logging

Forest ecosystems support some of the most threatened elements of biodiversity in Myanmar, including the majority of globally threatened plant and animal species. Thus, maintenance of extensive, undisturbed forest ecosystems must remain a cornerstone of conservation efforts in the country. However, there has been a long history of logging of Myanmar's forests, much of it on a commercial scale, which has had a massive impact on their extent and condition. Historically, mixed deciduous forests, which are rich in Teak, were the principal focus of commercial logging. However, harvestable Teak is becoming increasingly scarce, as evidenced by recent sharp increases in price. Recent years have, thus, seen a switch towards logging lowland evergreen forests (Clarke 1999). Montane evergreen forests in large parts of northern Myanmar remain largely unaffected.

An analysis of forest-cover change in Myanmar between 1990 and 2000 revealed a net annual rate of forest loss of 0.2 to 0.3% (Leimgruber *et al.* 2004), which is significantly lower than the rate in neighbouring Thailand (Lynam 2003). However, statistics on deforestation rates may not adequately convey the impacts of logging on forest quality and density, as valuable tree species are extracted and less economically valuable species left in the forest (Eberhardt 2003). Habitat degradation resulting from logging can reduce the suitability of forest habitats for plant and animal species, while the construction of logging roads can facilitate hunting and exploitation of NTFPs, and open up forest areas to human settlement.

In China, Thailand and Vietnam, deforestation was so extensive that, by the end of the 20th Century, the forestry industries of these countries had gone into substantial decline. This, coupled with major environmental disasters resulting from deforestation, such as flooding and landslides, led to nationwide logging bans in these countries (Carew-Reid 2002, BirdLife International 2003). While these logging bans have not been universally observed, they have significantly reduced pressures on natural forests in these countries. Increasing demand for wood products in these countries has yet to be fully met by commercial timber plantations, and the logging bans have increased pressures on natural forests in Myanmar (BirdLife International 2003). Given the rapid rates of economic growth in China, Thailand and Vietnam, pressures on natural forests in Myanmar can be expected to increase significantly, unless effective measures for the protection and sustainable management of these forests are introduced soon.

Box 14: Patterns of forest losses in Myanmar in the 1990s

Peter Leimgruber, Daniel S. Kelly, Thomas Müller, Jamie Robertson, Melissa A. Songer, and Catherine A. Christen, Smithsonian Institution, National Zoological Park

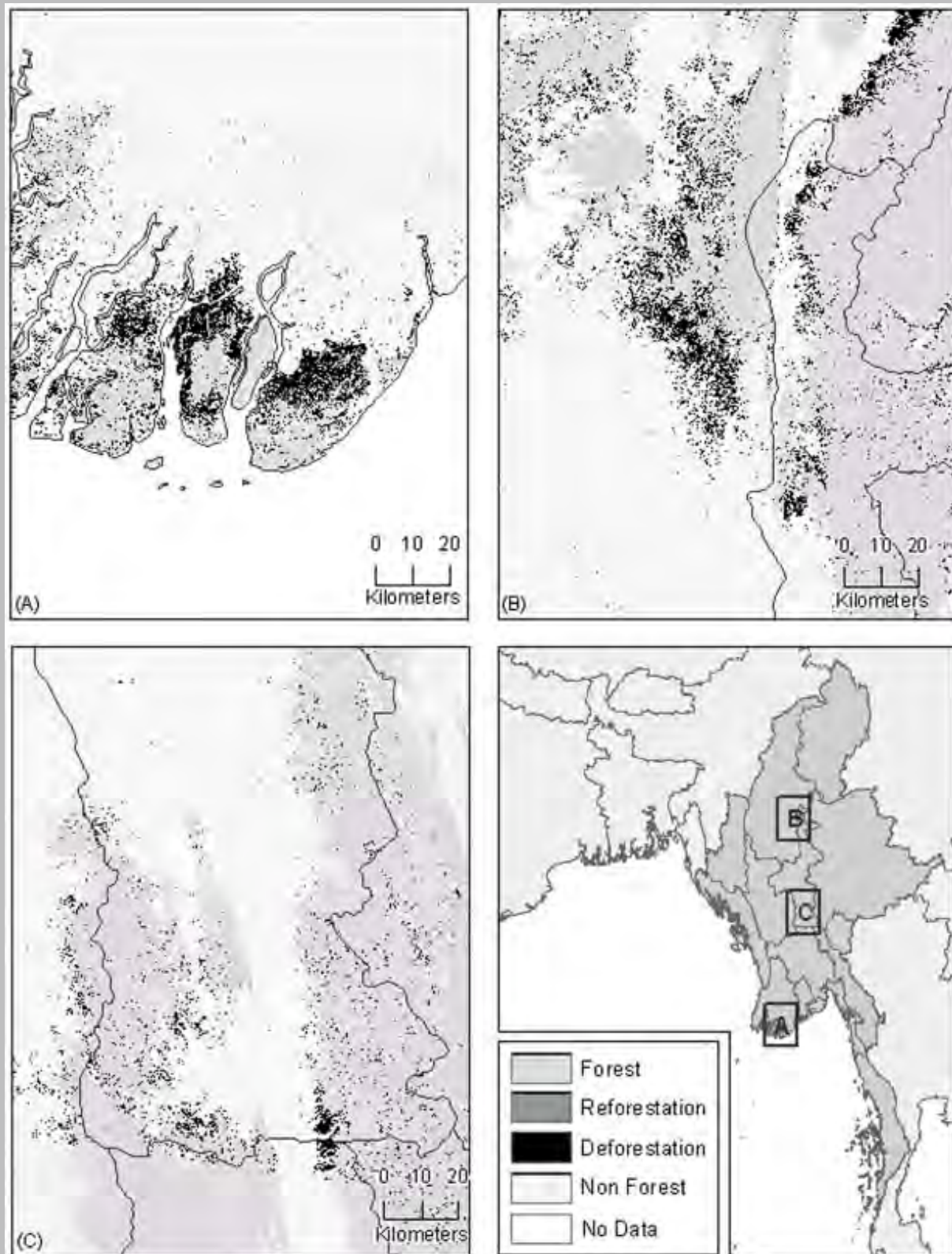
Myanmar's vast Teak forests, stretching from the Himalayan foothills to the Ayeyarwady Delta, have long represented a valued but disputed resource. Their unique geographical position, encompassing several biogeographic regions, makes them a unique biodiversity hotspot, with many endemic species. Elsewhere in Asia, forests underwent dramatic declines during the 20th Century. Myanmar's forests may now represent some of the largest strongholds for many threatened species, from birds, like Gurney's Pitta *Pitta gurneyi*, to large mammals, including Tiger *Panthera tigris* and Asian Elephant *Elephas maximus*.

As forests elsewhere in the region have dwindled and logging bans have been introduced in Thailand and China, pressures on Myanmar's forests have increased. Many recent reports discuss broad-scale logging of the country's forests, especially in border regions. The United Nations' Food and Agriculture Organisation (FAO) lists Myanmar among the 10 tropical countries with the highest deforestation rate. However, no systematic countrywide assessment of Myanmar's forests has been conducted.

Analysis of Landsat satellite images from different decades provides a powerful tool for assessing forest trends. Researchers from the Smithsonian Institution's National Zoological Park combined imagery from the early 1990s and early 2000s to determine the extent and condition of Myanmar's remaining forests. The image classification techniques were based on previous work by scientists at Conservation International.

The study results were striking. Myanmar still retains much of its forests, over 66% of the country. Countrywide, annual deforestation was 0.3%, only slightly above the global average. However, deforestation varies considerably among regions; the greatest forest losses have occurred in Ayeyarwady, Mandalay and Sagaing Divisions, ranging from 0.4% to 1.2% annually. The researchers also identified 10 deforestation hotspots across the country. Forest losses are greatest in the mangrove forests of the Ayeyawardy delta, where as much as 20% of mangrove forests disappeared in only 10 years. Other deforestation hotspots include: the northern edge of the central dry zone and Ayeyarwady valley; northern Bago Yoma and Sittaung valley; northern Shan plateau; northern Chin State and the Myitha River; eastern Sagaing Division and the east bank of the Ayeyarwady River; Nagaland, northern Sagaing Division and the Uyu River; north-western Rakhine State; the border region between Mon State and Tanintharyi Division; and the southern tip of Tanintharyi Division.

Mangrove and dry to dry-deciduous forests types are among the most threatened. Only immediate conservation efforts will preserve the last remnants of these ecosystems. Large, relatively untouched forests remain in northern Myanmar, adjacent to the Western Forest Complex in Thailand, and in areas of the Rakhine Yoma. The satellite analysis demonstrates that, at the beginning of the new millennium, Myanmar still has its famed forests. Some important forest ecosystems and regions, however, are seriously threatened. These threats will soon result in substantial further losses unless land-use planning and management processes are developed, and integrated with conservation needs.



Deforestation hotspots in: (A) the Ayeyarwady Delta region; (B) the northern edge of the Central Dry Zone and Ayeyarwady valley; and (C) northern Bago Yoma and Sittaung valley. (Map: Smithsonian Institution)



Forest cover and forest cover change in Myanmar between the early 1990s and the early 2000s.
(Map: Smithsonian Institution)

Agricultural expansion

Agricultural expansion includes unplanned and unrestricted agricultural expansion by rural populations but can also take the form of commercial clear cutting, for crops such as peanuts. Visual inspection of forest loss patterns suggests that agricultural expansion is taking place along the edges of large forested regions, such as along the northern edge of the Central Dry Zone and in the Ayeyarwady and Myitha River valleys (Leimgruber *et al.* 2004). In part, agricultural expansion is driven by human population growth, and its effects on natural habitats are exacerbated by the lack of comprehensive land-use policies and planning.

Shifting cultivation

In mountainous regions of Myanmar, ethnic minority communities frequently practice forms of shifting cultivation, typically involving rotational systems of swidden fields and regenerating fallows. Evidence from elsewhere in mainland South-East Asia indicates that shifting cultivation can be both a productive and an environmentally sustainable way of using land in lightly populated areas, which, under the correct conditions, can help to retain high levels of biodiversity (Pye-Smith 1997). While shifting cultivation may not necessarily result in net forest loss, it may result in an increase in fragmentation and an overall decrease in forest condition, making forest areas unsuitable for some species of conservation concern.

There is little detailed information available on the impacts of shifting cultivation on biodiversity in Myanmar, although a spatial analysis of forest cover change between 1990 and 2000 conducted by Leimgruber *et al.* (2004) revealed high rates of net forest loss in northern Chin State and Nagaland (northern Sagaing Division), which they attributed to intense shifting cultivation. The impact of shifting cultivation in southern Chin State is precipitating an environmental crisis, with apparent similarities to the midlands of Nepal, where high population growth and dependency on natural resources have led to farming in increasingly marginal lands, resulting in deforestation and land degradation (MOPE 2002). In southern Chin State, shifting cultivation has destroyed most of the forest below 2,000 m asl, and threatens Natmataung National Park (J. C. Eames pers. obs.). There is a need for further studies of the relationship between upland agricultural systems and biodiversity in Myanmar, in order to determine how different systems can be integrated with conservation.

Conversion of forest to plantations

Conversion of forest to plantations is one of the major causes of habitat loss in Myanmar. In central Myanmar, there has been extensive replacement of natural forest by Teak (e.g. Das 2000), while, in southern Tanintharyi Division, lowland forest is being converted to oil palm plantations (Leimgruber *et al.* 2004, Eames *et al.* 2005). There are inevitably conflicts in land use policies between the need to ensure self-sufficiency in certain foodstuffs, like edible oil, etc, and preservation and conservation of natural habitats. This has resulted in some areas, especially in the south of the country, witnessing large areas of natural habitats being converted into large scale plantations. In addition to the direct loss of habitat resulting from conversion, construction of roads and other infrastructure and provision of employment opportunities are likely to encourage in-migration into hitherto sparsely populated parts of the country, and place additional pressure on natural resources.

Conversion of coastal habitats

Myanmar's coastal habitats are important for numerous elements of biodiversity, including migratory waterbirds, Mangrove Terrapin (Critically Endangered) and Estuarine Crocodile *Crocodylus porosus*, and several areas clearly meet the criteria for designation as Wetlands of International Importance under the Ramsar Convention. However, there are indications that coastal habitats, particularly mangrove, are currently experiencing some of the highest rates of loss in the country (Leimgruber *et al.* 2004). One of the main causes of loss of coastal habitats is conversion of mangrove to aquaculture. While traditionally managed, extensive forms of aquaculture can provide valuable wildlife habitat (BirdLife International 2003), Aquaculture enterprises should be encouraged to use modern and scientific methods in their businesses to make them more sustainable and to prevent die-back of mangroves and loss of habitats for many species. Another major factor contributing to the decline of mangrove forests is production of charcoal and fuelwood for local sale and export to Thailand.

Infrastructure development

Most of the countries in mainland South-East Asia are experiencing high rates of economic growth, which are fueling a boom in urban, industrial and infrastructure development. In many cases, in the absence of adequate mitigation measures, these developments are having severe impacts on the region's biodiversity. Road developments, for example, can cause fragmentation and loss of natural habitats, create barriers to the dispersal of wildlife, encourage human settlement in previously remote areas, and facilitate extraction and trade of natural resources.

Dams are another type of infrastructure development with potentially major impacts on biodiversity. Dam construction can inundate riverine habitats upstream, and alter seasonal flow regimes and natural sedimentation processes downstream. In addition, dams can have direct impacts on fish migration routes and access to spawning grounds, as most lack fish passes or strategies to maintain aquatic communities downstream (Dudgeon 2000a,b). Migratory fish species particularly susceptible to the impacts of dams include cyprinids in the genera *Tor*, *Neolissochilus*, *Barbonymus*, *Scaphiodonichthys* and *Schizothorax*, and large bagrid catfishes in the genera *Hemibagrus*, *Sperata* and *Rita* (S. Kullander, C. Ferraris, Jr and Fang Fang *in litt.* 2004). Dam construction can also have indirect impacts on biodiversity, for instance relocation of human communities into areas where they place additional pressure on natural resources.

Despite its relative economic isolation, Myanmar has not completely escaped the wave of infrastructure development that has swept over the rest of the region. For example, according to the official figures of the Ministry of Information (2002), 26 hydropower dams and 129 irrigation dams have been built in the country since 1988. However, because of the slower rate of rural development in the country, infrastructure developments that disrupt wildlife populations, such as roads, powerlines and dams, have been relatively localised (Lynam 2003). For example, only around 25% of protected areas contain roads (Rao *et al.* 2002), and most of these are unsurfaced and for seasonal access only (Lynam 2003).

Nevertheless, the potential for the rate of infrastructure development to accelerate once Myanmar's economy begins to develop is great. For instance, in February 2004, a feasibility study was initiated by the Bangladesh-India-Myanmar-Sri Lanka-Thailand Economic Cooperation grouping for a gas pipeline between India and Thailand, via Myanmar (The Hindu 2004). A series of dams is also planned for the Thanlwin catchment, with the objectives of water diversion and generation of hydroelectricity. A strategic environmental assessment should be undertaken before commencement of this plan. Development of mechanisms for integrating biodiversity considerations into the development planning processes of government, donors and the corporate sector is a high priority for conservation investment. This is likely to prove to be a far more effective means of minimising the biodiversity impacts of infrastructure development than mitigating them after the event.

Invasive species

Introduction of invasive species, both deliberate and accidental, has occurred at a number of locations in Myanmar, although, to date, there has been little research into the impacts of invasive species in the country. Invasive species are potentially a significant threat to some aquatic ecosystems. For example, two large introduced species, Grass Carp *Ctenopharyngodon idellus* and Rohu *Labeo rohita*, are found in Inle Lake, of which the former is considered to definitely pose a threat to the lake's ecosystem (Kullander *et al.* 2004). Invasive plant species are a major conservation issue in the Central Dry Zone, where introduced species such as *Prosopis juliflora* and *Euphorbia* spp. dominate the vegetation in some areas. In general, however, the impacts of invasive species are relatively localised, and probably less severe than those of many other threats to biodiversity in the country.

Pollution

Urbanisation, industrialisation and agricultural intensification are all contributing to increased levels of pollution in Myanmar. There has been little research on the impacts of pollution on biodiversity in the country, and it is difficult to evaluate the importance of this threat. Extrapolating from other countries in the region, it can be predicted that increased use of agrochemicals is likely to become a major threat to biodiversity, through triggering severe declines in invertebrate and, subsequently, bird populations in agricultural landscapes.

Mining for gold, gems and other minerals is another major source of pollution in Myanmar. Moody (1999 cited in Eberhardt 2003) identifies around 35 such mines, both large and small scale, in the country. The current Mining Law should be strengthened to include provisions for environmental impact assessments to be conducted for mines and ensure standards of good practice. Systematic monitoring of the implementation of these provisions should also be an important aspect of the law. (Moody 1999 cited in Eberhardt 2003). Large-scale mines generate environmental waste and release toxins into the environment, while extensive gold-panning is releasing mercury into the upper reaches of the Ayeyarwady and Chindwin Rivers (Eberhardt 2003), although the government has been taking action to control this.

Root causes

Economic growth and increasing consumption

Economic growth and ever-increasing consumption by expanding human populations are the main underlying causes of biodiversity loss in the Asia Region. Despite the Asian financial crisis of the late 1990s and the subsequent recession in some countries, many countries are presently experiencing rapid economic growth, which has dramatically increased demand for natural resources and energy, and resulted in degradation and loss of natural habitats throughout the region. While the rate of economic growth in Myanmar is relatively low at present, increasing regionalisation of the economy means that exploitation of the country's natural resources is being driven increasingly by economic growth and increasing consumption in China, Thailand and other countries.

Measures of ecological footprint, or human demand on nature, show that, in 2000, consumption in Myanmar was significantly below ecological capacity, creating an ecological remainder of 0.24 global hectares per capita (Venetoulis *et al.* 2004). However, ecological remainders are typically occupied by the footprints of other countries, through export production, rather than kept in reserve, and this is very much the case in Myanmar, with its exports of natural gas, wood products and other natural resources.

While growth of Myanmar's economy could be expected to contribute to increased pressure on the country's natural resources, it could potentially also result in more resources being made available for biodiversity conservation.

Poverty

The population of Myanmar is predominantly rural, and a significant proportion lives below the US\$1 per day poverty threshold. Consequently, there are high levels of dependency on natural resources, particularly in upland areas. In many cases, use of natural resources by rural communities is at least potentially sustainable. However, various factors, including external economic forces, population growth, and loss of access to land, can lead to unsustainable levels of natural resource use, and degradation and loss of natural habitats. These problems have been compounded by decades of armed conflict, which have left an estimated 800,000 to 1 million people internally displaced within Myanmar (Mason 2000). This displacement has clearly had a devastating impact on the physical and social capital of upland populations, and undermined their ability to adopt sustainable livelihoods (Eberhardt 2003).

Poverty and land degradation in the uplands of Myanmar are linked in a mutually reinforcing cycle that is difficult to break (Eberhardt 2003). There is a clear need to develop approaches to natural resource management that deliver significant benefits to local communities while meeting biodiversity conservation objectives. In many cases, such approaches will be dependent upon simultaneously addressing issues of institutional capacity and land-use policy and planning (see following sections).

Capacity constraints

Government institutions have the principal responsibility for conserving biodiversity but they are often severely constrained by shortages of financial resources and technical expertise. For instance, NWCD has insufficient financial, human and material resources to fulfil its mandate to manage protected areas (Clarke 1999). Government institutions responsible for conservation often suffer from low staff morale, lack of incentives for good performance, and lack of training. These shortcomings are compounded by inappropriate regulatory and management frameworks. These constraints represent opportunities for NGOs and academic institutions to play a role in strengthening the capacity of key government institutions responsible for conservation.

Lack of environmental safeguards

In the absence of other sources of foreign exchange, the Government of Myanmar views natural resource exploitation as its best option for maintaining hard currency reserves (Eberhardt 2003). The government is pursuing a number of export-oriented policies, including commercial logging, hydroelectricity generation and aquaculture development. In implementing export-oriented policies, appropriate mitigation measures for biodiversity conservation should be seriously considered. The Environmental Protection Law is being drafted and, with the promulgation of this law, it is hoped that the current lack of environmental safeguards in the formulation of policies and programmes will be remedied. Thorough environmental impact assessments should be conducted and their findings taken into account. Integration of biodiversity considerations into government decision making is urgently needed, particularly in the agriculture, forestry, fisheries, mining and energy sectors.

Lack of comprehensive land-use policies and planning

All land in Myanmar belongs to the state, and land-use rights are granted for specific periods, dependent upon use (Eberhardt 2003). Land-tenure systems in most upland areas are based on customary rights under local institutions (Eberhardt 2003), which are not upheld under national law. As a result, rural communities are vulnerable to losing access to land through such processes as establishment of commercial plantations by agribusinesses, and appropriation of land for other uses, under the self-reliance policy. This is further compounded by a lack of a specific land-use policy to settle disputes over land tenure (Eberhardt 2003). Loss of land can force local communities to shorten fallow cycles, or cultivate steeper, less productive slopes, which are more susceptible to environmental degradation (Eberhardt 2003). Moreover, unplanned expansion of commercial plantations, such as oil palm, can lead to large-scale conversion of forest. Introduction of comprehensive land-use policies and land-use planning, consistent with sustainable rural livelihoods and biodiversity conservation, is a pressing need.

Undervaluation

Throughout the world, market prices tend to reflect only the direct use values of natural resources, ignoring indirect use, option use and existence values. In general, natural resources tend to be severely undervalued. This is broadly the case in Myanmar, where decisions about natural resource use are typically based only on direct use values, such as timber or hydroelectricity revenues. In part, this undervaluation of natural resources may exist because some values, such as carbon sequestration, are of lower importance to the Government of Myanmar than export earnings. Another factor may be that the immediate benefits of exploiting a natural resource may be more attractive to the government than the long-term benefits accrued from conservation of a resource, such as water catchment protection, soil erosion control or other ecological services. Many of the most important values of natural resources, particularly existence values, may be essentially unquantifiable.

A recent global study estimated the combined value of 17 different ecosystem services, including climate regulation, water supply and food production, at between US\$16 and 54 trillion per year (Costanza *et al.* 1997). In addition, a number of recent projects in the Asia Region have aimed to demonstrate the economic values of natural resources to governments, including a review of the role of protected areas in development in Cambodia, Lao PDR, Thailand and Vietnam (ICEM 2003b), and a review of the roles of natural vegetation in China (MacKinnon *et al.* 2001). Such approaches could be adopted in Myanmar, to promote a fuller accounting of the values of natural resources in decision-making processes. In particular, there may exist opportunities to ensure that existing and future foreign investors compensate more fully for the full economic costs of their investments, for instance through a natural resources tax or through appropriate mitigation measures. Moreover, financial mechanisms could be developed that enable the beneficiaries of dispersed ecosystem services provided by Myanmar's natural ecosystems to contribute to their conservation, such as carbon offset payments and debt-for-nature swaps.

Lack of grassroots support for conservation

Although, in general, the people of Myanmar are supportive of conservation objectives, rural people living in close proximity to protected areas may not be supportive of conservation efforts, such as protected area management (Clarke 1999). Reasons for this may include failure to effectively communicate the objectives of conservation actions, lack of mechanisms for local communities to benefit from protected areas, and lack of opportunities for grassroots participation in conservation activities. There are several ways through which NGOs and academic institutions could build grassroots support for conservation, including: changing public perceptions towards conservation through awareness raising; promoting conservation approaches that deliver benefits to rural livelihoods as well as biodiversity; acting as a bridge between government conservation initiatives (such as protected areas) and local communities; developing non-formal approaches to site-based conservation that maximise grassroots participation; and strengthening the capacity of protected area managers in community outreach and participation.

Global climate change

There have been no studies on the impacts of global climate change on biodiversity in Myanmar. Studies in other parts of the world suggest that the impacts of climate change are already being experienced by some ecosystems, and that any eventual climatic equilibrium may be preceded by a period of increased variability (IPCC 2001). Global climate change should be considered to be an emerging threat, with potentially severe implications for biodiversity in Myanmar. While uncertainty exists regarding how global changes might affect Myanmar's biodiversity, conservation planning can adopt a precautionary approach and account for potential altitudinal shifts of habitat types. If global climate change continues in the current direction, high altitude habitats may be especially threatened.

THREATS 1



It has been estimated that hunting occurs in around 70% of Myanmar's protected areas. This activity threatens to drive a number of species to national extinction. Hunting is a part of Chin culture and, on Mount Bwe Pa in the Chin Hills Complex, most men carry firearms. Photo: J. C. Eames.



This amazing trophy collection was photographed at the home of the *saw bwa* (local tribal chief) of Shukhua village in central Chin State in 2003. The collection included 58 Asian Black Bear *Ursus thibetanus*, 42 Eurasian Wild Pig *Sus scrofa*, nine Sambar *Cervus unicolor*, 103 Red Muntjac *Muntiacus muntjak*, three Gaur *Bos gaurus*, eight Banteng *B. javanicus* and 63 Mithan *B. frontalis* (a domesticated derivative of Gaur) trophies. Although accumulated over a long period, the collection demonstrates the central role hunting plays in Chin culture. Many Chin homes have smaller trophy collections. Photo: Sonny Nyein.

THREATS 2



Hunting, rather than habitat loss, has driven Eld's Deer *Cervus eldii* to the point of extinction in many parts of South-East Asia, and threatens the endemic subspecies found in Myanmar. Photo: John Blower.



Trade demand, from both domestic and international markets, is often a key factor driving over-exploitation of plants and animals, and is particularly significant in the case of species used in the manufacture of traditional medicines, such as orchids and turtles. While large volumes of wildlife and wildlife products are transported from Myanmar to Yunnan province, China, significant amounts are also sold on the domestic market. Photo: WCS Myanmar Program.

THREATS 3



Small-scale, artisanal fishing is practiced throughout the country, particularly along major rivers, at large lakes and ox-bows such as here at an ox-bow lake on the Tanai River. Although the fishing rights are auctioned regularly by the Forest Department, there is no yield management. These ox-bows are critically important for the conservation of a suite of globally threatened waterbirds, seriously diminished elsewhere in the region. Photo: J. C. Eames.



The conversion of lowland evergreen forest to oil palm estates in the Sundaic Subregion is a major issue that threatens the persistence of lowland forest. Unless protected areas are established in the next five years, all remaining significant blocks of lowland forest will likely be destroyed. Photo: J. C. Eames.

THREATS 4



There is little detailed information available on the impacts of shifting cultivation on biodiversity in Myanmar, although a spatial analysis of forest cover change between 1990 and 2000 revealed high rates of net forest loss in northern Chin State and Nagaland (northern Sagaing Division), which were attributed to intense shifting cultivation. This photograph taken in north-east Kachin State vividly illustrates how a mosaic of habitat patches results from the practice. Photo: J. C. Eames.



Logging in the north-eastern Kachin State, first documented by the British botanist Frank Kingdon-Ward earlier in the last century, is still a menace. This photograph, taken in 2005, shows recently cut logs awaiting loading onto a truck. Photo: J.C. Eames.

THREATS 5



A group of boats engaged in dredging for gold on the Ayeyarwady River. This activity releases mercury into the ecosystem, which has unknown impacts on humans and wildlife. The Government of Myanmar has been taking action to control this activity. Photo: J. C. Eames.



The Lower Chindwin River forms a conservation corridor, connecting the Central Ayeyarwady River, Central Myanmar Dry Zone and Upper Chindwin Lowlands Corridors. This Priority Corridor is entirely unprotected, and faces a number of significant threats to biodiversity, including dredging for gold, pollution from gold mining (pictured here), disturbance to sandbars, hunting of birds, and degradation of riverine forest through timber and bamboo extraction. Photo: WCS Myanmar Program.

SYNOPSIS OF CURRENT INVESTMENT

The purpose of this section is to assist in identifying investment opportunities in biodiversity conservation by NGOs and academic institutions in Myanmar. This is achieved through an analysis of current investment by source, thematic area and geographical focus. As well as an evaluation of the amount of investment and number of projects, consideration is given to which approaches to conservation are achieving results, and where the greatest opportunities to engage NGOs and academic institutions in conservation may lie.

The drafting team attempted to collate data on all conservation projects on-going during 2003 and projects expected to begin before the end of 2004 (pipeline projects). Data on selected recently completed projects were also collated, to illustrate thematic patterns in conservation investment. Although efforts were made to collate comprehensive data on conservation investments, there remain gaps in these data, as well as ambiguities over specific funding periods and amounts, and donor-implementer relationships. Precise details of government investment in conservation were difficult to obtain, as a result of which the following analysis is heavily biased towards investment by international donors.

Major sources of investment

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, although the European Union has recently revised its position on provision of development assistance to Myanmar, and for the first time now explicitly supports NGO projects addressing tropical deforestation. Investment in conservation by the Government of Myanmar is limited, although some protected areas receive moderate amounts of funding. There is an urgent need for additional conservation investment in the country, as many major opportunities for conservation are currently being missed.

National government investment

As a Contracting Party to the CBD, Myanmar has a commitment to provide financial support and incentives for the conservation and sustainable use of biodiversity. Actual levels of government funding for biodiversity conservation are very low, however, as it is a low budgetary priority. Nevertheless, the government is making significant conservation investments in some areas. For example, the national protected area system receives some government funding, although resources and staffing are heavily skewed towards a small number of sites, with many protected areas having few or no personnel or funds. The government is also investing in community-based natural resources management, through the Community Forestry Instructions, which promote community participation in reforestation, and have the potential to contribute towards conservation goals. The government is also investing in biodiversity research, through national academic institutions.

Bilateral and multilateral donors

A significant proportion of international investment in conservation in Myanmar comes from or via bilateral and multilateral donors. Because of the political situation, however, the amount is lower than in many other countries in the Indo-Myanmar (Indo-Burma) Hotspot. The World Bank does not have major lending or technical assistance programmes in Myanmar. Similarly, the Asian Development Bank (ADB) has not provided any loans to Myanmar since 1986, nor any technical assistance since 1987, although the country is involved in ADB's regional cooperation initiative for the Greater Mekong Subregion.

Overall, the largest bilateral and multilateral donors to Myanmar are the Government of Japan and UN agencies. The majority of Japanese development assistance to Myanmar is via JICA. JICA has been providing technical aid to Myanmar for over 20 years, and currently has projects in the agriculture, economy, drug control and health sectors. With relevance to biodiversity conservation, JICA has supported the development

of a forestry development training centre, as well as community forestry and reforestation activities in the Ayeyarwady Delta and Central Dry Zone. UN agencies active in Myanmar include UNDP, UNEP and FAO. UNDP's programme in Myanmar is focused on activities with impacts at the grassroots level in the areas of basic health, training and education, HIV/AIDS, the environment and food security.

Among the European Union countries, the UK is one of the major donors. As with most other multilateral and bilateral donors, the UK's development assistance to Myanmar is concentrated on humanitarian issues, mainly via DFID. The UK also provides some support for biodiversity conservation. For example, through the Darwin Initiative, the Department of Environment, Food and Rural Affairs (DEFRA) is currently funding BirdLife International to implement a project to build grassroots support for site-based conservation.

The Australian Government, via AusAid, is another major donor active in the natural resources sector, and is currently providing support for community forestry and natural resources management activities implemented by CARE and other international NGOs. The US Fish and Wildlife Service has supported a number of species-focused conservation activities in Myanmar in recent years, including for Hoolock Gibbon, Tiger and Asian Elephant.

As a Contracting Party of the CBD, Myanmar is eligible for support from the Global Environment Facility (GEF), and has nominated the Chair of the NCEA as the national GEF focal point. However, Myanmar has yet to receive any conservation investment from this source.

Private foundations

In previous years, the MacArthur Foundation has invested in biodiversity conservation in Myanmar, including two consecutive projects on regional collaboration for biodiversity management in the Eastern Himalayas, implemented by ICIMOD, which also included activities in China and Nepal. Currently, however, the MacArthur Foundation is not funding conservation activities in the country, and the majority of conservation investment from private foundations is from smaller foundations and species-focused funds, such as DSWF, the Rufford Small Grant Scheme, and the Great Ape Conservation Fund. In addition, the Keidanren Nature Conservation Foundation has supported WCS to conduct training for protected area staff in Myanmar, while the Nagao Natural Environment Foundation has supported FREDa to research and publish a book on the medicinal plants of Myanmar.

International NGOs and academic institutions

A small number of international NGOs and academic institutions have funded conservation activities in Myanmar, including BirdLife International, CAS, the Smithsonian Institution, WCS and WildAid. These investments have often been co-financed by other donors. The majority of recent conservation investment by international NGOs and academic institutions has been for biodiversity inventory work, surveys for globally threatened species, training for government staff in biodiversity survey techniques, infrastructural and management support for protected areas, and development of species and protected area management plans.

Local NGOs

Investment by local NGOs only represents a small fraction of the total investment in conservation in Myanmar. Unlike in some Asian countries, local NGOs in Myanmar do not have large memberships. Rather, their principal source of funding for conservation activities is donor-funded projects, although some receive limited support from private businesses.

Private sector

In general, private sector investment in biodiversity conservation in Myanmar is very limited. To a certain extent, this reflects the current level of development of the domestic private sector, and the small number of

multinational corporations investing in the country. There are, however, some examples of conservation initiatives supported by the private sector. First, the Save the Tiger Fund, a collaboration between the Exxon-Mobil Corporation and the National Fish and Wildlife Foundation, has supported a number of projects in the country, including the preparation of a national Tiger action plan (Lynam 2003). Second, the investors in the controversial Yadana gas pipeline (Total, Unocal, Petroleum Authority of Thailand, and Myanmar Oil and Gas Enterprise) are supporting the establishment of Tanintharyi Nature Reserve. In the future, if foreign investment in Myanmar increases and the domestic economy develops, opportunities for leveraging support for conservation from private businesses may increase. All opportunities should be evaluated carefully, to guard against potential negative social or environmental impacts.

Thematic distribution of investment

Site-based conservation: protected areas

Compared with other parts of the Indo-Myanmar (Indo-Burma) Hotspot, Myanmar's protected area system has received relatively little conservation investment from either the government or international donors. There are exceptions to this general pattern, however, and a small number of protected areas in Myanmar have been the focus of significant conservation investment. As well as addressing threats to biodiversity at these sites, these investments have generated experience about the effectiveness of different approaches to site-based conservation in Myanmar, which can be drawn upon when site-based conservation initiatives are developed at other sites in the future.

Until 2003, WildAid and DSWF invested in the *Surviving Together Programme* at Alaungdaw Kathapa National Park, a collaborative project with the Forest Department and FREDa. This programme comprised several components, including provision of radios and other equipment to strengthen anti-poaching work; baseline biodiversity inventories; education and awareness raising among local communities in cooperation with Buddhist monks; and increased community participation in environmentally compatible agriculture and forestry models.

WCS has been investing in a programme of conservation activities at Hukaung Tiger Reserve, in collaboration with the Forest Department. To date, surveys have been conducted on Tiger and its prey species, and research has been initiated on the impacts of hunting on wildlife and the role of wildlife in the local economy. Planned activities include: monitoring the abundance of Tiger and other wildlife species; training for protected area staff and local community members in enforcement and monitoring techniques; and education and awareness raising to generate support for conservation among local communities. WCS has supported infrastructure development and staff management costs for a number of other protected areas, including Htamanthi and Meinmahla Kyun Wildlife Sanctuaries and Natmataung National Park, and continues to support management costs for Hkakaborazi National Park.

The Smithsonian Institution has been working at Chatthin Wildlife Sanctuary, in collaboration with the Forest Department, since 1994. Activities to date have included: baseline biodiversity surveys; avian monitoring; ecological studies of Eld's Deer, small mammals, reptiles and amphibians; community relations work; and capacity building for protected area staff, including training courses and mentored projects. Smithsonian Institution scientists are currently advising graduate students from Yangon University and the University of Maryland on ecological studies there. Between 1999 and 2004, Smithsonian Institution scientists worked at two additional protected areas, Alaungdaw Kathapa National Park and Htamanthi Wildlife Sanctuary, to implement a project on monitoring and managing Asian Elephant populations. The project trained over 30 staff at the two protected areas in elephant monitoring techniques.

As well as investments at particular sites, there has also been some investment in protected areas planning. Between 1981 and 1984, FAO and UNDP supported the *Nature Conservation and National Parks Project*, which conducted field surveys to identify potential protected areas (Clarke 1999). However, the project was severely constrained because many potential sites for protected area designation were inaccessible due to

security reasons (Brunner *et al.* 1998). More recently, WCS, in collaboration with the Ministry of Forestry, has conducted a number of field surveys of existing and potential protected areas, and undertaken a status review of the protected area system (Rao *et al.* 2002), while BirdLife International has begun a series of surveys of potential sites, and identified several sites of international conservation importance suitable for protected area development. However, significant gaps remain in the national protected area system, with regard to the coverage of species, habitats and ecosystems, and systematic review and expansion of the system is a high priority.

Site-based conservation: non-formal approaches

In addition to investment in protected areas planning and management, there have been small amounts of investment in non-formal approaches to site-based conservation in Myanmar. For example, BirdLife International is currently implementing a Darwin-Initiative-funded project, which has supported the establishment of village-based groups of stakeholders, termed 'Site Support Groups', in the buffer zone of Natmataung National Park. These groups promote small-scale, village-based rural development initiatives, and undertake poaching patrols inside the national park. Few of these initiatives have been implemented for long enough to enable their effectiveness to be evaluated. However, elsewhere in the Indo-Myanmar (Indo-Burma) Hotspot, such approaches have proven to be a very cost-effective means of engaging local stakeholders in site-based conservation, and attaining conservation success in contexts where formal protected areas approaches are inappropriate or unlikely to be sustainable.

Conservation of wetland biodiversity

Within Myanmar, wetland ecosystems are severely under represented within the national protected area system. As a result, most investment in the conservation of wetland biodiversity in the country has been targeted outside of protected areas. While there has been little direct investment in wetland biodiversity conservation, several poverty alleviation and/or environmental protection projects in wetland ecosystems have made significant contributions to conservation objectives.

Between 1995 and 2001, UNDP and FAO supported a series of projects at three townships in the coastal zone of Myanmar, with the objective of building local capacity, enhancing the environment, and establishing a rural revolving fund for poverty alleviation. These projects promoted sustainable management of mangrove ecosystems through various forms of community participation. The models of sustainable mangrove ecosystem management developed under the UNDP/FAO projects are being sustained with the support of the Mangrove Service Network, a service provider for extension, education and social mobilisation. In addition to the UNDP/FAO projects, JICA, ACTMANG and FREDa are all involved in community forestry initiatives to protect and rehabilitate mangrove ecosystems in the Ayeyarwady Delta.

Box 15: Site Support Groups at Natmataung National Park

Jonathan C. Eames, BirdLife International *in Indochina*

The Biodiversity and Nature Conservation Association (BANCA) and BirdLife International, in collaboration with the staff of Natmataung National Park in Chin State, are providing village-based groups with development inputs in return for villagers' support for conservation of the national park. BANCA and BirdLife are working in two villages, Okpo and Hilaung, in the buffer zone of Natmatuang National Park. These villages were carefully selected by U Uga of BANCA and U Shein Gay Ngai, the Warden of Natmataung National Park, in part because of their poverty and the level of hunting by villagers in the national park. In 2004, a series of meetings were held with local villagers and district authorities to identify the development priorities in each village. National park staff also made the villagers aware of their obligations as stakeholders in maintaining the integrity of the national park, which includes Mount Victoria, the highest peak in Chin State. As a result, the villages elected representatives to form Site Support Groups (SSG) to take the lead in promoting village development initiatives and anti-poaching patrols around the national park.

SSGs are groups of concerned stakeholders who organize themselves to assist the conservation of sites of international conservation importance, termed Important Bird Areas or IBAs by BirdLife International. The BirdLife International Partnership of non-government organisations promotes this approach worldwide, to help safeguard formal protected areas, as well as sites that may not otherwise receive protection.

To date, the two SSGs in Myanmar, with BANCA and BirdLife support and with funding provided through the UK Government's Darwin Initiative, have established nurseries for coffee and avocado seedlings, introduced a higher yielding seed potato variety from Shan State, and built or repaired freshwater storage tanks in both villages. In return for these inputs, the SSGs have initiated anti-poaching patrols, which intercept hunters around the national park and confiscate traps.

One of the issues for villagers has been food security. At the villagers' request, the project began by providing rice to households facing food shortages. This was discontinued, however, after the project discovered the villagers' preference for improved potato varieties. Villagers are now asking for the project's help to introduce other crops.

Already there are indications of strong levels of take-up by the villagers, especially at Hilaung village, where the anti-poaching patrols have asked for staff from the national park to back them up and for the project to provide uniforms. The project interprets this to be a measure of pride in what they are doing, and an expression of their commitment.

Flushed with success, BANCA and BirdLife would like to scale-up activities at Okpo and Hilaung villages, and also introduce the model to other villages in the buffer zone. This will form part of their Darwin-funded project in 2005. They are also keen to hear from donors who may wish to support the initiative.

Box 16: Building fire mitigation shelters at Natmataung National Park

L. Fernando Potess, People, Resources and Conservation Foundation

With an area of 73 km², Natmataung National Park, previously known as Mount Victoria, is the largest protected area in the Chin Hills of Myanmar. Reaching an elevation of 3,340 m asl, the national park features temperate flora with pine and rhododendron forests at higher elevations, and oak and hill evergreen forests on the wetter slopes and at lower elevations. Although isolated from the main ridges of the Eastern Himalayas, Natmataung is nevertheless part of the Eastern Himalayas Endemic Bird Area, and supports one bird species endemic to the southern Chin Hills: White-browed Nuthatch *Sitta victoriae* (Endangered). Other Eastern Himalayan endemic bird species at Natmataung include Hume's Pheasant *Syrnaticus humiae*, Blyth's Tragopan *Tragopan blythii* (both Vulnerable), and Grey Sibia *Heterophasia gracilis*. Large mammals of conservation concern at the national park include Hoolock Gibbon *Bunipithecus hoolock* (Endangered), Asian Black Bear *Ursus thibetanus* and Southern Serow *Capricornis sumatraensis* (both Vulnerable).

Local villagers living in the Natmataung area belong to the Chin ethnic group. The Chin practice shifting cultivation for subsistence and still depend heavily on forest resources for their livelihoods. Shifting cultivation practices often result in forest fires within the national park. Another cause of forest fires is accidental spread of abandoned campfires along forest trails. Villagers travel along trails through the national park during all times of year, to sell their products at market, usually camping overnight in the forest. Travellers light fires to cook meals and provide heat during cold nights on the ridge-top trail. According to local informants, these travellers do not always extinguish their campfires before abandoning their temporary camps, resulting in forest fires. Strong winds, in the relatively dry pine forest on the ridges, increase the risk of uncontrolled fires during the dry season. The biological integrity of Natmataung National Park is being threatened by these uncontrolled fires.

The People, Resources and Conservation Foundation (PRCF) has targeted forest fires deriving from uncontrolled campfires for mitigation measures because: (i) they are highly localised and are an immediate threat to the most vulnerable part of the ecosystem; and (ii) they can be addressed with limited financial and human resources in a short timeframe. PRCF plans to establish three fire mitigation shelters along the main ridge of Mount Victoria. These shelters will include secure fireplaces, be located near water sources and be for the sole use of local villagers.

In collaboration with the Biodiversity and Nature Conservation Association (BANCA), and with support from an international donor, PRCF has already constructed one shelter at a site called Eight Mile Spring, at 2,600 m asl. Additional grants for the second and third shelters need clarification approval from the US Department of Treasury Office of Foreign Assets Control. PRCF hopes that this limited intervention will test the potential for a wider range of conservation interventions at Natmataung in future, to address more complex and widespread threats to biodiversity and local socio-economic development needs.

Conservation of marine biodiversity

As with wetlands, marine ecosystems are severely under represented within Myanmar's protected area system. There has been scant investment in the conservation of marine biodiversity in the country, and this remains a major funding gap. The review of investment opportunities presented in this document forms part of a larger process of conservation priority setting for the Indo-Myanmar (Indo-Burma) Hotspot, which does not include marine habitats. A separate exercise, engaging additional stakeholders, will be necessary to identify marine conservation priorities in Myanmar.

Landscape-level conservation

In many parts of the Indo-Myanmar (Indo-Burma) Hotspot, site-based approaches to conservation are increasingly being complemented by landscape-level approaches. Such approaches enable conservationists to build broader constituencies of support for conservation, address the conservation needs of landscape species, and promote the long-term maintenance of ecological and evolutionary processes. Landscape-level approaches also facilitate the integration of biodiversity considerations into the policies and programmes of other sectors, and leverage additional resources for conservation from innovative sources. Although such approaches have been identified as a high priority for a number of conservation corridors, including the Sundaic Subregion (Tanintharyi) and the Upper Chindwin Lowlands, very little funding has been secured to pursue them. These approaches represent another major funding gap in Myanmar.

Species-focused conservation

Investment in species-focused conservation in Myanmar has mainly been limited to small grants from such sources as the Oriental Bird Club, the Rufford Small Grant Scheme, the Save the Tiger Fund, and the US Fish and Wildlife Service (USFWS). For example, the Oriental Bird Club has recently supported a study by MBNS on the ecology of White-browed Nuthatch at Natmataung National Park.

Much recent investment in species-focused conservation has been for high-profile species, such as Tiger and Asian Elephant. For instance, in 1999/2000, USFWS provided a grant to the Smithsonian Institution for the project *Managing Three Critical Elephant Ranges in Myanmar*, while the Save the Tiger fund recently supported the preparation of a national Tiger action plan for Myanmar (Lynam 2003). However, even for high profile species, existing sources of funding are far from sufficient to meet their conservation needs. Species-focused conservation remains a major funding gap in Myanmar, and one that offers many opportunities to engage NGOs and academic institutions, both local and international, in biodiversity conservation. There is always a need to translate the results of species-focused research into conservation action.

Wildlife trade

Despite the trade in wildlife and wildlife products being widely recognised as one of the major factors driving over-exploitation of plant and animal species in Myanmar, investment in tackling the trade has been severely limited. Little detailed information is available on the scale and dynamics of the wildlife trade, as a result of which it is difficult to advocate for strengthened enforcement by government institutions, and monitor the effectiveness of actions aimed at controlling the trade.

There is a high need for sustained investment in addressing the threat posed by the wildlife trade, both within Myanmar and in the main markets for wildlife and wildlife products sourced in the country, such as China and Thailand. Investment will be required for a coordinated programme of conservation actions, combining short-term measures to understand the dynamics of the trade, identify and secure key populations of targeted species, and strengthen the capacity of enforcement agencies, with longer-term measures to reduce demand, through changing attitudes of consumers or, potentially, developing alternative, sustainable sources.

Box 17: Conserving freshwater and coastal cetaceans in Myanmar

Brian Smith, Wildlife Conservation Society

Irrawaddy Dolphins *Orcaella brevirostris* in the Ayeyarwady River are in immediate danger of extinction. This freshwater dolphin population is isolated from the nearest other members of the species in the Bay of Bengal by more than 1,000 km of river length, and was recently classified as Critically Endangered, according to IUCN criteria. Surveys conducted by the Wildlife Conservation Society (WCS) and Myanmar Department of Fisheries between 2002 and 2004 revealed that the total population numbers 59 to 72 individuals, and that its downstream range has declined by almost 60%. Documented threats include incidental killing in gillnets and during illegal electric fishing operations, and excessive sedimentation and mercury and noise pollution caused by large gold mining dredges and shoreline blasting operations.

In many areas of the world, dolphins are viewed as competitors to humans. However, Irrawaddy Dolphins in the Ayeyarwady River are revered by local people, and they provide direct economic benefits via their role in a cooperative fishery with cast-net fishermen. The fishermen summon the dolphins by tapping the sides of their boat with a conical wooden pin called a *labai kway*. If the dolphins "agree" to help the fishermen, one animal slaps the water surface with its tail flukes. One or two lead dolphins then swim in smaller and smaller semi-circles, corralling the fish toward the shore, while the other animals remained outside to guard against escapees. With a wave of their half-submerged flukes, the dolphins then deliver a concentrated mass of fish to the fishermen and "signal" them to cast their net. Using this technique, the fishermen can catch as much fish in a single net cast as they normally do during a whole day of fishing without the dolphins. The dolphins benefit from the activity by preying on fish whose movements are confused by the sinking net and those that are momentarily stuck on the mud bottom after the net is pulled up. Opportunities to improve the conservation prospects of dolphins in the Ayeyarwady River are excellent due the important role these animals play in the culture and economy of local people.

Initial efforts have also been made by WCS and the Myanmar Department of Fisheries to assess marine populations of cetaceans in Myanmar. From 23 February to 6 March 2005, the two organisations conducted a vessel-based line-transect survey for cetaceans along almost 1,100km of trackline in the coastal waters of the Mergui (Meik) Archipelago. A total of 34 sightings were made of seven species: Indo-Pacific Bottlenose Dolphin *Tursiops aduncus*; Indo-Pacific Humpback Dolphin *Sousa chinensis*; Dwarf Spinner Dolphin *Stenella longirostris roseiventris*; Pantropical Spotted Dolphin *S. attenuata*; Finless Porpoise *Neophocaena phocaenoides*; Irrawaddy Dolphin; and Bryde's Whale (small form) *Balaenoptera edeni*. These preliminary results indicate that the Mergui Archipelago supports relatively high cetacean diversity and abundance in the region. Sighting rates were much higher than those reported for coastal waters of the Andaman Sea in Thailand. Current efforts include investigating incidental catches in gillnet fisheries and incorporating cetaceans as an integral component of conservation planning for the archipelago.

Biodiversity survey and inventory

Although the need for additional investment remains high, biodiversity survey and inventory is one thematic area in Myanmar that has received relatively large amounts of conservation investment in recent years. Some of this investment has come from small foundations and grant schemes, such as the Rufford Small Grant Scheme, which recently supported BANCA to conduct a biodiversity and conservation assessment of Tanintharyi Division. Other investment has come from UK Government sources, such as the Darwin Initiative of DEFRA, which supported a series of surveys of limestone-karst-dependent bats by the Harrison Institute and Yangon University, and which will fund BirdLife International and BANCA to undertake future research on Gurney's Pitta. However, a significant proportion of this investment has come from US sources. For example, the *Myanmar*

Herpetological Survey was supported by a grant from the National Science Foundation (NSF) to CAS and the Smithsonian Institution's National Museum of Natural History. A continuation of this project with the Forest Department is currently under review by the NSF. Similarly, the Biodiversity Surveys and Inventories Programme of the Smithsonian Institution supported the *Botanical Exploration in Myanmar Project*, a collaborative effort involving the US National Herbarium, Yangon University and the Forest Department, which resulted in the publication of a checklist of the gymnosperms and angiosperms of Myanmar (Kress *et al.* 2003). Furthermore, the Smithsonian Institution and the Vienna Natural History Museum have supported entomological surveys in Myanmar, which resulted in the publication of an illustrated checklist of the butterflies of Myanmar (Kinyon 2003). Because of recent tightening of the economic and political sanctions on Myanmar by the US Government, it is currently unclear how sustainable these sources of support will be. Also, there remain very significant gaps in the taxonomic coverage of recent biodiversity survey and inventory efforts, with freshwater biodiversity being one of the major information and funding gaps, although an on-going collaboration between CAS and individual researchers from the Swedish Museum of Natural History to inventory the freshwater fish of Myanmar (Kullander *et al.* 2004) may go some way towards addressing this.

Environmental education and awareness raising

Elsewhere in the Indo-Myanmar (Indo-Burma) Hotspot, environmental education and awareness raising activities are receiving significant amounts of conservation investment. In Myanmar, however, investment in environmental education and awareness raising is limited, particularly at the national level, where there have been few initiatives targeting the general public or key decision makers in government, donor agencies and the corporate sector. In 2004, CI and the Smithsonian Institution received a grant from the Blue Moon Fund for a collaborative programme of graduate education and research at Yangon University. A goal of this programme is to focus graduate student research on conservation biology in protected areas. The Diplomatic School in Yangon has also embarked on an environmental education curriculum, to prepare Myanmar high school students for undergraduate education in the US. The Smithsonian Institution and WCS have participated by lecturing to students on this programme. The funding gap in environmental education and awareness raising is an opportunity for conservation investment, because supportive attitudes towards conservation among local communities and decision makers are a precondition for lasting conservation success.

Regional conservation initiatives

Although, there are a number of regional conservation initiatives in the Indo-Myanmar (Indo-Burma) Hotspot, very few actively involve Myanmar. One potential regional conservation initiative, currently being explored by the Governments of Thailand and Myanmar, is the Tenasserim Transboundary Conservation Project. If this project proceeded, it would involve linking Kaeng Krachan National Park and the Western Forest Complex in Thailand, via a habitat corridor in southern Myanmar.

Geographical distribution of investment

In part because of the country's relationship with international donors, Myanmar currently receives substantially less conservation investment than other countries in the Indo-Myanmar (Indo-Burma) Hotspot. There are several on-going conservation investments in Myanmar and a small number of pipeline investments. Table 11 summarises these investments by conservation corridor.

Table 11. Summaries of investment in each conservation corridor in Myanmar

Conservation Corridor	On-going Conservation Investments	Pipeline Conservation Investments
Ayeyarwady Delta	<ul style="list-style-type: none"> Community forestry initiatives to protect and rehabilitate mangrove ecosystems (small; implementer - ACTMANG/FREDA; donor - JICA). Limited government funding for protected area management. 	<ul style="list-style-type: none"> None known.
Bago Yoma Range	<ul style="list-style-type: none"> None known. 	<ul style="list-style-type: none"> None known.
Central Ayeyarwady River	<ul style="list-style-type: none"> Limited government funding for protected area management. 	<ul style="list-style-type: none"> None known.
Central Myanmar Dry Forests	<ul style="list-style-type: none"> Programme of research and training activities at Chatthin Wildlife Sanctuary (small; implementer - Smithsonian Institution). Limited government funding for protected area management. 	<ul style="list-style-type: none"> Sustainable management of deciduous dipterocarp forests (small; implementer - Smithsonian Institution).
Central Myanmar Deciduous Forests	<ul style="list-style-type: none"> Limited government funding for protected area management. 	<ul style="list-style-type: none"> Gibbon Research in Mahamyaing Wildlife Sanctuary Project (small; implementer - WCS).
Central Thanlwin River	<ul style="list-style-type: none"> None known. 	<ul style="list-style-type: none"> None known.
Chin Hills Complex	<ul style="list-style-type: none"> Building Constituencies for Site-based Conservation in Myanmar (small; implementer - BirdLife International; donor - DEFRA). Limited government funding for protected area management. 	<ul style="list-style-type: none"> Project to control wildfires at Natmataung National Park (small; implementer - BANCA; donor - PRCF).
Kayah-Kayin Range	<ul style="list-style-type: none"> Limited government funding for protected area management. 	<ul style="list-style-type: none"> None known.
Lower Chindwin River	<ul style="list-style-type: none"> None known. 	<ul style="list-style-type: none"> None known.
Naga Hills	<ul style="list-style-type: none"> None known. 	<ul style="list-style-type: none"> None known.
Nan Yu Range	<ul style="list-style-type: none"> None known. 	<ul style="list-style-type: none"> None known.
Northern Mountains Forest Complex	<ul style="list-style-type: none"> Research and protection activities at Hkakaborazi National Park and Hponkanrazi Wildlife Sanctuary (small; implementer - WCS). Building Constituencies for Site-based Conservation in Myanmar (small; implementer - BirdLife International; donor - DEFRA). Limited government funding for protected area management. 	<ul style="list-style-type: none"> None known.
Rakhine Yoma Range	<ul style="list-style-type: none"> Limited government funding for protected area management. 	<ul style="list-style-type: none"> None known.
Sundaic Subregion (Tanintharyi)	<ul style="list-style-type: none"> Building Constituencies for Site-based Conservation in Myanmar (small; implementer - BirdLife International; donor - DEFRA). Limited government funding for protected area management. 	<ul style="list-style-type: none"> The Conservation of Sundaic Lowland Forest Biodiversity in the Tanintharyi Peninsula, Myanmar (medium; implementer - BirdLife International; donor - GCF/British Birdwatching Fair).
Upper Chindwin Lowlands	<ul style="list-style-type: none"> Research and protection activities at Hukaung Tiger Reserve (small; implementer - WCS). Project to conduct Tiger surveys in the Hukaung Valley (small; implementer - WCS; donor - Save the Tiger Fund/USFWS). Building Constituencies for Site-based Conservation in Myanmar (small; implementer - BirdLife International; donor - DEFRA). Limited government funding for protected area management. 	<ul style="list-style-type: none"> Establishment of a Tiger Reserve in Hukaung Valley Region of Northern Myanmar (medium; implementer - WCS).

Note: budget available for activities within the conservation corridor: small < US\$100,000; medium US\$100,000-1,000,000; large > US\$1,000,000.

Box 18: Tracking Asian Elephants in Myanmar

Peter Leimgruber, Chris Wemmer and Daniel S. Kelly, Smithsonian Institution, National Zoological Park

No other country in Asia has been so closely identified in the popular imagination with elephants than Myanmar. Yet, despite this prominence, little is known about the status of remaining Asian Elephant *Elephas maximus* populations in the country. Our understanding of the movement patterns, area requirements and habitat needs of Myanmar's forest elephants is even less well understood, and there are few radio-tracking studies of forest elephants in South-East Asia.

The dense canopy and rugged topography of much of Myanmar's forests make capturing and radio-tracking elephants a challenge. In 2002, Smithsonian scientists collaborated with the Forest Department and Myanmar Timber Enterprise (MTE) to assess whether satellite tracking of elephants was feasible in Myanmar. The capture operation was lead by U Ye Htut, Warden of Alaungdaw Kathapa National Park (AKNP) and U Myo Than, MTE veterinarian, and resulted in the capture and radio-collaring of a young female elephant at AKNP. The collar used for the project relies on an internal Global Positioning System to accurately record the animal's location. The location data is then transmitted via the ARGOS satellite and processed at the Smithsonian. The female elephant was successfully tracked for 21 months, and her movement patterns were analysed. Data from only one elephant is of limited value but the project demonstrated the possibility of conducting larger-scale satellite tracking studies on Myanmar's endangered elephants. The project also found that, during the 21-months of tracking, the elephant never ventured far outside AKNP. The area used by the elephant seemed to change seasonally, with the elephant ranging over larger areas during the rainy season when water was not limited.

The greatest threat to Myanmar's remaining wild elephants may be loss of habitat due to rapidly expanding rural populations. As elsewhere in Asia, this is resulting in increasing people-elephant conflicts near major elephant habitats, such as the Bago Yoma. Working with U Wan Htun and U Thaung Nyunt, the Smithsonian is now using satellite tracking to investigate how remnant elephant populations in the conflict areas of Bago Yoma are utilising the landscape. In January 2005, two female and one young male elephant from three separate groups in the Bago Yoma were collared. Preliminary analyses suggest that the groups move from forest patch to forest patch, crossing agricultural areas along the way. Protecting these movement corridors might be a simple way to mitigate conflicts. The new and expanded study will provide essential information on movement behaviour and area requirements of forest elephants. It also has the potential to produce critical information for a better understanding of elephant behaviour in people-elephant conflict areas.

SOLUTIONS 1

Implementing focused conservation actions for priority species is one of five strategic directions for conservation investment identified in this document. The high mountains of northern Myanmar support a number of mammal species characteristic of the Eastern Himalayas, including Red Panda *Ailurus fulgens* (Endangered). The significance of the Myanmar population of this species is poorly known, and status surveys are a high priority. The retiring nature of Red Panda and its habit of spending long periods sleeping in the sun present researchers with particular survey challenges. The species may be more common and widespread within its Myanmar range than is currently believed. Photo: J. C. Eames.



Gurney's Pitta *Pitta gurneyi* was believed to be on the verge of extinction until the rediscovery of the species in Myanmar in 2003 gave new hope for its conservation. Unlike in Thailand, sufficient lowland forest remains in Myanmar to establish landscape-scale protected areas. The establishment of an expanded Lenya National Park, incorporating Ngawun Reserve Forest and its extension, is the most urgent habitat conservation issue in Myanmar today. A successful outcome seems dependent on conducting targeted advocacy and awareness raising for decision makers in government and the corporate sector, emphasising the need for mainstreaming biodiversity into other policy sectors. Photo: L. Bruce Kekule.

SOLUTIONS 2



Piloting alternative approaches to formal protected area management at priority sites is a key investment priority, which can strengthen conservation of priority sites. Working with local communities to better manage natural resources by establishing community agreements in return for provision of rural development inputs represents a relatively new approach in Myanmar. Photos: Vicky Bowman (top) and J. C. Eames (bottom).

SOLUTIONS 3



Biodiversity survey and inventory is one thematic area in Myanmar that has received relatively significant amounts of conservation investment in recent years. Some of this investment has come from small foundations and grant schemes. Other investment has come from UK Government sources, such as the Darwin Initiative of DEFRA, which supported a series of surveys of limestone-karst-dependent bats by the Harrison Institute and Yangon University (pictured), and which will fund BirdLife International and BANCA to undertake future research on Gurney's Pitta *Pitta gurneyi*. In addition, significant amounts of investment in biodiversity survey and inventory have come from US sources. Photo: Paul Bates/Harrison Institute.



Although, in general, the people of Myanmar are supportive of conservation objectives, rural people living in close proximity to protected areas may not be supportive of conservation efforts perceived to restrict their access to natural resources. NGOs and academic institutions could build grassroots support for conservation, including: changing public perceptions towards conservation through awareness raising; promoting conservation approaches that deliver benefits to rural livelihoods as well as biodiversity; acting as a bridge between government conservation initiatives (such as protected areas) and local communities; developing non-formal approaches to site-based conservation that maximise grassroots participation; and strengthening the capacity of protected area managers in community outreach and participation. Photo: WCS Myanmar Program.

SOLUTIONS 4



Supporting local NGOs and academic institutions to engage in biodiversity conservation is critical to building conservation management capacity. Here, members of the WCS Myanmar Program check a camera trap as part of a Tiger *Panthera tigris* survey. Photo: WCS Myanmar Program.



Creating capacity to coordinate conservation investment in Myanmar is one of the strategic directions identified in this document. Government institutions have the principal responsibility for conserving biodiversity but are often severely constrained by shortages of financial resources and technical expertise. These constraints represent opportunities for NGOs and academic institutions to play a role in strengthening the capacity of key government institutions responsible for conservation. The photograph shows representatives of NGOs, academic institutions, government institutions and donor agencies active in Myanmar who participated at the first stakeholder workshop, in Yangon in August 2003. Photographer unknown.

INVESTMENT OPPORTUNITIES

Investment opportunities in conservation by NGOs and academic institutions in Myanmar have been identified through an inclusive, participatory process, which has engaged representatives of NGOs, academic institutions, government institutions and donor agencies. Relative to the other countries in the Indo-Myanmar (Indo-Burma) Hotspot, existing conservation investment in Myanmar, both absolute and as a proportion of investment needs, is very limited. Consequently, the 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.

The Government of Myanmar is making limited investments in conserving natural habitats and wildlife populations, particularly through establishment and management of protected areas. These investments are supplemented by limited investments from international sources. Current levels of conservation investment fall far short, however, of the level required to prevent biodiversity losses of global significance.

When Myanmar's political and economic isolation decreases, government investment in conservation can be expected to increase, in line with its commitment under Article 20 of the CBD. This investment is anticipated to be complemented by increased investment from other sources, including bilateral donor agencies, international development banks, the GEF, private foundations, and the corporate sector. For the effectiveness of these investments to be maximised, it will be necessary to ensure that: (i) there is a solid basis of scientific information on the status and distribution of biodiversity to inform 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 and academic institutions are strong, well coordinated and actively engaged in biodiversity conservation. Over the next five years, investment in conservation by NGOs and academic institutions should concentrate on putting such a framework in place, as a foundation for future conservation efforts.

Table 12. Priority Corridors and Sites for conservation investment in Myanmar

Priority Corridors	Additional Priority Sites
1. Central Myanmar Dry Forests	1. Minzontaung
2. Central Myanmar Mixed Deciduous Forests	2. Myaleik Taung
3. Chin Hills Complex	3. Shwe U Daung
4. Lower Chindwin River	
5. Northern Mountains Forest Complex	
6. Rakhine Yoma Range	
7. Sundaic Subregion (Tanintharyi)	
8. Upper Chindwin Lowlands	

It will also be necessary to focus conservation investment in Myanmar geographically. Based on available information, the geographical priorities for investment are the eight Priority Corridors and three additional Priority Sites, all of which are of high global biodiversity importance and have a high need for additional conservation investment (Table 12). Complementary species-focused actions will also be required for 48 Priority Species, particularly control of hunting and status surveys. The Priority Corridors and additional Priority Sites cover a total area of 202,300 km², equivalent to 30% of the country's land area. While the proportion of Myanmar prioritised for conservation investment in this way is relatively high, it reflects three factors: (i) the persistence of extensive landscapes of contiguous natural habitat in the country; (ii) the high need for conservation investment throughout the country; and (iii) the lack of detailed information on the status and distribution of globally threatened species and other elements of biodiversity necessary to define the boundaries of conservation corridors more precisely.

INVESTMENT PRIORITIES AND STRATEGIC DIRECTIONS

The stakeholders at the first stakeholder workshop formulated a set of Investment Priorities, which encapsulated the major thematic priorities for investment in conservation by NGOs and academic institutions in Myanmar. The draft Investment Priorities were then reviewed by the drafting team, in the context of current conservation investment in the country, and grouped into Strategic Directions. Finally, the Strategic Directions and Investment Priorities were fed back to stakeholders at the second workshop for further review and comments.

Throughout this process, five criteria were used to select Investment Priorities. Following these criteria, each Investment Priority must:

- 1) support the conservation of one or more Priority Species, Site or Corridor;
- 2) address an urgent threat to biodiversity;
- 3) fill a gap in conservation investments by national governments and donors;
- 4) provide an opportunity for effective engagement of NGOs and/or academic institutions in conservation; and
- 5) be cost effective.

A total of 16 Investment Priorities were formulated, grouped into five Strategic Directions. These are presented in Table 13, and described in greater detail in the following section.

Table 13. 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

1. Strengthen conservation of Priority Sites

Compared with other countries in the Indo-Myanmar (Indo-Burma) Hotspot, Myanmar has been the focus of relatively little government or donor investment in site-based conservation. The country's protected area system is relatively under-developed, both in terms of coverage and management effectiveness (Rao *et al.* 2002). Few alternative approaches to formal protected areas management have been developed, despite the fact that such approaches have met with initial success elsewhere in the hotspot.

A number of international NGOs, most notably WCS, have been supporting the expansion of the national protected area system in Myanmar, while other organisations active in the country, such as BirdLife International, have experience of protected areas planning and/or strengthening protected area management from other countries. A number of local NGOs and international development NGOs are well positioned to build grassroots support for conservation and pilot alternative approaches to formal protected area management.

This Strategic Direction is consistent with the goals of *Myanmar Agenda 21* (NCEA 1997), particularly 15.1.3, which recognises that the "existing protected area system does not cover the whole range of variation of the ecosystems and the species of actual or potential socio-economic value" in the country and recommends that "the present protected areas need to be more broad-based and representative, comprising all natural ecosystems", and 15.1.7, which identifies a need to "strengthen existing protected areas and develop new protected areas to enhance biodiversity conservation".

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

A recent global gap analysis (Rodrigues *et al.* 2003) identified major gaps in the coverage of existing protected area systems with regard to species, and found that the most urgent priorities for expansion are concentrated disproportionately in Asia. These findings were reflected in the message from Fifth World Parks Congress to the CBD, which stated that, while much progress has been made in developing the global protected area system, there remain serious gaps in the coverage of many important species and biomes.

In Myanmar, 7% of the national land area is currently included within formal protected areas (M. Rao *in litt.* 2004), which compares with over 13% for Cambodia, Lao PDR, Thailand and Vietnam collectively (ICEM 2003). Of the eight Priority Corridors, only the Northern Mountains Forest Complex and the Upper Chindwin Lowlands are relatively well represented within the national protected area system. Additionally, only 17 of the 37 Priority Sites are designated or officially proposed as protected areas. Moreover, many of Myanmar's older protected areas, such as Pidaung Wildlife Sanctuary, are little more than "paper parks", with little effective on-the-ground management and large degraded areas within them. There is a critical need, therefore, to review the existing protected area system both for representativeness and effectiveness, and to expand it to address gaps in coverage of globally threatened species and KBAs.

Under Article 8 of the CBD, the government has a commitment to "establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity". Given the track record of several NGOs and academic institutions active in Myanmar in protected area planning, there exists a great opportunity for them to support the government to fulfil this commitment. It is essential that expansion of the national protected area system be conducted systematically, on the basis of analyses of scientific information. Similar analyses have led to the systematic expansion of protected area systems elsewhere in the Indo-Myanmar (Indo-Burma) Hotspot, including those conducted by the Lao-Swedish Forestry Cooperation Programme in Lao PDR (Berkmüller *et al.* 1993, 1995), Kasetsart University in Thailand (Kasetsart University 1987), and BirdLife International in Vietnam (Wege *et al.* 1999), in collaboration with government partners. In addition to work at the national level to promote and guide expansion of the system, there is also a need to work at individual sites, to conduct feasibility studies, prepare management plans, and build a constituency of support among key stakeholders.

1.2 Strengthen protected area management at Priority Sites

While reviewing and expanding Myanmar's protected area system is a high priority for conservation investment, protected area designation does not, by itself, guarantee the conservation of a site. Seventeen Priority Sites are designated or officially proposed as protected areas, including some of the most important sites for global biodiversity conservation in the country. At all of these sites, protected area managers face severe constraints, in terms of personnel, equipment, financial resources, and staff capacity. As a result, these protected areas experience human activities incompatible with their conservation objectives, including extraction of NTFPs, grazing, hunting and fuelwood extraction (Rao *et al.* 2002). There is an urgent need to strengthen protected area management at these Priority Sites, to ensure the attainment of Site Outcomes.

A few Priority Sites have been the focus of initiatives to strengthen protected area management, including: Alaungdaw Kathapa National Park, where the Forest Department, FREDa and WildAid implemented the *Surviving Together Programme*; Chatthin Wildlife Sanctuary, where the Smithsonian Institution, in collaboration with the Forest Department, has been conducting capacity building for protected area staff; and Hkakaborazi National Park, Hponkanrazi Wildlife Sanctuary and Hukaung Tiger Reserve, where WCS is implementing a programme of targeted research and protection, together with the Forest Department. Despite these initiatives, there is a high need for additional conservation investment in strengthening management effectiveness at all Priority Sites designated or officially proposed as protected areas.

Experience from Myanmar suggests that sustained training at specific sites can be a good way to improve management effectiveness at individual protected areas. Experience also shows that the effectiveness of training programmes can be enhanced by follow-up implementation exercises and projects, which allow trainees to put the training into practice.

1.3 Pilot alternative approaches to formal protected area management at Priority Sites

Establishment and management of formal protected areas has been the principal approach to site-based conservation employed in Myanmar to date. While this approach should remain the cornerstone of site-based conservation efforts in the country, it is not appropriate in every situation. For example, where a site has a large resident human population or experiences high levels of human use, formal protected area designation may result in significant negative impacts on local communities, or entail high opportunity costs, in terms of foregone economic benefits. By failing to secure grassroots support, the prospects for successful long-term conservation may be fatally undermined. There is a strong need to develop and pilot alternative approaches to formal protected area management, which can be introduced at Priority Sites outside the national protected area system. This is recognised in the Seventh Conference of the Parties to the CBD's Decision on Protected Areas, which "underlines the importance of conservation of biodiversity not only within but also outside protected areas" and suggests that parties "recognize and promote a broad set of protected area governance types... which may include areas conserved by indigenous and local communities."

Twenty Priority Sites are not included within formal protected areas. While formal protected area designation may be appropriate for some, there are many opportunities to introduce non-formal approaches at others. Such approaches could include: developing local conservation regulations and initiating community patrol groups; engaging local stakeholders, such as grassroots organisations, tourism companies or religious and informal leaders, in site stewardship; or developing voluntary agreements with private land owners or concessionaires to conserve key species and habitats. As well as being more appropriate in certain situations, such approaches to site conservation can also be more cost effective than formal protected area management, and more sustainable, because they focus on building local capacity and structures.

In recent years, a variety of alternative approaches to formal protected area management have been developed in the Indo-Myanmar (Indo-Burma) Hotspot, including community-based primate conservation groups in Vietnam (e.g. Swan and O'Reilly 2004), and village-protected Fish Conservation Zones in Lao PDR (Baird 2001). These represent a valuable source of experience to draw on when developing similar approaches

in Myanmar. Within Myanmar, a number of community-based natural resource management approaches have already been developed, such as field-based application of the Community Forestry Instructions, government regulations that promote local participation in reforestation. The potential exists to extend these approaches to conservation of Priority Sites, thereby attaining Site Outcomes.

1.4 Support strengthening of the legislative framework for protected area management and species conservation

In addition to shortages of personnel, equipment, financial resources, and staff capacity, effective management of Myanmar's protected areas is constrained by the lack of a clear and comprehensive legislative framework. The principal piece of legislation governing the establishment and management of protected areas is the 1994 Protection of Wildlife and Protected Areas Law. There are several significant weaknesses in this legislation, particularly a lack of clarity on which activities are allowed and prohibited in different protected area categories.

The current legislative framework also places severe constraints on species conservation efforts in Myanmar. Although Myanmar acceded to CITES in 1997, national legislation has not yet been brought in line with this convention. In particular, the Protection of Wildlife and Protected Areas Law does not enable the effective enforcement of international laws regulating international trade in wildlife and wildlife products.

Without a framework of laws and regulations supportive of conservation efforts by protected area managers and wildlife protection officials, the effectiveness of conservation investments in protected areas management and species conservation will be diminished. There exist opportunities for NGOs and academic institutions to support relevant government institutions strengthen the legislative framework for protected areas management and species conservation, by, for example, facilitating reviews of existing legislation, or strengthening capacity among government institutions responsible for drafting new protected areas and wildlife protection legislation.

2. Mainstream biodiversity into other policy sectors

Site-based conservation, whether via formal protected area management or alternative approaches, can be an effective means of addressing immediate threats to biodiversity. However, site-based conservation is often undermined by incompatible initiatives of other policy sectors, for example infrastructure developments that result directly in habitat loss and facilitate natural resource exploitation, or land-use decisions that promote conversion of lowland evergreen forest into oil palm plantations or mangrove into aquacultural ponds. The underlying causes of these threats include pursuit of economic policies inconsistent with biodiversity conservation, the relatively low priority given to biodiversity conservation by decision makers, and inadequate environmental safeguards in government and donor policies and programmes. These underlying causes should not be viewed as unassailable obstacles but, rather, as opportunities for mainstreaming biodiversity into other policy sectors, thereby mitigating potential threats before they occur and leveraging sufficient support for conservation success. This is in-line with Millennium Development Goal No. 7 of the United Nations, which sets a target for the global community to "integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources".

Although Myanmar has remained somewhat insulated from the economic forces that have driven rapid changes in social, economic and natural landscapes across the Asia Region, the level of donor and private sector investment in the country is likely to increase significantly at some point in the future. There is a need, therefore, for mechanisms that balance economic development with biodiversity conservation. Given that Myanmar's economy is heavily natural resource based, there is a particular need to mainstream biodiversity into the agriculture, forestry, fisheries, mining and energy sectors. NGOs and academic institutions are well placed to support such mainstreaming, due to their linkages to the grassroots level, first-hand understanding of the impacts of land-use and development decisions on biodiversity, and access to scientific data to support their arguments. Considering their potential to mitigate threats before they occur and leverage additional support for conservation, investments in mainstreaming biodiversity can be very cost effective.

2.1 Integrate biodiversity into decision-making processes for land-use and development interventions in the Priority Corridors

Some threats to biodiversity, such as conversion of forest to plantations and infrastructure development, do not originate from local communities but from land-use and infrastructure development decisions made at sub-national and national levels. A major underlying cause of these threats is the limited integration of biodiversity considerations into land-use and development decision making. In essence, decision-makers remain largely unaware of the values of biological diversity, and voices of concern from local communities and NGOs are not being heard.

There are several ways in which NGOs and academic institutions can promote the integration of biodiversity into land-use and development decision making, including by: identifying and documenting critical sites for biodiversity; communicating conservation messages to decision makers; promoting effective environmental impact assessment legislation and processes; providing technical support for development of land-use plans for Priority Corridors that incorporate protected areas and other KBAs; and monitoring the impacts of land-use and development decisions on biodiversity. There is a need for biodiversity mainstreaming initiatives to build strong linkages with monitoring programmes for Conservation Outcomes (see Investment Priority 5.1), both to inform the initiatives and to evaluate their impact.

2.2 Conduct targeted advocacy and awareness raising for decision makers, in government, donor agencies and the corporate sector

Without the support of key decision makers in national and local government institutions, donor agencies and the corporate sector, it is very difficult to successfully mainstream biodiversity into other policy sectors. There is, therefore, a need for NGOs and academic institutions to undertake targeted advocacy and awareness raising for key decision makers. Effective approaches to advocacy that could be adopted by NGOs and academic institutions include influencing policy through localised pilot initiatives, documenting and sharing successes, and disseminating information on national and regional examples of best practice.

Advocacy and awareness raising for decision makers should focus on the biodiversity and socio-economic values of natural ecosystems in Myanmar, and the practical steps that can be taken to maintain these values. In addition to creating a supportive environment for biodiversity mainstreaming, targeted advocacy and awareness raising can generate political support for other conservation measures, such as enforcement of wildlife protection laws, expansion of the national protected area system, or control of illegal logging. To have the maximum impact, advocacy and awareness initiatives must be informed by the results of relevant research. In this context, research into economic valuation of biodiversity or studies on the contribution of protected areas to socio-economic development could be very useful.

2.3 Forge partnerships between biodiversity conservation and rural development initiatives, maximise synergies and mitigate risks

High levels of dependency on natural resources among rural communities in Myanmar, particularly in upland areas, are contributing to land degradation and biodiversity loss. In many areas, for conservation efforts to be successful, there is a clear need to address livelihood issues. Typically, NGOs and academic institutions specialising in biodiversity conservation lack sufficient resources and relevant expertise to adequately address these issues. In this context, it is important for conservation organisations to forge partnerships with development organisations, to jointly develop approaches to natural resource management that deliver significant benefits to local communities while, at the same time, meeting biodiversity conservation objectives.

Opportunities to link biodiversity conservation with rural development exist in many parts of Myanmar. For example, local communities in Mon and Kayin States protect caves with large bat populations, because of their economic importance as a source of guano (P. Bates *in litt.* 2004). Similarly, community forestry and reforestation activities around the northern and western edges of the Central Dry Zone have the potential to deliver

livelihood benefits while, at the same time, alleviating the extremely high human pressure on forests in these areas. Other opportunities are presented by two integrated multi-sectoral community development projects currently being implemented by UNDP, which aim to enhance the capacity of the poor to address their needs through establishment of self-reliance groups. Both projects have potential linkages with conservation initiatives at protected areas and other KBAs, particularly with regard to promoting grassroots participation in conservation.

As well as maximising synergies, forging partnerships with rural development initiatives can enable conservation organisations to identify and mitigate activities with potential negative impacts on biodiversity, such as promotion of forms of land-use that threaten the integrity of KBAs or conservation corridors.

3. Implement focused conservation actions for Priority Species

Species-focused conservation is a major funding gap in Myanmar. The stakeholders selected 48 Priority Species for species-focused conservation. While some of these species require specific conservation actions, to address their particular conservation needs, the majority fall into suites of species with common conservation needs, requiring similar conservation actions.

Within Myanmar, as elsewhere in the hotspot, many species, particularly those with a high demand in trade, are undergoing significant declines, even in extensive areas of suitable habitat, and the "empty forest syndrome" is common throughout the country. There is an urgent need to address hunting and trade of many Priority Species. Other Priority Species require species-focused conservation because they are widely distributed at low densities, and can only be conserved by addressing disturbance, habitat loss and other threats across their ranges.

For many Priority Species, there is a need for greatly improved information on their status, distribution and ecology, as a guide to future conservation efforts. For many Priority Species, insufficient information is available about their distribution to allow appropriate conservation measures to be taken, including revision of the national protected area system.

The need for greatly improved information is not only limited to Priority Species but there is also a need for baseline information on the status and distribution of all taxonomic groups, to guide conservation planning. Some of this information is currently being collected, through such initiatives as the *Botanical Exploration in Myanmar Project*, a collaboration among the Smithsonian Institution, the Forest Department and Yangon University. Baseline information on the distribution and presence of butterflies, reptiles and amphibians has also been collected for several years on a countrywide basis by collaborations among CAS, the Smithsonian Institution and the Forest Department. However, there remain a number of major gaps in baseline information regarding other taxa, most significant of which, from a conservation planning perspective, is a severe shortage of information on freshwater biodiversity in the country.

Many NGOs and academic institutions active in Myanmar have experience and capacity to implement species-focused conservation actions. Species-focused conservation presents many opportunities for collaboration among national and international NGOs, academic institutions and government institutions. In particular, there exist many opportunities to both build on and build up local capacity in species-focused conservation, as a basis for attaining Species Outcomes.

3.1 Establish a wildlife trade monitoring system for Priority Species and use the results to strengthen and better target enforcement at national and regional levels

Many Priority Species are severely threatened by hunting, which is usually, but not always, driven by high demand from the international wildlife trade. In many cases, for example Tiger, trade demand threatens to drive populations to extinction even within protected areas (Rabinowitz 1998, Bennett and Rao 2002, Lynam 2003). For these species, therefore, site-based conservation must be complemented by measures to reduce wildlife trade and, thereby, alleviate pressure on wild populations.

There is a need for a coordinated programme of conservation actions, aimed at controlling the trade in wildlife, with a particular focus on Priority Species. Some of the key actions required must be taken by government, particularly revision and enforcement of wildlife protection laws, and prosecution of offenders. However, there are many opportunities for NGOs and academic institutions to provide support and guidance, some of which are addressed under other Strategic Directions, such as strengthening protected area management (see Investment Priority 1.2), advocacy and awareness raising for decision makers (see Investment Priority 2.2), and monitoring programmes for Conservation Outcomes (see Investment Priority 5.1). An additional opportunity identified at the stakeholder workshops was to establish a wildlife trade monitoring system for Priority Species, and use the results to strengthen and better target enforcement at national and regional levels. Such a monitoring system could be linked with similar initiatives elsewhere in the Indo-Myanmar (Indo-Burma) Hotspot, to advocate regionally for strengthened legislation and enforcement.

3.2 Take range-wide conservation actions for certain widely dispersed Priority Species

Seven Priority Species occur at low densities over large areas: White-bellied Heron; White-winged Duck; Sarus Crane; White-rumped Vulture; Slender-billed Vulture; Masked Finfoot; and Lesser Adjutant. All of these are bird species characteristic of wetland and/or open country habitats. While few of these species are specifically targeted by hunters, they are often threatened by disturbance or loss of key habitats, such as nesting sites or feeding areas. While some of these species may occur in significant concentrations, at least during certain times of the year, few protected areas are of sufficient size to maintain viable populations over the long term. Consequently, in addition to site-based protection, these Priority Species require conservation actions throughout their ranges. These actions include education and awareness raising among rural communities to encourage people not to disturb the species, and promotion of grassroots participation in the conservation of key habitats. For some species, other actions may be required, for instance supplementary feeding to restore severely depressed populations, in the case of White-rumped Vulture and Slender-billed Vulture.

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

For five Priority Species, there are no recent confirmed records from the wild in Myanmar: Hairy Rhinoceros; Lesser One-horned Rhinoceros; Anthony's Pipistrelle; Joffre's Pipistrelle; and Pink-headed Duck. All of these species require greatly improved information on their status and distribution before meaningful conservation actions can be taken for them. The priority action for all of these species is to identify extant populations (if any remain), investigate their status, ecology and threats, and feed the results into conservation planning, including, where necessary, revision of the national protected area system. Relatively small amounts of investment in status surveys can potentially leverage significant additional resources for the conservation of Priority Species, thereby attaining Species Outcomes.

The stakeholders recommended that status surveys are also a high priority for 34 other Priority Species. While most of these species are known to occur at some sites in Myanmar, there is an urgent need for surveys to identify additional sites for each species, so that these can be placed under appropriate protection. Such action is a particularly high priority for turtle species, which are threatened by trade-driven over-exploitation throughout the country, and for which identification of a network of core areas that can form the focus of intensive protection efforts is an essential short-term conservation measure, while complementary actions to reduce pressure from the wildlife trade take effect.

3.4 Conduct baseline biodiversity surveys for selected freshwater taxa, and apply results to conservation planning

Freshwater species provide wetland products that are critical to many of the rural poor throughout the Indo-Myanmar (Indo-Burma) Hotspot. This dependency has been demonstrated by a recent study on rural livelihoods in Attapu province, Lao PDR, where a broad diversity of some 200 species of aquatic plants and

animals were being used by villagers (Meusch *et al.* 2003). Freshwater species are also among the most threatened in the region, as a result of unsustainable fishing practices, and habitat alteration and loss. However, the taxonomy, status and distribution of freshwater taxa in Myanmar, as elsewhere in the region, are very little studied.

A lesson learned from experience elsewhere in mainland South-East Asia is that, because the available scientific information on the status and distribution of freshwater biodiversity is typically less comprehensive than that on terrestrial biodiversity, the conservation needs of freshwater biodiversity tend not to be taken fully into account during conservation planning. As a result, the coverage of terrestrial ecosystems within national protected area systems and networks of non-formal conservation areas is generally much better than that of freshwater ecosystems. In Myanmar, it is still possible to avoid repeating this mistake, by collecting baseline information on the taxonomy, status and distribution of freshwater taxa and incorporating it into conservation planning at a stage when the window of opportunity to expand the national protected area system is still open, and while there are opportunities to integrate biodiversity considerations into the decision-making processes of other policy sectors (see Investment Priority 2.1).

Baseline biodiversity inventories and status surveys are a priority for all taxonomic groups in Myanmar, not only freshwater taxa. However, survey and inventory initiatives are already underway for plants and terrestrial vertebrates, most notably the collaborative programmes of CAS, the Smithsonian Institution, the Forest Department and Yangon University. Consequently, freshwater biodiversity remains a major funding gap. In order to coordinate efforts in Myanmar with initiatives elsewhere in the region, the following freshwater taxa should be prioritised for baseline surveys: fish, crustaceans, molluscs and odonates. A critical constraint on baseline surveys for freshwater taxa is the shortage of specialists to identify and classify material. Therefore collaborative initiatives to study existing collections, enable specialists to access collections and build capacity among national specialists are at least as important as continued collections.

4. Support local NGOs and academic institutions to engage in biodiversity conservation

Despite limited funding opportunities and, until recently, limited encouragement and support from the international conservation community, a small number of local NGOs active in biodiversity conservation have emerged in Myanmar. Typically, these organisations benefit from committed personnel and constructive relationships with government. The same can be said for a number of local academic institutions, particularly Yangon and Mandalay Universities, which are beginning to develop programmes in conservation biology and are starting to play a more active role in biodiversity conservation. Partnerships with international academic institutions and NGOs can accelerate this process.

Local NGOs and academic institutions have limited experience and expertise in developing and implementing international-donor-funded projects, and capacity building is required in this area if the potential for these organisations to take a leading role in future conservation initiatives in the country is to be realised. Another need is for strong networks of NGOs and academic institutions, including both local and international organisations. As well as facilitating exchange of information and experience, and providing mutual support, such networks could enable coordinated and collaborative conservation action, particularly where each organisation is able to contribute different skills and experience. Such networks could also provide a mechanism for broadening the constituency for biodiversity conservation in Myanmar, through engaging grassroots organisations, development NGOs and private businesses.

4.1 Strengthen the capacity of local NGOs and academic institutions to develop and implement conservation projects

Although local NGOs and academic institutions in Myanmar harbour many well-educated and dedicated professionals, as a result of decades of isolation these organisations suffer from a lack of knowledge of international standards and thinking on sustainable development (Eberhardt 2003). A number of local organisations,

including NGOs and academic institutions, have been involved in implementing major international-donor-funded projects, and several of these organisations have entered into informal or formal partnerships with international NGOs or academic institutions. Such collaborations have often involved the transfer of technical skills from international to local organisations, particularly in the area of biodiversity survey. In general, however, the potential to use these collaborations as a way to strengthen the capacity of local NGOs and academic institutions to develop and implement conservation projects has not been fully realised. With relatively modest funding, there are many opportunities for international NGOs and academic institutions to actively strengthen the capacity of local organisations in such areas as administration, financial management, proposal development, communication and strategic planning. Such investments could be separate initiatives or they could form part of collaborative projects with broader objectives.

4.2 Develop mechanisms for coordination and information sharing among NGOs and academic institutions active in Myanmar

Each NGO and academic institution active in Myanmar has particular areas of programmatic focus and expertise. However, many of the major threats to biodiversity in the country can only be effectively addressed through coordinated programmes of conservation action at several levels, from data collection and grassroots engagement of communities, through institutional capacity building, to awareness raising and advocacy for decision makers. In order to effectively address these threats, there is often a need to bring the skills and experience of different organisations to bear in a coordinated fashion.

There is also a need for improved communication among NGOs and academic institutions, to facilitate information exchange. For instance, networks that linked grassroots organisations with NGOs active at the national level would be well positioned to monitor the impacts of land-use and development decisions on biodiversity, and feed the results into national-level advocacy (see Investment Priority 2.2). Similarly, conservation partnerships among NGOs, academic institutions and protected area managers could enable information on biodiversity, threats and conservation actions generated at the site level to guide conservation actions at the national level, and facilitate more effective targeting of capacity building for protected area staff (see Investment Priority 1.2). Improved communication would also allow lessons learned by NGOs and academic institutions to be shared with other organisations, so that mistakes would be less likely to be repeated and best practice approaches could be replicated elsewhere.

As well as improving coordination and communication among organisations already engaged in biodiversity conservation, effective networks could also help to engage other organisations. For instance, development NGOs with experience in natural resource management or community empowerment could be engaged in site-based conservation initiatives, while private businesses could enter into NGO-corporate sector partnerships.

4.3 Support the development of conservation curricula at local academic institutions

A major constraint on the ability of local NGOs and academic institutions to engage in biodiversity conservation is the shortage of trained conservationists and field biologists in Myanmar. This constraint arises from the lack of conservation training and education programmes in high schools and tertiary institutions. Very few students and researchers are interested in conservation science or field biology, because wildlife training and biodiversity conservation are virtually non-existent from the teaching syllabus and because they have few role models to follow. The shortage of suitably trained individuals is also a major factor contributing to the low capacity of government institutions responsible for managing the country's biodiversity.

While some international academic institutions and NGOs, including CI and the Smithsonian Institution, have already initiated some programmes of graduate study and research at local academic institutions, there is a great need for a full overhaul of undergraduate and graduate biological science curricula, in order to equip the next generation of protected area managers, field biologists and conservationists with appropriate skills, and expose them to international ideas and approaches. The need for modern curricula on conservation biology is greatest at Yangon and Mandalay Universities, which are most active in field biology, and the University of Forestry at Yezin, which graduates foresters who eventually become protected area managers.

5. Create capacity to coordinate conservation investment in Myanmar

The geographical, species and thematic priorities for conservation investment presented in this document are determined by the current conservation situation in Myanmar and available information. These priorities are likely to change, even within the next few years, as the conservation situation on the ground changes, and, especially, as more information becomes available. It is essential that conservation investment in Myanmar is responsive to such changes, so that new opportunities are taken, and redundant effort is avoided. To this end, there is a need for a mechanism to coordinate conservation investment, linked to a monitoring programme for Conservation Outcomes. This would allow Investment Priorities to be continually re-evaluated, investment to be redirected to other priorities as Conservation Outcomes were attained, and successful conservation approaches to be documented and replicated.

5.1 Initiate standardised monitoring programmes for Conservation Outcomes

Reliable information on the status of, the nature and severity of threats to and the type and effectiveness of conservation actions for globally threatened species, KBAs and conservation corridors is essential to the success of a number of priority conservation actions in Myanmar. These include review and expansion of the national protected area system (see Investment Priority 1.1), integration of biodiversity considerations into the decision making processes of other sectors (see Investment Priority 2.1), and targeted advocacy and awareness raising for key decision makers (see Investment Priority 2.2). Such information is needed to guide conservation investments in the country, and ensure that limited conservation resources remain focused on the highest geographical, species and thematic priorities. Monitoring of Conservation Outcomes allows conservation success to be measured, which can help to leverage additional resources for conservation efforts in the country.

Baseline data are already available for some Conservation Outcomes in Myanmar, and additional data will be generated through status surveys of Priority Species (see Investment Priority 3.3), baseline surveys of freshwater biodiversity (see Investment Priority 3.4), and other initiatives. Monitoring programmes are currently in place for only a handful of Species and Site Outcomes, and these are not standardised or effectively linked to conservation planning and advocacy at the national level. There is a need to initiate standardised programmes for monitoring Conservation Outcomes, following the Pressure-State-Response model. Standardised protocols for site-based monitoring already exist, and could be adopted for use in Myanmar, such as the Protected Area Management Effectiveness Tracking Tool developed by the World Bank and WWF (Stolton *et al.* 2003). However, standardised protocols may need to be developed for monitoring Species and Corridor Outcomes. To ensure comparability, monitoring programmes developed in Myanmar should, where possible, be compatible with those being developed elsewhere in the Indo-Myanmar (Indo-Burma) Hotspot.

As far as possible, monitoring should be integrated into other conservation initiatives, and not be a stand-alone activity. In this way, there will be greater opportunities to link monitoring results to site management, conservation planning and advocacy. There is a need to develop monitoring programmes jointly with the Forest Department, in order to facilitate sharing of information and to form a basis for collaborative action. Networks of NGOs and academic institutions organisations (see Investment Priority 4.2) could also play an important role in monitoring Conservation Outcomes, by providing a link between grassroots data collection and engagement in policy and planning processes at national and sub-national levels.

5.2 Establish a mechanism to manage information on Conservation Outcomes and Investment Priorities, coordinate conservation actions, and leverage additional funding

Many of the stakeholders consulted during the preparation of this document emphasised the need for conservation investments in Myanmar to be coordinated, in order to maximise their impact. An essential precondition for effective coordination of conservation investments is the availability of reliable and up-to-date information on Conservation Outcomes and Investment Priorities. While standardised monitoring programmes will generate such information, it needs to be collated, evaluated and the results used to reach a consensus on

conservation priorities among NGOs, academic institutions, government institutions and donor agencies. With such a consensus in place, conservation actions by different organisations can be coordinated, both at the national level and within individual Priority Corridors. Another important function of a coordination mechanism would be to pro-actively engage NGOs and academic institutions in biodiversity conservation, by making them aware of funding opportunities, identifying opportunities for capacity building, and building partnerships. Such a mechanism could also act as a focal point for donors wishing to invest in conservation in Myanmar, and could play an important role in actively leverage additional funding.

If sufficient resources were available, the coordination mechanism may be able to provide small amounts of investment directly to local NGOs, academic institutions and individuals, to enable them to undertake small-scale, cost effective initiatives, such as piloting innovative approaches to conservation, or conducting targeted research. In addition, such small-scale financial support could be used to strengthen the capacity of local NGOs and academic institutions (see Investment Priority 4.1), for instance by enabling individuals to attending training courses, or funding the preparation of technical manuals.

Sustainability

The rationale behind the Strategic Directions and Investment Priorities outlined above is that investments over the next five years should deliver long-term conservation benefits, through establishing the conditions necessary to maximise the effectiveness of future investments. Key features of Strategic Directions and Investment Priorities that contribute to their sustainability are:

- a solid foundation for future site-based conservation actions will be built through Strategic Direction 1, in the form of a representative national protected area system, managed by a cadre of highly trained, well motivated management staff, supported by an appropriate legislative framework, and complemented by alternative approaches to formal protected area management of demonstrated effectiveness;
- biodiversity will be mainstreamed into decision making through Strategic Direction 2, thus ensuring that future conservation initiatives are not undermined by incompatible initiatives of other policy sectors;
- a sound basis of scientific information on the status of globally threatened species, KBAs and conservation corridors will be generated and made available through Investment Priorities 3.1, 3.3, 3.4 and 5.1, ensuring that future conservation investment is focused on the highest geographical, species and thematic priorities;
- a constituency of support for biodiversity conservation in the country will be built at the grassroots level (through Investment Priority 1.3), among key decision makers (through Investment Priority 2.2), and in the form of strong, well coordinated local NGOs and academic institutions, (through Strategic Direction 4).
- capacity to coordinate conservation investment in the country will be put in place under Strategic Direction 5, which will maximise the effectiveness of future conservation investments by maximising synergies, minimising overlaps and leveraging additional resources.

CONCLUSION

As a result of periods of instability and political isolation, large areas of Myanmar remained inaccessible to researchers for much of the second half of the 20th Century. Work conducted by local and international biologists over the last decade, building on research conducted during the British colonial era, has revealed that Myanmar still retains most of its biodiversity values, including populations of endemic and globally threatened species. The recent discoveries of a numerous species new to science suggest that much remains to be learnt about this biologically rich country. However, Myanmar is not a country caught in time, and the forces driving biodiversity loss in other parts of the Asia Region, including population growth, economic development, increasing consumption and integration into the global economy, are at play in the country. Over-exploitation of wildlife, large-scale timber extraction, conversion of natural habitats to other land-uses and infrastructure development are all major threats to biodiversity. Fortunately, there are still opportunities to plan and introduce conservation measures to mitigate these threats. However, the time available is short.

This document outlines the geographic, taxonomic and thematic priorities for conservation in Myanmar, and identifies investment opportunities in conservation by NGOs and academic institutions. The document is the output of an inclusive, participatory process, involving stakeholders from NGOs, academic institutions, government institutions and donor agencies, supported by review of literature and other information sources.

The geographic priorities for conservation investment in Myanmar comprise eight Priority Corridors and 37 Priority Sites, including some of the best remaining examples of the most threatened ecosystems in the Indo-Myanmar (Indo-Burma) Hotspot, and the least protected and most threatened habitat types in Myanmar.

The taxonomic priorities for conservation investment in Myanmar comprise 48 Priority Species, which require species-focused action in addition to site-based and landscape-level conservation. Many of these species are severely threatened by hunting and require conservation actions to alleviate pressure from the wildlife trade. Other species require greatly improved information about their status and distribution in the country, or range-wide conservation actions.

Finally, the thematic priorities for conservation investment in Myanmar were formulated as 16 Investment Priorities, grouped into five Strategic Directions: site-based conservation; biodiversity mainstreaming; species-focused conservation; strengthened engagement in conservation by NGOs and academic institutions; and coordination of conservation investments. The Investment Priorities are as follows:

- review and support the expansion of the national protected area system to address gaps in coverage of globally threatened species and KBAs;
- strengthen protected area management at Priority Sites;
- pilot alternative approaches to formal protected area management at Priority Sites;
- support strengthening of the legislative framework for protected area management and species conservation;
- integrate biodiversity into decision-making processes for land-use and development interventions in the Priority Corridors;
- conduct targeted advocacy and awareness raising for decision makers in government, donor agencies and the corporate sector;
- forge partnerships between biodiversity conservation and rural development initiatives, maximise synergies and mitigate risks;
- establish a wildlife trade monitoring system for Priority Species and use results to strengthen and better target enforcement at national and regional levels;
- take range-wide conservation actions for certain widely dispersed Priority Species;
- 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;

- conduct baseline biodiversity surveys for selected freshwater taxa, and apply results to conservation planning;
- strengthen the capacity of local NGOs and academic institutions to develop and implement conservation projects;
- develop mechanisms for coordination and information sharing among NGOs and academic institutions active in Myanmar;
- support the development of conservation curricula at local academic institutions;
- initiate standardised monitoring programmes for Conservation Outcomes;
- establish a mechanism to manage information on Conservation Outcomes and Investment Priorities, coordinate conservation actions, and leverage additional funding.

Unlike a number of other countries in the region, Myanmar still supports extensive, intact natural landscapes, with full biotic communities. There is support for biodiversity conservation on the part of the government, and a growing momentum of engagement in conservation by NGOs and academic institutions. Because of the political situation, however, 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. There is an urgent need for an ambitious programme of investment that tackles the most immediate conservation needs while, at the same time, building a solid foundation for future conservation efforts.

ABBREVIATIONS USED IN THE TEXT

ACTMANG	Action for Mangrove Reforestation
ADB	Asian Development Bank
ASEAN	Association of South-East Asian Nations
BANCA	Biodiversity and Nature Conservation Association
CBD	Convention on Biological Diversity
CEPF	Critical Ecosystem Partnership Fund
CI	Conservation International
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species of Wild Animals
DEFRA	Department of Environment, Food and Rural Affairs
DSWF	David Shepherd Wildlife Foundation
EBA	Endemic Bird Area
EcoDev	Economic and Development Association
FAO	Food and Agriculture Organisation
FREDA	Forest Resources, Environment, Development and Conservation Association
GAD	General Administration Department
GCF	Global Conservation Fund
GDP	gross domestic product
GEF	Global Environment Facility
IBA	Important Bird Area
ICIMOD	International Center for Integrated Mountain Development
IUCN	World Conservation Union
JICA	Japanese International Cooperation Agency
JIFPRO	Japanese International Forestry Promotion and Cooperation Centre
JOFCA	Japanese Overseas Forestry Consultant Association
MAB	Man and the Biosphere
MBNS	Myanmar Bird and Nature Society
NCEA	National Commission for Environmental Affairs
NGO	non-governmental organisation
NSF	National Science Foundation
NTFP	non-timber forest product
NWCD	Nature and Wildlife Conservation Division
ODA	Overseas Development Assistance
PRCF	People, Resources and Conservation Foundation
SPDC	State Peace and Development Council
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US	United States
USFWS	United States Fish and Wildlife Service
WCS	Wildlife Conservation Society
WWF	World Wide Fund for Nature/World Wildlife Fund

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ATTACHMENT 1

Preliminary list of globally threatened species in Myanmar

No.	Scientific Name	Common Name	Global Status			Threat			Selection Criteria for Priority Species		
			Critically Endangered	Endangered	Vulnerable	Myanmar Supports Significant Population	Species-focused Action Required	Need for Additional Investment			
	MAMMALS		4	9	26						
1	<i>Ailurus fulgens</i>	Red Panda		EN		Yes	Yes	High			
2	<i>Bos gaurus</i>	Gaur			VU	Yes	No	N/A			
3	<i>Bos javanicus</i>	Banteng		EN		Yes	No	N/A			
4	<i>Bubalus bubalis</i>	Wild Water Buffalo		EN		Yes	Yes	High			
5	<i>Budorcas taxicolor</i>	Takin			VU	Yes	Yes	High			
6	<i>Bunipithecus hoolock</i>	Hoolock Gibbon		EN		Yes	Yes	Medium			
7	<i>Callosciurus pygerythrus</i>	Irrawaddy Squirrel			VU	Yes	No	N/A			
8	<i>Callosciurus quinquestriatus</i>	Anderson's Squirrel			VU	Yes	No	N/A			
9	<i>Capricornis sumatraensis</i>	Southern Serow			VU	Yes	No	N/A			
10	<i>Catopuma temminckii</i>	Asian Golden Cat			VU	Yes	Yes	High			
11	<i>Cervus eldii</i>	Eld's Deer			VU	Yes	Yes	Medium			
12	<i>Craseonycteris thonglongyai</i>	Kitti's Hog-nosed Bat		EN		Yes	Yes	High			
13	<i>Cuon alpinus</i>	Dhole			VU	Yes	No	N/A			
14	<i>Dicerorhinus sumatrensis</i>	Hairy Rhinoceros	CR			Yes	Yes	High			
15	<i>Elephas maximus</i>	Asian Elephant		EN		Yes	Yes	Medium			
16	<i>Hylopetes alboniger</i>	Particolored Flying Squirrel		EN		Yes	No	N/A			
17	<i>Hystrix brachyura</i>	East Asian Porcupine			VU	Yes	No	N/A			
18	<i>Lutra lutra</i>	Eurasian Otter			VU	Yes	No	N/A			
19	<i>Lutrogale perspicillata</i>	Smooth-coated Otter			VU	Yes	No	N/A			
20	<i>Macaca arctoides</i>	Bear Macaque			VU	Yes	No	N/A			
21	<i>Macaca assamensis</i>	Assamese Macaque			VU	Yes	No	N/A			
22	<i>Macaca leonina</i>	Northern Pig-tailed Macaque			VU	Yes	No	N/A			
23	<i>Muntiacus crinifrons</i>	Black Muntjac			VU	Yes	Yes	High			
24	<i>Mustela strigidorsa</i>	Stripe-backed Weasel			VU	Yes	No	N/A			
25	<i>Naemorhedus baileyi</i>	Red Goral			VU	Yes	Yes	High			
26	<i>Naemorhedus caudatus</i>	Long-tailed Goral			VU	Yes	No	N/A			
27	<i>Neofelis nebulosa</i>	Clouded Leopard			VU	Yes	Yes	High			
28	<i>Panthera tigris</i>	Tiger		EN		Yes	Yes	High			
29	<i>Pardofelis marmorata</i>	Marbled Cat			VU	Yes	Yes	High			
30	<i>Pipistrellus anthonyi</i>	Anthony's Pipistrelle	CR			Yes	Yes	High			
31	<i>Pipistrellus joffrei</i>	Joffre's Pipistrelle	CR			Yes	Yes	High			
32	<i>Prionailurus planiceps</i>	Flat-headed Cat			VU	No	N/A	N/A			
33	<i>Prionailurus viverrinus</i>	Fishing Cat			VU	Yes	No	N/A			
34	<i>Rattus sikkimensis</i>	Sikkim Rat			VU	Yes	No	N/A			
35	<i>Rhinoceros sondaicus</i>	Lesser One-horned Rhinoceros	CR			Yes	Yes	High			
36	<i>Tapirus indicus</i>	Asian Tapir			VU	Yes	Yes	High			
37	<i>Trachypithecus pileatus</i>	Capped Leaf Monkey		EN		Yes	Yes	High			
38	<i>Ursus thibetanus</i>	Asian Black Bear			VU	Yes	Yes	High			
39	<i>Vernaya fulva</i>	Vernay's Climbing Mouse			VU	Yes	No	N/A			

No.	Scientific Name	Common Name	Global Status			Threat			Selection Criteria for Priority Species		
			Critically Endangered	Endangered	Vulnerable	Myanmar Supports Significant Population	Species-focused Action Required	Need for Additional Investment			
	BIRDS		4	8	33						
40	<i>Aceros nipalensis</i>	Rufous-necked Hornbill			VU	Yes	No	N/A			
41	<i>Aceros subruficollis</i>	Plain-pouched Hornbill			VU	Yes	No	N/A			
42	<i>Alcedo euryzona</i>	Blue-banded Kingfisher			VU	Yes	No	N/A			
43	<i>Anas formosa</i>	Baikal Teal			VU	No	N/A	N/A			
44	<i>Apus acuticauda</i>	Dark-rumped Swift			VU	No	N/A	N/A			
45	<i>Aquila clanga</i>	Greater Spotted Eagle			VU	No	N/A	N/A			
46	<i>Aquila heliaca</i>	Imperial Eagle			VU	No	N/A	N/A			
47	<i>Ardea insignis</i>	White-bellied Heron		EN		Yes	Yes	High			
48	<i>Aythya baeri</i>	Baer's Pochard			VU	Yes	No	N/A			
49	<i>Brachypteryx hyperythra</i>	Rusty-bellied Shortwing			VU	Yes	No	N/A			
50	<i>Cairina scutulata</i>	White-winged Duck		EN		Yes	Yes	High			
51	<i>Chrysomma albirostre</i>	Jerdon's Babbler			VU	No	N/A	N/A			
52	<i>Ciconia boyciana</i>	Oriental Stork		EN		No	N/A	N/A			
53	<i>Ciconia stormi</i>	Storm's Stork		EN		No	N/A	N/A			
54	<i>Columba punicea</i>	Pale-capped Pigeon			VU	Yes	No	N/A			
55	<i>Eurynorhynchus pygmeus</i>	Spoon-billed Sandpiper			VU	No	N/A	N/A			
56	<i>Falco naumanni</i>	Lesser Kestrel			VU	No	N/A	N/A			
57	<i>Gallinago nemoricola</i>	Wood Snipe			VU	No	N/A	N/A			
58	<i>Grus antigone</i>	Sarus Crane			VU	Yes	Yes	Medium			
59	<i>Gyps bengalensis</i>	White-rumped Vulture	CR			Yes	Yes	High			
60	<i>Gyps tenuirostris</i>	Slender-billed Vulture	CR			Yes	Yes	High			
61	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle			VU	No	N/A	N/A			
62	<i>Heliopais personata</i>	Masked Finfoot			VU	Yes	Yes	High			
63	<i>Leptoptilos dubius</i>	Greater Adjutant		EN		No	N/A	N/A			
64	<i>Leptoptilos javanicus</i>	Lesser Adjutant			VU	Yes	Yes	High			
65	<i>Lophophorus sclateri</i>	Sclater's Monal			VU	Yes	No	N/A			
66	<i>Mergus squamatus</i>	Scaly-sided Merganser		EN		No	N/A	N/A			
67	<i>Otus sagittatus</i>	White-fronted Scops-owl			VU	Yes	No	N/A			
68	<i>Pavo muticus</i>	Green Peafowl			VU	Yes	Yes	High			
69	<i>Pelecanus philippensis</i>	Spot-billed Pelican			VU	Yes	No	N/A			
70	<i>Pitta gurneyi</i>	Gurney's Pitta	CR			Yes	Yes	High			
71	<i>Pycnonotus zeylanicus</i>	Straw-headed Bulbul			VU	No	N/A	N/A			
72	<i>Rhodonessa caryophyllacea</i>	Pink-headed Duck	CR			Yes	Yes	High			
73	<i>Rynchops albicollis</i>	Indian Skimmer			VU	No	N/A	N/A			
74	<i>Sitta formosa</i>	Beautiful Nuthatch			VU	Yes	No	N/A			
75	<i>Sitta magna</i>	Giant Nuthatch			VU	Yes	No	N/A			
76	<i>Sitta victoriae</i>	White-browed Nuthatch		EN		Yes	Yes	High			
77	<i>Spizaetus nanus</i>	Wallace's Hawk-eagle			VU	No	N/A	N/A			
78	<i>Stachyris oglei</i>	Snowy-throated Babbler			VU	Yes	No	N/A			
79	<i>Symaticus humiae</i>	Hume's Pheasant			VU	Yes	No	N/A			

No.	Scientific Name	Common Name	Global Status			Selection Criteria for Priority Species		
			Critically Endangered	Endangered	Vulnerable	Myanmar Supports Significant Population	Species-focused Action Required	Need for Additional Investment
80	<i>Tragopan blythii</i>	Blyth's Tragopan			VU	Yes	No	N/A
81	<i>Treron capellei</i>	Large Green-pigeon			VU	No	N/A	N/A
82	<i>Tringa guttifer</i>	Spotted Greenshank		EN		Yes	No	N/A
83	<i>Turdoides longirostris</i>	Slender-billed Babbler			VU	No	N/A	N/A
84	<i>Turdus feae</i>	Grey-sided Thrush			VU	Yes	No	N/A
	REPTILES		4	10	7			
85	<i>Amyda cartilaginea</i>	Asiatic Softshell Turtle			VU	Yes	Yes	High
86	<i>Batagur baska</i>	Mangrove Terrapin	CR			Yes	Yes	High
87	<i>Chitra vandijki</i>	Burmese Frog-faced Softshell Turtle		EN*		Yes	Yes	High
88	<i>Crocodylus siamensis</i>	Siamese Crocodile	CR			Yes	Yes	High
89	<i>Cuora amboinensis</i>	Asian Box Turtle			VU	Yes	Yes	Low
90	<i>Geochelone platynota</i>	Burmese Star Tortoise	CR			Yes	Yes	High
91	<i>Heosemys depressa</i>	Arakan Forest Turtle	CR			Yes	Yes	High
92	<i>Heosemys grandis</i>	Giant Asian Pond Turtle			VU	Yes	Yes	Low
93	<i>Heosemys spinosa</i>	Spiny Turtle		EN		Yes	Yes	Medium
94	<i>Hieremys annandalii</i>	Yellow-headed Temple Turtle		EN		Yes	Yes	High
95	<i>Indotestudo elongata</i>	Elongated Tortoise		EN		Yes	Yes	Medium
96	<i>Kachuga trivittata</i>	Burmese Roofed Turtle		EN		Yes	Yes	High
97	<i>Manouria emys</i>	Asian Giant Tortoise		EN		Yes	Yes	High
98	<i>Manouria impressa</i>	Impressed Tortoise			VU	Yes	Yes	High
99	<i>Morenia ocellata</i>	Burmese Eyed Turtle			VU	Yes	Yes	High
100	<i>Nilssononia formosa</i>	Burmese Peacock Softshell		EN		Yes	Yes	High
101	<i>Notochelys platynota</i>	Malayan Flat-shelled Turtle			VU	No	N/A	N/A
102	<i>Pelochelys cantorii</i>	Asian Giant Softshell Turtle		EN		Yes	Yes	High
103	<i>Platysternon megacephalum</i>	Big-headed Turtle		EN		Yes	Yes	High
104	<i>Pyxidea mouhotii</i>	Keeled Box Turtle		EN		Yes	Yes	Medium
105	<i>Siebenrockiella crassicolis</i>	Black Marsh Turtle			VU	Yes	Yes	Low
	INVERTEBRATES		0	0	1			
106	<i>Euploea andamanensis</i>	Andaman Crow			VU	N/A	N/A	N/A
	PLANTS		13	12	13			
107	<i>Afzelia xylocarpa</i>			EN		N/A	N/A	N/A
108	<i>Anisoptera costata</i>			EN		N/A	N/A	N/A
109	<i>Anisoptera scaphula</i>		CR			N/A	N/A	N/A
110	<i>Aquilaria malaccensis</i>				VU	N/A	N/A	N/A
111	<i>Burretiodendron esquirolii</i>				VU	N/A	N/A	N/A
112	<i>Calocedrus macrolepis</i>				VU	N/A	N/A	N/A
113	<i>Cephalotaxus mannii</i>				VU	N/A	N/A	N/A
114	<i>Cleidiocarpon cavaleriei</i>				VU	N/A	N/A	N/A
115	<i>Cleidiocarpon laurinum</i>			EN		N/A	N/A	N/A

No.	Scientific Name	Common Name	Global Status			Threat			Selection Criteria for Priority Species		
			Critically Endangered	Endangered	Vulnerable	Myanmar Supports Significant Population	Species-focused Action Required	Need for Additional Investment			
116	<i>Cycas siamensis</i>				VU	N/A	N/A	N/A			
117	<i>Dalbergia oliveri</i>			EN		N/A	N/A	N/A			
118	<i>Dipterocarpus alatus</i>			EN		N/A	N/A	N/A			
119	<i>Dipterocarpus baudii</i>		CR			N/A	N/A	N/A			
120	<i>Dipterocarpus costatus</i>			EN		N/A	N/A	N/A			
121	<i>Dipterocarpus dyeri</i>		CR			N/A	N/A	N/A			
122	<i>Dipterocarpus gracilis</i>		CR			N/A	N/A	N/A			
123	<i>Dipterocarpus grandiflorus</i>		CR			N/A	N/A	N/A			
124	<i>Dipterocarpus kerrii</i>		CR			N/A	N/A	N/A			
125	<i>Dipterocarpus retusus</i>				VU	N/A	N/A	N/A			
126	<i>Dipterocarpus turbinatus</i>		CR			N/A	N/A	N/A			
127	<i>Hopea apiculata</i>		CR			N/A	N/A	N/A			
128	<i>Hopea ferrea</i>			EN		N/A	N/A	N/A			
129	<i>Hopea griffithii</i>				VU	N/A	N/A	N/A			
130	<i>Hopea helferi</i>		CR			N/A	N/A	N/A			
131	<i>Hopea odorata</i>				VU	N/A	N/A	N/A			
132	<i>Hopea sangal</i>		CR			N/A	N/A	N/A			
133	<i>Intsia bijuga</i>				VU	N/A	N/A	N/A			
134	<i>Magnolia rostrata</i>				VU	N/A	N/A	N/A			
135	<i>Parashorea stellata</i>		CR			N/A	N/A	N/A			
136	<i>Picea farreri</i>			EN		N/A	N/A	N/A			
137	<i>Pterocarpus indicus</i>				VU	N/A	N/A	N/A			
138	<i>Shorea farinosa</i>		CR			N/A	N/A	N/A			
139	<i>Shorea gratissima</i>			EN		N/A	N/A	N/A			
140	<i>Shorea henryana</i>			EN		N/A	N/A	N/A			
141	<i>Shorea roxburghii</i>			EN		N/A	N/A	N/A			
142	<i>Taiwania cryptomerioides</i>				VU	N/A	N/A	N/A			
143	<i>Vatica cinerea</i>			EN		N/A	N/A	N/A			
144	<i>Vatica lanceaefolia</i>		CR			N/A	N/A	N/A			
	Total		25	39	80						

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.

ATTACHMENT 2

Preliminary list of KBAs in Myanmar

No.	KBA	Mammals	Birds	Reptiles	Plants	Protected Area*	IBA†	Selection Criteria for Priority Sites	
								KBA within a Priority Corridor	Supports Globally Threatened Species Endemic to Myanmar
1	Alaungdaw Kathapa	+	+		+	PA	IBA	Central Myanmar Mixed Deciduous Forests	No
2	Ayeyarwady Delta: Meinmahla Kyun		+	+		PA	IBA	No	No
3	Ayeyarwady River: Bagan Section		+	+			IBA	No	No
4	Ayeyarwady River: Bhamo to Shwegu Section		+				IBA	No	No
5	Ayeyarwady River: Moda Section		+				IBA	No	No
6	Ayeyarwady River: Myitkyina to Sinbo Section		+				IBA	No	No
7	Ayeyarwady River: Sinbyugyun to Minbu Section		+				IBA	No	No
8	Ayeyarwady River: Singu Section		+				IBA	No	No
9	Bumphabum	+	+			PA	IBA	Upper Chindwin Lowlands	No
10	Bwe Pa		+				IBA	Chin Hills Complex	No
11	Central Bago Yoma	+						No	No
12	Central Tanintharyi Coast			+				Sundaic Subregion (Tanintharyi)	Burmese Eyed Turtle
13	Chatthin	+	+			PA	IBA	Central Myanmar Dry Forests	No
14	Chaungmagyi Reservoir		+				IBA	No	No
15	Chaungmon-Wachauung		+				IBA	Sundaic Subregion (Tanintharyi)	Gurney's Pitta
16	Dawna Range	+						No	No
17	Gyobin		+				IBA	No	No
18	Hkakaborazi	+	+		+	PA	IBA	Northern Mountains Forest Complex	No
19	Hpa-an	+						No	No
20	Hponkanrazi	+	+		+	PA	IBA	Northern Mountains Forest Complex	No
21	Htamanthi	+	+		+	PA	IBA	Upper Chindwin Lowlands	No
22	Htaung Pru	+						Sundaic Subregion (Tanintharyi)	No
23	Hukaung Valley	+	+		+	PA	IBA	Upper Chindwin Lowlands	No
24	Indawgyi	+	+			PA	IBA	No	No

No.	KBA	Mammals	Birds	Reptiles	Plants	Protected Area*	IBA†	Selection Criteria for Priority Sites	
								KBA within a Priority Corridor	Supports Globally Threatened Species Endemic to Myanmar
25	Inle Lake		+	+		PA	IBA	No	No
26	Kaladan Estuary			+				Rakhine Yoma Range	Burmese Roofed Turtle
27	Kamaing		+				IBA	No	No
28	Karathuri		+				IBA	Sundaic Subregion (Tanintharyi)	Gurney's Pitta
29	Kawthaung District Lowlands		+				IBA	Sundaic Subregion (Tanintharyi)	No
30	Kennedy Peak		+				IBA	Chin Hills Complex	No
31	Khaunglanpu	+						Northern Mountains Forest Complex	No
32	Kyauk Pan Taung		+			PA	IBA	Chin Hills Complex	No
33	Kyee-ni Inn		+				IBA	No	No
34	Lampi Island		+			PA	IBA	Sundaic Subregion (Tanintharyi)	No
35	Lenya		+				IBA	Sundaic Subregion (Tanintharyi)	No
36	Loimwe	+				PA		No	No
37	Mahamyaing	+	+		+	PA	IBA	Central Myanmar Mixed Deciduous Forests	No
38	Mahanandar Kan		+				IBA	No	No
39	Mawlamyine	+						No	No
40	Mehon (Doke-hta Wady River)		+				IBA	No	No
41	Minzontaung			+		PA		No	Burmese Star Tortoise
42	Momeik-Mabein	+						No	No
43	Moyingyi		+			PA	IBA	No	No
44	Myaleik Taung			+				No	Burmese Star Tortoise
45	Myitkyina-Nandebad-Talawgyi		+				IBA	No	No
46	Myittha Lakes		+				IBA	No	No
47	Nadi Kan		+				IBA	No	No
48	Nam Sam Chaung (Kachin State)		+				IBA	No	No
49	Nam San Valley (Shan State)		+				IBA	No	No
50	Nat-yekan		+				IBA	Rakhine Yoma Range	No

No.	KBA	Mammals	Birds	Reptiles	Plants	Protected Area*	IBA†	Selection Criteria for Priority Sites	
								KBA within a Priority Corridor	Supports Globally Threatened Species Endemic to Myanmar
51	Natmataung (Mount Victoria)		+			PA	IBA	Chin Hills Complex	White-browed Nuthatch
52	Ngawun	+	+				IBA	Sundaic Subregion (Tanintharyi)	Gurney's Pitta
53	Ngwe Taung		+				IBA	Rakhine Yoma Range	No
54	Ninety-six Inns		+				IBA	No	No
55	North Zarmayi		+		+		IBA	No	No
56	Northern Rakhine Yoma	+						Rakhine Yoma Range	No
57	Nyaung Kan-Minhla Kan		+				IBA	No	No
58	Pachan		+				IBA	Sundaic Subregion (Tanintharyi)	No
59	Panlaung-Pyadalin Cave	+				PA		No	No
60	Paunglaung Catchment Area	+						No	No
61	Pe River Valley (Mintha Ext Reserve Forest)	+						Sundaic Subregion (Tanintharyi)	No
62	Peleik Inn		+				IBA	No	No
63	Rakhine Yoma	+		+		PA		Rakhine Yoma Range	Arakan Forest Turtle
64	Saramati Taung	+						No	No
65	Shinmataung		+				IBA	No	No
66	Shwe U Daung			+		PA		No	Burmese Star Tortoise
67	Shwese ttaw	+	+	+		PA	IBA	Central Myanmar Dry Forests	Burmese Star Tortoise
68	Tanai River	+	+			PA	IBA	Upper Chindwin Lowlands	No
69	Tanintharyi National Park	+	+			PA	IBA	Sundaic Subregion (Tanintharyi)	No
70	Tanintharyi Nature Reserve	+						Sundaic Subregion (Tanintharyi)	No
71	Taung Kan at Sedawgyi		+				IBA	No	No
72	Thaungdut	+						No	No
73	Upper Mogaung Chaung Basin		+				IBA	No	No
74	Uyu River		+		+		IBA	Lower Chindwin River	No
75	Yemyet Inn		+				IBA	No	No
76	Zeihmu Range		+				IBA	Chin Hills Complex	No

Notes: * = KBA is designated or officially proposed as a protected area, in whole or in part; † = KBA meets the criteria for designation as an Important Bird Area.

ATTACHMENT 3

Preliminary list of conservation corridors in Myanmar

No.	Conservation Corridor	KBAs	Area (km ²)	Selection Criteria for Priority Corridors			
				Important Populations of CR and EN Animal Species	Important Populations of Landscape Species	Unique or Exceptional Ecological & Evolutionary Processes	Need for Additional Investment
1	Ayeyarwady Delta	Ayeyarwady Delta: Meinmahla Kyun	5,300	Mangrove Terrapin		migration of shorebirds; recruitment of fish	High
2	Bago Yoma Range	Central Bago Yoma; North Zarmayi	17,800	Asian Elephant; Banteng	Asian Elephant		High
3	Central Ayeyarwady River	Ayeyarwady River: Bagan Section; Ayeyarwady River: Bhamo to Shwegu Section; Ayeyarwady River: Moda Section; Ayeyarwady River: Myitkyina to Sinbo Section; Ayeyarwady River: Sinbyugyun to Minbu Section; Ayeyarwady River: Singu Section; Myitkyina-Nandebad-Talawgyi; Myittha Lakes; Nam Sam Chaung (Kachin State); Ninety-six Inns; Peleik Inn; Taung Kan at Sedawgyi; Yemyet Inn	18,000	White-bellied Heron; White-rumped Vulture; White-winged Duck	Irrawaddy Dolphin; sandbar-nesting birds; vultures; White-bellied Heron	migration of fish	High
4	Central Myanmar Dry Forests	Chatthin; Shwesettaw	15,000	Burmese Star Tortoise; White-winged Duck			High
5	Central Myanmar Mixed Deciduous Forests	Alaungdaw Kathapa; Mahamyaing	7,600	Asian Elephant; Banteng; Capped Leaf Monkey; Hoolock Gibbon	Asian Elephant		High
6	Central Thanlwin River		11,000		sandbar-nesting birds	migration of fish	High
7	Chin Hills Complex	Bwe Pa; Kennedy Peak; Kyauk Pan Taung; Natmataung (Mount Victoria); Zeihmu Range	23,900	White-browed Nuthatch; White-rumped Vulture	Rufous-necked Hornbill; vultures	altitudinal migration of birds	High
8	Kayah-Kayin Range	Dawna Range	13,000	Kitti's Hog-nosed Bat			High
9	Lower Chindwin River	Uyu River	8,400	White-rumped Vulture	sandbar-nesting birds; vultures	migration of fish	High
10	Naga Hills	Saramati Taung	5,500	Hoolock Gibbon			High
11	Nan Yu Range		20,500				High
12	Northern Mountains Forest Complex	Hkakaborazi; Hponkanrazi; Khaunglanpu	25,800	Hoolock Gibbon; Red Panda; White-bellied Heron	Rufous-necked Hornbill; Takin; White-bellied Heron	altitudinal migration of birds	High

No.	Conservation Corridor	KBAs	Area (km ²)	Selection Criteria for Priority Corridors			
				Important Populations of CR and EN Animal Species	Important Populations of Landscape Species	Unique or Exceptional Ecological & Evolutionary Processes	Need for Additional Investment
13	Rakhine Yoma Range	Kaladan Estuary; Nat-yekan; Ngwe Taung; Northern Rakhine Yoma; Rakhine Yoma	53,000	Arakan Forest Turtle; Asian Elephant; Banteng; Burmese Roofed Turtle; Hoolock Gibbon	Asian Elephant; Rufous-necked Hornbill	migration of shorebirds; recruitment of fish	High
14	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	Asian Elephant; Gurney's Pitta; Mangrove Terrapin; Storm's Stork; Tiger	Asian Elephant; Plain-pouched Hornbill; Tiger	migration of shorebirds; recruitment of fish	High
15	Upper Chindwin Lowlands	Bumphabum; Htamanthi; Hukaung Valley; Tanai River	24,400	Asian Elephant; Capped Leaf Monkey; Hoolock Gibbon; Slender-billed Vulture; Tiger; White-bellied Heron; White-rumped Vulture; White-winged Duck; Wild Water Buffalo	Asian Elephant; Tiger; White-bellied Heron; sandbar-nesting birds	altitudinal migration of birds; migration of fish	High



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