

Central Java with Special Focus on Endemic Primate Species' for our consideration. As Perth Zoo was, and remains, the only ARAZPA zoo – and one of only three zoos in the world – to hold and breed silvery gibbons (*Hylobates moloch*), primate section staff felt that supporting this survey would create an effective link between captive breeding and conservation in the wild. Thus, the SGP was established by Perth Zoo primate keepers, docents, other zoo staff, and members of the Australian Primate Society to raise funds for the survey.

Support was sought and obtained from the Director and senior managers for a variety of fund-raising activities to be held at the zoo, which would include the use of zoo facilities and equipment. One hundred per cent of monies raised would be used for the conservation of the silvery gibbon.

The SGP embarked on a frantic 18-month fund-raising drive with quiz nights, guest speakers, cake stalls, rallies and sale of silvery gibbon T-shirts, windcheaters and notepads. The total raised was A\$27,000 – far more than anyone could have predicted at the beginning. We were able to fully fund the Central Javan survey which, after a number of delays, was completed in 1994. Gibbons were only found in two forest patches; other habitat areas that once contained the animals had either disappeared or were so severely degraded that they could no longer support populations.

Early in 1994, Ron Tilson, of Minnesota Zoo and CBSG, approached us for funding to support an IUCN/SSC Population and Habitat Viability Assessment (PHVA) workshop to be held in Java in May, to determine the status of the Javan (silvery) gibbon and the Javan langur in the wild, and make recommendations for their conservation. As the information generated would guide future efforts, the SGP committed A\$3,000 to the workshop, which my wife, Dianne, and I attended.

Alarming, the results of the PHVA indicated that the total wild population may consist of only 300–400, and certainly less than 2,000 individuals, left in 21 discontinuous forest patches. The largest observed populations, all of less than 100 individuals, occur in three national parks. These offer the best hope for protecting this endemic species in its natural range, as many of the other populations are not within protected areas. Based on this information, the workshop concluded that the status of *Hylobates moloch* was Critical. It recommended that the remaining wild populations be actively managed and that the present captive-breeding program be expanded to ensure long-term survival.

After attending the workshop, we visited two of the parks that contain this species to obtain first-hand information from officials regarding the current situation, existing problems and future plans. We were impressed by the knowledge and commitment of the staff, who have an increasingly difficult job to do, often hampered by lack of resources.

On returning to Perth, we recommended that the Project now directly contribute to the survival and protection of the remaining wild population by providing support to one of these protected areas – Gunung Halimun National Park, in western Java. With the assistance of Ron Tilson, a Memorandum of Cooperation has recently been signed between the Silvery Gibbon Project and the Indonesian park authorities, with a commitment to provide A\$10,000 in this financial year. We have already forwarded half of this money, which is being used to construct a park entrance gate as well as additional signage, important in this instance as the park was only gazetted

in 1992. We have pledged further funds each year to assist in the development of infrastructure and to purchase needed equipment.

With the assistance of several international primate researchers, our current fund-raising activity is the production and sale of a set of 'Endangered Primates of the World' greeting cards. The set consists of eight cards and envelopes, and these can be air-mailed anywhere in the world for US\$12 per set. Total Project funds raised to date exceed A\$32,000. We would welcome support from *International Zoo News* readers; your International Money Order will be used to continue our support of Gunung Halimun National Park in the future, and help to assist in the *in situ* conservation of the silvery gibbon, one of the most endangered primates in the world.

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BIODIVERSITY AND CONSERVATION IN THE PHILIPPINES

**BY WILLIAM L.R. OLIVER AND
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Introduction

In recent years, the World Conservation Union (IUCN) and most other major international conservation organisations have come to regard the Philippines as one of the highest priority countries in the world for conservation concern. There are three main reasons for this:

- (a) the enormous biological importance of the archipelago, which bridges two major biogeographical regions and supports an astonishingly wide variety of animal and plant species;
- (b) the extraordinarily high percentage of uniqueness or 'endemism' amongst these species – i.e. about 67% of species amongst the major groups of animals and plants found in the Philippines occur nowhere else in the world;
- (c) the high rate of deforestation and other degradative factors, including serious inadequacies in the existing environmental protection measures and the protected areas network.

To these can be added a fourth reason, namely the almost total lack of awareness (and therefore of concern) about these factors amongst the vast majority of Filipino people – even within the government and other decision-making sectors.

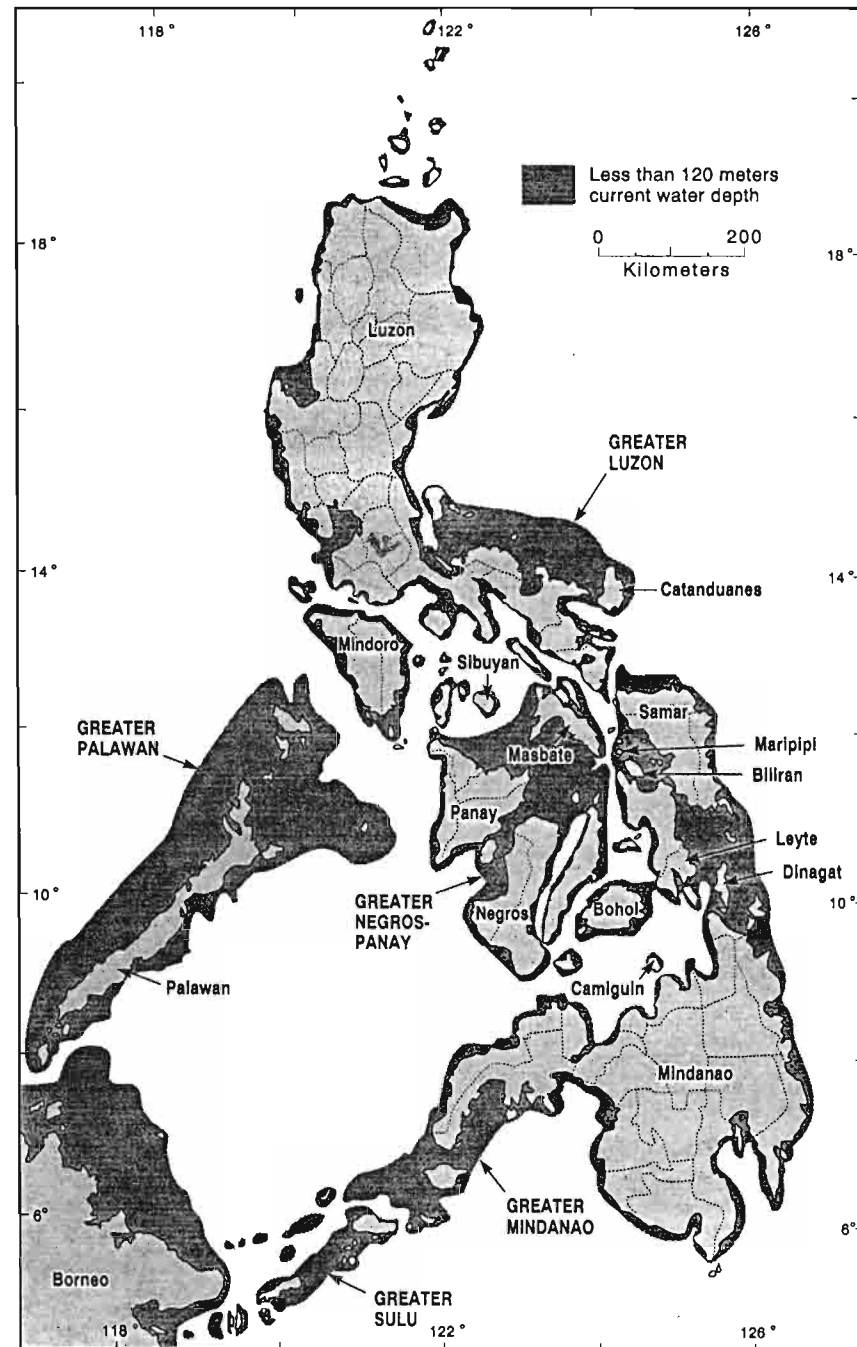
Biodiversity, endemism and biogeography

The biodiversity of the Philippines archipelago is exceptionally rich. For example, some 556 species of birds have been recorded in the country, of which at least 395 species breed there (or did so formerly) and about 169 (43%) species (and many more subspecies) are endemic. Among the native land mammals, there are at least 180 species (though every year more new species are being described from the Philippines than from any other country), of which at least 115 (67%) species (and still more subspecies) are endemic (Heaney, 1993; Heaney *et al.*, 1987). This compares favourably to Madagascar (which is often regarded as the single highest conservation priority country in the world), where there are 105 species of mammals, of which 80 are endemic, despite the fact that Madagascar has more than twice the land area.

Indeed, given its small size, the relative percentage and absolute number of species endemic to the Philippines is extraordinary. Amongst the other vertebrates there are, for example, at least 293 species of reptiles and amphibians, of which 214 (or 73%) are endemic – an exceptionally high number and degree of uniqueness. The above figures of 43% for birds and 67% for mammals also constitute much higher rates of endemism than those of any other biogeographic province in the whole of the Indo-Malayan Realm – itself one of the richest and most distinct of the world's biogeographic regions (Heaney *et al.*, 1987; MacKinnon and MacKinnon, 1986).

One of the main reasons for the richness of the Philippine fauna is that the country is bisected by 'Wallace's Line', one of the world's major biogeographic boundaries. The fauna therefore includes both 'Sundaic' and 'Wallacean' elements, the former being mostly confined to the Palawan Region (which, being the only part of the Philippines ever to have been connected to the rest of Asia by a land-bridge, has close affinities with Borneo and the rest of the Greater Sunda Islands). The remainder of the country, which lies east of Wallace's Line (i.e. Luzon, the Visayas, Mindanao, etc.), constitutes the Philippine biogeographic province in the strict sense. Moreover, the latter region is itself divided by deep-water channels into at least five major sub-regions (i.e. centres of endemism, originating in late Pleistocene islands – see Fig. 1; Heaney, 1986). These are: the 'Luzon Faunal Region' (including Marinduque and Catanduanes); 'Mindoro'; the 'West-central Visayas' (or 'Negros-Panay Faunal Region'), comprising Masbate, Ticao, Panay, Guimaras, Negros and Cebu; the 'Mindanao Faunal Region' (including Bohol, Samar, Leyte, Mindanao, Basilan, etc.); and the 'Sulu Islands'. Thus, biogeographically (rather than geopolitically) Samar,

Figure 1 (opposite). The major biogeographic divisions or faunal regions of the Philippine Archipelago – Luzon, Mindoro, Negros-Panay (or West-central Visayas), Mindanao, Sulu and Palawan – as delimited by the 120 m bathymetric line (which approximately corresponds with the late Pleistocene coastline, c. 12,000 BP). Smaller and less rich, but still highly distinctive, units include Camiguin, Sibuyan, and the Babuyan Islands (north of Luzon). Wallace's Line separates the Greater Palawan region from the rest of the Philippines.



Leyte and Bohol (for example) are as distinct from the Western Visayas as Palawan is from the rest of the Philippines.

All this accounts for the fact that Palawan has many species found nowhere else in the country (e.g. peacock pheasant, binturong, mouse deer, etc.) – though most of these species are widely distributed elsewhere in South-east Asia; just as it accounts for the fact that, for example, the tamaraw is found only on Mindoro, the spotted deer only in the West Visayas, and the tarsier only in Bohol, Samar, Leyte and Mindanao. In fact, each of these regions, many of the principal islands within each region, and even smaller distinct faunal centres such as Sibuyan and Camiguin, has a unique complement of species found nowhere else in the country, as well as a host of other species unique to the archipelago and a further array of other species found elsewhere in South-east Asia – a heady mixture, seasoned still further with a sprinkling of migrant and cosmopolitan forms.

Threats and extinctions

The principal threats to the fauna of the Philippines are the burgeoning human population (now numbering over 67 million people) and continued deforestation. The human population growth rate is one of the highest in the world, and the Philippines is already one of the most densely populated countries in South-east Asia. It also has one of the weakest protected areas systems and one of the worst records of deforestation in this region (Collins *et al.*, 1991; Braatz, 1992). At least 94% of the total land area of approximately 300,000 km² was originally covered by tropical forests. However, by 1988, satellite imagery had revealed that only about 21% natural forest cover remained (Forest Development Bureau, 1988). According to World Bank figures cited by Braatz (*op. cit.*), about 90% of lowland forest in the Philippines has been lost in the last 30 years, and only 5% of the land area remains under natural forest. These problems are exacerbated by the disproportionate extent of habitat loss in some of the faunistically most important regions – notably the West-central Visayas, Mindoro and southern Luzon (see below), and intense hunting pressure on all larger or commercially valuable species.

These factors have combined to produce fears of unprecedented losses of biodiversity and species extinctions (Anon., 1990; Braatz, 1992), and belated recognition that the Philippines is one of the world's highest priority countries for conservation concern (S. Stuart, pers. comm.; ICBP, 1989; Anon., 1990). For example, a recent review by BirdLife International (Collar *et al.*, 1994) of the distribution and conservation status of the birds of the world ranks the Philippines as being:

- (a) the third highest in the world (after Indonesia and Brazil – both vastly larger countries) for the number of globally threatened bird species represented;
- (b) second in the world (after Brazil) for the numbers of most threatened bird species (i.e. species in the 'endangered' and 'critically endangered' categories); and
- (c) first in the world for the number (i.e. 40) of endangered and critically endangered endemic bird species in the country.

The most extinction-prone species are obviously those with the most

restricted ranges, such as those confined to a particular small group of islands, a single island or even limited parts of one island. Luzon, for example, has markedly different faunas in the north and south, with many endemic species (some quite spectacular) in each region. However, there are still relatively extensive tracts of both lowland (Sierra Madre) and highland (Cordillera Central) forest remaining in the north, but the southern lowlands have been almost denuded and the majority of species unique to this region are now seriously threatened with extinction. In these circumstances, it is not surprising that lowland Luzon has also been identified by BirdLife International (ICBP, 1992) as one of the world's ten highest conservation priority 'endemic bird areas (EBAs)', in terms of both numbers of endemic bird species represented and degrees of threat.

Unfortunately, however, the Philippines, which is also the only country in the world completely covered by EBAs, has far more than its share of these most critical areas. The whole of Mindoro is also included in this short-listing, as is the 'Negros-Panay (or West-central Visayas) Faunal Region'. Put another way, no less than three (or 30%) of the world's ten highest priority conservation areas are in the central Philippines. Islands such as Masbate, Guimaras, Cebu and Siquijor have almost no remaining natural vegetation, and most of their native and endemic species and subspecies are now extinct, 'functionally extinct' or critically threatened. Cebu, for example, is known to have had at least 14 species and subspecies of birds found nowhere else in the world, but at least three of these are extinct and all but one of the others is thought to number less than 100 individuals (in one case – the exquisite Cebu flowerpecker (*Dicaeum quadricolor*) – only four individuals are known, making it the most endangered bird in the world). Similarly, a hornbill (*Penelopides panini ticaensis*) known only from Ticao (off Masbate) was recently declared extinct – the first hornbill to be exterminated as a direct result of human activity anywhere in the world. To cite yet another example, two of the four species of fruit bat known to have become extinct throughout the world in recent times also came from Panay, Negros and Cebu (Mickleburgh *et al.*, 1992).

These species are important indicators of the state of the environment, and the issues are not confined to the ethics of species conservation. Put most simply, native forests not only protect native species, they are a potentially invaluable reservoir of natural resources. They also protect top soil, curtail floods and prevent drought far more effectively than any introduced forest or other silvicultural/agricultural development, let alone the increasingly widespread denudation which mars the Philippine landscape. Rainfall above 1,000 m elevation in Philippine mountains typically exceeds 5 m per year, and reaches at least 10 m in some areas. When the forest and its thick layer of litter, which makes up most of the ground cover which normally absorbs and gradually releases this water, is destroyed, the rainwater surges down the barren hillsides causing severe erosion, damaging crops, roads and other installations, silting dams and, finally, the already beleaguered coral reefs. The floods are then often replaced by severe drought, because the flood waters run into the sea rather than being absorbed into the ground water system. Anyone who doubts the impact of deforestation need go no further than

Masbate, where the water-sellers in the streets are a function of the island's zero forest cover; Cebu, where water is now being rationed and the underground water reservoirs contaminated; or Iloilo City, which recently suffered severe flooding.

The loss of species is thus a matter of concern not just to biologists, but to everyone, since the loss also signals the stress being placed on the environment. In their classic treatise *Extinction*, the American biologists Anne and Paul Ehrlich (1982) drew an analogy between the life-support systems of the planet and the construction of an aeroplane. Aeroplanes, as everyone knows, are made of metal sheets held together with rivets. The Ehrlichs compared the extinction of species to the 'popping' of these rivets; the notion being that if one or even several rivets are lost, nothing much happens to the aeroplane, but if the rivets keep on popping the whole system weakens to the point of collapse, with predictably catastrophic results. In any event, it seems clear that the pace of 'rivet popping' in the Philippines is already as fast as anywhere in the world at present, and is still gathering momentum. With the worst rates of deforestation, the weakest protected area systems, and the highest numbers of endangered or recently extinct species, the West-central Visayas is well ahead of the rest, but Mindoro, southern Luzon, the Romblon group and the Sulu Islands are not far behind.

Although the Philippines was one of the first Asian countries to establish national parks, current conservation efforts there are not well advanced. Much of this is the legacy of the period from the 1960s through the mid-1980s when the government functioned for the benefit of remarkably few people. In keeping with the change in government and attitudes that began in the late 1980s, the Department of Environment and Natural Resources (DENR) is attempting to slow down the rate of forest clearance and species extinctions, but is hampered by its own unwieldy infrastructure, its cumbersome bureaucracy, and the poor levels of awareness (let alone any sense of urgency) about these problems amongst the majority of its officers – particularly at the regional and provincial levels. The few available data from Negros Occidental, for example, indicate that during the 1980s the last remaining fragments of native forest were being lost at an average rate of 3,000 ha per annum, whilst the DENR expended its resources and energy on 'reforesting' approximately 1,000 ha per annum with fast-growing exotics that support almost no wildlife and may exacerbate water shortages. Put another way, about three times as much forest was lost as was planted during this period, and the forest that was planted was not only of infinitely less biological value, it was planted at enormously greater cost than would have been incurred by more effective protection of the few remaining native forests. Similarly, in early 1994, one of the very last remnants of native forest (c. 100 ha) in Cebu Central National Park, another biologically critical area, was seriously damaged by the DENR in a foreign-aided 'reforestation' project.

Lack of finance owing to the low political priority accorded to conservation issues is another problem, amply reflected in the fact that the agency principally responsible for biodiversity conservation, the Protected Areas and Wildlife Bureau, receives only 1.8% of DENR's annual budget, whilst the Department's entire budget includes virtually no allocations for the day-to-day protection of 'protected areas' – most of which exist only on paper.

The need for conservation education

These factors are the focus of increasing concern amongst international conservation organisations and the small number of biologists conducting relevant research in the country, who are increasingly determined to bring to an end the lack of awareness or concern among the Filipino people in general. This is true even within the highest socioeconomic and most educated classes, where the decision-makers have little knowledge of, and therefore interest in, the protection of the remnants of the country's natural heritage, whether for reasons of patrimony or for its intrinsic importance to the human environment. Even the recent concerns about illegal logging are entirely pragmatic, with little sense that the remaining forests are special and that their destruction may be measured in terms of global loss of biodiversity and natural resources, as well as national patrimony and human impoverishment. The terrible floods at Ormoc and other recent catastrophes in the Philippines have helped put deforestation on the political agenda, but the unique global significance of these forests is largely unrecognised.

The reasons for this lack of appreciation of the country's natural heritage are not hard to find, since the topic is not covered in any school curricula at the present time. Most of the little information available on natural history subjects comes from imported textbooks, magazines and TV programmes, leaving Filipino children and adults generally better informed about the biology and geography of the western world than of their own country. It is also embarrassingly apparent to every visiting biologist that past 'scientific imperialism' has ensured that information gleaned locally is far more accessible in the museums and libraries of the west than in the east. Relevant books and other materials are few in number and much too expensive if imported. Even the sincerely interested minority are therefore often poorly informed or institutionally isolated, whilst the dearth of career opportunities in terrestrial biology provides little incentive to change this situation.

Can anything be done ?

In relation to the size of its land mass, the Philippines is one of the world's major centres of biodiversity and endemism, yet it has received much less attention from the international conservation community than many other countries (such as Madagascar and Brazil) which have far fewer endemic species, and whose environmental problems are seldom as acute. Based on current evidence, it would seem that the country is already facing a major ecological crisis, and many other extinctions – perhaps constituting the most serious wave of extinctions anywhere in the world at present – seem inevitable unless urgent action is taken to address this situation. The relevant governmental authorities and international aid agencies are collaborating in an effort to establish a meaningful network of protected areas (the 'Integrated Protected Areas System' or 'IPAS' Project and, most recently, the so-called 'European Union Initiative'), but progress on the development of these areas is proving painfully slow. Moreover, even if the primary objectives of these plans are eventually realised, these systems alone cannot possibly cope with the protection of more than a few key areas or a proportion of

the country's biodiversity. More international effort and cooperation is clearly needed, and that effort must be made more effective.

What is actually required as a matter of equal or greater importance and urgency is locally or regionally based conservation initiatives, more properly-trained Filipino biologists, and the infrastructure and resources to support their activities. International action, no matter how much it may contribute to developing solutions to these problems, obviously cannot solve them on its own. Thus, whilst assistance and collaboration with outside agencies is often needed or appreciated, it is clear that the primary solutions to the environmental and conservation problems that beset the country lie principally with the people of the Philippines themselves.

In these respects, there are some hopeful signs. There has, for example, been a substantive increase in media coverage of environmental issues, and several magazines focusing on outdoor recreation and the environment have begun publication recently. Primary schools throughout the country are increasingly receptive to materials on the environment and conservation, and levels of student awareness are increasing. These factors are also reflected in the small but steady growth of the (formerly moribund) Wildlife Conservation Society of the Philippines, which was re-launched in 1992 and has attracted an increasing number of participants at its annual symposium (i.e. from about 25 in 1992 to 170 in 1995). Likewise, although still far too few, there has been a steady growth in the number of well-trained and enthusiastic field biologists – despite seriously inadequate salaries and heavy workloads. More support is clearly needed, but the process has begun.

Whilst there are reasons to hope that the future will bring further improvement, there is little time left to save much of the nation's incredible array of biodiversity and endemism, and to prevent the worst of the environmental problems that will result if recent trends are perpetuated. In global terms the Philippines is a 'hot spot', or rather a whole series of 'hot spots'. Indeed, islands such as Cebu, Negros and Panay are not only hot spots, they are hot spots within a larger hot spot (the West-central Visayas), within a still greater hot spot (the Philippines itself). However, there is as yet no meaningful biodiversity conservation programme in any of these islands, nor the infrastructure or resources to support such a programme even if one were established. Meanwhile, the chain-saws still reverberate amid looming cycles of floods and drought. The hard lessons of Ormoc and Pinatubo are being learned, but slowly, and too little is being done by too few people with too little support.

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CONSERVATION PROGRAMMES FOR THREATENED ENDEMIC SPECIES IN THE PHILIPPINES

BY WILLIAM L.R. OLIVER AND ROLAND WIRTH

A. Current Projects

All of the following projects / programmes have been initiated since 1990, some only recently. Those which are already well established (spotted deer, Visayan warty pig, Calamian deer and Philippine fruit bats) are all being conducted in close collaboration with relevant local NGOs under the aegis of formal agreements between the Department of Environment