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Nature matters

the AQD Museum and Biodiversity Garden, and the Environment Action Group

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Biological diversity is rapidly diminishing in forest, upland, and coastal environments in the Philippines and throughout the world. The primary cause of loss of biodiversity is not direct human exploitation or malevolence, but the habitat destruction and modification that inevitably result from the expansion of human population and human activities. From an estimated 12 million hectares of old-growth forests in the 1930s, the Philippines has barely 700,000 ha at present. As a result, animal and plant species have gone extinct, including 60% of the endemic flora. The extinction of populations and species exerts its primary impact on society through the impairment of ecosystem functions, that is, the loss of the free services (such as photosynthesis, pollination, and decomposition) rendered by plants, animals, and microorganisms.

Arresting the loss of diversity will be extremely difficult. This formidable effort must begin by increasing public understanding of the importance of the loss of diversity and the urgent need for conservation. One way to popularize biodiversity and environment issues is by popularizing nature parks and biodiversity exhibits such as museums, herbariums, zoos, and botanical gardens. This non-formal environment education through immersion and recreation is part of 'the birds and the bees and the flowers and the trees' approach toward the 'greening' of the mind, the heart, and the spirit.

This article provides an introduction to the biodiversity in the Philippines, at least the flora and fauna that have been studied, and particularly those described in reader-friendly publications. This article is part of a longer paper in the journal *Ambio* that also provides information on the use, management, and conservation of biodiversity and on the location and present status of nature parks and biodiversity exhibits in the country. Additional parts of the journal paper will appear in subsequent issues of this newsletter.

A compendium of data on Philippine flora and fauna was prepared in 1977-81 by a team of biologists commissioned by the Natural Resources Management Center of the Ministry of Natural Resources. Twelve volumes of the *Guide to Philippine Flora and Fauna* were published in 1986, containing descriptions of 3,351 species (Table 1). The Philippines has 12,000 species of flowering plants, pteridophytes, bryophytes, algae, and fungi, of which 3,500 species are endemic, and a tremendous variety is grown as ornamentals. Elmer Merrill described 1,007 species (591 genera, 136 families) in his 1912 *Flora of Manila.* Eduardo Quisumbing's encyclopedic account of plants with medicinal properties was followed by several pictorial booklets. The Department of Health has approved the commercialization and popular use of four medicinal plants: lagundi *Vitex negundo* against coughs,

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AQD's mini-forest at the Tigbauan Main Station

Table 1 The groups described in the 12 volumes of Guide to Philippine Flora and Fauna published in 1986 by the Natural Resources Management Center, Ministry of Natural Resources and University of the Philippines - Diliman, Quezon City.

Vol.	Groups included	Species	Genera	Families	Orders	Total species
I.1	Zoosporic fungi	118[a,b]	60	24	10	199
I.2	Seaweeds	90[b]	34	22	12	
I.3	Mosses	80[a]	49	22	7	104[a]
II.1	Ferns	278[a] + 54[b]	(5[a])			298[a] + 54
II.3	Gymnosperms	33; 6[a]	12	6	4	33
III.1	Dipterocarps	38+9 subspp.		1		
III.2	Non-dipterocarps	299+6 subspp.	196	66		
IV.1	Bamboos	25; 7[a]		1		
IV.2	Other grasses	85; 4[a]	70	1		
IV.3	Palms	85				106
V	Corals	400	65			499
VI.1	Gastropods	297	95	48	5	
VI.2	Bivalves	91	59	26	6	
VI.3	Annelids	49	30	15	2	
VII.1	Rotifers	61	23	16		
VII.1	Cladocerans	49	28	6		
VII.1	Copepods	15	12	4		
VII.2	Barnacles	138; 23[a]; 8[b]	33	11		
VII.3	Swimming crabs	44			5	
VIII	Hemipteran insects	113; 10[a]	58	20		
IX	Fishes	429; 6[a]	293	112	21	
X.1	Amphibians	66; 42[a]	20	7		67
X.2	Reptiles	205; 127[a]	73	17		215
XI.1	Passeriform birds	70; 61[a]			1	128; 111[a]
XI.2	Mammals	75; 58[a]	58	29	19	230
XII.1	Parasitic arthropods	48	34	17		
XII.2	Poisonous animals	55				

[a]endemic, [b]economically important

hierba buena *Mentha cordifolia* as analgesic, sambong *Blumea balsamifera* as diuretic, and tsaang-gubat *Ehretia microphylla* against diarrhea and digestive problems. The vincrisin-yielding shrub *Catharanthus roseus* grows wild by the roadside as do many other medicinals. Hydrocarbon-producing plants such as peres *Pittosporum resiniferum* and lumbang oil *Aleurites mollucana* were of much research interest during the oil shortage in the 1970s. Pesticidal plants such as makabuhay *Tinospora rumphii,* manzanilla *Tagetes erecta,* and neem *Azadirachta indica* are now promoted as alternatives to synthetic agricultural poisons. Mangroves (many species of salt-tolerant trees and associated plants) have also become more widely recognized for their ecological and economic importance to the coastal zones.

Early studies on the systematics and natural history of Philippine land vertebrates were done mostly by American scientists and Filipinos like Angel Alcala and Dioscoro Rabor. There are about 975 species of tetrapods in the Philippines — 67 amphibians, 215 reptiles, 500 birds, and 194 mammals. Some 639 non-mammalian species are found in the Visayas and Mindanao, and the species endemism is very high: 50% of bird species, 64% of snakes, 76% of lizards, and 64% of amphibians. Endemic forms occupy specialized habitats, particularly in forests. On denuded Cebu Island, nine species of endemic birds have become extinct. Of the land mammals in the Philippines, 76% of the species are small (rats, mice, and bats), but many of the larger ones (flying squirrels, bats, civets, leopard cat, flying lemur, macaques, tarsier, deers, wild pigs, tamaraw) have become endangered. John Eleuthere du Pont of the Delaware Museum of Natural History published in 1971 a particularly beautiful book, *Philippine Birds,* based on his work in the Philippines since 1958.

Ichthyology was also a thriving science during the first half of the century when American and Filipino scientists at the old Philippine Bureau of Science in Manila published many illustrated descriptions of Philippine fishes. These papers have been reprinted by the Smithsonian Institution and TFH Inc. in *Philippine Bureau of Science Monographic Publications on Fishes* in 1965 and in *Philippine Journal of Science Selected Ichthyological Papers Volumes I-III* in 1969. Albert Herre's 1953 *Checklist of Philippine Fishes* includes 2,117 species, but many more have now been recorded, including 544 genera of coastal marine fishes, of which 238 species are endemic and a great many are of commercial importance. Herre also wrote delightful fish stories for non-scientists in *Philippine Fish Tales* published in 1935.

Indeed faunal diversity in the marine coastal zone of the Philippines is quite high — 1,375 genera in 499 families of chordates and six major invertebrate phyla including corals and mollusks. Springsteen and Leobrera includes 1,700 species of mollusks in their beautiful book and Chou and Aliño gives a breathtaking view of life on the coral reefs. Recently, Jose Maria Lorenzo Tan documented at least 18 species (but there may be as many as

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27) of whales and dolphins in Philippine waters. Several species of marine animals have become endangered due to habitat destruction, exploitation for commerce, or hunting out of curiosity: giant clams (*Hippopus porcellanus, Tridacna gigas, T. derasa*), the sea cow *Dugong dugon,* the estuarine *Crocodylus porosus,* marine turtles (*Chelonia mydas, Eretmochelys imbricata, Lepidochelys olivacea, Dermochelys coriacea*), and sea snakes (*Hydrophis cyanocinctus, H. semperi, H. melanocephalus, H. ornatus, Laticauda colubrina, L. semifasciata, L. laticaudata, Pelamis platurus*).

The species count in the Philippines is far from complete. Several listings of terrestrial and marine flora and fauna have appeared in local science journals such as *Kalikasan,* the *Philippine Scientist,* and the *Papers of the National Museum.* Now more than ever, a comprehensive but rapid assessment of biodiversity is necessary before any more species go extinct.

The Philippines has enough laws to protect wildlife, both plants and animals, but these laws have been difficult to enforce partly because of the low environmental awareness of the general public. Angel Alcala recommends three wildlife conservation measures: (i) intensive conservation education at all school levels and of all sectors of society, (ii) establishment of more nature parks and wildlife reserves, and (iii) establishment of breeding centers for endangered wildlife. The following articles in this series will describe the developments in non-formal conservation education, and in nature parks and wildlife breeding centers in the Philippines.

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work for entrepreneurs to pursue. Many results, however, look ideal in the laboratory but are not realistic in the field. That is the sad part. And we thought we did a good job already. Take for example making low cost farm-made feeds. The seasonal availability of many raw materials actually make backyard feedmilling uneconomical during lean supply months when big commercial feed millers corner the supply. As a backyard feedmiller you buy your raw materials at the retail level which is not only more costly but must be paid in cash. Furthermore, rudimentary feed pelleting equipments produce feed pellets that have poor water stability. This leads to poor growth due to significant nutrient losses and water pollution. Thus, in actual field conditions, at least in the Philippines, making farm-made feeds is not economically viable. Research work I believe should be conceptualized and carried out up to the commercial scale where our ultimate goal of food production is realized. It is actually more challenging and fulfilling this way.

How do you view the progress of aquaculture technology generation in the country?

There is a lot of research being done but unfortunately there is little that end up in commercial use. I believe researchers should try to be more involved with the industry even if they do not share the same view with entrepreneurs. It was widely known in the scientific community that intensive shrimp farming is not going to be sustainable so many distanced themselves from conducting research in these activities. When the the industry was eventually hit by disease problems, there was little that could be done by researchers