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Conservation of Asian Raptors in the Changing Environment: Continued Need for Local, Regional, and Global Collaborative Strategies

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Asia, as the largest continent, comprises a wide range of biomes that host more than 230 species of diurnal and nocturnal raptors, with especially high biodiversity toward the equator. In addition, Asia holds numerous endemic and rare species specialized for particular habitats; unfortunately, many of these are threatened and/or understudied. About one quarter of Asia's raptors are migratory, and migrating raptors provide a significant attraction for tourists and birdwatchers, which contributes to local income generation, and education and research at migratory hotspots and overwintering sites. Such vast migratory movements have been documented at prominent count sites such as Chumphon in Thailand, Tanjung Tuan in Malaysia, and Kenting in Taiwan, thanks to the efforts of many volunteers.

Asian raptors serve key ecosystem functions and services, owing to their diverse trophic levels and ecological niches. For example, the Barn Owl (*Tyto alba*) serves as a biological control agent in many agricultural areas in Southeast Asia. Scavenging vultures in South, Central, and East Asia remove carcasses while simultaneously preventing the spread of diseases. This implies that the absence or changes in raptor populations could potentially lead to adverse cascading effects such as competitive exclusion, intraguild predation, and extirpation or extinction.

In Southeast Asia, many raptor habitats are threatened by anthropogenic activities linked to drastic land development and exploitation of natural resources to support the growth of human populations. In addition to habitat loss and degradation, raptors of Asia also face multiple threats ranging from collisions with wind power generation facilities or vehicles, to electrocutions, to secondary poisoning through agrochemicals. Despite the presence of some laws and regulations, poaching and illegal trade for consumption and pet businesses that involve raptors remain problematic in Asia. Some more recent threats also should not be overlooked. Falconry activity in Southeast Asia seems to be a new trend that has been promoted via social media, although tracing the sources of supply and demand of such activities is difficult. Some of the more localized issues posing threats to raptors include feeding of unnatural food to coastal raptors as part of tourism attractions, intentional and accidental trapping of birds by farmers and fishermen, and limestone quarrying.

Thanks to the efforts of many local raptor researchers and volunteers, there have been increasing numbers of ecological studies on Asian raptors over the last two decades, which is encouraging for raptor conservation. However, there is still a dearth of studies on many forest-dependent species, island endemics, and habitat specialists with small geographic ranges and/or long generation times. Many of these species are extinction-prone, found in habitats that are difficult to access, elusive, and scarcely distributed. Given the long-term effects of global climate change and rising sea level, there is an urgent need for long-term and/or more in-depth studies to fill knowledge

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gaps on the ecology of Asian raptors, especially those in Southeast Asia and on small islands. Fast-changing human landscapes also result in behavioral changes by some species, e.g., foraging in urban areas by coastal raptors, catching of unusual prey such as domestic animals, and hunting during unexpected times of day. Incorporating economic valuation, vocalization assessment, and the internet of things technology into raptor research seems to be a feasible option worth exploring.

For migratory raptors, a better understanding of migration and wintering ecology, as well as long-term regional population trends is essential to assess potential declines that may otherwise go undetected. In Asia, raptors migrate along the East Asian–Australasian, Central Asian, or West Asian–East African flyways. Protection of these migratory birds requires regional and international frameworks and collaborations, e.g., the Memorandum of Understanding on the Conservation of Migratory Birds of Prey in Africa and Eurasia (CMS Raptors MoU), which is one such crucial initiative that should be encouraged among the Asian countries.

The Asian Raptor Research and Conservation Network (ARRCN) exemplifies the importance of international and regional collaborations in raptor research and conservation in this region. With a total of about 260 members from 33 countries, ARRCN has organized 12 biennial symposiums since the first meeting in Japan almost 25 yr ago. The significant contribution, endless support, and perseverance of many individuals, especially the President of ARRCN, Dr. Toru Yamazaki, and country representatives, have helped realize the aims of the network: (1) exchanging and compiling data about raptors and (2) organizing raptor monitoring and training activities for members, local communities, and young raptor researchers. In addition to conference proceedings, ARRCN has produced two field guides to raptors of Asia (Yamazaki et al. 2012, Gombobaatar and Yamazaki 2018) that serve as important references for raptor researchers and enthusiasts. As a result of the virtual 12th ARRCN Symposium held in 2022, ARRCN now supports the initiatives of the Global Raptor Impact Network (GRIN; McClure et al. 2021) and Global Anthropause Raptor Research Network (GARRN; Sumasgutner et al. 2021) in improving raptor conservation and research through sharing of data via global-scale collaborations. Some of the papers presented at the symposium have been included in this issue of the *Journal of Raptor Research*.

Compared to their counterparts in many developed countries, Asian raptor researchers and conservationists are challenged by disparity in research advancements, larger knowledge gaps, and a relative mismatch of research findings and conservation actions. In addition, they also struggle with including multiple stakeholders in conservation measures, obtaining financial support, and bridging the gaps between scientific findings and policy. In many cases, community engagement has proved to be a way forward for conserving raptors, as in the case of the iconic Philippine Eagle (*Pithecophaga jefferyi;* Panopio et al. 2021), the Black Kite (*Milvus migrans*) in Taiwan (Rado et al. 2021), and the migratory Amur Falcon (*Falco amurensis*) in India (Coordinating Unit of the Raptors MOU 2021). Many local raptor-related nongovernmental organizations have made great contributions to raptor protection; for example, the Raptorwatch Network Philippines has convinced local communities in northern Luzon, the Philippines, to protect the spring migration roosting site of Grey-faced Buzzards (*Butastur indicus*), halting the long-established traditional practice of harvesting these birds. In response to the ever-changing environment, using raptors as indicator species or flagship species remains relevant and justified in Asia, as do collaborative efforts to build capacity in raptor conservation and research in this part of the world.

I would like to take this opportunity to sincerely thank everyone who contributed in one way or another to making the 12th ARRCN symposium a success, and everyone who contributed papers concerning Asian raptors for this issue of the *Journal of Raptor Research*.

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