

Introduction

Overview of the Gibbons and the IUCN Primate Specialist Group Section on Small Apes

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Gibbons and siamangs (termed ‘gibbons’ hereafter) are members of the family Hylobatidae and are the smallest of the apes, distinguished by their coordinated duets, territorial songs, arm-swinging locomotion and small family group sizes. They are the most speciose of the apes with four extant genera (*Hylobates*, *Hoolock*, *Symphalangus* and *Nomascus*) distributed across East and Southeast Asia. Of the 20 species, 95 per cent are considered critically endangered or endangered according to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species (Rawson *et al.*, 2011; Fan and Bartlett, 2017; IUCN, 2021).

Under the IUCN umbrella are a number of primate specialist groups focusing on specific taxa. The IUCN’s Section on Small Apes (SSA) consists of 105 gibbon conservation practitioners across 21 countries. Steered by an executive committee and connected through a website (<https://gibbons.asia/>), an email list and social media (Twitter, Instagram and Facebook), the SSA brings together experts to determine the most urgent *in-situ* and *ex-situ* actions needed for gibbons. The SSA aids communication between gibbon experts worldwide, assists with direct conservation action and funding, and helps to raise awareness through public engagement events (such as International Gibbon Day held annually on 24 October).

SSA members work with gibbons in a wide variety of ways, and much of the scope of the work of SSA members is reflected in this book.

Overview of Chapters

This volume contains a diverse mix of chapters covering hylobatid ecology, conservation, phylogenetics and taxonomy. Conservation challenges, practice-based approaches and strategies for recovery are presented for several of Southeast Asia’s rarest species, including the Cao vit gibbon, *Nomascus nasutus* (Chapter 1); northern yellow-cheeked gibbon, *Nomascus annamensis* (Chapter 2); Hainan gibbon, *Nomascus hainanus* (Chapter 3); Bornean white-bearded gibbon, *Hylobates albibarbis* (Chapter 4); silvery gibbon, *Hylobates moloch* (Chapter 5); pileated gibbon, *Hylobates pileatus* (Chapters 6 and 7); Kloss’s gibbon, *Hylobates klossii*

(Chapter 8); western hoolock gibbon, *Hoolock hoolock* (Chapters 9, 10 and 11); siamang, *Symphalangus syndactylus* (Chapters 12 and 13); and white-handed gibbon, *Hylobates lar* (Chapter 13).

All the aforementioned studies reveal the importance of regular field surveying to monitor population dynamics, whilst also assessing key conservation threats and implementing locally relevant conservation strategies. These critically important studies highlight the urgent need for ongoing funding to support field work, particularly for species that are surviving with critically low population numbers, in high-risk areas. Furthermore, they highlight the need to identify sustainable funding models to support conservation programmes that actively involve the local human populations who live alongside critically endangered species.

Several chapters argue for the importance of integrating anthropological and historical perspectives, including social, political and cultural approaches, into primate conservation (see Chapters 14, 15 and 16). As these chapters demonstrate, the cultural significance of gibbons to humans is both an asset to understanding how best to engage people in contemporary conservation efforts, as well as a clue to understanding patterns of past and future species loss.

The final section of this volume addresses wider issues pertinent to conservation, including hylobatid genetics and phylogenetics. Chapter 17 provides an up-to-date assessment of the phylogenetic interrelationships among hylobatids and elucidates the seemingly elusive relationships between the four genera, shedding light on the complexity of hylobatid genomics. Chapter 18 addresses the use of microsatellites in the management of captive gibbons, assessing their use in the feasibility and sustainability of captive breeding programmes and for resolving paternity questions.

The Future of Gibbon Research

All gibbons are threatened to varying degrees by a perfect storm of issues: habitat loss through legal and illegal logging and conversion to plantations (large and small scale); habitat fragmentation due to roads, power plants, hydrodams and mining (Rainer *et al.*, 2014); hunting for both bushmeat and traditional medicine; the illegal pet trade (Rainer *et al.*, 2021); and climate change leading to increased forest fires and further habitat loss.

A new global threat presented itself in December 2019 in the form of a coronavirus (COVID-19), an infectious disease caused by the SARS-CoV-2 virus. Since then, there has been increased research on the impacts of COVID-19 on fieldwork (Santos *et al.*, 2020), ecotourism (Molyneaux *et al.*, 2021), emerging diseases and landscape conservation (Harrison *et al.*, 2020), and individual species conservation (Hansen *et al.*, 2021). What is less well understood are the long-term impacts of our inability to be on the ground to conserve and protect wildlife habitats, the knock-on effects of reductions in or total loss of funding, the possible decline of small populations due to increased anthropogenic pressures caused by the pandemic, and the susceptibility of

most primates to the virus. This presents several challenges and opportunities for continuing effective gibbon conservation into the future.

Because of the travel bans caused by the outbreak of COVID-19, many gibbon practitioners and researchers were forced to cancel or postpone their fieldwork. The importance of gibbon-range researchers has therefore never been more prominent. Local researchers play key roles in the running of long-term field sites that provide crucial knowledge and information for decision-makers, as well as being more actively involved and more influential in policy-making compared with international researchers (Hu *et al.*, 2019). We are proud that this volume provides a platform for many researchers and conservationists from gibbon-range countries (e.g. China, India, Vietnam, Indonesia and Thailand) to share their knowledge, experiences and ideas for gibbon research and conservation. Unfortunately, none of the authors come from Myanmar, Cambodia or Laos, which still support viable populations of numerous gibbon species.

We are also delighted to see international collaborations demonstrated in this volume. The four editors of the volume include one from a gibbon-range country, China, and three from the UK. Among the 18 chapters, 7 are the results of international collaboration, where at least one author from a gibbon-range country has teamed up with at least one international expert. Collaborations can bring new perspectives, ideas, technologies, frameworks and funding, and build capacity in gibbon-range countries. As gibbons know no borders, international collaborations are imperative for their future conservation.

Between 11 May and 1 June 2020, SSA members were invited to answer an anonymous semi-structured survey regarding urgent priorities for studying gibbons. Of the 105 SSA members, 81 responded (77 were actively working with gibbons at the time of the survey) across 68 non-governmental organisations and institutions. All gibbon-range countries were represented. Twenty-two priority areas were identified for future gibbon research (number of respondents is shown in parentheses):

1. Accurate current and future population projections ($n = 24$).
2. Habitat loss and restoration ($n = 19$).
3. Conservation planning and evaluation ($n = 14$).
4. Understanding general gibbon behaviour (in response to anthropogenic factors) ($n = 9$).
5. Illegal trade ($n = 7$).
6. More community engagement in gibbon-range countries ($n = 6$).
7. Incorporating social science approaches to elucidate conservation issues ($n = 6$).
8. Supporting long-term projects and datasets ($n = 6$).
9. Gibbon health ($n = 6$).
10. Providing guidelines on release and translocations ($n = 5$).
11. Improved law enforcement ($n = 5$).
12. Genetic diversity ($n = 5$).
13. Education and awareness-raising ($n = 3$).
14. Improve population survey methods through novel approaches ($n = 2$).

15. Taxonomy and identification ($n = 2$).
16. Welfare and health in captivity ($n = 2$).
17. Reproduction ($n = 2$).
18. Anti-poaching actions ($n = 2$).
19. Climate change ($n = 1$).
20. Encouraging more researchers to study gibbons ($n = 1$).
21. Comparative studies ($n = 1$).
22. Collaborations ($n = 1$).

When asked what challenges respondents faced when bridging research and conservation practice, 28 per cent stated a lack of funding. More than one-fifth of respondents highlighted a lack of support from local partners, communities and/or policy-makers (22 per cent), followed closely by a lack of capacity/time (18 per cent), expertise (e.g. training in research methods; 15 per cent), language barriers (4 per cent) and access to literature (4 per cent). Nine per cent of respondents mentioned ‘other’ challenges associated with current research outputs not being useful for direct conservation action, a lack of support from host country research departments, a lack of interdisciplinary international collaborations, a lack of skilled manpower and political barriers.

With this in mind, here we present recommendations for the future of gibbon conservation and research. In general, conservation project actions need to be implemented at a multi-level scale using multiple and adaptive local conservation management approaches. This must include local leadership, integration, capacity building and education to support on-the-ground conservation efforts that are underpinned by scientific monitoring research. In addition, projects need to ensure effective collaboration with multiple stakeholders including government.

More specifically to gibbons, each gibbon-range country needs to consider national and local areas of knowledge gaps and barriers to the implementation of gibbon conservation research and action. The following actions are recommended across all gibbon-range countries.

- Strengthening coordination among gibbon conservation projects worldwide, including zoos, sanctuaries and rehabilitation centres.
- Increase awareness of scientifically sound practice in gibbon conservation and, where possible, ensure publications are open access.
- Clearly justify how future research can directly inform conservation action.
- Provide multi-lingual IUCN-endorsed guidelines to conservationists, field scientists and decision-makers.
- Develop conservation action plans that clarify priorities in gibbon conservation for practitioners, decision-makers and donors.
- Ensure the IUCN Red List of Threatened Species is thorough and up to date.
- Provide direct technical support and training to implement projects engaged with gibbon conservation, including early-career researchers in gibbon-range countries.
- Strengthen collaborations, most notably among gibbon-range country researchers, and share resources (e.g. funding, equipment) and knowledge.

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