

# Asian Hornbill Bibliography: a dynamic, online, open-access reference database for use in manuscript citations and hornbill research

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## Abstract

*Bibliographic databases and citation tools are integral aids to research. The Asian Hornbill Bibliography presents a compendium of research on Asian hornbills by combining an open access bibliographic database with the free and open source reference manager, Zotero. The bibliography, also hosted on and made accessible from the IUCN Hornbill Specialist Group website, includes 725 publications, including books, book chapters, journal articles, reports, conference proceedings, general articles, and media reports. Here, we describe the process of parsing an initial list of references stored in a Word document to an appropriate bibliographic format and its subsequent import into a Zotero Group Library created to be public and open. Hornbill researchers can freely use the bibliography, join the Zotero Group or copy the bibliography for their use. Researchers can use Zotero plugins to insert citations in manuscripts and generate reference lists formatted in accordance with any of more than 10,000 citation styles. A static, annually updated version of the Bibliography is also available under a Creative Commons license. The Asian Hornbill Bibliography will be dynamically updated by continuously updating the database of references in the Zotero Group Library using available easy-to-use citation import tools or manual entry, if required. The Asian Hornbill Bibliography will be expanded to be an authoritative and valuable research aid for hornbill researchers worldwide.*

**Keywords:** ornithology, bird conservation, Bucerotidae, Zotero, bibliographic database, reference manager, citation tools, research aids, open science

## Introduction

Bibliographic research and referencing are both time-consuming and integral to science. Researchers need to find, collate, and read relevant prior publications, cite them appropriately in scientific manuscripts, prepare properly-formatted and detailed reference lists, and keep track of new research publications that continuously appear (Côté *et al.*, 2013; Mann, 2005). When the same tasks have to be repeated for different research studies or outputs by the same or other researchers, the cumulative effort involved can become repetitive and burdensome. Key resources and software tools that aid and simplify these tasks are bibliographic databases (which contain lists of relevant publications that can be explored or queried) and reference management software (which researchers can use to store, organise, and cite references relevant to their research). If resources or software tools are free to use and open access, they support widespread

adoption across the scientific community, even among those who cannot afford expensive commercial options.

When free and open access bibliographic databases are linked with reference management software, they provide four significant benefits for researchers.

1. Besides functioning as a freely accessible repository of past research and publications on a specific research area or species of interest, existing tools and features allow the database to be made publicly available on the internet in a form where other researchers can view, access, and/or contribute to it, or download copies for their own personal use.
2. As the reference management software reads metadata (such as author names, year of publication, abstracts, keywords, tags, and digital object identifiers or DOIs) into the database, users can filter references by metadata variables, read the text of abstracts, or access the full reference using direct links to websites where they are available.
3. Reference manager software also have installable plugins for commonly used word processors (such as Word in Microsoft Office, Writer in LibreOffice, and GoogleDocs), which allow researchers to directly insert stored references at relevant places in their manuscripts and generate reference lists automatically formatted in specific citation styles.
4. Web browser plugins and citation importing tools allow users to easily and directly update these databases by adding new references on the fly, without needing to man-

ually enter or copy the author name(s), title, publication details, and other metadata.

Here, we describe the creation of a bibliographic database on Asian hornbills (Aves: Bucerotidae) integrated with the Zotero reference management software (<https://www.zotero.org>) as a free, open access resource available for use by hornbill researchers worldwide. The database is designed not as a static resource but as a dynamic database periodically updated online. At present, the database contains a compilation of scientific research publications and other literature on all 32 species of Asian hornbills till 2023. The bibliography is hosted as a live version on the website of the IUCN Hornbill Specialist Group (IUCN HSG, <https://iucnhornbills.org/bibliography>) and a static version (to be periodically updated) is also available for download (Datta et al., 2024). Here, we describe how the bibliography was created and imported into Zotero and how hornbill researchers can make best use of this resource.

## **Origin of the Bibliography**

The bibliography began as a compilation of references in a Word document and associated worksheet (Excel or Googlesheet) prepared by Aparajita Datta (AD) and Maitreyi Hegde (MH). The references were compiled from an existing list of publications available with AD since 2014, supplemented by extensive searches by MH on Google Scholar, Web of Science, and Scopus to manually add references (using keywords for hornbills and for particular Asian species). A few resources were collected directly from these authors and a selection of popular articles mostly shared by AD and Bee Choo Strange were included. Together, AD and MH compiled literature related to Asian hornbills, which resulted in 670 references, excluding a few hornbill posters.

## Limitations of Word and Excel compilations

Although a Word document listing references is useful as a starting point, this bibliography-as-text is a static document. Created manually and organised in alphabetical arrangement by author, it offers a single view that cannot be easily or automatically rearranged; for instance, to be viewed chronologically or by other variables such as journal name or metadata tags (e.g., species). It also has limited search capability to locate references using the Find (Ctrl-F) search box within the word processor. Once a particular reference is located, it has to be copied and pasted into manuscripts or other working documents and manually reformatted to conform to other citation styles.

The Excel version of the Asian hornbill Bibliography had the same details entered although separated into different fields (columns). This enabled basic filtering and sorting besides import into similar tools such as AirTable for filtered and sorted views. For researchers intending to insert these references in manuscripts, the references are even more difficult to use from the worksheet because the full citation is distributed as separate elements in different columns, which typically pastes into Word documents as tables. They need additional work after copy-pasting into manuscripts to remove tabular elements and conform to citation styles. Although the references were carefully compiled, checked for errors, and corrected, some errors remain in the Word and Excel documents from the manual entry of each reference. These documents typically contain minor formatting or typographical errors that vary from reference to reference—such as related to author initials or names, or inconsistent use of DOI (<https://doi.org/10.1111/example>) or just as the slug (10.1111/example), and so on.

Many relevant metadata fields were missing in some or all the references in the bibliography-as-text Word documents and Excel worksheets, such as Abstracts and the DOI or URL links to webpages carrying the source publication. Relevant fields (such as journal name, volume and page numbers) were also not separated out as fields and would require manual editing and formatting if they needed to be used in other citation styles.

## Parsing references for import into a bibliographic database

For the Asian Hornbill Bibliography (Word document) to become more useful, we needed to parse and transform the references into standard bibliographic formats that would allow their import into reference management software. A good choice of standard reference format is BibTeX (<https://www.bibtex.org>), which is a tool and a file format used to describe and process lists of references. Although BibTeX is often used with LaTeX documents, a reference downloaded in BibTeX format can also be imported into virtually any reference manager software and used for formatting lists of references. The reference(s) in BibTeX format are saved as a file with a '.bib' extension, which is a plain text document that can also be opened and viewed with any text reader.

To parse the Asian Hornbill Bibliography (Word document) into BibTeX format, we used the free, online resource, AnyStyle (<https://anystyle.io/>; ver. 1.3.14). This allowed us to simply paste the list of references in batches of 200 into the text box area (one reference per line with a line break at the end; blank lines are ignored). The parser split each reference into constituent fields (title, author, year, journal and so on). The output was saved as a BibTeX file for importing

the references into a reference manager. Although AnyStyle has some on-screen error-correction or editing capability, we largely ignored this and did the final corrections, if any, in the chosen reference manager software.

The parsing was intended as a one-time effort to extract references, after which the Word document was retired. Subsequent edits, revision, and updating of the bibliography was carried out exclusively through the reference manager software, Zotero (<https://www.zotero.org>).

### **Choice of Zotero as reference manager**

A large number of tools are available for managing references, as documented in detail in 'Comparison of reference management software' on Wikipedia (Wikipedia contributors, 2024). From these, we chose Zotero for a number of reasons. Zotero is a free and open-source tool developed as a project of the Corporation for Digital Scholarship, a non-profit organization dedicated to the development of software and services for researchers and cultural heritage institutions. All essential functionality comes at no cost to researchers who can create free accounts (with up to 300 MB storage space; more storage can be purchased if required at modest pricing). Zotero can be used on the web (by logging in on <https://www.zotero.org/> on a browser) or using a Desktop client installed on the user's computer or laptop (<https://www.zotero.org/download>). The Zotero reference library on the user's computer syncs seamlessly with their online library. Folders can be created to organise the references. Zotero has an active developer community, well-documented support and knowledge base (<https://www.zotero.org/support/>), and a helpful community forum (<https://forums.zotero.org/discussions>).

The Zotero code and Wiki content are open source materials available under free licenses such as Gnu GPL and Creative Commons.

Zotero offers plugins that allow inserting citations and generating reference lists within commonly used Word processors (Microsoft Word, LibreOffice Writer, GoogleDocs) and statistical software (RStudio comes with native Zotero integration). There is support for over 10,000 citation styles, including most commonly used journal styles. Zotero has browser plugins (for Firefox, Chrome, Edge, and Safari; <https://www.zotero.org/download/connectors>) that allow one to save viewed references from various websites to their Zotero libraries directly from your web browser. This automatic capture of references reduces the tedium of manually copying out references and relevant details from webpages or PDF files and also by-and-large reduces errors. It also automatically saves relevant metadata in corresponding fields (year, journal or publication name, DOI, abstract, and so on). It comes with a PDF reader, note editor, and ability to import publication data from PDF files.

Finally, Zotero allows the creation of 'Groups' through which multiple researchers can collaborate on creating, using, and sharing reference libraries (<https://www.zotero.org/groups>). The Asian Hornbill Bibliography was created as a Zotero group in April 2023 at [https://www.zotero.org/groups/4777134/asian\\_hornbill\\_bibliography](https://www.zotero.org/groups/4777134/asian_hornbill_bibliography), with the group library at: [https://www.zotero.org/groups/4777134/asian\\_hornbill\\_bibliography/library](https://www.zotero.org/groups/4777134/asian_hornbill_bibliography/library).

The settings are presently configured for the library to be open to the public. Anybody can search the 'Asian Hornbill Bibliography,' view and download references, or join the group. The group owner (IUCN HSG) and group admins (presently Pooja Y. Pawar and T. R. Shan-

kar Raman) can edit group settings, and the ability to add, edit, or delete references in the library is restricted to the admins. The steps involved in the creation of the Asian Hornbill Bibliography from the original Word document into a Zotero Group Library are illustrated in Fig. 1.

## Asian Hornbill Bibliography – Zotero Group library

After editing, correcting, and removing duplicates from the original 670 references, a number of recent references were imported and added to the database, including all papers on

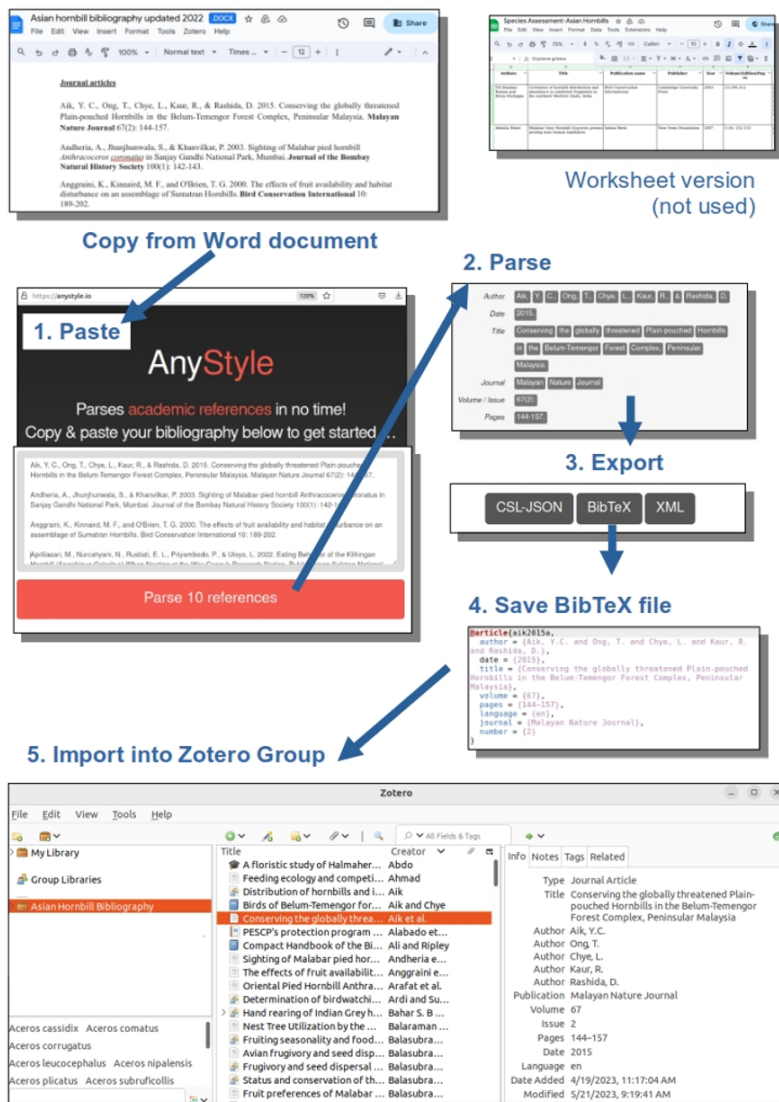


Fig. 1. Steps involved in creation of Asian Hornbill Bibliography from a listing of references in a Word document.

Asian hornbills published in the first four volumes of the IUCN HSG journal *Hornbill Natural History and Conservation*. As a result, the Zotero group library holds at present (13 March 2024) a total of 725 references. These 725 references include 496 peer-reviewed journal articles, 24 reports, 19 theses, 24 books, 24 book chapters, 47 newspaper and magazine articles, 83 conference proceedings, and 5 general documents, a film (video), the Bibliography of South Asian Ornithology (Pittie, 2023) and the static Version 1.0 of the present bibliography (Datta *et al.*, 2024). Excluding the static version, the references date back to a single paper in 1902 and then from the 1950s up to 2023. The highest number of publications on hornbills were published in the decade 2011 – 2020 (321 references including 220 journal articles). The bibliography includes a majority of papers on abundance and distribution, besides publications on behaviour, habitat ecology, feeding ecology, breeding and nesting ecology, conservation and management, threats, captive breeding, and systematics and evolution.

### **Live IUCN HSG webpage for the Asian Hornbill Bibliography**

To create a live, online view of the Bibliography including the latest updates (if any), we integrated the bibliographic database in the Zotero group library into the website of the IUCN SSC Hornbill Specialist Group (IUCN HSG). To do so, we first linked the Zotero group library with BibBase (<https://bibbase.org/start>) and then embedded the following script into the IUCN HSG website page:

```
<script  
src="https://bibbase.org/show?bib=https://  
bibbase.org/zotero-group/iucnhs-  
g/4777134&msg=embed#"></script>
```

As a result, the Asian hornbill bibliography

maintained in Zotero can now be dynamically viewed online on the IUCN HSG website under the 'Resources' tab at this URL: <https://iucnhornbills.org/bibliography/>

The database may take a few seconds to load as it has over 720 references. The references can be viewed by Author (the default), Year, Type (journal article, book, etc.), or keywords (here, the scientific name of Asian hornbill species, or "General" for other general references). The scientific name was used as Keyword so that people can easily view references aggregated by species. The Keywords on the IUCN HSG webpage view correspond to 'Tags' in Zotero. For publications dealing with more than one species, each scientific name was entered as a separate Tag for that reference. Such references appear multiple times in the IUCN HSG bibliography webpage, once under each of the corresponding species ('Keyword').

### **Publishing the static current version**

The current version of the database was published on the open science repository, Zenodo (Datta *et al.* 2024). This repository, intended to be annually updated to the latest version of the database, contains the original Word and Excel files, the bibliography as saved on Zenodo, and a new Word document version generated in a standard citation format from the Zenodo library reflecting corrections to references, if any. The following files are available in Datta *et al.* (2024):

1. A README.txt file containing general information and instructions: text file
2. Original word processor document of the Asian Hornbill Bibliography: a Microsoft Word/LibreOffice Writer file with '.docx' extension

3. Original worksheet file of the Asian Hornbill Bibliography: a Microsoft Excel/libreOffice Calc file with '.xlsx' extension
4. BibTeX file of the database downloaded from the Zenodo library: readable also as a text file with '.bib' extension
5. A new document in RTF or rich-text format ('.rtf' extension) generated from the Zenodo group library, readable in most word processors
6. An HTML version of the bibliography in alphabetical order of title—a browser viewable HTML version with '.html' extension

The bibliography file was generated by using the 'Export Library' option in Zotero and saved as a BibTeX file (.bib). The new word processor RTF version was generated using the 'Create Bibliography' option with all 725 items selected. The HTML version was created using the 'Generate Report' option with all items in the library selected.

## Updating the Asian Hornbill Bibliography

The bibliography needs to be updated with both overlooked older references and newer publications. Where the source publication is on a website that allows export/saving of the reference as a BibTeX file, Zotero can import references from the saved .bib file. The Zotero browser connector plugin can also be used as on many websites, including journal websites, to directly import the reference with a few clicks. For publications that are not available on the web or in any database or BibTeX format, there are two options to update the database: direct manual entry in Zotero (Add Item) or using AnyStyle (<https://anystyle.io>) to parse a plain text reference into a BibTeX file for import into Zotero. Once imported, appropriate tags such as scientific name of hornbill species need to be added.

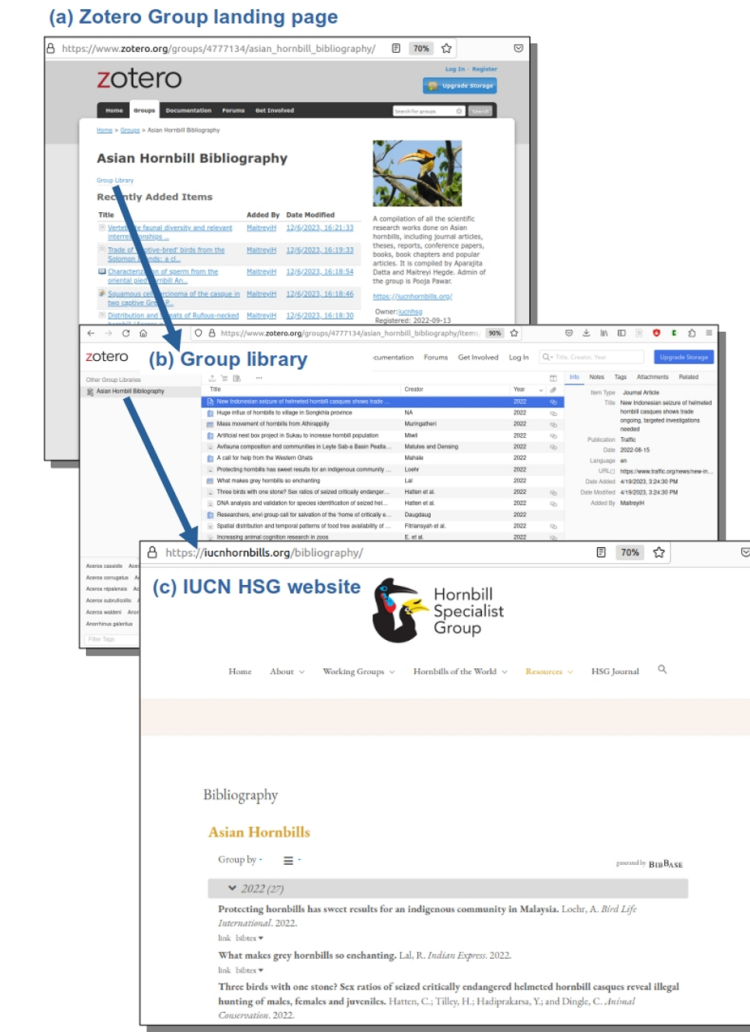
At present such edits and updating can only be carried out by the Zotero group admins. We intend to open it to all Zotero Group members eventually. If made fully open at present, references may get inadvertently deleted and thereby lost from the database, since it is not possible to restrict deletion rights. Until such a Zotero feature is available or automatic backup or versioning are possible, the library editing rights will remain restricted to admins. Hornbill researchers interested in joining as admins to contribute to maintaining and updating the database can get in touch with the IUCN Hornbill Specialist Group (Contact: IUCN HSG Programme Officer, E-mail: [programme.officer.hsg@gmail.com](mailto:programme.officer.hsg@gmail.com)) with an expression of interest.

Once a year, a static version of the entire Bibliography will be published to Zenodo to update Datta et al. (2024) as a new version.

## Using the Asian Hornbill Bibliography

Hornbill researchers and others can use the Asian Hornbill Bibliography in the following ways (Fig. 2). For maximum ease of use, we suggest that users also have Zotero accounts, install the Zotero desktop version on their computers, and install two key plugins (Zotero connector plugin for their browser and Zotero plugin for their word processor).

1. **Searching for hornbill literature:** Users can search the bibliography for relevant literature by visiting the main Zotero group landing page and navigating to the Zotero group library here: ([https://www.zotero.org/groups/4777134/asian\\_hornbill\\_bibliography/library](https://www.zotero.org/groups/4777134/asian_hornbill_bibliography/library)). On the library page, they can enter into the Search box particular search terms or keywords to find related publications.



**Fig. 2.** Multiple ways to access the Asian Hornbill Bibliography including: (a) viewing the Zotero Group main landing page where users can join as members, (b) exploring the Zotero Group Library page that allows users to search and export references, and (c) exploring filtered views on the IUCN HSG website.

**2. Exploring the IUCN HSG Asian Hornbill Bibliography page:** on the IUCN HSG Resources page where the Asian Hornbill Bibliography can be viewed: <https://iucn-hornbills.org/bibliography/>, users can sort listings and access links to the references. Using the dropdown filter, the references can be viewed by Author (default), Year, Type (journal article, book etc.), or by hornbill species (keywords, arranged by scientific name). Where Abstracts are available in the database, they can be viewed directly

below the reference. Clicking on the DOI or URL link icons below the reference will open the corresponding website page containing the referenced publication.

**3. Saving the database for personal or offline use:** Users can join the Zotero group library ([https://www.zotero.org/groups/4777134/asian\\_hornbill\\_bibliography/](https://www.zotero.org/groups/4777134/asian_hornbill_bibliography/)) as members by clicking the 'Join' button. Once synced, this will create a copy of Asian Hornbill Bibliography as a folder under 'Group Libraries' in

the Zotero application on the user's computer. If you wish to make a copy for personal use without joining the Zotero group, the entire bibliography can be exported from the group library page and saved as a BibTeX file (or other formats), which the user can subsequently import into their personal library ('My Library') in the Zotero application or in most other reference manager software.

4. **Using citations in manuscripts:** Once users have joined the Zotero group as members and have the bibliography synced in their Group Library (or downloaded a copy into My Library without joining the group), they can use the references directly in manuscripts. The word processor plugins allow the user to insert, edit, rearrange or delete a reference or sets of references in the main text. The user can also generate a full bibliography automatically formatted to match any chosen journal or publication citation style at the appropriate place in the manuscript.
5. **Contributing to updating the database:** The users can also contribute to updating the database by suggesting changes or corrections to existing references or addition of newer publications using the online form (<https://forms.gle/5VFj9bbPZA1vXaHt5>) available on the IUCN Asian Hornbill Bibliography page (<https://iucnhornbills.org/bibliography/>). We aim to update this dataset regularly.
6. **Creating derived resources:** The Asian Hornbill Bibliography, both the static version (Datta *et al.* 2024) and the dynamic online version (Zotero Group Library) are provided under open access licenses (Creative Commons with Attribution 4.0 or CC-BY 4.0). Users can thus download the bibliographic database and create derivative resources

(such as hornbill bibliographies on particular species, study areas, or themes) under the terms of the CC-BY 4.0 license.

## Conclusion and future work

The Asian Hornbill Bibliography serves as a valuable resource for hornbill researchers and other tropical biologists worldwide. This bibliography will also be useful for non-scientists, science communicators, journalists, and the general public interested in hornbills and topics related to tropical forests. Leveraging the power of free and open source tools and resources, the bibliography provides an accessible entry point to the body of literature on Asian hornbills. It provides a standard, relatively error-free, and convenient way to reference hornbill literature in scientific publications and manuscripts, thereby saving researchers from repetitive tasks and time-consuming manual citation practices. We aim to expand and enhance the database in future to serve as an authoritative and regularly updated compendium of hornbill research, besides including other relevant items such as general articles, webpages, posters, educational resources, and audio-visual material on Asian hornbills. The bibliography can also be combined with similar compilations of literature on African hornbills to create an authoritative bibliography on hornbills of the world.

## Acknowledgements

This work was supported by a grant to the IUCN SSC Hornbill Specialist Group from Mandai Nature, Singapore. We thank Dr. Sonia Luz and Dr. Jessica Lee of Mandai Nature for their support. We thank Elizabeth Zadnik and Bee Choo Strange for their inputs for the database. TRSR was supported by a grant from Rohini Nilekani Philanthropies to NCF.

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