

Mobilising data and building capacity for identification and monitoring of ecologically important insect taxa in Malaysia and Singapore

Programme:BIFA
Project ID: BIFA6_032
Project lead organization:Asian School of the Environment
Project implementation period:1/11/2021 - 28/2/2023
Report approved: 12/5/2022

Narrative Midterm report

Executive Summary

On 13 Apr 2022, we published our first dataset 'Taxonomic checklist of Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia. Prior to publishing, Marx Yim (Project Officer) received his certification (Advanced Badge) on 6 Apr 2022 following the Asia Data Mobilisation Course. Leading up to publishing, we have been in close contact with Lily Shrestha who has been invaluable in our project implementation and has helped to monitor our project's progress. To date, we have met with two of our project collaborators and presented more on GBIF and our project to them in addition to discussing how we can integrate their collections into our project.

After improved understanding of our data, it was decided that we would streamline certain datasets and dataset deliverables. This was discussed with Lily and she has confirmed this with the GBIF Secretariat. Because most of our data are derived from a similar pool of sources, we have decided to link certain datasets together. For example, we would have taxon as our core and have multiple extensions including occurrence instead of publishing them separately as a single taxon and occurrence dataset. The approach will be similar in both Sabah, Malaysia datasets and Singapore datasets. Despite some datasets becoming extensions now instead of a core, it is still a dataset and for higher data usability for data users, this approach was recommended.

To ensure successful implementation of the project in the remaining project period, Marx Yim has outlined a timeline of when remaining deliverables will be achieved. We will also continue communication with Lily to discuss how we can ensure future datasets are of the richest/highest quality prior to publishing and to also discuss remaining project objectives.

Progress against milestones

Has your project published at least one dataset through GBIF.org?: Yes

Dataset published:

| Dataset | DOI |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|
| Taxonomic Checklist of Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia | https://doi.org/10.15468/r8s697 |
| | |
| | |

Has at least one member of your project team received certification following the BIFA capacity enhancement workshop?: Yes

Name of the workshop participant:Marx Yim

Certification obtained: Advanced Badge

Activity progress summary

Project set up, training & BIFA workshop

- Marx Yim (Project Officer) completed the Asia Data Mobilisation workshop and received his certification (Advanced badge) on 6 Apr 2022
- A meeting was convened with our local collaborator, Lee Kong Chian Natural History Museum and we shared more on GBIF and our BIFA project objectives. We also discussed how we can integrate and utilise the Singapore dung beetle collections in the museum.
- A preliminary meeting was convened with our collaborator, UMS Borneensis Sabah, Malaysia and we shared more on GBIF and our BIFA project objectives. We also discussed how we can integrate and utilise the Borneensis dung beetle collections and help them with capacity building in databasing and digitization.
- We organised two separate talks with the Tropical Ecology and Entomology Lab and the Forest Ecology Lab at the Asian School of the Environment, Nanyang Technological University to share more on GBIF and our BIFA project. We have since received interest from our colleagues who wish to digitise their herbarium collection housed in ASE.
- We have plans to hold workshops/trainings in the future for interested parties.

Collate datasets from literature and specimens

Sabah

- All published literature and datasets containing occurrences of dung beetles in Sabah have been collated.
- Specimens from studies collected by Dr. Eleanor Slade in her previous studies in Sabah have also been transported from Oxford University Museum of Natural History Museum to ASE in Singapore.
- We have obtained additional Sabah specimens from UMS, Borneensis collection to photograph for the keys and guides.

Singapore

- We have visited the collections at the Lee Kong Chian Natural History Museum and have since examined and discussed how to integrate their dung beetle collections. We have also collected specimens from them for imaging, digitisation and for further studies to understand the taxonomic and geographic gap of dung beetles in Singapore.
- Published literature and datasets have been collected from their originators. The next step is data extraction and transcription.
- We have just completed a comprehensive sampling effort of dung beetles in Singapore between Nov to Dec 2022 and that data will be included into the Singapore-related dataset deliverables.

DNA barcoding of specimens

Sabah

- In collaboration with the Reproductive Evolution Lab, National University of Singapore (NUS) majority of Sabah dung beetle species have been sent for sequencing and we are waiting for sequencing companies to return findings.
- The remainder of the Sabah dung beetles species are undergoing PCR conducted by Marx Yim and Ong Xin Rui in the Tropical Ecology and Entomology Lab, Nanyang Technological University (NTU). The next step is to send them for sequencing.
- The combination of both sequencing results from NUS and NTU will form the basis of our DNA barcoding dataset for Sabah dung beetles.

Singapore

- There are existing DNA barcodes for some Singapore species that were published on GenBank by our colleagues in NUS.
- Using the specimens that we have collected recently between Nov to Dec 2022 in Singapore, we are undergoing PCR conducted by Zann Teo, Marx Yim and Ong Xin Rui from the Tropical Ecology and Entomology Lab. The next step is to send them for sequencing.
- The combination of the existing DNA barcodes from NUS and the DNA barcodes derived from our samples in NTU will form the basis of our DNA barcoding dataset for Singapore dung beetles.

Visits to Sabah and Finland and collection of datasets

- We have a planned visit to Universiti Sabah Malaysia in May 2022 to examine the Borneensis collection and to discuss with our UMS collaborators on how we can integrate their dung beetle collection into this project and its datasets.
- We have a planned visit to Forest Research Centre Sabah Malaysia in June 2022 to examine their collection and to discuss with our FRC collaborators on how we can integrate their dung beetle collection into this project and its datasets.
- Our travel to visit Helsinki Natural History Museum in Helsinki is still under discussion and may not happen within the timeframe of this project due to covid related travel issues.
- Dr Eleanor Slade (Project Investigator) has recently returned from Oxford, UK with Sabah dung beetles that were sampled from her previous studies.
- Additional plans to visit the dung beetle collections of Natural History Museum in London and the Oxford University Museum of Natural History are being discussed.

Construction of user friendly keys and guides for Singapore and Sabah

Sabah

- Majority of lowland Sabah dung beetles species have been imaged, edited together with completed plates and a guide is almost complete.
- A key has been created. The next step is to test the key with various parties to check for usability.
- A poster of all lowland Sabah dung beetle species is complete. It will be included into the guidebook.
- The combined guide and key will be compiled into an open-access guidebook.
- With the help of a confirmed book publisher in Sabah, we will print out hard copies of this guide upon completion.

Singapore

- Imaging of dung beetle species of Singapore is currently underway in addition to the production of a key.

Data input and publishing in GBIF

Sabah

- All transcribing and data extraction related to all Sabah-related dataset deliverables have been complete and entered into a major dataset 'Bornean dung beetle database, Tropical Ecology and Entomology Lab'
- One dataset 'Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia has been published on 13 Apr 2022.
- With all verbatim data extracted from our sources, all further extensions such as occurrence (extension of taxon core) and sampling event core datasets will be published accordingly after further data management and data cleaning.
- Regarding DNA-derived data, we are awaiting findings from sequencing companies and have more specimens ready to be sent to for sequencing.

Singapore

- Data transcription and extraction for Singapore-related dataset deliverables are to begin shortly.
- Regarding DNA-derived data, we have specimens that will be sent for sequencing shortly.

Completed activities

Activity name: Project set up, training & BIFA workshop

Description: • Marx Yim (Project Officer) completed the Asia Data Mobilisation workshop and received his certification (Advanced badge) on 6 Apr 2022

- A meeting was convened with our local collaborator, Lee Kong Chian Natural History Museum and we shared more on GBIF and our BIFA project objectives. We also discussed how we can integrate and utilise the Singapore dung beetle collections in the museum.

A preliminary meeting was convened with our collaborator, UMS Borneensis Sabah, Malaysia and we shared more on GBIF and our BIFA project objectives. We also discussed how we can integrate and utilise the Borneensis dung beetle collections and help them with capacity building in databasing and digitization.

- We organised two separate talks with the Tropical Ecology and Entomology Lab and the Forest Ecology Lab at the Asian School of the Environment, Nanyang Technological University to share more

on GBIF and our BIFA project.

Start Date - End Date: 1/11/2022 - 6/4/2022

Verification Sources: • Marx Yim received his certification (Advanced badge) on 6 April 2022 by the GBIF Secretariat through email after submitting his assessments upon completion of the BIFA workshop.

- Refer to 'Events' on Project Page for meeting with LKCNHM and recent first meeting with UMS, Sabah.

- Refer to communications output document attached for presentations

Activity name: Collate datasets from literature and specimens - Sabah

Description: • All published literature and datasets containing occurrences of dung beetles in Sabah have been collated.

- Specimens from studies collected by Dr. Eleanor Slade in her previous studies in Sabah have also been transported from Oxford University Museum of Natural History Museum.

Start Date - End Date: 1/11/2021 - 31/3/2022

Verification Sources: The 'Taxonomic Checklist of Dung beetles in Sabah, Malaysia' was published on 13 April 2022. It was derived from a completed occurrence dataset.

Activity name: Publication of 'Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah'

Description: This dataset was published and registered on GBIF on 13 April 2022.

Start Date - End Date: 1/11/2021 - 13/4/2022

Verification Sources: <https://doi.org/10.15468/r8s697>

Report on Deliverables

Deliverables progress summary

Datasets deliverables summary

After improved understanding of our data, it was decided that we would streamline certain datasets and dataset deliverables. This was discussed with Lily and she has confirmed this with the GBIF Secretariat. Because most of our data are derived from a similar pool of sources, we have decided to link certain datasets together. For example, we would have taxon as our core and have multiple extensions including occurrence instead of publishing them separately as a single taxon and occurrence dataset. The approach will be similar in both Sabah, Malaysia datasets and Singapore datasets. Despite some datasets becoming extensions now instead of a core, it is still a dataset and for higher data usability for data users, this approach was recommended.

Summary of revised dataset deliverables

1. Dung beetles of Sabah: Taxon dataset (core) + Occurrence dataset (ext.) + DNA-derived dataset (ext.)
2. Dung beetles of Singapore: Taxon dataset (core) + Occurrence dataset (ext.) + DNA-derived dataset (ext.)
3. Dung beetles of Sabah: Sampling-effort dataset (core) + Occurrence dataset (ext.)

On 14 Apr 2022, we have published the first Taxonomic Checklist of the Dung beetles of Sabah, Malaysia. The occurrence dataset for Sabah is also nearing completion. We are still waiting on findings from sequencing companies for Sabah specimens and we have more specimens to be sent for sequencing.

Singapore related datasets are currently in progress. The next step after the collection of published literature and datasets is data extraction into a verbatim Singapore dataset complete with taxon, occurrence and all other extractable data. Sequencing efforts for Singapore dung beetles are currently underway though partially complete as we have access to the sequences completed by previous studies from NUS.

With regard to the guidebooks and keys these are well underway and we expect them to be completed by the end of the year. The majority of lowland Sabah dung beetles species have been imaged, edited together with completed plates and a guide is almost complete. A key has been created. The next step is to test the key with various parties to check for usability. A poster of all lowland Sabah dung beetle species is complete. It will be included into the guidebook. The combined guide and key will be

compiled into an open-access guidebook. With the help of a confirmed book publisher in Sabah, we will print out hard copies of this guide upon completion.

For Singapore imaging of dung beetle species of Singapore is currently underway in addition to the production of a key.

PhD student Ong Xin Rui is currently in the middle of optimising the eDNA methods to use dung beetles as invertebrate samplers of vertebrates.

Progress towards deliverables

Title: Asia Data Mobilisation Workshop & Certification

Type: Other

Description: Marx Yim (Project Officer) has successfully attended and completed the workshop held. He then submitted his assessment and received his certification (Advanced Badge).

Sources of verification: On 6 April 2022, GBIF Secretariat emailed Marx Yim to inform him of his certification (Advanced Badge)

Title: Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Type: Dataset

Status update: This taxonomic checklist was published and registered onto GBIF on 13 April 2022. Prior to publishing, this dataset was checked for issues through the GBIF validator tool and was viewed by Lily Shrestha.

Dataset scope: Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Expected number of records: 192

Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade

Data host institution: Asian School of the Environment

Sampling method:

% complete: 100

DOI: <https://doi.org/10.15468/r8s697>

Expected date of publication:

Title: Occurrence of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Type: Dataset

Status update: This occurrence dataset will be an extension of the taxonomic checklist that has already been published. Data cleaning and management is in progress to ensure the richest dataset possible prior to publishing.

Dataset scope: Occurrence of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Expected number of records: 6000

Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade

Data host institution: Asian School of the Environment

Sampling method:

% complete: 70

DOI:

Expected date of publication: 2022-06-30

Title: DNA Sequences of Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Type: Dataset

Status update: Findings from DNA sequencing efforts have yet to return from sequencing companies. We also have additional specimens ready to be sent for sequencing.

Dataset scope: DNA Sequences of Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Expected number of records: 100
Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade
Data host institution: Asian School of the Environment
Sampling method:
% complete: 50
DOI:
Expected date of publication: 2023-01-31

Title: Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Type: Dataset

Status update: We are about to begin data extraction and transcription of published literature and published datasets. Further studies need to be conducted with reference collections provided by LKCNHM and cross-referenced with images from Biodiversity Portal of Singapore as well as from specimens that we have collected from our own sampling efforts.

Dataset scope: Taxonomic Checklist of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Expected number of records: 25

Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade

Data host institution: Asian School of the Environment

Sampling method:

% complete: 25

DOI:

Expected date of publication: 2022-12-30

Title: Occurrence of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Type: Dataset

Status update: We are about to begin data extraction and transcription of published literature and published datasets.

Dataset scope: Occurrence of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Expected number of records: 1000

Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade

Data host institution: Asian School of the Environment

Sampling method:

% complete: 20

DOI:

Expected date of publication: 2022-12-30

Title: DNA Sequences of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Type: Dataset

Status update: Findings from DNA sequencing efforts have yet to return from sequencing companies. We also have additional specimens ready to be sent for sequencing. Sequences of Singapore dung beetles conducted by NUS have been obtained.

Dataset scope: DNA Sequences of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Singapore

Expected number of records: 25

Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade

Data host institution: Asian School of the Environment

Sampling method:

% complete: 50

DOI:

Expected date of publication: 2023-01-31

Title: Sampling-effort dataset of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Type: Dataset

Status update: This dataset is being produced in tandem with the occurrence dataset of Sabah dung beetles. It requires further data management and cleaning. This dataset will be published shortly after the occurrence dataset of Sabah dung beetles is published.

Dataset scope: Sampling-effort dataset of the Dung beetles (Coleoptera: Scarabaeidae: Scarabaeinae) in Sabah, Malaysia

Expected number of records: 3000
Data holder: Marx Yim, Xin Rui Ong, Eleanor Slade
Data host institution: Asian School of the Environment
Sampling method:
% complete: 70
DOI:
Expected date of publication: 2022-08-31

Events

GBIF-BIFA Meeting with Collaborator, Lee Kong Chian Natural History Museum

Dates: 2021-11-29 - 2022-11-29
Organizing institution: Lee Kong Chian Natural History Museum - Asian School of the Environment
Country: Singapore
Number of participants: 5
Comments:
Website or sources of verification: <https://www.gbif.org/event/c47137-e62c-42c7-85ec-80c72e8/gbif-bifa-meeting-with-collaborator-lee-kong-chian-natural-history-museum>

Events

GBIF-BIFA Presentation to Tropical Ecology & Entomology Lab, ASE

Dates: 2022-03-17 - 2022-03-17
Organizing institution: Asian School of the Environment, Nanyang Technological University
Country: Singapore
Number of participants: 12
Comments:
Website or sources of verification:

Events

GBIF-BIFA Presentation to Forest Ecology Lab, ASE

Dates: 2022-03-24 - 2022-03-24
Organizing institution: Asian School of the Environment, Nanyang Technological University
Country: Singapore
Number of participants: 20
Comments:
Website or sources of verification: <https://twitter.com/ElleSlade/status/1509124737523363846>

Events

GBIF-BIFA Meeting with Collaborator, Universiti Malaysia Sabah

Dates: 2022-04-08 - 2022-04-08
Organizing institution: Universiti Malaysia Sabah - Asian School of the Environment
Country: Sabah, Malaysia
Number of participants: 3
Comments:
Website or sources of verification: <https://www.gbif.org/event/799de3-c9cb-4e91-93e0-b7b5404/gbif-bifa-meeting-with-collaborator-universiti-malaysia-sabah>

Communications and visibility

Since the start of the project, we have communicated our progress through posts on Twitter, our Tropical Ecology and Entomology Lab website and have been working to create a Sabah dung beetle guidebook.

See 'BIFA6_032 Communications Output' document for more information.

Monitoring and evaluation

Monitoring and evaluation findings

The project is making excellent progress and running according to schedule thanks to the expert project co-ordination by Marx Yim. We have met our mid-term outputs and deliverables in setting up the project and meeting with our partners. Marx received his advanced badge and we published our first dataset. We have been in frequent communication with Lily who has been expertly guiding us through the process and has helped us refine and streamline our dataset outputs into core and extensions. We are very grateful for her help, advice and patience! Because of Marx and Lily the project has run smoothly and efficiently.

We have had strong engagement with our partners at LKCNHM and UMS. Marx Yim may travel with LKCNHM to London and Oxford and possibly Helsinki and Leiden to examine their collections and how they can be used in this project. However, this international travel has been delayed so far because of covid. Our partners at Borneensis UMS have engaged with us on the project and we have loaned specimens from them to photograph in Singapore for the guidebooks and keys, They are interested in how to integrate their collections data into GBIF and this project and we will capacity build with them to exchange knowledge and to help them with digitisation and databasing of their dung beetle collections. We will have a week meeting with them in May for further discussions and also meet with FRC Sabah in June to discuss the integration of their collections into this project.

The support from the GBIF Secretariat and Lily has been outstanding and has contributed to the success of the project, and enabled us to streamline our datasets and make them more accessible. We will build on this new knowledge which will now ease the publication of the rest of the datasets.

Impact of COVID-19 pandemic on project implementation

The project has achieved its midterm goals and deliverables despite covid restrictions, and travel to Malaysia now means we will have meetings with project partners in UMS and FRC in May and June.

We have not been able to travel to Helsinki due to international travel restrictions and we may not be able to visit them within the project time frame. However, due to strong collaborations with our partners in the region we do not expect this to affect our outputs or deliverables.

GBIF leads the Biodiversity Information Fund for Asia (BIFA), a programme funded by the Ministry of the Environment, Government of Japan. The programme provides supplementary support for activities addressing the needs of regional researchers and policymakers through mobilization and use of biodiversity data.

