Data Mobilization of Botanical Collections at Herbarium Bogoriense (BO), Indonesia

Programme: BIFA
Project ID: BIFA6_014
Project lead organization: Herbarium Bogoriense, Indonesian Institute of Sciences
Project implementation period: 1/9/2021 - 31/3/2023
Report approved: 31/5/2023

Narrative Final report

Executive Summary

The target of the BO BIFA program is to mobilize at least 10.000 botanical collections the Herbarium Bogoriense (BO) via GBIF. We successfully achieved 10.017 records of type collections managed in 7 datasets; Ebenaceae, Fagaceae, Fabaceae, Nepenthaceae, Pteridophytes, Liliopsida, and Magnoliopsida. Most of those records are completed by the images and georeference. Overall, the project implementation is on the track, and the technical issues can be handled. The important lesson learned from this data mobilization program are as follows: 1. The inconsistency and incompleteness of data collections affect the speed of mobilizing the botanical data. 2. Program supervision is highly needed to handle technical problems during the execution of the program. GBIF Secretariat and GBIF Node for Asia highly contribute to solving the technical issues.

Four major program activities are being conducted, as mentioned in the approved proposal. However, the validation process of the species name still needed to be finished in February 2023 and just completed in March 2023. Tracing the protologues to ensure that the type of collections kept at BO is correct is challenging for the curators, and this is an additional step for the program. Tracing the protologue consumes more time to complete the validation process. In many species names, the curators did not find the correct protologue. To speed the validation process, the curator eventually went through the listed collection without having the protologue.

After finishing the BO BIFA project, the post-project activity planned is continuing the remaining undigitized BO type collections for another data mobilization project, and preparing the scientific publication.

Progress against milestones

Has your project completed all planned activities?: Yes

Has your project produced all deliverables?: No

Rationale: We planned to publish the scientific publication in the second midterm of the project. However, the project activities, particularly validating taxonomy names, have not reached the target. Accordingly, we decided to complete the published data records as a priority rather than a scientific paper. After submitting the narrative and final financial report, we will continue preparing the scientific journal that contains the curatorial work findings during the BO BIFA Implementation Program.

Report on Activities

Activity implementation summary

Validate taxonomic identification, databasing, imaging, and georeferencing data are the main activities to achieve the program's goal. Those activities involved the curators, herbarium assistants, Data Entry Operators, BO technicians, and IT specialist.

1. Validating taxonomic identification

A list of the type collections was taken from Indonesian Biodiversity Information System (IBIS) database, and more than 10.000 type collections were physically checked and validated. The listed names are then reviewed and validated by curators for taxonomy based on the newest classification. Since the beginning of the program, curators have started the validating process of the species names. Up to mid of January 2023, about 4.500 records have been validated and published via the GBIF website. Those record numbers still needed to be closer to our target. Then, we required more time to complete all the targets and requested a one-month project extension was approved by GBIF. The extension was successfully implemented to meet the final 10.017 records in the first week of March 2023 and published end of March 2023. Data records have been cleaned and formatted following DwC. At the end of the project, the 10.017 validated data have been published into 7 datasets and can be viewed through the GBIF website.

2. Databasing

The data collection that was unavailable in IBIS was entered into the Indonesian Biodiversity Information System (IBIS) database by the Data Entry Operator (DEO). Unfortunately, the IBIS database is a very unstable system, so trouble often occurs during data entry. To secure the data collection produced by the BO BIFA program, the data entry operator temporarily listed the data in the excel file, which will be entered when the database is stable.

3. Imaging

Initially, we proposed to publish at least 10.000 records and complete them by capturing images of those records, one photo for one collection sheet. Many images can be viewed on the GBIF website, and about 10.000 photos have already been uploaded. The type images save at the National Scientific Repository (=RIN) under the responsibility of BRIN. The image link was embedded in each data record on the DwC format.

4. Georeferencing

The precise location where the specimens were collected was georeferenced. Georeference was determined based on the geographic information available on the specimen labels. Many records do not have detailed localities. Consequently, we cannot provide the coordinates of the latitude and longitude. We use the locality on the specimen label to trace the coordinates using maps, gazetteers, and online databases on the internet.

Completed activities

Activity name: Validating taxonomic identification

Description: Sorted, validated, published and register into GBIF via IPT.
Start Date - End Date: 11/10/2021 - 3/3/2023
Verification Sources: DOI of all published datasets.

Activity name: Databasing

Description: Validated database by physically checking notes on specimens. The validated information were added to the excel
Start Date - End Date: 3/1/2022 - 16/1/2023
Verification Sources: -

Activity name: Imaging

Description: The capture images has been finished in mid of January 2023. The type images save at the National Scientific Repository (=RIN) under the responsibility of BRIN. The image link was embedded in each data record on the DwC form.
Start Date - End Date: 3/1/2022 - 16/1/2023
Verification Sources: Image links have been added at the DwC format.

Activity name: Georeferenced

Description: Finding the coordinates of the locality where specimen collected.
Start Date - End Date: 3/1/2022 - 28/2/2023
Verification Sources: DwC format published into GBIF website.

Report on Deliverables

The 10.017 records of the taxonomic dataset of botanical collections at Herbarium Bogoriense (BO) have been successfully published via GBIF Website. Those cover groups of higher plants, i.e., Fabaceae, Ebenaceae, Nepenthaceae, and many other families that included Magnoliospida datasets. We processed those data records and uploaded them into 7 datasets in GBIF under 7 DOIs. Moreover, the images completed the datasets.

The two expected deliverable product of this projects are scientific publications and project reports. The scientific publications have yet to be produced up to March 2023. Meanwhile, the project report on the mid-term and final narrative report has been submitted. After submitting the narrative and final financial report, we will continue preparing the scientific journal.

Production of deliverables

Title: Type collections of Ebenaceae at Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 237 occurrence records completed by images.
Dataset scope: The type collections of Ebenaceae were mostly collected from Indonesia, and from several other countries, ie. Malaysia, Philippines, Sri Lanka, Thailand, etc. }
Expected number of records: 237
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the Ebenaceae specimens from the Indonesian Biodiversity Information System (IBIS) include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. That information was in DwC form, then published and registered to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/9p9ydz
Expected date of publication:

Title: Type collections of Fagaceae at Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 138 occurrence records completed by images.
Dataset scope: Castanopsis, Lithocarpus and Quercus that were mostly collected from Indonesia, and from several other countries, ie. Malaysia, Philippines, Myanmar, and Vietnam.}
Expected number of records: 138
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/2a3tr7
Expected date of publication:

Title: Type collections of Fabaceae at Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 456 occurrence records completed by images.
Dataset scope: The dataset consists of several genera within Fabaceae were mostly collected from Indonesia, and from several other countries, ie. Malaysia, New Guinea, Philippines, Solomon Islands, Sri Lanka, and Vietnam. }
Expected number of records: 456
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.

% complete: 100
DOI: https://doi.org/10.15468/sjvr34
Expected date of publication:

Title: Type collections of Nepenthaceae at the Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 87 occurrence records completed by images
Dataset scope: The type specimens of Nepenthaceae were mostly collected from Indonesia, i.e. from Borneo, Moluccas, Papua, Sulawesi, and Sumatra. Other specimens are from Peninsular Malaysia and the Philippines.}
Expected number of records: 87
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the Nepenthaceae specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/g629ne
Expected date of publication:

Title: Type collections of Pteridophyte at Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 365 occurrence records completed by images
Dataset scope: Type collections of Pteridophyte that kept at the Herbarium Bogoriense consist of several families were mostly collected from Indonesia, and from several other countries, ie. American Samoa, Chile, French Polynesia, Malaysia, New Guinea, and Philippines.}
Expected number of records: 365
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the Pteridophytes specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/wg3xae
Expected date of publication:

Title: Type collections of Liliopsida at Herbarium Bogoriense (BO), Indonesia

Type: Dataset

Status update: 382 occurrence records completed by images
Dataset scope: "Type collections of Liliopsida that kept at the Herbarium Bogoriense consist of several families were mostly collected from Indonesia, and from several other countries, ie. Fiji, French Polynesia, India, Malaysia Mexico, Micronesia, New Guinea, Philippin}
Expected number of records: 382
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/w2srw7
Expected date of publication:

Title: Magnoliopsida Type Collections at Herbarium Bogoriense

Type: Dataset

Status update: 8352 occurrence records completed by images
Dataset scope: The dataset consists of many higher plant families that collected from countries in Asia, and other continents. }

Expected number of records: 8352
Data holder: Herbarium Bogoriense, BRIN
Data host institution: Herbarium Bogoriense, BRIN
Sampling method: The extracted taxonomic data of the Erythroxylaceae, Lythraceae, Malpighiaceae, Menispermaceae, Rhamnaceae, Rousseaceae, Thymelaeaceae and many other specimens from the Indonesian Biodiversity Information System (IBIS) that include the taxonomic name, location, habitat, collection date, collector name, collector number, and collection number. Those information form DwC, then publish and register to GBIF via IPT.
% complete: 100
DOI: https://doi.org/10.15468/tgp64a
Expected date of publication:

Title: Scientific paper on Data mobilization of the Herbarium Type Collections

Type: Data Papers
Description: During the process of Data mobilization of the Herbarium Type Collections, the curators identified several important curatorial findings, which will be the points of the published paper. We will collaborate with the project counterpart to elaborate on those curatorial findings.
Sources of verification: -

Impact of COVID-19 pandemic on project implementation

The impact of Covid-19 happened at the beginning of the project. This limited access to the collections, particularly in October 2021- March 2022, has affected our activities;i.e. validating, databasing, imaging and georeferencing. The delay of those activities gave impacted the number of published datasets. The validating process has been delayed due to the COVID-19 pandemic. Herbarium Curators must work from Home (WFH) instead of working at the herbarium. The WFH gives less opportunity for Curators to validate the herbarium specimens.

Events

Digitization program at Herbarium Bogoriense

Dates: 2022-09-30 -
Organizing institution: Research Center for Biosystematics and Evolution, BRIN
Country: Indonesia
Number of participants: 10
Comments: The event was a part of the training workshop on the Herbarium Management Collection. The participants were lecturers of Mataram University. I introduced the digitization of the Herbarium Collection and presented the data mobilization program funded by BIFA-GBIF.
Website or sources of verification: Photos of the event

Events

Workshop on Data Mobilization of the Herbarium Bogoriense

Dates: 2022-12-21 - 2022-12-22
Organizing institution: BIFA Program collaborated with Research Center for Biosystematics and Evolution, BRIN
Country: Indonesia
Number of participants: 30
Comments: A workshop on Data Mobilization of the Herbarium Bogoriense brought together several students and researchers interested in mobilizing their data.
Website or sources of verification: Photos of the event

Communications and visibility

The BIFA project was started by having an internal and external meetings. Internal communication has been established, particularly for the Deputy of Life Sciences and Environment, Head of Research Center for Biosystematics and Evolution, Director of Scientific collection, and the curators of Herbarium Bogoriense. Those communication meetings have been reported in the midterm narrative report to

GBIF.

The two other disseminating events have been organized, and brought students, lectures, and researchers interested in management herbarium, particularly mobilizing collection data. In October 2022, the Research Center for Biosystematics and Evolution held a training course on herbarium management for the 8 lecturers of the University of Mataram, Lombok, Indonesia, on 26-30 October 2022. One of the topics included in the training was digitizing herbarium collections, and the BIFA program was presented as part of the digitization collection course. The second event held by BIFA Program, which collaborated with the Research Center for Biosystematics and Evolution, BRIN, was a training workshop on the data mobilization of the herbarium collections on 21-22 December 2022. The material courses were how to manage the herbarium collections from the field to prepare for the mobilization of data and what kinds of taxonomic data that important to be a part of published datasets. The 30 participants were mostly taxonomists from internal and external Research Center.

Monitoring and evaluation

Final Evaluation

The Project Coordinator routinely conducted the internal monitoring and evaluation (M&E) on the work of the Curators, IT specialist, Herbarium Assistants, Data Entry Operators (DEO), and the program treasurer. The M&E to BIFA Project was also held by the Deputy Live Sciences, BRIN and his team. They regularly conducted the M&E of the external funding project, and BIFA is one of them. They evaluated the BO BIFA project three times; July 2022, August 2022, and December 2022. Two aspects of the project M&E were the progress of project planned activities and budget evaluation.

Despite the intensive working schedule, we achieved most proposed activities by the funding period on February 2023 and finished the validating species name in early March 2023. We produced 7 datasets published to GBIF in May 2022-March 2023. Several meetings and two training workshops related to the BIFA project have been executed, and those are the project disseminating program. All those activities were primarily done following the schedule mentioned in the approved proposal. However, the scientific publication as one of the project deliverables was not achieved after the deadline. The failure to produce this scientific publication was partially due to the high concentration of the team members to finish the datasets as the main target of the BO BIFA program. Nevertheless, the team plans to complete the scientific publication after the narrative and final financial reports are submitted to GBIF.

The strength of this project implementation is the high commitment of the project members that take responsibility for their expertise. Recruiting external human resources in the project with herbarium experience is necessary for the work's success. In Addition, communication among the team members was actively held. The project coordinator and the project assistant monitor the progress and output of the project. Another strength is that the GBIF funding transfer has successfully arrived in Indonesia. The BRIN internal bureaucracy highly supports the BO BIFA to meet all the project goals by paying all project expenses on time.

The weakness of this project implementation is the high of institution programs that included the team members in those programs. Consequently, curators need more time to validate the species names of the project-listed collections. In Addition, the tracing protologue is time-consuming. As a result, the curators did very hard work to finish all their project responsibilities.

The change in the project's original plan is instead of publishing datasets on several big families of higher plants, i.e. Myrtaceae, Fabaceae, Lauraceae, etc. We decided that the dataset published covers many groups, either small or large families. This change happened because the number of original targeted families collections was lower than expected.

The team members of the BO BIFA program expect that the published datasets of type collections kept at BO will significantly contribute to the wide community: academicians, systematists, ecologists, and other communities in the world. The 7 datasets published via GBIF are part of the BO collections. The huge numbers of BO collections wait to be handled for another data mobilization project.

The GBIF Secretariat and the GBIF-ASIA Node, throughout the implementation of the project, very well support the BO BIFA project. They give fast and good responses to emails and provide the best solution for our difficulties. The GBIF Asia Node fully helped with technical issues during the program.

Best Practices and Lessons Learned

The mobilization data of Herbarium collections is a new program for BO BIFA team members, and there is still much to learn. For the first midterm, the project team focused on the main activities of the program: validating, databasing, imaging, and georeferencing. This program gives us a new

opportunity to start mobilizing the botanical data of herbarium collections.

The lesson learned from this project is as follows:
1. To complete project goals, good plan activities and a high project team commitment are important aspects of the program.

2. The host Institution's support, regarding the IT equipment, is highly needed to execute the data mobilization project.

3. Good communication among the team members contributes to the program's success.

4. Program supervision of GBIF is essential to solve the technical issues during the program implementation.

Post Project Activity(ies)

Post-project activity, besides scientific publication, is continuing the undigitized BO data collections for another data mobilization project. The number of data records will be corrected and updated, particularly the inconsistency and incompleteness of data collection. We will continue validating more unpublished records in the dataset. .

Sustainability plans

After the project, we plan to discuss with the Director of the Herbarium Bogoriense and the BO collection manager to find a good strategy to continue the program. They must seek opportunities to obtain funding and resources to promote data mobilization. We are planning to mobilize the data of the remaining types of collections. In addition, the data mobilization program of BO will be disseminated and shared with others through either national and international seminars or other events. As the biggest herbarium in Indonesia, Herbarium Bogoriense has become the role model for Indonesian local herbaria in enhancing the data mobilization program. When more grants come, data mobilization of remaining type and general collections will be the next target and invite more curators/taxonomists from different institutions/herbaria to join the project. The availability of herbarium collections of 32 local herbaria will be a good resource for the national database of Indonesian biodiversity.