FINAL ACTIVITY REPORT

Guidelines on how to complete the activity report are included in italics.

Remember that this report will be made available on your project page on the GBIF website and therefore should not include email addresses, unless you have permission from all mentioned in the report that their email information can be published.

Contents

Project information

Main contact person and role:	Nurainas, lead of Project
Institution/network/agency affiliation:	Herbarium of Andalas University (ANDA), Department of Biology, Mathematics and Natural Science, Andalas University
BIFA Project ID:	BIFA3_17
Project title:	Flora of Sumatra: Digitizing and data basing specimens of the Sumatran Flora deposited in Herbarium Universitas Andalas (ANDA)
Start date and end date of the reporting period:	April 2018 to March 2019
Country in which the activities take place:	Indonesia

Executive summary

Provide a brief explanation of the project and its implementation, the context and the approach taken for the final evaluation, and a summary of the objectives achieved, lessons learned and conclusions.

[The project titled “the Flora of Sumatra: Digitizing and Data basing specimen of the Sumatran Flora deposited in Herbarium Universitas Andalas (ANDA)”. Our goal was to share digital information about floras from Sumatra hosted at the Herbarium Andalas University (ANDA). The herbarium is one of the active herbaria on Sumatra, Indonesia, serving for both research and education. Currently, the herbarium hosts about 65,000 sheets of herbarium collections, consisting of vascular plants and moss, but all of the collections were uncatalogued or were not available in online database.

In this project, we have improved access to the flora diversity information from Sumatra. The available information and easy access to our specimen records will be useful for current and future research, and to support policy making decision on species diversity in Indonesia. We worked together with the GBIF node in Indonesia (InaBIF) and fully supported by Herbarium Bogoriense (BO), Kagoshima University (KAG), and Edinburgh Herbarium (E). Our parent institution, Andalas University, also supported the project and provided co-funding for us. Furthermore, our project involved student volunteers from the Department of Biology, Andalas University, that worked for the data collection.

We started our project by conducting a workshop to train the data-entry team and to promote the project to students and faculties within our institution. In general, the attendees of the workshop comprised of prospective volunteers, students, and faculties at the Department of Biology, Andalas University. The materials for our workshop were mostly adopted from the workshop in Beijing, China, that our representative attended.

During the project, we encountered several issues. The first issue was the delay of the start of the project due to uncertainties in acquiring appropriate equipment. It then slowed down the progress of digitization process. In the first half of the project, we digitized less than 6,000 sheets of herbarium collections, slightly below our target. In the next half of the project, however, we have digitized 13,568 sheets of specimens, surpassing our 12,000 sheets of specimens targeted for the project. Other issues we encountered in this project was the slow process of the verification of species identification assisted by experts for designated taxa. We sent the experts an excessive number of specimens to verify the species identification, which was overloaded the capacity that the experts could assist in a short period of time. In the future, we will vet the specimens thoroughly before we send them to the experts. We will only send the specimens that are unable to verify using our own resources at the herbarium. In addition, in this project, we also encountered defective specimens, either because of to the age of the specimens or insect and fungal problems. We fumigated and remounted all of them.

In total, we have digitized 13,568 sheets of specimens, in 374 species of 85 genera within 15 families of vascular plants. Among all of the families we have cataloged are Balsaminaceae, Begoniaceae, Dipterocarpaceae, Euphorbiaceae, Fagaceae, Gesneriaceae, Nepenthaceae, Polygalaceae, Rosaceae, Sapotaceae, Symplocaceae, Pandaceae, Phyllanthaceae, Putranjivaceae and Chrysobalanaceae. Among them are 40 species that are endemic to Sumatra. All the data have been published on GBIF website through the link: https://www.gbif.org/dataset/3e0987c4-375f-4d68-b2ac-5e4e3a6d3d6d.

The project has taught us new knowledge about team management, working with standardized field information biodiversity data following Darwin Core, data cleaning techniques with appropriate software, dataset management, and data publication using IPT protocol. The herbarium has also acquired more equipment for the digitization of specimens. During this project, the herbarium received additional equipment for data capture, including scanners, cameras, and computers from BIFA and the co-funder. The equipment will be used for future data capture. In conclusion, this project is the first step for improving access to specimens on Sumatra.]

Project objectives

This section should include the list of objectives included in your original project proposal, stating for each how far you advanced towards their achievement. Also include any additional objectives that were defined during the implementation of the project. In the event of undexpected challenges prevented you to reach a planned project objective, please provide detailed explanations and indicate how you plan to reach these objectives post project.

[The aims of the project are to digitize the collections hosted at Herbarium ANDA; to prepare and establish well-managed and integrated specimen database following GBIF standard; to manage collections, locality information and specimen images; and to produce the catalogue of the Flora of Sumatra.]

Activities

Please indicate the status of the activities as outlined in the project proposal, at the time of final reporting. The table below should be completed in the same way as in the full proposal but should include information and updates on the status of each activity.

In the event of unexpected delay please provide detailed explanatory notes and indicate planned completion date after the end of the project. Add as many rows as needed.

In the event of any additional activities having being completed during the implementation of the project, please add rows as required.

Description of activity	Partners involved	Contribution of activity to goals listed in table 4.3	Status of activity as of final reporting Completed? Yes/No	Explanatory notes, inc. planned completion date if necessary	Source(s) of verification
Digitizing and publishing georeferenced species occurrence data based on specimens held in Asian collections					
Preparation and national stakeholders meeting	InaBIF	Providing workshop/training to digitize the specimens hosted at Herbarium ANDA.	Yes	We conducted an event to promote GBIF/InaBIF and a technical meeting in Padang to coordinate the BIFA3_17 project.	Invitation for the speakers, materials, list of attendees, meeting notes, and the event documentation (Annex 1).
Volunteer recruitment and training for specimen management	-	Providing resources and knowledge to manage the collections, locality information, and specimen images at Herbarium ANDA	Yes	We conducted a workshop and volunteer recruitment and selection for the data entry.	Workshop materials, list of attendees, and the event documentation (Annex 2).
Define strategy for data basing prioritization.	RBGE	Quality data for checklist preparation	Yes	Direct discussion or via emails with the experts about the chosen taxa and the reason of choosing them.	List of selected family (Annex 3)
Acquiring digitalization facilities for the project	-	To digitize the specimens hosted at Herbarium ANDA	Yes	Purchasing the IT equipment for data capture and storage.	IT equipment photographs (Annex 4).

Description of activity	Partners involved	Contribution of activity to goals listed in table 4.3	Status of activity as of final reporting Completed? Yes/No	Explanatory notes, inc. planned completion date if necessary	Source(s) of verification
Data Entry (collection, image and locality information data)	-	To manage the taxonomic, geographic and collector data linked with specimen images	Yes	Photo of specimen on Flickr pro	Flickr Pro Herbarium ANDA https://www.flickr.com/photos/144304656@N02/albums
Specimen IDs validation	BO, RGBE, KAG	To guarantee the accuracy of the identification data	yes	Completed	List of selected family (Annex 3)
Compiling inventories of biodiversity data holdings (for example, by implementing metadata catalogues)					
Compiling and arranging collection metadata, locality information, and specimen images	InaBIF	To help in integrating collections, locality information, and specimen images with GBIF database	yes	Data cleaning. We used open-source software inc. OpenRefine, CANADENSYS tools for coordinate conversion, and Splink for coordinate verification; Plant list to verify the taxonomic nomenclature	Data on csv format: https://drive.google.com/open?id=1ql5Rs6xZ7pX_i6fbfsOKw855_3eu6or5
Integrating the metadata following on GBIF system	InaBIF	To help in integrating collections, locality information,	Yes	Metadata integrating process	GBIF-Integrating Publishing Toolkit http://ipt.biolo

Description of activity	Partners involved	Contribution of activity to goals listed in table 4.3	Status of activity as of final reporting Completed? Yes/No	Explanatory notes, inc. planned completion date if necessary	Source(s) of verification
		and specimen images with GBIF database			gi.lipi.go.id/resource?r=anda_test2
Uploading dataset	InaBIF, GBIF	To help in integrating collections, locality information, and specimen images with GBIF database	Yes	Published	Dataset title: Flora of Sumatra. Link web GBIF https://www.gbif.org/dataset/3e0987c4-375f-4d68-b2ac-5e4e3a6d3d6d.
Preparing data papers					
Drafting the checklist of the flora of Sumatra	BO, RGBE, KAG	Verifying the identification data to produce the checklist of the flora of Sumatra and to promote the database of Sumatran plant diversity	Yes	The output is an electronic book (e-book) on the catalog of the specimens deposited at the Herbarium ANDA.	The book cover, contents, and the back-cover page (Annex 5).
Attending an international seminar to promote online sumatran biodiversity database	-	Promoting the database of Sumatran plant diversity	In process	Abstract submitted for the Flora of Malesiana Symposium 11 in July 2019 in Brunei.	Abstract and FM 11 submission letter (Annex 6).
Other activity types					
Re-mounting and re-labeling the damaged	-	Digitizing the specimen	Yes	We conduct the activities if	the re-mounting

Description of activity	Partners involved	Contribution of activity to goals listed in table 4.3	Status of activity as of final reporting Completed? Yes/No	Explanatory notes, inc. planned completion date if necessary	Source(s) of verification
collections		data deposited at ANDA		we found defective specimens, including if it happens during data capture.	documentation (Annex 7).

Deliverables

This section should summarize the project deliverables completed by the final reporting date, with a description of the associated outputs. Please highlight any changes from the original plans provided in the full project proposal.

In the event of unexpected delay, please provide detailed explanatory notes and indicate planned completion date. Add as many rows as needed.

In the event of any additional deliverables having being completed during the implementation of the project, please add rows as required.

a. Data

Details of datasets mobilized and/or pending mobilization as an outcome of the project: Please use list from mid-term report and update this as at final reporting.

If the dataset is not yet published, please indicate it as "not published" and provide a detailed explanation and expected date of publication. Add rows as required.

Title of dataset	**Taxonomic/ geographic scope**	**Approximate number of records (specimens)**	**Current format (e.g. undigitized, digitized)**	**Status of dataset: Published/not published – inc. date/expected date of publication**	**Explanatory notes**	**DOI or URL**
Flora of Sumatra: Vascular plant collection of selected families deposited at Herbarium of Andalas University (ANDA)	Geographic	13,568 sheets of specimens	Digitized	Published on GBIF web in 7 March 2019	In the proposal, we promised three different datasets, such as data collection, specimen images, and locality information. In practice, all of these datasets were	DOI: 10.15468/sncpxn

					considered as data types under GBIF terminology. Thus, in this project we only produced one dataset titled Flora Sumatra.	

b. Other deliverables

Describe other deliverables (e.g. publication of data papers, catalogues, reports etc.). produced and/or planned to be produced as a post-project deliverable. Please provide indicative dates/estimated time for completion for planned post-project deliverables.

Please provide links in the sources of verification. Attachments should be provided in the Annex.

Name and type of deliverable	Status of deliverable Published/not published – inc. date/expected date of publication or estimation of time for completion	Explanatory notes	Source(s) of verification
Publication of data papers	Partially completed	We are working on adding more details for the data analyses.	The draft of the manuscript (Annex 8).
Draft Catalogue	Partially completed	We are still preparing the data for the e-book.	The book cover, contents, and the back-cover page (Annex 5).
Conference presentation on FM 11	Partially completed	We have submitted the abstract for the Symposium of Flora Malesiana 11 in Brunei.	Abstract and FM 11 submission letter

			(Annex 6).
Reports	Completed	-	The report documents.

Calendar of activities

The calendar should be completed in the same way as in the Full Project Proposal (4.6) but should include any changes. Please provide reasons for any changes in the Notes column in the table below.

Proposed dates	Activity	Lead partner	Notes
April 2018	Staff recruitment for data entry	ANDA	Completed
June 2018	Attendance of project team member at BIFA Capacity Enhancement Workshop	GBIF	Completed
July-Nov 2018	Data entry, verification ID	ANDA, BO, KAG, E	Completed
August 2018	Training/Workshop	ANDA	Completed
Sept 2018	Mid-term report	ANDA-GBIF	completed
Oct.2018	Meeting and coordination with InaBIF	ANDA, InaBIF	Completed
Feb-Mar 2019	Data analyses	ANDA	completed
March 2019	Dataset Publish to GBIF web	ANDA, InaBIF	Completed.
March 2019	Data-paper, catalogue	ANDA	Partially completed
March 2019	Final Report	ANDA	Completed

a. General explanatory notes

[We have completed most of the activities for the project. During the project, we revised several activities to improve efficiency. We also keep collaborating with InaBIF, particularly for publication purposes. We also received valuable support from other partner in choosing target taxa for the project.]

Project communications and visibility

Describe the way the results of your project have been and will continue to be communicated and shared with the project stakeholders and broader GBIF community. Please also review the page describing your project available from

http://www.gbif.org/programme/bifa . Highlight any additional documents, events, news items or links that you would like to add to your page and provide links/attachment in the Annex.

[InaBIF, which is the only GBIF node partner in Indonesia, actively supported us during the project. InaBIF is administered under the Indonesian Institute of Science (LIPI). InaBIF project link can accessed through the link melalui https://www.gbif.org/publisher/07acecfd-5994-47a7-bd1b-ccdbf534973b. The result of this project has been published on GBIF website hosted by InaBIF under DOI 10.15468/sncpxn and can be accessed through the link: https://www.gbif.org/dataset/3e0987c4-375f-4d68-b2ac-5e4e3a6d3d6d.]

Final evaluation findings and conclusions

This section of the report should cover for example:

- *An evaluation of the project activities and their outputs/deliverables*
- *An assessment of the overall outcomes, impacts of the project and how it contributes to the overall objective of the BIFA programme*
- *Comments on the project implementation and completion, and its efficiency and effectiveness, strength and weaknesses etc.*
- *Any feedback on the project's relevance from the partners and stakeholders*
- *Indications and reasons for any changes which have been made to the project's original plans, and actions to follow-up*
- *The management arrangements for the project, including support from the GBIF Secretariat*
- *Areas of success to build on, after the project's implementation period*
- *Conclusions from your experience during the implementation of the project*

[Overall, we have successfully conducted the project. General evaluation for the project as follows:

For the project activities and the outputs/deliverable, in general, the project has been conducted according to our plans. Until the end of the project, we have successfully achieved 80% of our target for the project. The data occurrence publication was more than our expectation with over 13,000 sheets of specimens, surpassing our target in the proposal with only 12,000 sheets of specimens. Several activities that still have not been completed were a seminar, data papers, and an e-book on the checklist of Sumatran flora. For the seminar, we have registered for the Symposium of the Flora Malesiana, Brunei, in July this year. We are currently working on the data paper publication and the e-book. Other issues during the project was the delayed verification of species identification from the experts for designated taxa, due to too excessive numbers of specimens sent to the experts.

For the assessment of the overall outcomes, the impacts of the project, and its contribution to the overall objective of the BIFA programme, overall, the activity BIFA3_17 is in accordance with BIFA in the mobilization of biodiversity data. As an institution in the Asian region, the data we provided in this project will reduce the gap of biodiversity data from Asia.

For the feedback on the project's relevance from the partners and stakeholders, several parties have appreciated our effort in this project. The dataset Flora of Sumatra from Herbarium Andalas (ANDA) that we produced during this project, until now, is the only plant information from Sumatra available on GBIF.

For the indications and reasons for any changes which have been made to the project's original plans and actions to follow-up, during this project we need to revise some of our plans. The revisions were to improve the efficiency and effectiveness of our project. Several changes we made particularly for the IT equipment acquisition. It was planned to use cameras for photographing specimen. We changed it to use a scanner following suggestions from our partners. The scanner acquisition was delayed because the scanner was not available at the time of purchase. The scanner was specifically made for herbarium usage. Hence, it required a pre-order to purchase.

For the experience during the implementation of the project, all of our team member has gained considerable amount of experience from the project. In particular, our team has learned the mobilization and digitization of biodiversity data using the standardized process including publication. We also gained experience in team management and how to work on target for each team member. We also proud that after the publication of our database we received positive feedback from stakeholders.]

Sustainability plans

Please provide a description of how the partners involved will build on the results of this project in their future work. This could include future collaborative activities, such as plans to complete any unfinished project activities and how the future impact of the project could be monitored and/or measured.

[1) Herbarium Andalas University (ANDA) in collaboration with InaBIF, partners, and the university will keep developing and improving the data digitization for the rest of the collections at the herbarium.

2) With partners, we will continue to work on some pending activities, including data publication.

3) As a GBIF partner, Herbarium Andalas University (ANDA) will regularly update the data that have been published on GBIF website.

4) Herbarium Andalas University (ANDA) will be the partner of InaBIF in the mobilization and digitization of biodiversity data in Indonesia. In particular, we will be the center of information for the mobilization of biodiversity data from the region of Sumatra.]

Recommendations and lessons learned

This section should describe your experiences that could help in designing and implementing biodiversity mobilization projects more effectively, including the best practices to adopt and the pitfalls to avoid.

[1). In the future, we recommend developing an offline database system to manage more complete data. Several rare and protected plants are prone to over-exploitation. Sharing a precise location online will harm the species in their habitat. Thus, an offline digital database is paramount to store more detailed information.

2). We recommend preparing offline materials for the workshop. We encountered internet connection issues during the workshop that had limit us in providing examples for the attendees.

3). IT equipment acquisition need to be planned as early as possible. The delay in acquiring IT equipment will delay the next activities in the project. Some of the equipment were not sold in a small city and had to wait for a shipment from a big city which then delayed the project.

4). We recommend vetting the specimens thoroughly before sending them for verification to the experts of designated taxa. The verification is important to ensure accuracy of the species identification on the specimens' label. The number of specimens we sent, however, was excessive, which had delayed the verification process. Thus, vetting the specimens more thoroughly before sending them to the expert will help to reduce the number of specimens. For well-known species, we should use our own resources at the herbarium to verify the species identification. Only specimens that were unable to verify at the herbarium should be sent to the experts.]

Annex – Sources of verification

Sources of verification are for example links to relevant digital documents, news/newsletters, brochures, copies of agreements with data holding institutions, workshop related documents, pictures, etc.

Annex 1. Invitation for the speakers, materials, list of attendees, meeting notes, and the event documentation:

Annex 2. Workshop materials, list of attendees, and the event documentation:

Annex 3. List of selected family:

https://drive.google.com/open?id=1ZkakJYLfrQZX8s68UksvsuKzkyhB27dX

Annex 4. IT equipment photographs:

Annex 5. The book cover, contents, and the back-cover page:

Annex 6. Abstract and FM 11 submission letter:

Annex 7. The re-mounting documentation:

Annex 8. Draft of manuscript:

Signed on behalf of the project partners

Date
