Mobilising the Namibian faunal and floral collections and improving national open data engagement

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Final Narrative Report

Executive Summary

This project had three major objectives: 1. to establish the Namibian national GBIF node and gain traction among stakeholders (nationally and internationally); 2. to start digitising and standardising the digital storage of the national faunal (National Museum of Namibia: NMNW) and floral (National Botanical Research Institute: NBRI) collections; 3. to publish the first data onto GBIF from the Namibian Node and from the national (floral and faunal) collections. All three of these major objectives were achieved.

Although the main objectives were achieved, some of the specific deliverables could not be completed due to some foreseen and unforeseen delays. The long-term impact of the published data, the protocols developed, and the institutional capacity that has been improved, are likely to be very positive and result in increased publications and use of GBIF data from Namibia.

While the traction gained among local and some international stakeholders was positive, we may not have reached maximum impact in terms of media attention and sustained feedback from all the stakeholders. The main limitation in this regard and in regard to the project overall, was the severe lack of technical staff, and the relatively small number of staff members that could devote significant time to the project. Several processes proved much more time-consuming than anticipated, and the policies that need to be navigated within government institutions in order to implement the project, were complicated and arduous. Building the technical capacity required for adequate data curation, processing, and publication (within the NMNW, NBRI, and multiple stakeholder institutions) will take considerably longer than was anticipated, and international help will be needed. We are also learning how to create a better formalised financial structure for the node within government, which will allow us to expand the capacity for the node operations in the future.

The activities started during this project will largely continue, as the two institutions have a mandate to make biodiversity data publicly accessible and usable. Continued development of the relational databases now hosted by both institutions, and the automation of the data exporting process, are also underway.

While the project timeline and activities may have been somewhat delayed, the overall objectives achieved by starting the Namibian GBIF Node, publishing the first datasets, improving the national collections, and registering the first two publishing institutions and their various collections on GBIF, is a major step forward for Namibia. For decades, various Namibians have tried to accomplish what has finally come to fruition during this project.

Progress against milestones

Has your project completed all planned activities?: No

Has your project produced all deliverables: No

Rationale: Additional error-checking is needed in both plant datasets. The Hemiptera insect dataset was finished ahead of schedule, and was published before the project deadline, thus making up for the unpublished numbers estimated for the herpetology dataset. Errors detected in the herpetology dataset require additional verification with the collection, hence the publication of this dataset will be delayed, but is in progress. However, additional activities to ensure the longevity of the project, were implemented: the creation of a relational database for the Museum collections, which will streamline GBIF publications in future.

Report on Activities

Summary of the implementation of the project activities

All activities related to the digitisation, cleaning/verification, and publication of data have been conducted, and were completed for some of the datasets (two have been published). The impact of this work done on institutional capacity and ability of these NMNW and NBRI to carry out their duties, was considerably positive. Thousands of records were digitised for the first time, hundreds of specimens were catalogued and labelled for the first time, and several thousand records of poorly studied taxa are now available on GBIF. The institutions have learn a lot from this experience, as neither institution had published on GBIF before. The process and expertise needed for digitising, data-cleaning and verification, will be highly valuable to the institution, and will ensure a continuation of GBIF data publications from both institutions. These institutions have the mandate to make data available for public use, and will therefore continue to improve its datasets and prioritise GBIF publication.

Several datasets were fully digitized, but additional issues were flagged prior to publication, which will require additional verification and cleaning. Overall, the data verification, cleaning, and publication activities were delayed as per the initial proposal. Some of the delays include the delay in the initial funding payment due to the lengthy process of having a bank account approved by the Ministry of Education. Several unexpected setbacks or problems were encountered in the collections, and some of the digitised data contained more errors than was anticipated based on the training that was dispensed. Hence, we are behind schedule on the data publishing activities, but the datasets are being worked on.

One additional activity (in line with the proposed activities) was initiated: the design and creation of a Specify relational database for the NMNW. This database was created to digitally store and manage all of the collections' data, with all metadata fields fully integrated. A training workshop was held in collaboration with the South African GBIF network, and extensive distance-learning was conducted to set up the database and train staff members in its use and maintenance. Currently, there is a database running at the NMNW, and data are being cleaned and made ready for import. Export protocols are also being developed to allow for regular, automated publication of the data onto GBIF, with an automated DarwinCore mapping and filtering system having been set up. While the database is active and functional, soem additional issues are being sorted out before we initiate the first round of GBIF publications. However, the positive impact of this database on long-term data integrity and security, curatorial efficiency, and the improved rate of data publication, cannot be overstated.

Regarding the stakeholder engagement workshops, these were positively received by all stakeholders, and the national awareness of the Namibian GBIF Node has certainly been improved. It may take some time to build the capacity within the node and the interested stakeholders, to generate additional publishing institutions within the country. However, this process has been initiated and long-term impacts are expected.

While all activities were partially completed, there were several planned events and dataset publications which we were unable to complete in the project period, due to several delays in getting permission from the

relevant government ministries to complete certain key steps, and to enable compliance with the stringent conditions that were attached to the funding (no overhead costs including banking costs, small contributions towards IT purchases, and the co-purchase of IT items). Two of these conditions were against institutional policy, and the process of getting exceptions made was extremely arduous (in fact, the NMNW was unable to purchase the two laptops, and funding had to be sourced elsewhere to complete the most basic components of the digitisation activities). We strongly recommend that such conditions be seriously considered for review in future GBIF project funding, as it has massively impacted the efficiency of this project, and has considerably reduced its impact within the project period. We had secured funding from various other sources in the mean-time, and no other funding body was unmilling to at least cover the basic banking costs related to the funding. Additionally, the unwillingness to fund IT equipment as a major part of the budget, for a project with the main goal of mobilising data, was a major weakness (which may even be stated as 'ridiculous'). On the other hand, the funding to hire experts and technicians for data-entry was invaluable, and most of the project deliverables were achieved through the help of these technicians and experts.

Completed activities

Activity: Specimen data verification and digitisation

Description: Digital data-capture of specimen data from catalogue books and labels into standardised forms was completed for the entire Hemiptera section in Entomology Collection, NMNW (6005 occurrences), including 12 valid species not on GBIF, two species on the GBIF backbone for which the first occurrences ever were published, and one species that has no publisehd records for Namibia on GBIF. Many additional records from the catalogue book were digitised to Excel format for the first time.

At NBRI, 8093 records were digitised.

Most of this work was done by the technicians hired, although staff members also contributed significantly.

The institutional capacity and the scientific value of the collections themselves were considerably improved. Institutional and national capacity was improved, as several staff members and four technicians entering the job market, were trained and were able to apply their skills in terms of data handling procedures. New data from poorly known taxa and geographic locations have become, and more will be made digitally available. The quality and quantity of the data available for Namibian taxa has improved, which is likely to facilitate greater use of GBIF data locally.
Start Date - End Date: 21/4/2021 - 15/2/2023
Verification Sources: Entomology Excel spreadsheet
NBRI Excel Spreadsheet
Hemiptera published dataset (https://doi.org/10.15468/xzqenv)

Activity: Electronic data cleaning and standardisation

Description: This activity was completed with regard the NMNW Hemiptera dataset and the Scorpiones dataset, which are already published on GBIF. These are poorly known taxonomic groups, with several species published on GBIF for the first time. Even occurrences that were only identified to family level, are now visible to taxonomists world-wide. Several more datasets were preliminarily cleaned and verified (not reported here, but includes ~20,000 records previously digitised but not standardised), and will likely be ready for publication in the next year or two (not included in verification yet).

This activity is still ongoing for the NBRI dataset and now for several digitised datasets at the NMNW (including Herpetology, several Arachnid collections, Mammalogy, Ichthyology and Ornithology).
Start Date - End Date: 10/6/2021 - 20/3/2023
Verification Sources: Published datasets: https://doi.org/10.15468/xzqenv ; https://doi.org/10.15468/gmn5t4

Unpublished datasets: those mentioned in project proposal are attached

Activity: GBIF publication

Description: We compiled, cleaned, verified, formatted, and published two datasets along with all the

required metadata etc.

These 9,572 occurrence records are the first published (on GBIF) by any Namibian institution, and represent high-quality records of poorly studied species of conservation importance.

Several other datasets are still being cleaned and verified before they can be published, but these contributions are expected to be significant, especially in terms of the species for which very little occurrence data are available.
Start Date - End Date: 1/3/2022 - 28/3/2023
Verification Sources: Published GBIF datasets: https://doi.org/10.15468/xzqenv https://doi.org/10.15468/gmn5t4

Activity: Training of trainers: data gathering; Open data use workshops

Description: These two activities include three (3) completed workshops, which were generally combined in terms of data-use and data-gathering, since most of the same stakeholders were interested in both these workshops.

We held the first combined workshop to train trainers on data-gathering and data-use on 20 July 2022, which included staff from the Ministry of Environment, Forestry and Tourism, the Ministry of Education, Arts and Culture, the Namibian University of Science and Technology, and several environmental consultants.

The second workshop was a more technical, focused workshop to build the capacity of the NMNW staff on building and maintaining a Specify relational database for specimens, which has now been implemented at the NMNW and will streamline data publication in the future. This workshop was held 11 - 15 July 2022.

The third workshop (22-24 Nov 2022) was held with international stakeholders, including conservationists and scientists working on amphibians in Africa, from across the world, which also covered both data-use and data-gathering. Local stakeholders from both major Namibian universities also attended. In this workshop, we presented some of the work that the NMNW was involved in and the likely impact of data published on GBIF. We covered the use of GBIF data, the trackability of published data, and how authors and contributors are credited for their work. We then dealt with specific participants, finding out what the GBIF participation status of their countries were, and exploring various ways in which they could practically contribute data to GBIF directly (data-papers) and indirectly (through institutions). Several of the participants did have data publishing experience already, while others were unfamiliar with GBIF.

We believe that these workshops will have long-lasting impacts. Locally, all the relevant institutions are now aware of the Namibian Node, our activities, and some of the ways in which they can contribute. Several email conversations from the local universities had already indicated their willingness to begin submitting data from student projects to be published on GBIF, and we have begun conversations about how to set up institutional infrastructures to support publishing activities into the future. Several environmental consultants and scientists that were unaware of how to use GBIF data and the amount of data available, are now able to do this. While the measurable impact may take several years to become clear, we believe that we have started a positive movement towards progress within the Namibian community, and among the international community of scientists working in Africa.
Start Date - End Date: 20/7/2022 - 25/11/2022
Verification Sources: See Workshop Documents ZIP folder attached

Activity: Capacity-building exchange visits

Description: Due to COVID and financial constraints, we were not able to complete physical visits to other GIBF nodes.

However, extensive conversations over email, Zoom, and other mediums were conducted with the South African Node (with which an international MOU is being constructed), and with the Belgian Node (along with the GBIF Secretariat).

This also included much technical advise on institutional database management and design from members of the South African GBIF network.

As a result, the Namibian Node was able to prioritize certain activities for the near-future, and begin to build

up its technical expertise for increasing the publication output in the future.
Start Date - End Date: 15/3/2022 - 31/3/2023
Verification Sources: End date: ongoing. Zoom and email conversations cannot be shared on this platform, however, for some of the results of our collaborations, see doi: 10.3897/biss.6.93874

Activity: Government stakeholder engagement on open data

Description: The content of this workshop as initially planned was not yet carried out - if the project is granted extension of time to spend the remaining funds, this portion will be completed.

However, the first workshop held was a very general stakeholder engagement workshop to build awareness around the Namibian node, its planned activities, and its planned impact. In this workshop, we reached various government stakeholders including those in the Ministry of Environment, Forestry and Tourism outside the node staff; the Deputy Executive Director of the Ministry of Education, Arts and Culture; several decision-makers in the National Commission on Research, Science and Technology. We also reached out to major research institutions, universities, and NGOs.

The impact of this launching workshop included the overall positive reception and in-principle support offered by all the stakeholders. Several institutions expressed interest in either being directly involved in data-publication, or in facilitating citizen science and other drives that would lead to increased data availability and use, within Namibia.
Start Date - End Date: 17/11/2021 - 17/11/2021
Verification Sources: Sign-in sheet; photo

Activity: Reassessment and documentation

Description: As initially proposed, this activity has only been started during the project period and will carry on afterwards.

Currently, there are only two citations linked to our one published dataset (see links below), but we expect the use of our published data to increase, for instance for environmental impact assessments and biodiversity quantification studies, as we publish more datasets.

Documenting of range-restricted species for the construction of no-go areas has been started. Thus far, a tick-list of Namibian reptiles and amphibians, including the identification of range-restricted species, has been created and published on our Environmental Information Service (EIS) website, as part of the national Atlassing drive, for use by EIA consultants especially.
Start Date - End Date: 25/11/2021 - 30/3/2023
Verification Sources: Checklists:
http://the-eis.com/elibrary/search/27630

http://the-eis.com/elibrary/search/27631

Activity: Government engagement to initiate Namibian GBIF membership

Description: This activity was completed in the early phases of the project and involved various meetings with government officials and the writing of official submissions for approval by the Executive Director of the Ministry of Environment, Forestry and Tourism. It resulted in the successful signing of the GBIF MOU by Namibia.
Start Date - End Date: 2/4/2021 - 13/7/2021
Verification Sources: https://www.gbif.org/news/5AM6goSjLovDPHSHDRoX9M/namibia-joins-gbif-as-associate-participant

Report on Deliverables

Deliverables - Summary

In terms of the datasets, most of the proposed deliverables have nearly reached completion, but only two datasets could be published during the project period. However, these two datasets contributed substantially to the number of records that we initially aimed to publish.

The establishment of a Specify Database for the NMNW was a new deliverable that was not initially proposed, but will contribute significantly towards the efficiency of the publication process and substantially improve the institutional data-handling and integrity, in the future.

The main causes of delay included: hold-ups in the initial receiving of funding due to institutional hurdles; institutional operations being severely compriomised during COVID outbreaks; some datasets having contained more extensive problems than were anticipated.

Deliverables produced by the project

Dataset deliverables

Arthropod collections data

Dataset type: Occurrences
Dataset scope: Scorpion data from Namibia and surrounding countries
Number of records: 3,567
Data holder: National Museum of Namibia
Data host institution: National Museum of Namibia
% complete: 100%
Status update: Completed; published
DOI: https://doi.org/10.15468/gmn5t4
Expected date of publication:

Arthropod collections data

Dataset type: Occurrences
Dataset scope: Insects (Hemiptera) from Namibia and other countries
Number of records: 6,005
Data holder: National Museum of Namibia
Data host institution: National Museum of Namibia
% complete: 100%
Status update: Published
DOI: https://doi.org/10.15468/xzqenv
Expected date of publication:

Botanical data: NE Namibia

Dataset type: Occurrences
Dataset scope: Plant specimen records for north-eastern Namibia
Number of records: 8,093
Data holder: National Botanical Research Institute
Data host institution: National Botanical Research Institute
% complete: 80%
Status update: Datasets (3 in total under this banner) were completed and exported, but additional errors were detected and thus additional verification will be needed before publication
DOI:
Expected date of publication: 2023-05-15

NMN Herpetology Collections

Dataset type: Occurrences
Dataset scope: Reptile specimen data from Namibia and surrounding countries
Number of records: 7,958
Data holder: National Museum of Namibia
Data host institution: National Museum of Namibia
% complete: 60%
Status update: This dataset has >3900 more records than the 4000 initially proposed, but still needs formatting and some additional verification.
DOI:
Expected date of publication: 2023-10-01

Plant Checklist for NE Namibia

Dataset type: Checklist
Dataset scope: All plant species recorded for the Kavango West, Kavango East
Number of records: 4,908
Data holder: National Botanical Research Institute
Data host institution: National Botanical Research Institute
% complete: 85%
Status update: 3 datasets in total, resulting in thousands more species than initially proposed (400). However, these datasets need to be verified as they contain some errors.
DOI:
Expected date of publication: 2023-05-31

Other deliverables

Use-cases and best practices compilation

Description: A document recording the Namibian use-cases for GBIF data (particularly that digitized by this project), best practices and lessons learnt during the project period.
% complete: 10%
Status update: There has not been enough time for substantial usage of the published data (2 use cases so far recorded). However, we are learning from the process of publication at the moment.
Sources of verification: https://www.gbif.org/resource/search?contentType=literature&gbifDatasetKey=7a5d39ef-1abc-442f-be56-5ccf3b27aedd

Training of trainer workshops

Description: At least one (probably up to 3, depending on initial attendance) workshop(s) on data capture, handling, standardization, and eventual feedback to eventual publication on GBIF. This/these will be held to engage practitioners and researchers from across the country, from multiple institutions.
% complete: 100%
Status update: 3 workshops held under this category: 1. (W2) GBIF DATA USE AND PRODUCTION; 2. (W3) WORKSHOP ON BIODIVERSITY DATABASE MANAGEMENT AT THE NATIONAL MUSEUM OF NAMIBIA; 3. (W4) AFRICAN AMPHIBIAN WORKING GROUP 2022
Sources of verification: See invitations, photographs, and attendance registers for W2-4.

Data use workshop

Description: At least one workshop (up to 3, depending on attendance) will be held with environmental practitioners and researchers and/or those involved in screening environmental reports. This/these workshop(s) will focus on filtering data from GBIF and specific uses within specific contexts - mostly focusing on occurrence data.
% complete: 100%
Status update: Three worskops were held under this theme, merged with "training of trainer" workshops (see

that deliverable).
Sources of verification: See invitations, attendance registers, and photos of W2-4

Government stakeholder workshop

Description: At least one (up to 3 depending on feedback and reception) workshop or meeting with a range of government officials from various relevant departments and ministries, on open data usefulness and the need for the integration of greater volumes of biodiversity data into policy and practice
% complete: 80%
Status update: One workshop was held under this banner (W1: INTRODUCTION TO THE NEW NATIONAL NODE AND THE FUTURE OF BIODIVERSITY DATA MANAGEMENT); one additional workshop was planned to plan the integration of published data into policy and practice, but this is will only be held at a later stage if the time to spend the project funding is extended
Sources of verification: See invitation, attendance register, and photo for W1

Events

Introduction to the new national node and the future of biodiversity data management

Dates: 2021-11-17 - 2021-11-17
Organizing institution: GBIF Namibia
Country: Namibia
Number of participants: 31
Comments: Workshop included representatives from various stakeholders including government, universities, and NGOs. The presentation of the node and its plans was positively received, and we received various expressions of interest for members to join the national steering committee and for future collaborations with the node.
Website or sources of verification: Photos; attendance register; invotation

Events

GBIF data use and production

Dates: 2022-07-20 - 2022-07-20
Organizing institution: National Museum of Namibia; National Botanical Research Institute
Country: Namibia
Number of participants: 22
Comments: As with most Namibian workshops in the biodiversity field, the number of participants were small, but included various key members from key stakeholder institutions. Several participants learnt about GBIF data use for the first time, and some were interested in developing their institutional capacity to publish data in the future,
Website or sources of verification: invitation; attendance register

Events

Biodiversity database management at the National Museum of Namibia, Windhoek

Dates: 2022-07-11 - 2022-07-15
Organizing institution: National Museum of Namibia
Country: Namibia

Number of participants: 8
Comments: This was a targeted, technical training workshop for the collection managers at the NMNW, to train them on the use of Specify - a databasing software developed for museums. As part of this workshop (but also carried out over an extended period of time through various emails and Zoom sessions), a database was designed and created for the NMNW, and is currently being populated with data.
Website or sources of verification: invitation; flight tickets; published Abstract

Events

African Amphibian Working Group 2022

Dates: 2022-11-22 - 2022-11-24
Organizing institution: National Museum of Namibia
Country: Namibia
Number of participants: 33
Comments: This was the only international event hosted, with primarily international delegates. We presented on the (digitisation and publication) work done at the NMNW during the GBIF project. Various members presented on their reseaarch in various African countries. We then had an extensive discussion on GBIF data-use within their research, and on how their institutions and delegates as individuals, can contribute to the publication of (amphibian) data onto GBIF. We looked at the immpact that GBIF data has had on amphibian research and conservation in Africa through its inclusion in IUCN Red List Assessments, national planning, and various distribution maps developed. We also looked at the significant contributions of citizen science to the records on GBIF. Finally, we identified various specific gaps in terms of taxa, geography, and types of data (especially DNA, photo, and call data), that need to be prioritised for future gathering and publication onto GBIF.
We invested most heavily into this worksop, both from the Ministry and from the grant funding, and believe that this workshop will have positive long-term consequences for data-contributions and use of the most threatened (globally) terrestrial vertebrate group: amphibians.
Website or sources of verification: invitation; attendance register; photo

Communications and visibility

Awareness of the national node has been spread via the workshops, personal interactions, and local new outlets, although we are planning some more media releases surrounding the recent publication of more data from Namibian institutions.

The lack of a website for the node and the NMNW is a major limitation and various official channels need to be followed before these can be approved. However, this is underway and the NMNW institutional web-page has already been approved. The lack of capacity in terms of people vs. the number of tasks, also limited our outreach activities. However, we plan to build on this in the future.

Monitoring and evaluation

Final Evaluation

Overall, all the major objectives of the project were achieved, but the number or extent of deliverables and the overall progress of the various activities were much slower than initially anticipated. A severe dearth of capacity in terms of number of staff members and their technical expertise, the pace of project activity implementation due to institutional policies vs. funding conditions, and a lack of infrastructural capacity, were identified as the main obstacles to further progress. We are planning to build this capacity in the coming years.

Various stakeholder institutions were positive about the establishment of the node and its activities, but

institutional capacity will have to be improved before more institutions become major data-publishers. Once more data becomes available on GBIF from the NMNW and NBRI, we expect the number of use-cases to increase considerably.

To the GBIF secretariat, we can confirm that this funding drive was an overall success in Namibia, which has had and is likely to have major positive impacts on the availability of biodiversity data in Namibia. However, we do recommend the reconsideration of some funding conditions for the future, taking note that grant conditions are often imposed by donors. The conditions that prevent the coverage of something as basic as banking costs, has caused resistance from the local project hosting institutions and clashes with various policies. Furthermore, we recommend that a data mobilisation project, especially in the third-world, will be much more successful if a larger portion of the budget can be allocated towards the exclusive purchase of IT equipment. This kind of equipment is essential for the most basic data-mobilising activities, and is always a major limitation for institutions operating in the third-world, It had caused some major delays in this project. Furthermore, the allocation of funding towards technicians and experts was invaluable to the completion of this project.

Best Practices and Lessons learned

1. Various alternative options for channeling external funding in a government institution were explored, and some more efficient options have been identified for future projects.
2. Technicians or students hired for data-entry will require extensive training and constant supervision, and frequent inspection of the data by an expert in the taxonomic field with extensive database knowledge, is necessary.
3. Institutional capacity for an efficient data-publication drive is a considerable challenge in our local setting, and needs to be prioritized for future development.

Post Project activities

1. Continuation of dataset development and publication
2. Continuation of database development
3. Continued interaction with stakeholders to initiate collaborative projects that will contribute data for publication, and make use of available data for sustainable development, research, and conservation
4. Continued improvement of visibility of the node and its activities in Namibia and abroad

Sustainability

Sustainability Plans

The collaboration between the NMNW and NBRI, and indeed between the Ministry of Education, Arts and Culture and the Ministry of Environment, Forestry and Tourism, has been a success during this project. The collaboration of these two institutions on various other projects has already started, in part due to the collaborations sparked by this project.

Several collaborative projects have already been initiated with the local universities and NGOs, and plans to integrate these activities with the node's activities are already underway.

Impact of COVID-19 pandemic on project implementation

The slower pace of all activities due to the absence of many staff members from their workstations and the temporary closure of all project partner institutions, was significant.


GBIF