Advancing freshwater biodiversity data and information access, utility and relevance for conservation decision making in Uganda

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Programme:BID
Project ID: BID-AF2020-145-USE
Project lead organization: National Fisheries Resources Research Institute, Jinja, Uganda
Project implementation period:1/4/2021 - 31/3/2023
Report approved: 25/10/2021

Narrative Early Progress report

Executive Summary

This project is working to improve quality of data available within GBIF, harness available data to develop biodiversity information products and increase user capacity to mainstream the products into conservation decision making. In the last phase, our team member completed modules of the data mobilization training workshop. We completed the inventory of the datasets whose quality needs improvement. These have been distributed among team members for mobilization. Our information products will benefit from new data in addition to that available through GBIF. Two new datasets have been mobilized. We have acquired and geo-referenced all relevant data on occurrences of fish and macro-invertebrates from GBIF that we need for most of the information products of interest. In addition, we now have access to the freshwater mapping tool from IUCN that will facilitate our national red list assessments of fish. From engagements among partners, we have added two additional information products: a checklist for macroinvertebrates of Uganda, and a map of status and changes in water quality. The early kick off and planning phase review workshops facilitated by the BID support team assisted us with monitoring and evaluating our progress. We have developed a quarterly work plan, in compliance to the needs of our institution that enables us stimulate implementation, review and report progress every quarter. Starting with August 2021, we plan to mobilize resources in the budget to facilitate an extra research assistant who is part of our core data mobilization team. Previously, the assistant has been supported with co-funding from JRS project which ended effectively by 31st July 2021.

Planning phase - User(s) consultation outcome(s)

Defining Data User Needs

Who is asking for information?
The National Environmental Management Authority (NEMA) in the context of their Connect project (https://www.connectbiodiversity.com/about-connect) are the primary institution asking for the information to mainstream into government decision making.

Are there specific information products that they prefer?
In the short term, NEMA and other lead agencies chose to pilot the mainstreaming of biodiversity information into the agricultural sector. The choice was a result of a Political Economic Analysis (PEA). The analysis also provided a list of information products required to facilitate the mainstreaming. The following are the information requirements that are relevant to us: (i) Distribution of biodiversity resources; conservation status; nature and extent of threats faced; (ii) Extent of invasive species and (iii) Map of biodiversity hotspots and distribution of important conservation species. We are contributing to these needs by providing (i) an index for prioritizing freshwater habitats for conservation, (ii) a national Red List for fish, and (iii) maps of biodiversity hotspots, distribution of species of conservation importance, and species abundance.

In what format(s) do they want the data in?
The information products are wanted mainly as maps.

When do they need the data i.e., are there any policy development cycles that you are aware of?
The mainstreaming in agriculture is ongoing and will involve introducing key decision makers in the

agricultural sector to developed biodiversity information products. Since February 2021, we have supported and worked with a team at Nature serve in developing information products using our data available within GBIF and Freshwater Biodiversity Portal for Uganda. The products will be used in engagement of the decision makers in the agricultural sector. Within the Connect project, there are plans to map available information products to other policy targets in Uganda to ensure long term use in government decision making. We are ready to contribute to this. Uganda is in the process of enacting a new policy for fisheries management (https://www.parliament.go.ug/news/5018/tough-penalties-against-illegal-fishing-practices-mooted). The new policy provides for stronger protection of fish and their environment, management strategy for each lake, and natural fisheries protection parks. We are aware of these provisions and our information products are planned to support them.

What is the scientific question that needs addressing?
In relation to the information requirements, the questions we are addressing are the following: (i) what freshwater habitats are priority for conservation in Uganda? What is the conservation status of fish species at national level? What are the hotspots of freshwater biodiversity? What are the distribution partners of threatened species?

How will you ensure user input into the development process?
To ensure user input into the development process, we have provided for stakeholder engagements. During the development of the information products, we shall undertake regular visits to user institutions and exhibit the products and solicit user inputs. We have also included the Directorate of Fisheries Resources, the lead agency for fisheries management, as a partner. This gives them time and capacity to provide their inputs in the products. Finally, we plan to make working versions of the information products in the portal as soon as possible to enable users to provide feedback.

What are the evaluation criteria for ensuring that data mobilization is addressing user needs?
We have knowledge of the information products required by users. Similarly, we know the data that the information products require i.e. fish species occurrences with data on abundance where possible, macro-invertebrates occurrences, and water quality. We know that our data mobilization is addressing user needs because it is providing data that is needed to develop the information products.

Defining Data Needs

How GBIF mediated data can address the scientific question? What dataset types are the most suitable to address the question (i.e., checklist, occurrence, sampling event)? How will the data need to be processed to get into the desired format by the user(s)?

The most suitable dataset types are species occurrences. To define habitats that are priority for conservation, we shall harness fish species occurrences. The species occurrences will be used to determine species richness of different water bodies and the global conservation status of the species. The species richness, and conservation status will be combined with the surface of the water bodies to develop an index of prioritizing habitats for conservation. For the national redlist, IUCN attributes for point data will be developed from the fish species occurrences. This data will be subjected to IUCN recommended mapping tool to develop distribution maps and determine the extent of occurrence (EOO) and area of occupancy (AOO). The EOO and AOO will be useful in assigning species a conservation status category. Matching species occurrences to IUCN conservation status will enable us to map areas with threatened and invasive species for both fish and macro-invertebrates. Mapping abundance of species will be restricted to macro-invertebrates for which we have substantial data on organism quantity from uniform sampling effort. The plan is to compute the ratio of abundance of EPT (Ephemeroptera, Plecoptera and Trichoptera) to other taxa for each sampling site. We have added a checklist of macro-invertebrates as an additional product. This will harness the species occurrences of macro-invertebrates to enumerate and list taxa in Uganda water bodies. This will give us taxa richness by water body for both fish and macro-invertebrates which are inputs into maps of species richness. Water bodies with the most unique species or threatened species will be designated as hotspots.

Are there any additional datasets that could be mobilized by the project to provide additional information?
Yes, additional datasets can be mobilized to contribute to the data required. Our work is based on species occurrences and the ideal is to have complete coverage of species ranges. In addition, the national red list could benefit from updates to species occurrences that are more than 30 years ago. For this reason, we are not hesitant to acquire new datasets and update the dataset compilations to develop the information products.

Can the project also use data that are already published through GBIF?
Yes. The project relies heavily on published species occurrences in GBIF by our own institution and other publishers.

Who will process these data? Do they have experience in this area?

Our data processing team includes two research officers at NaFIRRI (Principal investigator/coordinator and project scientific manager), one senior lecturer at Busitema University (partner institution) and one research assistant at NaFIRRI. The members have 5 to 10 years of data processing and analysis and hold MSc or PhD. The project coordinator and Vianny Natugonza have been involved in global IUCN redlist assessments. The experience gained from the assessments is relevant for the development of species distribution maps and the national redlist assessment.

Where will the information product be hosted?
The information products produced will be hosted by the Freshwater Biodiversity Portal for Uganda (https://freshwaterbiodiversity.go.ug/). The portal has been under development with funding from the JRS Biodiversity Foundation and is envisaged as a one stop center for all freshwater biodiversity data and information for Uganda. We have provided for the incorporation of the products into the portal. All resources in the portal will be publicly available.

What is realistic within the time frame of the project?
The proposed project period is realistic

Planning Phase Outcomes

Our project outcomes were reviewed during the early kickoff and the planning phase review workshops facilitated by GBIF, and an online meeting held with partners. For now, there are no major changes that we shall make as a result of the planning phase. In the planning phase, we learned about a plan to by the Connect project to map biodiversity information products to other policy needs in the country. We are committed to provide support to this intervention as it could provide a platform for our products to be used in decision making. In the meeting with partners, we discussed the features from this project that are expected to be in the freshwater biodiversity portal which will be hosting the products. What came up from the developer side is an idea to program the products such as the index to prioritize areas for conservation to automatically update when a dataset is uploaded in the portal. This could ensure continuous updates to the products in line with user needs. We adopted two additional information products from the planning phase. These are a checklist for macroinvertebrates in Uganda, and maps of status and changes in water quality. The former will be based on new and existing occurrences of macroinvertebrates. The water quality map will be based on data that is collected during biodiversity surveys. We mobilized most of this data alongside the species occurrences that we have published through GBIF and the freshwater biodiversity portal. It is also important to mention that the team is committed to developing the information products as soon as possible and allow more time for stakeholder engagements to improve feedback and utility.

Report on Activities

Activity progress summary

Activity 1: Project inception

The inception was delayed. The delay was caused by travel restrictions caused by a lock down imposed to prevent the spread of Covid 19. Uganda has been under lock down since 7th June 2021.

The lock down was partially eased starting with 1st August and the inception is planned to take place by the end of September. The delay of inception did not stop other activities from going on. However, release of the second installment will be delayed due to delayed expenditure.

Activity 2: Data mobilization

Mark Olokutum, a member of our team completed the data mobilization modules of the data mobilization workshop facilitated by GBIF. Mark is now actively mobilizing data and supporting others. Our data mobilization efforts include improving quality of published datasets as well as mobilizing new datasets. We completed the inventory of the datasets whose quality needs improvement and distributed them among team members. We have two new datasets of fish species occurrences from biodiversity surveys conducted in 2019 and 2021. One of the datasets is under review and another is waiting approval of the principal investigator of the parent project for publication.

 Activities 3 and 4: Development of freshwater biodiversity information products and tools

We are progressing well with preparation of datasets for the national red list, distribution maps of

threatened species, maps of biodiversity hotspots, checklist of macro invertebrates and the index for prioritizing conservation. We have acquired all the fish species and macro invertebrate species occurrences from GBIF and geo-referenced them. For the national relist, we have access to the Freshwater Mapping Tool of the IUCN which is used to make species distribution maps and make estimates of EOO and AOO for the assessments. The species occurrences have been transformed into IUCN attributes for point data. We have created a working set in the freshwater mapping tool which includes 284 species. These are the candidate species for the assessment. Under this activity, we would like to add develop two additional information products from the planning phase i.e. a checklist for macro invertebrates and a map of status and changes of water quality.

Activity 5: Incorporating biodiversity information products and tools into Freshwater Biodiversity Portal for Uganda (FBPU)

We completed a project agreement with our partner institution responsible for incorporating information products into the freshwater biodiversity portal and its maintenance. The transfer of funds to the partner was also completed. In the planning meeting, we have held discussions on the potential features that will be in the portal from this work.

Activities 6 and 7: Stakeholder engagement No stakeholder engagements were conducted in this phase. Our planned engagements are expected later in the project.

Progress on activities

Activity: Project inception

Description: Partner engagement and introduction of the project to the wider research community at NaFIRRI
Start Date - End Date: 1/8/2021 - 30/9/2021
Verification Sources: N/A

Activity: Data mobilization

Description: Enhancing quality of published and unpublished datasets and publish them on GBIF: Quality enhancement will involve adding missing abundance data and coordinates
Start Date - End Date: 1/8/2021 - 30/4/2022
Verification Sources: N/A

Activity: Development of freshwater biodiversity information products and tools

Description: Using species occurrences and biodiversity informatics tools to develop the biodiversity information and tools (maps of biodiversity hotspots, distribution of important conservation species, a checklist of macro-invertebrates,species abundance and extent of invasive alien species, and conservation priority index)
Start Date - End Date: 1/8/2021 - 31/7/2022
Verification Sources: N/A

Activity: Development of freshwater biodiversity information products and tools

Description: Development and review a National Redlist Assessments for fish
Start Date - End Date: 1/8/2021 - 31/3/2023
Verification Sources: N/A

Activity: Development of freshwater biodiversity information products and tools

Description: Developing a map of status and changes in water quality
Start Date - End Date: 1/8/2021 - 31/7/2022
Verification Sources: N/A

Activity: Incorporating biodiversity information products and tools into Freshwater Biodiversity Portal for Uganda (FBPU)

Description: This will involve the incorporation of mobilized data and generated biodiversity information and tools into the Freshwater Biodiversity Portal for Uganda.
Start Date - End Date: 1/8/2021 - 31/12/2022
Verification Sources: N/A

Activity: Stakeholder engagement

Description: Development of communication materials such as policy briefs for user engagement and increasing user capacity
Start Date - End Date: 1/9/2022 - 31/12/2022
Verification Sources: N/A

Activity: Stakeholder engagement

Description: Presenting biodiversity information products to stakeholders for use, feedback and review
Start Date - End Date: 1/1/2022 - 31/3/2023
Verification Sources: N/A

Report on Deliverables

Deliverables progress summary

We have not had delayed deliverables. All our deliverables under data mobilization are on track. We completed the inventory of the datasets whose quality needs improvement and distributed them among team members. We have two new datasets of fish species occurrences from biodiversity surveys conducted in 2019 and 2021. One of the datasets is under review and another is awaiting approval of the principal investigator of the parent project for publication. We commit to complete all data mobilization deliverables by 31 January 2022.

On the national red list for fish species, distribution maps for threatened fish species and macro-invertebrates, index for prioritizing habitats for conservation and maps of species richness and abundance of fish species and macro invertebrates, we are progressing well with preparation of datasets and tools for these deliverables. We have acquired all the fish species and macro invertebrate species occurrences from GBIF and geo-referenced them. For the national relist, we have access to the Freshwater Mapping Tool of the IUCN which is used to make species distribution maps and make estimates of EOO and AOO for the assessments. The species occurrences have been transformed into IUCN attributes for point data. We have created a working set in the freshwater mapping tool which includes 284 species. These are the candidate species for the assessment.

For the deliverable of incorporating biodiversity information in the Freshwater Biodiversity portal for Uganda, we completed a project agreement with our partner institution responsible for incorporating information products into the freshwater biodiversity portal and its maintenance. The transfer of funds to the partner was also completed. We have had discussions on the potential features that will be in the portal from this work.

On data user capacity for information use, no stakeholder engagements were conducted in this phase. Our planned engagements are expected later in the project.

Progress towards deliverables

Deliverables - Project planning phase

Deliverables - Project data mobilization phase

Occurrence Records for Uganda Mobilized from Observation Archives
Dataset type: Occurrences
Dataset scope: Dataset covers fishes of Uganda. Years in the data are 1996 to 2013. Published occurrences be updated by abundance data
Number of records: 9,214
Data holder: National Fisheries Resources Research Institute
Data host institution: National Fisheries Resources Research Institute
% complete: 30%
Status update: Inventory of datasets complete Data set distributed to team members for mobilization
DOI:
Expected date of publication: 2022-01-31

Additional fish species occurrence records for Uganda
Dataset type: Occurrences
Dataset scope: Dataset covers fishes of Uganda from numerous water bodies for years 1971-2015
Number of records: 507
Data holder: NaFIRRI
Data host institution: GBIF France
% complete: 30%
Status update: Datasets distributed to team members for mobilisation
DOI:
Expected date of publication: 2022-01-31

Fish species occurrence and composition in selected Ugandan water bodies, 2001-2003

Dataset type: Occurrences
Dataset scope: Dataset covers fishes of Uganda from various water bodies, 2001-2003
Number of records: 431
Data holder: NaFIRRI
Data host institution: GBIF France
% complete: 30%
Status update: Distributed datasets to team members for mobilisation
DOI:
Expected date of publication: 2022-01-31

Diversity, distribution and abundance of macro-invertebrates in areas with different pollution levels in Lake Victoria
Dataset type: Occurrences
Dataset scope: Macroinvertebrates of Lake Victoria (2011-2013).
Number of records: 24
Data holder: NaFIRRI
Data host institution: GBIF France
% complete: 30%
Status update: Distributed to members for mobilisation
DOI:
Expected date of publication: 2022-01-31

Fish species occurrences in Lake Nyaguo
Dataset type: Occurrences
Dataset scope: Fish species of Lake Nyaguo
Number of records: 88
Data holder: NaFIRRI
Data host institution: NaFIRRI
% complete: 90%
Status update: New dataset mobilized. Publication is waiting approval of the PI of the parent project
DOI:
Expected date of publication: 2021-09-30

Fish species occurrences in River Kagera
Dataset type: Occurrences
Dataset scope: Fish species occurrences from River Kagera
Number of records: 114
Data holder: NaFIRRI
Data host institution: NaFIRRI
% complete: 90%
Status update: Taxa in the data under review
DOI:
Expected date of publication: 2021-09-30

Deliverables - Project evaluation phase

A national red list for selected fish species
Description: Conservation status of selected fish species at the national revel. Developed by applying the IUCN redlist criteria to fish species occurrences
% complete: 10%
Status update: Acquired and processed data; Accessed the IUCN freshwater mapping tool; Created a working set with 284 candidate species for the assessment
Sources of verification: Fish species occurrences in IUCN attributes (https://www.dropbox.com/s/h4n3vd3nwzqa2ij/IUCN%20ATTRIBUTES%20DATA_clean.xlsx?dl=0); Candidate species for assessment (https://www.dropbox.com/s/s1ewidffqc1yng7/SPECIES%20LIST%20FOR%20ASSESSMENT.csv?dl=0)

Distribution maps for threatened fish species and macro-invertebrates
Description: Maps of vulnerable, Endangered and Critically Endangered species fish and macro-invertebrates. Integrating occurrences with the conversation status
% complete: 10%
Status update: Acquired and geo-referenced occurrences of fish and macro invertebrates. These have corresponding global IUCN conservation status
Sources of verification: See link to fish species occurrences above. Link to occurrences of macro invertebrates with matching IUCN conservation status where applicable: https://www.dropbox.com/s/1g8ht5t25ddkyt9/mergedalloccurencesdata.csv?dl=0

Maps of species richness and abundance of fish species and macroinvertebrates

Description: Mapping number of species extant in Uganda water bodies, major lake basins and selected administrative levels
% complete: 10%
Status update: Acquired datasets for fish and macro invertebrates available in GBIF and geo-referenced them
Sources of verification: See link to fish species occurrences above. Link to occurrences of macro invertebrates with matching IUCN conservation status where applicable: https://www.dropbox.com/s/1g8ht5t25ddkyt9/mergedalloccurencesdata.csv?dl=0

An index for prioritizing habitats for conservation.

Description: A tool for highlighting habitats of priority areas for conservation based on richness of threatened species, rear species and habitat surface area
% complete: 10%
Status update: Acquired fish species occurrences from GBIF and referenced them
Sources of verification: Please see link to data on the deliverable on national redlist

Freshwater biodiversity information available through the Freshwater Biodiversity portal for Uganda

Description: Developed information products will be incorporated into the Freshwater Biodiversity Portal for Uganda
% complete: 5%
Status update: Completed project agreement with Nugsoft technologies, the partner responsible for maintaining the portal and incorporating products into the portal
Sources of verification: Link to the project agreement: https://www.dropbox.com/s/royzydp0ekgwap9/NUGSOFT_NaFIRRI%20Contract_2021-07-14_091242_fully%20signed.pdf?dl=0

Data user capacity for information use

Description: Data users have capacity to use the information developed through engagements and communication
% complete: 0%
Status update: Activities on this expected later in the project
Sources of verification: N/A

A checklist for macro-invertebrates in Uganda

Description: A checklist for macro-invertebrates in Uganda showing the taxa extant in water bodies
% complete: 50%
Status update: Acquired occurrences from GBIF. More data will be mobilised
Sources of verification: Link to occurrences of macro invertebrates with matching IUCN conservation status where applicable: https://www.dropbox.com/s/1g8ht5t25ddkyt9/mergedalloccurencesdata.csv?dl=0

Map of water quality status and changes

Description: A map showing the status and changes in water quality at multiple sampling sites. Product proposed during the planning phase
% complete: 0%
Status update: Data to be mobilized
Sources of verification: N/A

Events

Planning meeting

Dates: 2021-07-15 - 2021-07-15
Organizing institution: National Fisheries Resources Research Institute
Country: Uganda
Number of participants: 9
Comments: The event was an online meeting where NaFIRRI and partner institutions met. We reviewed work plans, activities and deliverables and shared experiences from the early kick off workshop.
Website or sources of verification:
https://www.dropbox.com/s/a29ajd0mkuwuuga/snapgallery4.JPG?dl=0

GBIF leads the Biodiversity Information for Development (BID), a programme funded by the European Union. The programme provides supplementary support for activities addressing the

needs of regional researchers and policymakers through mobilization and use of biodiversity data.