



## **MID-TERM ACTIVITY REPORT**

### **DEVELOPMENT OF THE BIODIVERSITY DATABASE SYSTEM IN VIET NAM**

Prepared by **Biodiversity Conservation Agency (BCA)**  
**Viet Nam Environment Administration (VEA)**  
**Ministry of Natural Resources and Environment (MoNRE), Viet Nam**

*Ha Noi, August 2016*

# Development of The Biodiversity Database System In Viet Nam

## MID-TERM ACTIVITY REPORT

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## **Executive summary**

As role of leading agency in management of biodiversity database in Vietnam, Biodiversity Conservation Agency (BCA) considers participating in GBIF as a potential opportunity to exchange information at global level on biodiversity. Therefore, BCA implements this project to build national capacity in database management and understanding about GBIF in order to become GBIF member.

The project proposal was approved by GBIF in March 2016 and the grant letter was signed by GBIF and Biodiversity Conservation Agency (BCA) in 21 March 2016. The BCA leads project implementation with partners from stakeholders and information holders all around the country. In addition, the Japan Biodiversity Information Facility (JBIF) provides useful experience in node establishment and operation and understanding on GBIF which are good lessons and suggestions for establishing VBIF in the future.

The key actions in the project have been implemented in sustainable cooperation with the database management of the National Biodiversity Database System (NBDS) in order to build capacity of Vietnam in biodiversity information and database management and preparation to actively take part in GBIF.

Under the schedule of the project, many activities were implemented during the period 30 March to 20 August 2016. The approach of capacity building is to identify relevant stakeholders including information holders and partners. Capacity building for key relevant stakeholders is carried out in this period through training workshops on GBIF in Vietnam and Japan. Objective of roadmap is to propose a reliable roadmap for Vietnam to become a GBIF member. Desk study, surveys and consultation workshops and meetings are key methods applied for the implementation of the project. Questionnaire is designed to survey key relevant stakeholders at central level and local level, and then analysis result is provided as inputs for developing the roadmap for Viet Nam's participation in GBIF. Reviewing international and regional experiences as well as SWOT analysis on jointing GBIF was done.

Results in the project completed up to to now as following:

- Approval of the Global Biodiversity Information Facility (GBIF) grant letter agreement
- Identification of potential information holders for Viet Nam Biodiversity Information Facility (VBIF) in the future

- Building capacity for developing and maintaining the database system as well as for utilization of GBIF by training course in Japan
- Organizing the training workshop trainers who are potential information holders and relevant stakeholders on GBIF.
- Organizing a promotion workshop on Biodiversity Information in Viet Nam for relevant stakeholders; A brochure on GBIF and information sharing mechanism is designed and delivered to participants in the workshop
- Conducting a survey and proposing a roadmap for Vietnam to join GBIF.

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## Introduction

This report describes briefly information on the project including introduction, objectives, approach, activities and outputs up to now and especially progress of project from the approval of the GBIF Grant Letter (21 March 2016) to 30 August 2016. The progress of the project compared to schedule of the project up to now is closely monitored. The progress evaluation is carried out and recommendations are proposed for fulfillment from now to the end of the project. It contains details on the implementation, the results and the achievements of the key actions. It is to ensure completion of the project in due course in term of technical requirements and finance.

The project proposal was approved by GBIF in March 2016 and the grant letter was signed by GBIF and Biodiversity Conservation Agency (BCA) in 21 March 2016. The BCA leads project implementation with partners from related partners including: Ministry of Agriculture and Rural Development (MARD), the related departments in Ministry of Natural Resources and Environment (MONRE), Department of Natural Resources and Environment at local level (DONRE), Viet Nam Academy of Science and Technology

(VAST) in support of Japan Biodiversity Information Facility (JBIF). The direct participants and beneficiaries of this project are the Government management agencies for policy making in biodiversity conservation and management as well as other institutes and academies for scientific research purposes.

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## **The project and its objectives**

The project on Development of the Biodiversity Database System in Viet Nam aims to build capacity of Vietnam in biodiversity information and database management and preparation to actively take part in GBIF. It actually enables BCA to have a better understanding on biodiversity management in the world as well as to confirm the approach to become a member of GBIF in future.

The project is carried out with the lead implementation of BCA in financial support of Biodiversity Information Fund for Asia (BIFA). The project is also provided technical support from JBIF, especially the Node Manager, Dr. Tsuyoshi Hosoya in experience sharing in data mobilization and sharing.

With the activities conducted in the framework of the project, BCA introduces to the stakeholders and data managers about the advantages, benefits and opportunities for free and open biodiversity data access through GBIF, which attract the large attention and support from the target audiences.

Specifically, the project aims to:

- To identify the compatibility of the current National Biodiversity Database System with the Global Biodiversity Information Database and then, to recommend mechanisms to share information on biodiversity of Vietnam for open, free and broader access via GBIF
- To convince and increase the willingness to share biodiversity information of all biodiversity stakeholders and data managers in the country to further develop the national biodiversity database system (NBDS), contributing to inform decision makers in the policy development on biodiversity conservation and management.
- To prepare a rational proposal on road map on participation in GBIF and coordination mechanism for sharing information on biodiversity of Viet Nam to GBIF consistently and sustainably.

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## Project activities completed by mid-term

The major accomplishments in the mid-term period include

- i) Identification of potential biodiversity data holders for Viet Nam Biodiversity Information Facility (VBIF) in the future and engage them in VBIF;
- ii) The capacity building in biodiversity data accumulation, digitization and sharing in a GBIF node from experience of Japan node for key trainers;
- iii) A training workshop for trainers who are potential information holders and relevant stakeholders on GBIF is held and
- iv) A promotion workshop on Biodiversity Information in Viet Nam for relevant stakeholders is organized.
- v) Development of roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF.

*Chronological accomplishments for these activities are summarized in the Table 1 below.*

**Table 1 Summary of chronological mid-term accomplishments of project**

Date	Activities/Deliverables	Status/Major Accomplishments
11 <sup>th</sup> April 2016	Funds released to proponent	<ul style="list-style-type: none"><li>• The first tranche amounting to 13.584,00 Euro was released by GBIF to BCA on 11<sup>th</sup> April 2016.</li><li>• This amount represents 60% of the total project cost.</li></ul>
April to June 2016	Identification of potential biodiversity data holders for Viet Nam Biodiversity Information Facility (VBIF) in the future	<ul style="list-style-type: none"><li>• A desk study is conducted to primarily identify the potential biodiversity data holders in the country</li><li>• A survey/ questionnaire is designed and sent to all relevant stakeholders to evaluate their data and their willing to encode the digital data, provision, sharing and publish.</li><li>• A meeting between BCA and potential stakeholders is organized to discuss about GBIF participation and SWOT analysis in 1<sup>st</sup> June 2016.</li></ul>

Date	Activities/Deliverables	Status/Major Accomplishments
13-17 June 2016	Visit of Viet Nam key trainers to learn experience of Japanese Node in Japan	<ul style="list-style-type: none"> <li>• 4 trainers are experts in biodiversity conservation, biodiversity information and informatics are chosen to participate in the 5 days training course in the National Museum of Nature and Science, Japan. They have discussed with the relating staffs and node managers of JBIF to know about the actual operation of a Node.</li> <li>• The training course was last for 5 days (13 to 17 June 2016) at the National Museum of Nature and Science (NMNS) and the National Genetic Resources in Tsukuba, Japan.</li> </ul>
19 <sup>th</sup> – 21 <sup>st</sup> July 2016	Organization of the training workshop for trainers on GBIF	<ul style="list-style-type: none"> <li>• A training workshop for trainers who are potential information holders and relevant stakeholders on GBIF is held for about 30 target participants at local level, introducing about the benefits, opportunities, structure, participation and toolkit for publishing data on GBIF.</li> <li>• The possible mechanism to connect the local database to the national database system and to GBIF database.</li> </ul>
5 <sup>th</sup> May- 30 August 2016	Proposal of 1 <sup>st</sup> draft roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF	<ul style="list-style-type: none"> <li>• A core team with 2 key local experts on biodiversity/ biology and IT/ Informatics were contracted by BCA to develop the roadmap on Viet Nam's participation in GBIF and coordination mechanism for sharing information to GBIF</li> <li>• 2 experts closely work together and collaboration with BCA to develop the 1<sup>st</sup> draft version of the roadmap</li> <li>• The draft roadmap in soft copy are sent to relevant stakeholders and JBIF node manager for comments</li> <li>• The comments are collected and integrated into the Draft to improvement and completion.</li> <li>• After that, the update draft roadmap would be consulted in a technical meeting with key stakeholders for final one.</li> </ul>

<b>Date</b>	<b>Activities/Deliverables</b>	<b>Status/Major Accomplishments</b>
03 <sup>th</sup> – 04 <sup>th</sup> August 2016	Organization of promotion workshop on Biodiversity Information in Viet Nam for relevant stakeholders	<ul style="list-style-type: none"> <li>• The target participants of the promotion workshop are all of the potential information holders and managers at related ministries like MARD, MOST, VAST and different universities and institutes.</li> <li>• The workshop is contributed by several comments of the participants on the data enhancement, accumulation and sharing mechanism for GBIF as well as the establishment of a future node in Viet Nam.</li> </ul>
30 August 2016	Submission of the Mid-term activity and financial report to the GBIF Secretariat	<ul style="list-style-type: none"> <li>• Midterm activity and financial report completed and submitted to GBIF on 30 August 2016.</li> </ul>

### **The Main Mid-Term Accomplishments of Project**

#### **1. Identification of potential information holders for Viet Nam Biodiversity Information Facility (VBIF) in the future**

Identification of potential information holders for Viet Nam Biodiversity Information Facility (VBIF) is considered as one of the first priority in the project because of its significance in formulation of possible data mobilization and sharing mechanism in the future for Viet Nam Node.

This action is taken into account in every project activities. Among others, the potential biodiversity data holders are identified by an overall review of BCA and expert on the major biodiversity collections and databases over the country and by a national survey which was delivered to all stakeholders in the country and being collected and analysed the responses.

Thirty seven institutes, universities, museums, editors and publishers of scientific research and non-governmental organization are considered as holding biodiversity data (Table 1). In which, the organizations having museum and collection are main holders. Beside, around thirty one national parks, sixty four protected areas and thirteen species protected areas also keep a lot of biodiversity information. Non-government organizations such as World Wildlife Fund (WWF), BirdLife International, and International Union for Conservation of Nature (IUCN) have conducted many projects on biodiversity in Vietnam. Consequently, they have many biodiversity data of Vietnam. Vietnamese and foreigner



experts who working with biodiversity in Vietnam must be also included as data holders.

In 64 provinces and cities throughout Vietnam, Department of Natural Resources and Environment (belong Ministry of Natural Resources and Environment) and Department of Agriculture and Rural Development (belong to Ministry of Agriculture and Rural Development) possess biodiversity information.

It is supposed that after the mid-term review, the results of the surveys and study will be important inputs for the development of roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF.

A list of the main data holders initially identified by desk-study and the survey for stakeholders is in attachments of the ANNEX A.

In addition, BCA also has a close meeting with the key data holders about establishment of a node function in Viet Nam on 1<sup>st</sup> June 2016 at MoNRE. The objective of the meeting to know the willingness and demands of stakeholders in data accumulation, sharing and utilization

The outputs of the meeting are promising when reaching the consensus on the significance of participating and establishing a node in Viet Nam to GBIF. Most of the stakeholders demonstrated their commitments in providing data for NBDS and future VBIF. However, they also emphasized the need of guiding the data digitization under DarwinCore and the technique to link between private databases to national database system.

The results from the study, the survey and the discussion are integrated into the draft roadmap of Viet Nam collateral with in-depth researches to make a reasonable roadmap for MoNRE.

## **2. Building capacity for developing and maintaining the database system as well as for utilization of GBIF by training course in Japan**

With the support of Japan Biodiversity Information Facility (JBIF) and JICA, Biodiversity Conservation Agency (BCA) is the national focal agency to select and coordinate 4 participants, then the trainers to take part in a 4 day training course in Japan for developing and maintaining the database system as well as for utilization of GBIF.

The 4 participants of the training course are:

- Dr. Do Van Tu, Biologist expert from Institute of Ecology and Biological Resources (IEBR), VAST- one of the key biodiversity data holders in Viet Nam.

- Dr. Nguyen Xuan Thuy, Data Manager of Centre for Environmental Information and Data, Viet Nam Environment Administration (VEA), MONRE- Technical admin of the National Biodiversity Database System (NBDS).

- Dr. Bui Quang Hung, IT expert from Vietnam National University (VNU)- key member of the Core team in NBDS system architecture and structure development.

- Ms. Truong Quynh Trang, Government official, Biodiversity Conservation Agency- the national leading agency in biodiversity database development and management in Viet Nam.

The key mentors of the training course are the JBIF node manager, Dr. Tsuyoshi Hosoya and other members of JBIF team at the National Museum of Nature and Science (NMNS) and key members of the another node of JBIF, the National Genetics Institute. During the time of the course, the participants from Viet Nam were informed about fundamental knowledge of the function of GBIF and data standards, and other technical issues such as practice the utilization of GBIF toolkits as DarwinCore and IPT...

The lectures and visits to the node-functional organization in Japan helped Vietnamese participants to get a lot of useful information on data mobilization, digitization, sharing and acceleration in Japan.

A number of discussions were made to clarify the benefits and responsibility of a node in GBIF, the technical requirements on infrastructure, hard-ware and soft- ware of a node. A possible roadmap for Viet Nam's participation and establishment of an effective GBIF node was also developed by the participants, screening to various elements like potential nodes, mechanisms for data collecting and sharing, the principles for effectively operating a node....

The trained participants play important roles in educating and awareness raising for domestic stakeholders in related workshops after that. The trainers are also consulted by BCA in the actual development of proposed road map on participation in GBIF and coordination mechanism for sharing information to GBIF and to help to identify compatibility between NBDS and GBIF databases.

The detailed curriculum of the training course and program for trainers is shown in ANNEX B.

### **3. Organize the training workshop for trainers who are potential information holders and relevant stakeholders on GBIF**

A training workshop for trainers on GBIF is held in July for key stakeholders who are mainly identified at first step before. Presentations from the trainers in Japan Dr. Nguyen Xuan Thuy and Dr. Bui Quang Hung provided a lot of useful information and know-how in data exploitation and publishing by IPT to GBIF. The output of the workshop is highly positive when the data managers and practitioners got familiar to DarwinCore data format and using IPT to publish data to GBIF under the test mode.

- **Preparation:**

To preparation for the organization of the workshop, a list of potential data holders was created. A several preparatory activities were done by BCA resource persons and experts, including:

- Request confirmed participants to install the Tomcat software and IPT beforehand
- Prepare the Darwincore formatted data for practice
- Design an evaluation questionnaire for participants' responses in order to improve later training workshop of BCA on biodiversity informatics
- Prepare the presentations based on the knowledge and understanding gained from training course in Japan, delivered by the trainers.

The workshop was arranged to take place in the meeting Hall of Ministry of Natural Resources and Environment in Hanoi for 3 days.

- **Objectives**

The training workshop aims to update to the key biodiversity data holders the development of the NBDS and to give an overview on GBIF featured by DarwinCore and Integrated Publishing Tool (IPT)

Specifically, the workshop aims to:

- a) Create understanding about GBIF (its structure and operation, administration and technical aspects)
- b) Provide background information to get the participants familiar to GBIF such as the interface, IPT software and standard language DarwinCore, the utilization and exploitation of data and data publishing through GBIF's IPT
- c) Demonstrate the significance of biodiversity data digitization and display in a global standard format via GBIF; process and options to biodiversity data digitization;

d) Guide the data holders and technicians to using IPT by practice, then to publish some biodiversity data to GBIF

- **Target Participants**

About 30 participants from selected key organizations and institutes are involved in the workshop.

The List of participants and the Agenda of the workshop are included in the attachment1 and 2 of the ANNEX C.

- **Outputs of the workshop**

The workshop has achieved the following outputs:

- Trainees are oriented in the benefits and advantages of interoperable and digital database systems
- Trainees are introduced to GBIF developed tools such as IPT software and utilization of data on GBIF for scientific purposes
- Trainees are agreed that biodiversity digitation and data sharing are necessary among stakeholders but there should have a legal background for these activities as well as resources and mechanism to ensure the sustainability
- All of the stakeholders support the data provision to NBDS and VBIF in the future. However, they also notice the necessity to educate and popularize the technologies as well as guiding the utilization extensively;
- Some main data holders such as the Geographical Institute, the Forest Inventory and Planning Institute suggested a possible mechanism to maintain a database system under limited resources (personnel and finance) and connection between NBDS with other national database systems to accumulate the biodiversity- related data for long term, in order to meet the domestic demand as well as to publish data to GBIF.
- The result analysis of collected questionnaires from participants show that:
- The theme and topic of the training workshop is interesting and useful to trainees
- The methodology of the training course is appropriate but it needs more technical assistants for practice session. There should be guidance to standardize the data of trainees into DarwinCore to practice.
- Guidance on data utilization and exploitation as graphics and diagrams should be

provided to users

The evaluation questionnaire of the workshop is in attachment 3 of the ANNEX C

#### **4. Organize a promotion workshop on Biodiversity Information in Viet Nam for relevant stakeholders.**

The promotion workshop on Biodiversity Information in Viet Nam for relevant stakeholders is back to back with the workshop on NBDS funded by JICA Sustainable Natural Resources Management Project. The workshop also aims to consult the key stakeholders about the proposed road map for Vietnam to participate in GBIF step by step. The presentation and experience sharing from the node manager of JBIF, Dr Tsuyoshi Hosoya also made active discussion with participants.

- **Preparation:**

To prepare for the organization of the workshop, the resource persons from BCA was working with the trainers from Japan training course and some other experts in biodiversity information to design the overall methodology and workshop flow with the view to ensure qualified content and practice.

The targeted participants involve a wide range of stakeholders, such as staff from Ministry of Agriculture and Rural Development (MARD), Ministry of Science and Technology (MOST), Vietnam Academy of Science and Technology (VAST), local government and academic and data managers from provinces.

The draft of roadmap on participation of Vietnam in GBIF is introduced in soft copy and a brochure on GBIF and data sharing also printed to deliver to the participants

At the end of the workshop, an evaluation survey was delivered to participants for their opinions. The comments are gathered and analyzed then for reference in the next stage.

The workshop is designed to take place in 2 days in Hanoi. The expected number of participants is around 40 target ones.

- **Objectives**

The promotion workshop aims to facilitate a more effective and efficient mobilization of information through biodiversity data managers as effective and efficient contributor of biodiversity information to national NBDS and eventually, to the GBIF network.

Specifically, the workshop aims to:

a) Understanding about GBIF and management of biodiversity information management to get support from various holders for the participation of Vietnam in GBIF. The draft of roadmap on participation of Vietnam in GBIF will also be presented in the workshop

b) Update the development of the NBDS and possibility to incorporate provinces and other organizations in biodiversity data sharing for NBDS

c) Convince the data holders and managers of the significance of biodiversity data and information sharing, the possible mechanisms in data mobilization, process and sharing currently and in the future among all stakeholders.

d) Share experience in biodiversity data mobilization, process and sharing in Japan from Dr.Hosoya, the JBIF node manager

e) Discuss with the JBIF node manager on requirements and experience in establishing and operating an effective node such as the mechanism to mobilize the data from the holders

f) Evaluate the support of key data holders in information sharing for NBDS and GBIF

g) Introduce the 1<sup>st</sup> draft of the roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF for awareness and comments

#### **•Target Participants and Criteria for Selection**

About 40 data managers or staffs of selected provincial departments, organizations and institutes are involved in the workshop. The criteria for selection of target participants will be as follows:

a. The DoNRE of provinces with available biodiversity databases and rich biodiversity.

b. The organizations and institutes (under relevant ministries) who hold a large number of biodiversity data and information, the organizations with big collections or museums

c. The reputable institutes and academies in biodiversity research and conservation such as Vietnam Academy of Science and Technology (VAST) that can be the potential node-functional organization in Viet Nam.

The List of participants and the Agenda are shown in the attachment 1 & 2 of the

## ANNEX D.

### • **Outputs of the workshop**

The workshop has achieved the following outputs:

a) Create the understanding about GBIF and management of biodiversity information management to get support from various holders for the participation of Vietnam in GBIF

b) The proposed road map for Vietnam to participate in GBIF was consulted with the key stakeholders for further development. The draft roadmap was received some comments for approach and method of developing the roadmap. It was agreed that the soft copy of the roadmap would be send to the key stakeholders for further comments.

c) Several comments for development of biodiversity information in Viet Nam was taken note in the meeting minute of the workshop for BCA's consideration

d) The experience sharing in biodiversity-related database system with various contractors of the Viet Nam National Museum of Nature highlighted the importance of a standard data format for all contractors at the beginning of development of the database. This organization also showed their interest in becoming a key data provider for VBIF in the future with the consistent sharing mechanism.

e) Most of the comments of the stakeholders agree that it is necessary for a government agency to act as the focal point in mobilizing and sharing biodiversity data in the country and to the international database system.

f) All of the participants evaluated the significance of the workshop as well as express their interest of their organizations in participating in GBIF through the evaluation questionnaire. Most of them agreed that the workshop is really helpful and informative to them.

The evaluation questionnaire of the workshop and meeting minute of the workshop is in attachment 3& 4 of the ANNEX D.

### **6. Development of roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF**

The roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share

information on biodiversity of Vietnam for GBIF could be considered as one of the most major outputs of the project. The final report is expected to be finished in November 2016 after a comprehensive research of local experts and a number of consultation meetings with relevant stakeholders.

- **Objectives:**

- To review the current biodiversity data in the country, the structure and function of GBIF to evaluate the compatibility of national database and GBIF
- To review the international experience in node establishment and operation of some other nodes with similar context as Viet Nam
- Conduct a SWOT analysis to evaluate node function objectively
- To recommend mechanisms to share information on biodiversity of Vietnam for GBIF

- **Methodology**

- A literature review to the current status of existing biodiversity data in the country is conducted by the qualified experts. The international experience from different countries is looked through for reference
- A SWOT analysis to evaluate node function objectively is carried out to find out the strengths- weakness- opportunity- threat to joint in GBIF of Viet Nam
- Stakeholder consultation and analysis are also done to get the real findings on data storage, encoding, mobilizing and sharing in the country which is important the inputs for the roadmap, ensuring the possibility and feasibility of the roadmap in practice.

- **Current Outputs**

- The 1<sup>st</sup> draft of the roadmap on participation in GBIF and coordination mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF is presented at the promotion workshop for 40 stakeholders to comment;
- The real experience and understanding of suggestion of JBIF node manager also was integrated into the roadmap for further development of 2<sup>nd</sup> draft roadmap
- A tentative organization structure with the participation of key stakeholder of Viet Nam and a work flow for database and publishing from VBIF to GBIF are proposed for consideration



- Results from the SWOT analysis are referred. It helps to consolidate the approach of the Government to participate in GBIF in the future
- The options for VBIF node establish and operating are considering by BCA and experts at the same time.

The 1<sup>st</sup> Draft of the Roadmap is in the ANNEX E of this report.

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## **Project communications**

The progress and results of the project are closely coordinated with development of NBDS

Reports and periodic updates will be communicated and submitted to GBIF Secretariat and published at the website <http://www.gbif.org/programme/bifa/2015/biodiversity-database-system-vietnam>

The communications contact persons for this undertaking are as follows:

- Main Contact: Dr. Hoang Thi Thanh Nhan, Deputy Director of BCA (email: [hoangnhan.bca@gmail.com](mailto:hoangnhan.bca@gmail.com))
- Alternate Contact: Dr. Nguyen Xuan Dung, Chief of Administrative Office (email: [xuandungbt@gmail.com](mailto:xuandungbt@gmail.com) )

BCA will release related news about the project and events taking place about the project from time to time at the website where appropriate.

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## **Mid-term evaluation findings and recommendations for the remaining project implementation period**

The key data holders express their positive support and willingness to involve in the training and consultation. The careful discussion and consultation with stakeholders is vital tool in the course of engaging with stakeholders. We have seen situations where better engagement would have resulted in better results.

The approach of BCA to become a member to GBIF in future receives strong support from stakeholders.

In the remaining time of project, project implementation agency will paid closer attention to improve and finalize the roadmap on participation in GBIF and coordination

mechanism for sharing information to GBIF and identify compatibility and to recommend mechanisms to share information on biodiversity of Vietnam for GBIF.

BCA also recommend for more education and training workshops for more stakeholders in the country to reach to various potential data holders with the view to strengthening the public awareness and data mobilization. The awareness raising should be conducted more strongly for the public.

In addition, under the framework of the project, it raises a necessity for more available resource for data digitization as well as popularizing knowledge on DarwinCore and IPT. Other needed resources for establishing a node.

## ANNEX A: Identification of potential biodiversity data holders in Vietnam

### ATTCHMENT 1: List of identified potential biodiversity data holders in Vietnam.

No	Data holder	Museum	Collection	Potential data
<b>Vietnam Academy of Science and Technology (VAST)</b>				
1	Institute of Ecology and Biological Resources (IEBR) <a href="http://www.iebr.ac.vn/">http://www.iebr.ac.vn/</a>	X		Arthropods, vertebrate, mammal, invertebrates, reptiles & amphibians, fishes, mollusks, parasite, aquatic invertebrates, bird, plants, nematode, DNA, remote sensing, etc.
2	Institute of Oceanography (IO) <a href="http://www.vnio.org.vn/">http://www.vnio.org.vn/</a>	X		Marine fauna and flora of Vietnam
3	Institute of Marine Environment and Resources (IMER) <a href="http://www.imer.ac.vn/">http://www.imer.ac.vn/</a>		X	Marine fauna and flora of Vietnam
4	The Institute of Biotechnology (IBT) <a href="http://www.ibt.ac.vn/">http://www.ibt.ac.vn/</a>			DNA data on fauna and flora of Vietnam
5	Institute of Genome Research (IGR) <a href="http://www.igr.ac.vn/">http://www.igr.ac.vn/</a>			DNA data on fauna and flora of Vietnam
6	Vietnam National Museum of Nature (VNMN) <a href="http://vnmn.ac.vn/en/">http://vnmn.ac.vn/en/</a>	X		Fauna and flora of Vietnam
7	Institute of Highland Central (Viện Nghiên cứu Khoa học Tây Nguyên) <a href="http://www.tni.ac.vn/">http://www.tni.ac.vn/</a>	X		Fauna and flora of Vietnam's Central Highlands
8	Southern Institute of Ecology (SIE) <a href="http://sie.vast.vn/">http://sie.vast.vn/</a>		X	Fauna and flora of South Vietnam
9	Institute of Tropical Biology (ITB) <a href="http://itb.ac.vn/">http://itb.ac.vn/</a>			Fauna and flora of South Vietnam
10	Mientrung Institute for Scientific Reseach (MISR) <a href="http://misr.com.vn/">http://misr.com.vn/</a>		X	Fauna and flora of Central Vietnam
11	Institute of Resource, Environment and Development in Hue City			
<b>Ministry of Natural Resources and Environment (MONRE)</b>				
12	Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE) <a href="http://isponre.gov.vn/">http://isponre.gov.vn/</a>			
13	Ha Noi University of Natural Resources			Data on diversity of

No	Data holder	Museum	Collection	Potential data
	and Environment (HUNRE) <a href="http://hunre.edu.vn/">http://hunre.edu.vn/</a>			land snails in Vietnam
14	Ho Chi Minh University of Natural Resources and Environment (HCMUNRE) <a href="http://www.hcmunre.edu.vn/">http://www.hcmunre.edu.vn/</a>			
<b>Ministry of Education and Training (MOET)</b>				
15	Thai Nguyen University of Agriculture and Forest (TUAF) <a href="http://tuaf.edu.vn/">http://tuaf.edu.vn/</a>			
16	Thai Nguyen University of Education <a href="http://dhsptn.edu.vn/">http://dhsptn.edu.vn/</a>			Fauna and flora of Northeast Vietnam
17	Thai Nguyen University of Science <a href="http://us.tnu.edu.vn/">http://us.tnu.edu.vn/</a>			
18	Vinh University <a href="http://vinhuni.edu.vn/">http://vinhuni.edu.vn/</a>		X	Data on fish diversity of Central Vietnam
19	Hue University of Agricultural and Forestry (HUAF) <a href="http://huaf.edu.vn/">http://huaf.edu.vn/</a>			Fauna and flora of Central Vietnam
20	Hue University of Science (HUSC) <a href="http://www.husc.edu.vn/">http://www.husc.edu.vn/</a>			
21	The University of Da Nang – University of Education <a href="http://ued.udn.vn/">http://ued.udn.vn/</a>			
22	Can Tho University (CTU) (Colleague of Aquaculture and Fisheries (CAF)) <a href="https://www.ctu.edu.vn/">https://www.ctu.edu.vn/</a>		X	Data on fish in South Vietnam
23	Ho Chi Minh Nong Lam University (NLU) <a href="http://hcmuaf.edu.vn/">http://hcmuaf.edu.vn/</a>			Data on fish South Vietnam
24	Ha Noi National University of Education (HNUE) <a href="http://hnue.edu.vn/">http://hnue.edu.vn/</a>		X	Fauna and flora of Vietnam
25	Hanoi Pedagogical University 2 <a href="http://www.hpu2.edu.vn/">http://www.hpu2.edu.vn/</a>			Fauna and flora of Northeast and Northwest Vietnam
26	Da Lat University <a href="http://www.dlu.edu.vn/">http://www.dlu.edu.vn/</a>			
27	Tay Bac University (UTB) <a href="http://www.utb.edu.vn/">http://www.utb.edu.vn/</a>			Data on land snail in Northwest Vietnam
<b>Vietnam National University, Ha Noi</b>				
28	University of Science (HUS) (Faculty of Biology) <a href="http://hus.vnu.edu.vn/">http://hus.vnu.edu.vn/</a>	X		Fauna and flora of Vietnam
<b>Vietnam National University, Ho Chi Minh</b>				
29	University of Science (HCMUS) <a href="http://www.hcmus.edu.vn/">http://www.hcmus.edu.vn/</a>			Fauna and flora of South Vietnam
<b>Ministry of Agriculture and Rural Development (MARD)</b>				
30	Forest Inventory and Planning Department	X		Data on plant

No	Data holder	Museum	Collection	Potential data
	(FIPI) <a href="http://www.fipi.vn/">http://www.fipi.vn/</a>			biodiversity in the forests of Vietnam
31	Vietnam National University of Agriculture (VNUA) <a href="http://www.vnua.edu.vn/">http://www.vnua.edu.vn/</a>		X	Data on insect
32	Vietnam National University of Forestry (VNUF) <a href="http://www.vfu.edu.vn/">http://www.vfu.edu.vn/</a>		X	Data on plant
33	Vietnamese Academy of Forest Sciences (VAFS) <a href="http://vafs.gov.vn/">http://vafs.gov.vn/</a>			Data on plant
34	Research Institute of Marine Fishery (RIMF) <a href="http://www.rimf.org.vn/">http://www.rimf.org.vn/</a>		X	Data on marine fish diversity
35	Research Institute for Aquaculture No1 (RIA1) <a href="http://ria1.org/ria1/">http://ria1.org/ria1/</a>		X	Data on fish
36	Research Institute for Aquaculture No2 (RIA2) <a href="http://vienthuysan2.org.vn/">http://vienthuysan2.org.vn/</a>			Data on fish in the South Vietnam
37	Research Institute for Aquaculture No3 (RIA3) <a href="http://www.ria3.vn/">http://www.ria3.vn/</a>			Data on fish in the Central Vietnam
	<b>Editors and publishers of scientific research</b>			
38	Journal of Marine Science and Technology (VAS) <a href="http://vjs.ac.vn/index.php/jmst">http://vjs.ac.vn/index.php/jmst</a>			Articles on marine fauna and flora of Vietnam
39	Journal of Biotechnology (VAST) <a href="http://vjs.ac.vn/index.php/vjbt">http://vjs.ac.vn/index.php/vjbt</a>			Articles on DNA
40	Journal of Biology (VAST) <a href="http://vjs.ac.vn/index.php/vjbio">http://vjs.ac.vn/index.php/vjbio</a>			Articles on fauna and flora of Vietnam
	<b>Non-governmental organization (NGO)</b>			
41	International Union for Conservation of Nature (IUCN) <a href="https://www.iucn.org/">https://www.iucn.org/</a>			Report of threatened species Vietnam
42	World Wildlife Fund (WWF) <a href="http://www.worldwildlife.org/">http://www.worldwildlife.org/</a>			Report of fauna and flora of Vietnam
43	Birdlife <a href="http://www.birdlife.org/">http://www.birdlife.org/</a>			Report on bird of Vietnam

**ATTCHMENT 2: The national surveys for data holders and stakeholders:**

## **SURVEY FOR STAKEHOLDERS ON BIODIVERSITY**

**Q1. Which of the following best describes your institution?**

**University-based**

- ☐ Part of a primarily privately-funded university
- ☐ Part of a primarily public-funded university

**Not university-based**

- ☐ Primarily funded by national, state or city government, e.g., Smithsonian's National Museum of Natural History, Museum National d'Histoire Naturelle (Paris)
- ☐ Primarily privately-funded institution/museum, e.g., Carnegie Museum of Natural History, California Academy of Sciences (San Francisco), New York Botanical Garden
- ☐ Individual Private collection, e.g., American Entomological Institute

**Q2. What is/are the primary role(s) you play at your institution? Please check all that apply.**

- ☐ Director/President/CEO
- ☐ Head of Research and Collections
- ☐ Curator
- ☐ Collection/Data Manager or Collection/Data Assistant/Technician
- ☐ Information Manager
- ☐ Faculty member/Research Scientist
- ☐ Other. Please explain. \_\_\_\_\_

**Q3. Please indicate which of the following collections you are associated with. Please check all that apply.**

- ☐ Algae
- ☐ Arthropods
- ☐ Bryophytes
- ☐ Invertebrates, terrestrial (other than arthropods and mollusks)
- ☐ Fungi including lichens
- ☐ Herpetology (reptiles & amphibians)
- ☐ Ichthyology (fishes)
- ☐ Invertebrate Paleontology (invertebrate fossils)
- ☐ Malacology (Mollusks)
- ☐ Mammalogy
- ☐ Marine Invertebrates
- ☐ Ornithology (birds)
- ☐ Paleobotany & Palynology (fossil plants & pollen)
- ☐ Vascular Plants
- ☐ Vertebrate Paleontology (vertebrate fossils)
- ☐ Other. Please describe. \_\_\_\_\_

**Q4. For the collections you indicated in Q3, please estimate the number of objects/specimens and/or lots in each.**

	Specimens	Lots
Algae	<input type="checkbox"/>	<input type="checkbox"/>
Arthropods	<input type="checkbox"/>	<input type="checkbox"/>
Bryophytes	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrates, terrestrial (other than arthropods and mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Fungi including lichens	<input type="checkbox"/>	<input type="checkbox"/>
Herpetology (reptiles & amphibians)	<input type="checkbox"/>	<input type="checkbox"/>
Ichthyology (fishes)	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrate Paleontology (invertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Malacology (mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Mammalogy	<input type="checkbox"/>	<input type="checkbox"/>
Marine Invertebrates	<input type="checkbox"/>	<input type="checkbox"/>
Ornithology (birds)	<input type="checkbox"/>	<input type="checkbox"/>
Paleobotany & Palynology (fossil plants & pollen)	<input type="checkbox"/>	<input type="checkbox"/>
Vascular Plants	<input type="checkbox"/>	<input type="checkbox"/>
Vertebrate Paleontology (vertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please describe.	<input type="checkbox"/>	<input type="checkbox"/>

## **DATABASING**

**Q5. Are the data (e.g., label data, catalog data) associated with the collection specimens and/or lots you indicated captured or being captured in a digital format or digitized database?**

- ☐ Yes  
☐ No

If your answer is NO, please proceed to Q23**Q6. For the collections you indicated in Q3, please estimate the percentage of the collection that has been digitized. Be sure to indicate whether the estimate is based on SPECIMENS or LOTS or BOTH.**



	Specimens	Lots
Algae	<input type="checkbox"/>	<input type="checkbox"/>
Arthropods	<input type="checkbox"/>	<input type="checkbox"/>
Bryophytes	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrates, terrestrial (other than arthropods and mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Fungi including lichens	<input type="checkbox"/>	<input type="checkbox"/>
Herpetology (reptiles & amphibians)	<input type="checkbox"/>	<input type="checkbox"/>
Ichthyology (fishes)	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrate Paleontology (invertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Malacology (mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Mammalogy	<input type="checkbox"/>	<input type="checkbox"/>
Marine Invertebrates	<input type="checkbox"/>	<input type="checkbox"/>
Ornithology (birds)	<input type="checkbox"/>	<input type="checkbox"/>
Paleobotany & Palynology (fossil plants & pollen)	<input type="checkbox"/>	<input type="checkbox"/>
Vascular Plants	<input type="checkbox"/>	<input type="checkbox"/>
Vertebrate Paleontology (vertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please describe.	<input type="checkbox"/>	<input type="checkbox"/>

**Q7. Please estimate the percentage of the digitized collection data that is being provided/published to the external community via your institution's and/or community web portals such as GBIF, iDigBio, etc.**

	Specimens	Lots
Algae	<input type="checkbox"/>	<input type="checkbox"/>
Arthropods	<input type="checkbox"/>	<input type="checkbox"/>
Bryophytes	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrates, terrestrial (other than arthropods and mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Fungi including lichens	<input type="checkbox"/>	<input type="checkbox"/>
Herpetology (reptiles & amphibians)	<input type="checkbox"/>	<input type="checkbox"/>
Ichthyology (fishes)	<input type="checkbox"/>	<input type="checkbox"/>
Invertebrate Paleontology (invertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Malacology (mollusks)	<input type="checkbox"/>	<input type="checkbox"/>
Mammalogy	<input type="checkbox"/>	<input type="checkbox"/>
Marine Invertebrates	<input type="checkbox"/>	<input type="checkbox"/>
Ornithology (birds)	<input type="checkbox"/>	<input type="checkbox"/>
Paleobotany & Palynology (fossil plants & pollen)	<input type="checkbox"/>	<input type="checkbox"/>

	Specimens	Lots
Vascular Plants	<input type="checkbox"/>	<input type="checkbox"/>
Vertebrate Paleontology (vertebrate fossils)	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please describe.	<input type="checkbox"/>	<input type="checkbox"/>

**Q8. Please indicate whether digitization and publication of the collection data has benefited your institution, collections or programs (e.g., research, education, service) in any of the manners listed below. Please check all that apply.**

- ☐ increased exposure
- ☐ increased loans
- ☐ increased visits to use/study the collections by researchers, educators, etc. who discover you have material of interest to their work
- ☐ increased publicity
- ☐ increased use of collections and associated data in research
- ☐ increased research and publications
- ☐ increased success in extramural research and collections grants
- ☐ increased public awareness of the importance of collections
- ☐ curation practices changed as a result of digitization (more effective, efficient)
- ☐ use of the collection data by new communities
- ☐ use of the collection specimens by new communities
- ☐ better knowledge of the exact holdings of the collection (discovery)
- ☐ better management of physical specimens
- ☐ better management of the associated data
- ☐ digital preservation
- ☐ reduced physical handling of the physical collection
- ☐ new products derived from collection use and/or new uses of the collection
- ☐ new skills for the staff
- ☐ Increased private fundraising
- ☐ enhanced data quality
- ☐ Other. Please explain. \_\_\_\_\_
- ☐ No basis to judge

### **IMAGING**

**Q9. Are you currently imaging your collection, i.e., capturing digital images of the physical specimen as part of the collection digitization process?**

- ☐ Yes
- ☐ No

If you answer is NO, please proceed to Q12

**Q10. Please estimate the percentage of each collection that has been imaged.**

- \_\_\_\_\_ Algae
- \_\_\_\_\_ Arthropods
- \_\_\_\_\_ Bryophytes
- \_\_\_\_\_ Invertebrates, terrestrial (other than arthropods and mollusks)
- \_\_\_\_\_ Fungi including lichens
- \_\_\_\_\_ Herpetology (reptiles & amphibians)
- \_\_\_\_\_ Ichthyology (fishes)
- \_\_\_\_\_ Invertebrate Paleontology (invertebrate fossils)
- \_\_\_\_\_ Malacology (Mollusks)
- \_\_\_\_\_ Mammalogy
- \_\_\_\_\_ Marine Invertebrates
- \_\_\_\_\_ Ornithology (birds)
- \_\_\_\_\_ Paleobotany & Palynology (fossil plants & pollen)
- \_\_\_\_\_ Vascular Plants
- \_\_\_\_\_ Vertebrate Paleontology (vertebrate fossils)
- \_\_\_\_\_ Other. Please describe.

**Q11. Please estimate the percentage of the imaged collection provided/published to the external community via your institution's and/or community web portals, such as GBIF, iDigBio, etc.**

- \_\_\_\_\_ Algae
- \_\_\_\_\_ Arthropods
- \_\_\_\_\_ Bryophytes
- \_\_\_\_\_ Invertebrates, terrestrial (other than arthropods and mollusks)
- \_\_\_\_\_ Fungi including lichens
- \_\_\_\_\_ Herpetology (reptiles & amphibians)
- \_\_\_\_\_ Ichthyology (fishes)
- \_\_\_\_\_ Invertebrate Paleontology (invertebrate fossils)
- \_\_\_\_\_ Malacology (Mollusks)
- \_\_\_\_\_ Mammalogy

- \_\_\_\_\_ Marine Invertebrates
- \_\_\_\_\_ Ornithology (birds)
- \_\_\_\_\_ Paleobotany & Palynology (fossil plants & pollen)
- \_\_\_\_\_ Vascular Plants
- \_\_\_\_\_ Vertebrate Paleontology (vertebrate fossils)
- \_\_\_\_\_ Other. Please describe.

**Q12. Which of the following factors influence your decision whether or not to digitize or image a specimen/lot? Please check all that apply.**

- ☐ Research priority
- ☐ Taxonomic priority
- ☐ Geographic priority
- ☐ Funding/grant priority and opportunity
- ☐ Health and human service needs
- ☐ Partnership in a larger community effort
- ☐ No target priority, just opportunistic.
- ☐ Other. Please specify. \_\_\_\_\_

## **METADATA**

**Q13. Please indicate the kinds of information (or metadata) you provide/publish or/and consider critical. Please check all that apply.**

	We are currently providing this information.	I think it is critical we provide this information.
Taxonomic range	<input type="checkbox"/>	<input type="checkbox"/>
Geographical range	<input type="checkbox"/>	<input type="checkbox"/>
Kingdom	<input type="checkbox"/>	<input type="checkbox"/>
Place name coverage	<input type="checkbox"/>	<input type="checkbox"/>
Specimen preservation method/s	<input type="checkbox"/>	<input type="checkbox"/>
Percent of collection georeferenced	<input type="checkbox"/>	<input type="checkbox"/>
Major collectors/ collections	<input type="checkbox"/>	<input type="checkbox"/>
Publications	<input type="checkbox"/>	<input type="checkbox"/>
Collection size	<input type="checkbox"/>	<input type="checkbox"/>
Percent of collection digitized	<input type="checkbox"/>	<input type="checkbox"/>
Type specimens information	<input type="checkbox"/>	<input type="checkbox"/>
Name of curator	<input type="checkbox"/>	<input type="checkbox"/>
Name of technical staff	<input type="checkbox"/>	<input type="checkbox"/>
Name of collection manager	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please list.	<input type="checkbox"/>	<input type="checkbox"/>
Not applicable	<input type="checkbox"/>	<input type="checkbox"/>

**Q14. How do you share this metadata? Please check all that apply.**

- ☐ GRBio
- ☐ GBIF Registered Organization
- ☐ Index Herbariorum
- ☐ Print publication
- ☐ Other. Please specify. \_\_\_\_\_
- ☐ Not applicable

## **FUNDING/SUSTAINABILITY**

**Q15. Have you had or do you currently have funding to support your digitization/imaging efforts?**

- ☐ Yes
- ☐ No

**Q16. How do you fund or attempt to fund your digitization/imaging? Please check all that apply.**

- ☐ Part of the regular institutional budget
- ☐ External funding
- ☐ Ad hoc funding (e.g., opportunistic gifts)
- ☐ Not applicable

If you do not select "External funding" please skip to Q19

**Q17. What are/were the present/past sources of external funds for your digitization/imaging efforts? Please check all that apply.**

- ☐ Foundations and philanthropic organizations
- ☐ Industry or commercial entities
- ☐ Government agencies
- ☐ Other. Please specify. \_\_\_\_\_

**Q18. Which of the following best describes your approach for securing external funding for digitization/imaging? Please check all that apply.**

- ☐ We submit research proposals to agencies and foundations
- ☐ We work with our development office which targets potential funding sources

**Q19. Is your institution committed to sustaining your digitization/imaging efforts and digitized resources?**

- ☐ Yes
- ☐ No

If you answered NO, please skip to Q22

**Q20. Which of the following are included in this commitment to sustain the digitization effort? Please check all that apply.**

- ☐ Staff training
- ☐ Long term archival storage
- ☐ Long term curation of data
- ☐ Seeking continued funding
- ☐ Other. Please describe. \_\_\_\_\_

**Q21. How do you get your digitization done? Please check all that apply.**

	Not At All	Occasionally	Frequently
Paid staff	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Paid students, including work study or scholarship	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unpaid student internships	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Student volunteers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Crowdsourcing online	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Individual volunteers from the community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Volunteers organized through clubs, professional interest groups	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Outsourcing/contracting third party	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other. Please explain.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Q22. Which of the following describe your long-term plan for the digitization of your collections? Please check all that apply.**

- ☐ We will digitize only new additions to the collections.
- ☐ We will digitize only components of collections unique to our institution (e.g., type specimens, endemic species).
- ☐ We will digitize components of collections in response to research-based needs.
- ☐ We will gradually digitize our entire collection.
- ☐ We do not plan to digitize our collections.
- ☐ Other. Please explain. \_\_\_\_\_

## **IMPEDIMENTS**

**Q23. Which of the following factors limit your digitization efforts or have contributed to the decision at your institution or individual collection not to digitize and/or image the collections? Please check all that apply.**

- ☐ Not an institutional priority
- ☐ Not a collection priority
- ☐ Not a priority of the individual in charge of the collection
- ☐ Funding/resources not available
- ☐ Lack of time among personnel
- ☐ Limited expertise among personnel
- ☐ Insufficient information on digitization process and protocols
- ☐ Collection data has errors that must be corrected prior to any digitization effort
- ☐ Lack of perceived need (not convinced it is necessary or worthwhile)

- ☐ Size of task is overwhelming
- ☐ Collection deemed not sufficiently valuable to merit digitization
- ☐ Not a good effort/payoff ratio
- ☐ No benefit to reappointment, tenure or promotion at my institution
- ☐ Not sustainable
- ☐ Not willing to share data. Please explain the reason. \_\_\_\_\_
- ☐ Other. Please explain. \_\_\_\_\_

**Q24. Please rank the top 5 impediments (From Q23), in order of most challenging, to least challenging.**

Top 5 Impediments
Not an institutional priority
Not a collection priority
Not a priority of the individual in charge of the collection
_Funding/resources not available
Lack of time among personnel
Limited expertise among personnel
Insufficient information on digitization process and protocols
Collection data has errors that must be corrected prior to any digitization effort
Lack of perceived need (not convinced it is necessary or worthwhile)
_ Size of task is overwhelming
Collection deemed not sufficiently valuable to merit digitization
Not a good effort/payoff ratio
No benefit to reappointment, tenure or promotion at my institution
_ Not sustainable
Not willing to share data. Please explain the reason.
Other. Please explain.



**OPTIONAL**

Q25. Please provide your name and contact information so that we can contact you if we have any questions. **If you provide this information, we will share a summary of the survey results with you directly.** This information is OPTIONAL.

- Name
- Title
- Institution
- City
- State/Province
- Postal Code
- Country
- Email
- Phone

## **ANNEX B: The Training Course Program on Building capacity for developing and maintaining the database system as well as for utilization of GBIF**

Main Venue: National Museum of Nature and Science, Tsukuba, Ibaraki, Japan

14 June-17 June, 2016

### **Program:**

#### **Day1 (14 June, Tuesday): Getting started: sharing information**

##### **[Japan side]**

##### **1) Welcome and self-introduction [All]**

Self-introduction and brief introduction of the scientific background of the participants are presented.

##### **2) Review of the Proposal of the Mentoring Program (with JICA) [Hosoya]**

By reviewing the Proposal, we clarify the goal of the whole project. Connection to JICA SNRM (Sustainable Natural Resource Management Project) will be discussed

##### **3) Clarifying the aim and goal of the visit [Hosoya]**

The participants are expected to clarify the thematic aim and the final product of the visit.

##### **4) Relationship with JICA program [Kenmiya]**

- JICA program for biodiversity information is explained in relation to the present program.

##### **5) Introduction to GBIF [Hosoya]**

Using slides, GBIF provides fundamental information (e.g. organization, strategy, background to the regionalization, activities, functions, benefit when joining GBIF) of GBIF to the participants. Quick overview of the website of GBIF with reference to the available resources will be presented.

Experience in joining GBIF ( data sharing mechanism to collect, analyze and share data and information?)

##### **6) Activities in Asia Region [Hosoya]**

Using the slides, Asian representative provides the recent activities in Asia region (Regional strategy, scientific activities, etc.). Experiences in join in GBIF (advantages, disadvantages, responsibility of member);

(PM)

### 1) **Introduction to the status of Japanese Node (JBIF) [Hosoya]**

- - The Node manager provides the status report of JBIF including its organization (how many nodes, role of Ministry of Environment and other related organization).
- - Requirements of human and financial resources and technical standards, strategy, function, maintenance and operation of JBIF. One of the major topic the Science Museum Net will be discussed separately below.
- - The connection between GBIF and JBIF, national database system (any disadvantage, member responsibility).

### 2) **How Science Museum Net works [Hosoya]**

- Science Museum Net is a domestic network for data publication to GBIF and data sharing mechanism for domestic use. The presenter will provide its organization and function (Input, update, output, data standards...), structure based on the website and other resources (The typical or technical standards for input data? Any limits or disadvantage in connecting to other resources?)

### 3) **Observation on specimen collection and data digitization from external view [Ebihara]**

A researcher's view on current status on specimen collection and data digitization in Vietnamese institute will be presented.

### 4) **Applying cumulated data to political decision making [Ebihara]**

- An example is presented for providing a data based on the analysis of cumulated specimen data for potential conservative policy making in Japan is presented.

### 5) **DarwinCore [Jinbo, Osawa]**

- Overview of the fields of Darwin Core and Darwin Core Archives will be presented.

### 6) **Other key words and concepts for understanding biodiversity informatics (data paper, open data, CC license, DOI, etc.) [Osawa, Jinbo]**

- Some technical terms to understand biodiversity informatics will be presented and explained with their backgrounds.

## **[Vietnam side]**

### 1) **Status of biodiversity informatics in Vietnam [Vietnam Participants, TBD]**

- Status report on digitization and data mobilization are expected to be presented from the Vietnamese participants.

### 2) **NBDS: its function [Vietnam Participants, TBD]**

Overview of NBDS (National Biodiversity Data System) is expected to be presented from the Vietnamese participants.

## **Day2 (15 June, Wednesday): Discussion regarding the possible organization and role of Vietnam Node**

(AM)

**1) Accelerating data mobilization from Natural Historical Collection [Nakae]**

Questionnaire presented by the GBIF working group, process of response collection, and the results so far obtained will be presented.

(PM)

**1) Discussion regarding the possible organization of Vietnam Node [Vietnam Participants, TBD]**

A group discussion on possible organization of Vietnam Node, followed by a presentation from the Vietnamese participants.

**2) Discussion on the data mobilization [Vietnam Participants, TBD]**

- A group discussion on possible mechanism and incentives on data mobilization, followed by a presentation from the Vietnamese participants.

**Day3 (16 June, Thursday): IPT function and data exploitation**

**1) Examples of exploitation of the data in GBIF [Totsu]**

- Various interface and function to utilize data provided by GBIF will be presented based on GBIF's experience.

**2) IPT (Local use) [Osawa]**

IPT (Integrated Publication Toolkit) is a software required to send the biodiversity data to GBIF. One of the function of IPT is to publish a data paper compatible to Pensoft journal. The installation and data conversion will be demonstrated. The participants will learn the fundamental function of IPT through the process. The participants are recommended to bring their own PCs.

**Day4 (17 June, Thursday): Visit to National Institute of Genetics**

**1) Observation on IPT (connection to GBIF) [Yamazaki, Otsubo]**

IPT installed in server is to be used for data publication to GBIF. The function and user interface of IPT will be demonstrated by the specialist at NIG.

**2) Group discussion on data publication to GBIF**




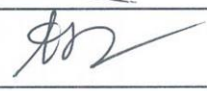


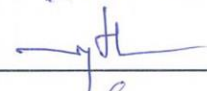



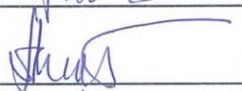


The way forward to install IPT in the future is expected to be discussed by the Vietnamese participants.

## ANNEX C: Training workshop for trainers in Hanoi

### ATTCHMENT 1: List participants for workshops for trainers in Hanoi

#### LIST OF ATTENDANTS

"Training course for trainers on GBIF"

No.	Name	Organization	Attendance allowance	Signature
1	Trần Mạnh Tiến	FIMO - VNU	3 days x 20 EUR = 60 EUR	
2	Bùi Quang Huy	VNU		
3	Lê Công Thắng	FIMO	3 days x 20 EUR = 60 EUR	thang
4	Nguyễn Văn Dương	FIMO	3 days x 20 EUR = 60 EUR	Dương
5	Hoàng Xuân Phương	VNU	3 days x 20 EUR = 60 EUR	phương
6	Nguyễn Văn Diệp	VNU	3 days x 20 EUR = 60 EUR	
7	Lê Xuân Cốc	FIMO	3 days x 20 EUR = 60 EUR	
8	Đỗ Thị Thu Thủy	TICA	3 days x 20 EUR = 60 EUR	Thủy
9	SAHI SH/NGSO	TICA		
10	Tsuyoshi Hiro	TICA		細野 剛
11	Vũ Anh Tân	Institute of Geography	3 days x 20 EUR = 60 EUR	
12	Nguyễn Thiên Tài	VNMN	3 days x 20 EUR = 60 EUR	
13	Hồng Văn Chung	Fi Pi	3 days x 20 EUR = 60 EUR	chp
14	Vũ Quang Nam	ĐH Lâm nghiệp	3 days x 20 EUR = 60 EUR	
15	Nguyễn Văn Sĩ	Viện Sinh thái và TN	3 days x 20 EUR = 60 EUR	
16	Hồng Văn Sơn	ĐH Lâm Nghiệp	3 days x 20 EUR = 60 EUR	
17	Trình Văn Thành	ĐH Lâm Nghiệp	3 days x 20 EUR = 60 EUR	Thư
18	Đỗ Văn Tú	Viện Sinh thái		
19	Nguyễn Xuân Dũng	BIF		
20	Lê Anh Dũng	Dain ABS	3 days x 20 EUR = 60 EUR	



No.	Name	Organization	Attendance allowance	Signature
21	Đỗ Thị Kim Nhung	Viện NC Sinh vật MTR	3 days x 20 EUR = 60 EUR	Nhung
22	Nguyễn Đình Dũng	Viện Sinh thái TNSV	3 days x 20 EUR = 60 EUR	Dũng
23	Phạm Ng. Th. Sơn	Cục TTKH & CNQG	3 days x 10 EUR = 60 EUR	Son
24	Chau Thị Hằng	Viện Sinh thái TNSV	3 days x 10 EUR = 60 EUR	Hg
25	Bùi Văn Thành	Viện Sinh thái TNSV	3 days x 20 EUR = 60 EUR	Thành
26	Ngô Huy Hoàng	Tổng ĐH KHTN HN	3 days x 10 EUR = 60 EUR	Hoàng
27	Ngô Hoàng Hào	FILP II	3 days x 20 EUR = 60 EUR	Hào
28	Lương Minh Nguyên	RIPs	3 days x 20 EUR = 60 EUR	Nguyên
29	Phùng Hồng	Bộ NN&PTNT	3 days x 20 EUR = 60 EUR	Hồng
30	Trương Quốc Trang	Cục BDDSM	3 days x 20 EUR = 60 EUR	Trang
31	Phùng Thu Thủy	BCA	/	Thủy
32	Nguyễn Nhung	IEA	3 days x 20 EUR = 60 EUR	Nhung
33	Phùng Văn Vui	MONRE	3 days x 10 EUR = 60 EUR	Vui
34	Hà Tuấn Minh	Sở KHCN	3 days x 20 EUR = 60 EUR	Minh

## ATTACHMENT 2: The Agenda of training workshop for trainers who are potential information holders and relevant stakeholders on GBIF

Time: 19-21 July 2016

Venue: Meeting Hall of Ministry of Natural Resources and Environment

### **DAY 1: 19/7/2016**

Time	Activities	Responsibility
<i>Morning Session</i>		
<b>8:00 – 8:15</b>	<b>Registration</b>	Biodiversity Conservation Agency
<b>8:15-8:30</b>	Opening Remark	Biodiversity Conservation Agency
<b>8:30 – 9:00</b>	<ul style="list-style-type: none"> <li>- Introduction to NBDS</li> <li>- Overview of collaboration mechanism on data sharing for NBDS</li> <li>- How provinces and other organizations can collaborate in biodiversity data sharing for NBDS</li> </ul>	Biodiversity Conservation Agency together with resource persons
<b>9:00 – 9:40</b>	Discussion Q & A	All Participants
<b>09:40-10:10</b>	<b>Break</b>	
<b>10:10-10:35</b>	Sharing the data input into NBDS and providing the guidance for data input into NBDS	Resources Person/ IT technician Centre for Environmental Information and Data, Viet Nam Environment Administration
<b>10:35 – 11:45</b>	Discussion Q & A	
<b>11:45</b>	<b>Lunch</b>	
<i>Afternoon session</i>		

<b>Time</b>	<b>Activities</b>	<b>Responsibility</b>
<b>13:30 – 14:30</b>	Demonstrating the functions and manipulation on NBDS interface The data input, export and data exploitation on NBDS	Dr. Nguyen Xuan Thuy Data Manager Centre for Environmental Information and Data, Viet Nam Environment Administration (Trainees from Japan training course)
<b>14:30–15:00</b>	Discussion Q&A	All Participants
<b>15:00 -15:15</b>	<b>Break</b>	
<b>15:15- 16:15</b>	Practice in using NBDS with the collected data from the trainees	Dr. Nguyen Xuan Thuy Data Manager Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Resource persons Technical assistants Centre for Environmental Information and Data, Viet Nam Environment Administration (Trainees from Japan training course)
<b>16:15- 16:30</b>	<b>Break</b>	
<b>16:30-17:00</b>	Discussion Q & A session	All participants
<b>17:00</b>	<b>Wrap- up and Closure for day 1</b>	Biodiversity Conservation Agency



**DAY 2: 20/7/2016**

<b>Time</b>	<b>Activities</b>	<b>Responsibility</b>
<i>Morning Session</i>		
<b>8:00 – 8:15</b>	<b>Registration</b>	Biodiversity Conservation Agency
<b>8:15-10:00</b>	Continue to practice on data input/ data export from the system Data searching and utilization in the NBDS	Dr. Nguyen Xuan Thuy Data Manager Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Resource persons Technical assistants Centre for Environmental Information and Data, Viet Nam Environment Administration (Trainees from Japan training course)
<b>10:00- 10:30</b>	<b>Break</b>	Biodiversity Conservation Agency together with resource persons
<b>10:30- 11:10</b>	- Overview and Introduction on GBIF - Sharing experiences in data mobilization, processing and sharing from Japan	Dr. Do Van Tu Institute of Ecology and Biological Resources-IEBR (Trainees from Japan training course)
<b>11:10-11:45</b>	Discussion Q & A	All Participants
<b>11:45</b>	<b>Lunch</b>	
<i>Afternoon session</i>		
<b>13:30 – 14:30</b>	Introduction on DarwinCore and IPT software of GBIF	Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Trainer from Japan training course

<b>Time</b>	<b>Activities</b>	<b>Responsibility</b>
<b>14:30–15:30</b>	Discussion Q&A	All Participants
<b>15:30-15:45</b>	<b>Break</b>	
<b>15:45- 16:40</b>	Installation of IPT and DarwinCore files into the laptops	Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Dr. Nguyen Xuan Thuy Data Manager  Trainers from Japan training course
<b>16:40-17:00</b>	Discussion	All Participants
<b>17:00</b>	<b>Wrap- up and Closure for day 2</b>	Biodiversity Conservation Agency

**DAY 3: 21/7/2016**

<b>Time</b>	<b>Activities</b>	<b>Responsibility</b>
<i>Morning Session</i>		
<b>8:00 – 8:15</b>	<b>Registration</b>	Biodiversity Conservation Agency
<b>8:15-10:00</b>	Practice on using IPT software to publish data to GBIF	Dr. Nguyen Xuan Thuy Data Manager Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Resource persons Technical assistants Centre for Environmental Information and Data, Viet Nam Environment Administration

<b>Time</b>	<b>Activities</b>	<b>Responsibility</b>
		(Trainees from Japan training course)
<b>10:00- 10:30</b>	<b>Break</b>	Biodiversity Conservation Agency together with resource persons
<b>10:30- 11:30</b>	Discussion Q & A	All participants
<b>11:30</b>	<b>Lunch</b>	
<b>13:30 – 15:30</b>	Practice on using IPT software to publish data to GBIF (cont)	Dr. Bui Quang Hung Vietnam Science and Technology University, VNU Trainer from Japan training course
<b>15:30-15:45</b>	<b>Break</b>	
<b>15:45-17:00</b>	Discussion	All Participants
<b>17:00</b>	<b>Wrap- up and Closure</b>	Biodiversity Conservation Agency

## ATTACHMENT 3: The Evaluation Questionnaire for trainees

### EVALUATION QUESTIONNAIRE

TRAINING WORKSHOP FOR TRAINERS ON NBDS AND GBIF

Hanoi, 19- 21 July 2016

	Greatly Interesting	Interesting	Normal	Not interesting
<b>1. The topics of the training workshop</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comment :

.....

.....

.....

	greatly useful	Useful	Normal	Limited
<b>2. Contents of Presentations</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comment :

.....

.....

.....

<b>3. Methods of trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>
Presentation on NBDS overview				
Presentation on NBDS data input/ export /search/using				
Presentation on functions and manipulation on NBDS interface				
Practice of NBDS				

<b>3. Methods of trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>
Presentation on Overview and Introduction on GBIF				
Presentation on Introduction on DarwinCore and IPT software of GBIF				
IPT installation and practice				

Comment

.....

.....

<b>4. The explanation and interpreting of the trainers</b>	<b>Greatly exciting (1)</b>	<b>Exciting (2)</b>	<b>Normal (3)</b>	<b>Boring (4)</b>	<b>Not understanding (5)</b>
Presentation on NBDS overview					
Presentation on NBDS data input/ export /search/using					
Presentation on functions and manipulation on NBDS interface					
Practice of NBDS					
Presentation on Overview and Introduction on GBIF					
Presentation on Introduction on DarwinCore and IPT software of GBIF					
IPT installation and practice					

Comment/ clarification of point (5)

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**6. Difficulties faced in practicing NBDS. Specify :**

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**7. Difficulties faced in practicing IPT to publish data. Specify :**

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**8. Other comments for improving the system of NBDS or recommend other functions**

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**9. Other topics and themes you would like to further discuss and know more about ?**

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.....

**10. Other contents on GBIF you would like to know more ?**

.....




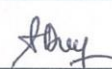
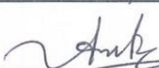
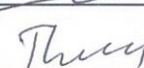
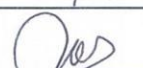
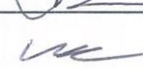

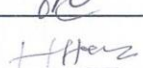
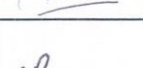

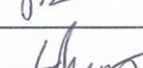
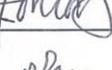
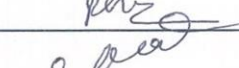
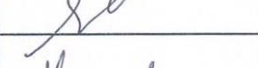
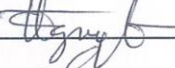

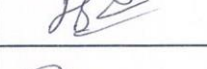
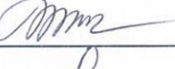
*Thank you for your evaluation !*

## ANNEX D: The Promotion Workshop on Biodiversity Information in Viet Nam












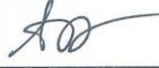








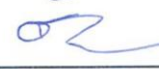
### ATTCHMENT 1: List of Participants of the Promotion Workshop on Biodiversity Information in Viet Nam for Relevant Stakeholders:

#### LIST OF ATTENDANTS

"Workshop on Biodiversity Information in Vietnam"

No.	Name	Organization	Attendance allowance	Signature
1	Đào Thái Nân	VEA	2days x 20 EUR = 40 EUR	
2	Lê Trung Dũng	ĐH Sư phạm HN	2days x 20 EUR = 40 EUR	
3	Bùi Văn Thanh	Viện STTN SV-VAST	2days x 20 EUR = 40 EUR	
4	Ngô Đình Dũng	VAST	2days x 20 EUR = 40 EUR	
5	Vũ Anh Tài	Viện địa lý	2days x 20 EUR = 40 EUR	
6	Đỗ Thị Thuý	Jica	2days x 20 EUR = 40 EUR	
7	Phạm Hồng Thái	Bảo tàng TN VN	2days x 20 EUR = 40 EUR	
8	Ngô Huy Vũ	Sở TNMT HN	2days x 20 EUR = 40 EUR	
9	Trần Thị Hồng	ĐH KHTN	2days x 20 EUR = 40 EUR	
10	Hoàng Thu Hiền	MOET	2days x 20 EUR = 40 EUR	
11	Đỗ Thị Kim My	Viện NC ST&MT rừng	2days x 20 EUR = 40 EUR	
12	Phạm Ngô T Sen	Cục TT CN & Giá	2days x 20 EUR = 40 EUR	
13	Đỗ Văn Tú	Viện STTN SV	2days x 20 EUR = 40 EUR	
14	Ngô Thu Phương	IMHEN	2days x 20 EUR = 40 EUR	
15	Ngô Hoàng Thảo	FIPI	2days x 20 EUR = 40 EUR	
16	Hoàng Minh Nghĩa	FIPI	2days x 20 EUR = 40 EUR	
17	Hoàng Văn Chung	WWF	2days x 20 EUR = 40 EUR	
18	Hoàng Ngọc Khắc	ĐHTN & MT Hà Nội	2days x 20 EUR = 40 EUR	
19	Lê Quang Tuấn	VAST	2days x 20 EUR = 40 EUR	
20	Ngô Huy Hoàng	Trường ĐHKH HN	2days x 20 EUR = 40 EUR	



No.	Name	Organization	Attendance allowance	Signature
21	Ng Mai Khuyên	MONRE	2 days x 20 EUR = 40 EUR	
22	Mã Văn Linh	MARD	2 days x 20 EUR = 40 EUR	
23	Phạm Văn Mẫu	Chi cục Kiểm HIN	2 days x 20 EUR = 40 EUR	
24	Ng Thị Thu	TTĐDSH, ĐN Lâm nghiệp	2 days x 20 EUR = 40 EUR	
25	Lê Thanh Huyền	ĐNTN&MT HIN	2 days x 20 EUR = 40 EUR	
26	Trần Mạnh Tiến	ĐN Nhà Nội	2 days x 20 EUR = 40 EUR	
27	Bùi Quang Dũng	VNU	2 days x 20 EUR = 40 EUR	
28	Lê Công Thắng	ĐN Bách Khoa	2 days x 20 EUR = 40 EUR	
29	Ng Văn Dũng	FIMO-VNU	2 days x 20 EUR = 40 EUR	
30	Khương Xuân Phụng	FIMO-VNU	2 days x 20 EUR = 40 EUR	
31	Ng Văn Diệp	ĐH CN	2 days x 20 EUR = 40 EUR	
32	Lê Xuân Cầm	ĐH CN	2 days x 20 EUR = 40 EUR	
33	Ng Huyền Nhung	VFA	2 days x 20 EUR = 40 EUR	
34	Nguyễn Xuân Dữ	BCA	2 days x 20 EUR = 40 EUR	
35	Phùng Văn Vui	MONRE	2 days x 20 EUR = 40 EUR	
36	Lê Anh Dũng	Dân ABS	2 days x 20 EUR = 40 EUR	
37	Trương Q. Trang	Cục BTĐDSH	2 days x 20 EUR = 40 EUR	
38	Phạm T. Quỳnh Lê	BCA	2 days x 20 EUR = 40 EUR	
39	Trần T. Nguyệt	Cục BTĐDSH	2 days x 20 EUR = 40 EUR	
40	Hà T. Minh Thân	MARD	2 days x 20 EUR = 40 EUR	
41	Đào Minh Danh	Sở KNCN HIN	2 days x 20 EUR = 40 EUR	



[illegible]

## ATTCHMENT 2: Agenda of The Promotion Workshop On Biodiversity Information In Viet Nam For Relevant Stakeholders

Time: 03- 04 August 2016

Venue: MONRE meeting Hall, 10 Ton That Thuyet Str., Hanoi

### DAY 1: 03/08/2016

Time	Activities	Facilitors
<b>8:00 – 8:15</b>	<b>Registration</b>	Biodiversity Conservation Agency
<b>8:15-8:30</b>	Opening Remark	Biodiversity Conservation Agency
<b>8:30 – 9:00</b>	<ul style="list-style-type: none"> <li>- Introduction to NBDS</li> <li>- Overview of collaboration mechanism on data sharing for NBDS</li> <li>- How provinces and other organizations can collaborate in biodiversity data sharing for NBDS</li> </ul>	Biodiversity Conservation Agency together with resource persons
<b>9:00 – 9:30</b>	<ul style="list-style-type: none"> <li>- Overview on GBIF</li> <li>- Node function exemplified by Japan (JBIF)</li> </ul>	Tsuyoshi Hosoya PhD, National Museum of Nature and Science, Japan
<b>9:30 – 10:00</b>	Sharing experiences in data mobilization, processing and sharing from Japan	Resource persons (Trainees from Japan training course)
<b>10:00 – 10:30</b>	Discussion Q & A	All Participants
<b>10:30 – 10:45</b>	<b>Break</b>	
<b>10:45-11:15</b>	Introduction of the 1 <sup>st</sup> draft road map for Vietnam to participate in GBIF	Biodiversity Conservation Agency Dr. Do Van Tu Expert tem IEBR
<b>11:15–12:00</b>	Discussion Q&A	All Participants
<b>12:00</b>	<b>Lunch</b>	

Time	Activities	Facilitors
<b>13:30 – 15:00</b>	Discussion with key potential data holders - Participation of Viet Nam in GBIF -The roadmap for Vietnam to become GBIF member -The possible data mobilization strategy/mechanism - The possible data sharing strategy/mechanism	- Biodiversity Conservation Agency - Tsuyoshi Hosoya PhD, National Museum of Nature and Science, Japan - All key data holders
<b>15:00- 15:10</b>	<b>Break</b>	
<b>15:10-16:30</b>	Discussion (continue)	
<b>16:30</b>	<b>Wrap- up and Closure</b>	Biodiversity Conservation Agency

## **DAY 2: 04/08/2016**

Time	Activities	Facilitors
<b>8:00 – 8:15</b>	<b>Registration</b>	Biodiversity Conservation Agency
<b>8:15-8:30</b>	Introduction on FORMIS ( Forestry Management Information System)	FORMIS project
<b>8:30 – 9:00</b>	Discussion Question and Answer (Q&A) Section	All Participants
<b>9:00 – 9:30</b>	Sharing experience from using NBDS for inputting data	Biodiversity Conservation Agency
<b>9:30 – 10:00</b>	<b>Break</b>	
<b>10:00 – 10:30</b>	Discussion Question and Answer (Q&A) Section	All Participants
<b>10:30-11:15</b>	Sharing experiences in data mobilization, processing and sharing from some major data holders	Institute of Geography Forestry Inventory and Planning Institute

<b>Time</b>	<b>Activities</b>	<b>Facilitors</b>
<b>11:15–12:00</b>	Discussion	
<b>12:00</b>	<b>Closure Lunch</b>	
<b>13:30 – 15:00</b>	Discussion (continue)	
<b>15:00- 15:10</b>	<b>Break</b>	
<b>15:10-16:30</b>	Discussion (continue)	
<b>16:30</b>	<b>Wrap- up and Closure</b>	Biodiversity Conservation Agency

# ATTACHMENT 3: The Evaluation Questionnaire for the Promotion Workshop

## EVALUATION QUESTIONNAIRE

PROMOTION WORKSHOP ON BIODIVERSITY INFORMATION IN VIET NAM

Hanoi, 03- 04 August 2016

	Greatly Interesting	Interesting	Normal	Not interesting
<b>1. The topics of the training workshop</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comment :

.....

.....

.....

	greatly useful	Useful	Normal	Limited
<b>2. Contents of Presentations</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Comment :

.....

.....

.....

<b>3. Methods of trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>
Presentation on NBDS overview and introduction				
Presentation on GBIF and JBIF introduction				
Presentation on Sharing experiences in data mobilization, processing and sharing from Japan				
Presentation on Introduction of the 1 <sup>st</sup> draft road map for				

<b>3. Methods of trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>
Vietnam to participate in GBIF				
Presentation on Introduction on FORMIS (Forestry Management Information System)				
Presentation on Sharing experience from using NBDS for inputting data				
Presentation on Sharing experiences in data mobilization, processing and sharing from some major data holders				

Comment

.....

.....

<b>The explanation and interpreting of the trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>	<b>Not understanding</b>
Presentation on NBDS overview and introduction					
Presentation on GBIF and JBIF introduction					
Presentation on Sharing experiences in data mobilization, processing and sharing from Japan					
Presentation on Introduction of the 1 <sup>st</sup> draft road map for Vietnam to					

<b>The explanation and interpreting of the trainers</b>	<b>Greatly exciting</b>	<b>Exciting</b>	<b>Normal</b>	<b>Boring</b>	<b>Not understanding</b>
participate in GBIF					
Presentation on Introduction on FORMIS ( Forestry Management Information System)					
Presentation on Sharing experience from using NBDS for inputting data					
Presentation on Sharing experiences in data mobilization, processing and sharing from some major data holders					

Comment/ clarification of point (5)

.....

.....

.....

#### **6. Assess the necessity of Viet Nam's participation in GBIF**

Truely necessary

Necessary but more consideration

Not truely Necessary

☐
☐
☐

Specify :

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.....

.....

#### **7. Is your organization/ institute willing to share / provide data to GBIF?**

Specify :

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**8. Other topics and themes you would like to further discuss and know more about ?**

.....

.....

.....

**9. Other contents on Biodiversity Information you would like to know more ?**

.....

.....

**10. Do you have any comments for logistics preparation?**

.....

.....

.....

*Thank you for your evaluation !*



## **ANNEX E: The road map for Vietnam participating in global biodiversity information facility (GBIF) (draft 1)**

### **Contents**

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**Figure 1.** Map of GBIF Country Participants

a) Purpose of GBIF

The purpose of GBIF is to promote, co-ordinate, design, enable and implement the compilation, linking, standardisation, digitisation and global dissemination and use of the world's biodiversity data, within an appropriate framework for property rights and due attribution. GBIF works in close co-operation with established programmes and organisations that compile maintain and use biological information resources. The Participants, working through GBIF, establish and support a distributed information system that enables users to access and utilise considerable quantities of existing and new biodiversity data.

b) Goals of GBIF It is the intention of the Participants that GBIF:

- be shared and distributed, while encouraging co-operation and coherence;
- be global in scale, though implemented nationally and regionally;
- be accessible by individuals anywhere in the world, offering potential benefits to all, while being funded primarily by those that have the greatest financial capabilities;
- promote standards and software tools designed to facilitate their adaptation into multiple languages, character sets and computer encodings;
- serve to disseminate technological capacity by drawing on and making widely available scientific and technical information; and
- make biodiversity data universally available, while fully acknowledging the contribution made by those gathering and publishing these data.

c) Some facts about GBIF

- It provides a single point of access (through this portal and its web services) to hundreds of millions of records, shared freely by hundreds of institutions worldwide, making it the biggest biodiversity database on the Internet.
- The data accessible through GBIF relate to evidence about more than 1.6 million species, collected over three centuries of natural history exploration and including current observations from citizen scientists, researchers and automated monitoring programmes
- More than 1,400 peer-reviewed research publications have cited GBIF as a source of data, in studies spanning the impacts of climate change, the spread of pests and diseases, priority areas for conservation and food security. About one such paper is published each day.
- Many GBIF Participant countries have set up national portals using tools, codes and data freely available through GBIF to better inform their citizens and policy makers about their own biodiversity.

## **1.2. Governance (How decisions, advice, management and funding are organized in GBIF)**

### ***The GBIF Governing Board***

Pursuant to Paragraphs 4.2 and 4.3 of the GBIF MOU, the Governing Board will consist of one Representative from each Participant. The Governing Board is the means by which GBIF Participants make collective decisions. Currently meeting once a year, it consists of one representative from each Participant country and organization. The Governing Board meets in a Participant country that offers to host it. The meeting is organized by the Secretariat in collaboration with the hosting country. The formal proceedings of the Board are associated with a number of other events at the same location, including meetings of nodes, standing committees, training events and the annual Science Symposium.

Only representatives from Voting Participant Countries (those countries making a financial contribution to GBIF's central fund) have the right to vote on the Governing Board.

Representatives from Associate Participants, both countries and organizations, are encouraged to attend the Governing Board and take part in its discussions, but may not vote.

The Secretariat of the Convention on Biological Diversity (CBD) is invited to designate a non-voting representative to the Governing Board.

The Governing Board has established Rules of Procedure, further elaborating on the provisions of the Memorandum of Understanding (MoU) regarding the structure of the board, meetings, requirements for participation and the establishment of subsidiary bodies.

### ***Observers***

Countries, organizations or other international bodies that have not signed the MoU, but are interested in the activities of GBIF, may be recognized by the Governing Board as observers. A number of former Participants that have not yet signed the latest MoU are also classified as observers to the Governing Board.

### ***The Executive Committee***

The Executive Committee operates on behalf of the Governing Board when the Board is not in session and within the areas of responsibility delegated to it by the Governing Board. Among its functions are monitoring of the performance of the Secretariat in carrying out the decisions taken by the Governing Board including implementation of the Strategic Plan and the Work Programme, and management of the budget.

### ***GBIF's standing committees***

As required under its rules of procedure, the GBIF Governing Board has set up three standing committees to act as advisory bodies, each with its own terms of reference and with its officers and membership elected by the Governing Board. They are: the Science Committee, the Budget Committee and the Participant Node Managers Committee (including the Nodes Steering Group) (Fig. 2). The functions and membership of each committee are described hereafter.

- Science Committee: The GBIF Science Committee is an advisory committee that oversees the development and progress of the GBIF work programme and makes recommendations to the Governing Board, the Executive Committee and the Secretariat. Among its other functions, the Science Committee is responsible for the selection of winners of the Ebbe Nielsen Prize and GBIF Young Researchers Award, and of speakers at the annual GBIF Science Symposium.

- Budget Committee: The Budget Committee is an advisory committee dealing with various financial issues relating to the administration of GBIF funds. Among other functions, it oversees the audit of the annual accounts submitted to the Governing Board, and it provides guidance for the selection of GBIF's auditing company. The committee makes recommendations to the Governing Board, the Executive Committee and the Secretariat. Its terms of reference can be found [here](#).

- Participant Node Managers Committee: The Participant Node Managers Committee (also referred to as the Nodes Committee) serves as a forum for sharing information about the status and best practices of GBIF Participant nodes. It also acts as an advisory committee making recommendations to the Governing Board, the Executive Committee, the Science Committee and the Secretariat concerning issues relevant to the nodes. The Nodes Steering Group (NSG), established in 2011, consists of the Chair and Vice Chairs of the Participant Node Managers Committee, and regional representatives from each of the six GBIF regions (Africa, Asia, Europe, Latin America, North America and Oceania). Among its objectives are to formulate specific recommendations to the relevant GBIF bodies based on feedback provided by Participant nodes, and to provide advice on the GBIF Work Programme relevant to nodes.

### ***GBIF task groups***

According to its rules of procedure, the GBIF Governing Board may establish and assign responsibilities to ad hoc committees or task groups. The terms of reference, guidelines and budgets for these groups are set by the Governing Board or by the Executive Committee on its behalf. Current task groups: Task group on accelerating the discovery of bio-collections data; Task group on data fitness for use in agrobiodiversity; Task group on data fitness for use in distribution modeling.

### ***How GBIF is funded***

The GBIF Secretariat, advisory committees and work programme are funded by GBIF's Voting Participants through an annual basic financial contribution based on a formula linked to the Participant country's GDP. Countries whose per capita income falls below US\$13,000 per year are entitled to a 50 per cent discount on this contribution.

In addition to the basic financial contributions, both Voting and Associate Participants may make supplementary financial contributions to fund specific parts of the work programme or for other purposes agreed to by the Governing Board.

The Secretariat may also accept income from additional sources, such as foundations, agencies, research councils and private companies, for the purposes set out in the Memorandum of Understanding and the GBIF Strategic Plan.

### ***The GBIF budget***

The Secretariat budgets, administers and reports on GBIF funds in accordance with a set of financial regulations approved by the Governing Board.

GBIF uses the calendar year as its financial year, and follows a rolling budget in which an adopted budget is amended at intervals to reflect changing circumstances. The Governing Board approves the budget two to three months in advance of the financial year, typically in October. When the draft financial report for the previous year is ready in April/May, the budget is revised by the Executive Committee taking any variations into account.

Each country Participant in GBIF is responsible for funding the establishment of a Participant node, digitization programmes, meetings and workshops at the national or organizational level.

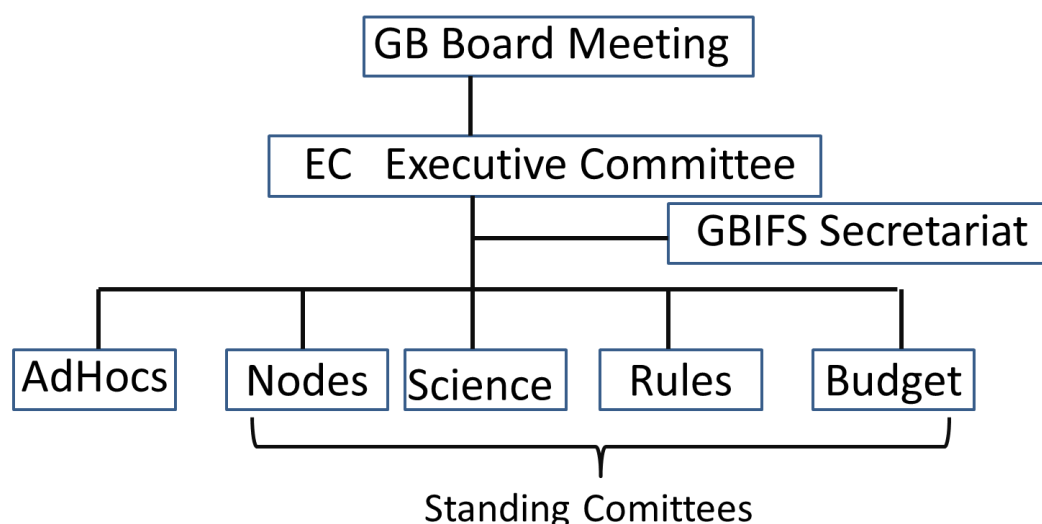
GBIF finances are audited by an international auditing company.

### ***The GBIF Secretariat***

The GBIF Secretariat, located at the Natural History Museum in Copenhagen, Denmark, is charged with developing, executing and reporting on the GBIF work programme.

The tasks of the Secretariat include:

- operating the GBIF portal and associated informatics products
- coordinating activities of the network related to data mobilization, publishing and management
- monitoring data gaps and use of GBIF-mediated data for science, and
- operating central communication and collaboration services



**Figure 2.** The organization of GBIF

### 1.3. Infrastructure (How GBIF works as a global informatics infrastructure)

The GBIF informatics architecture provides an open platform to connect and access biodiversity databases around the world.

The distributed infrastructure spans across the hundreds of institutions participating in GBIF enabling users to discover, access, integrate and help curate the growing content shared on the network.

The GBIF architecture encompasses well-known community-developed data standards and protocols enabling **interoperability at global scale**. As an open infrastructure, a growing number of tools and workflows are able to connect and participate in the GBIF network.

For convenience the infrastructure can be considered in terms of a number of sequential processes:



- Digitization: The initial capturing of information in electronic form, through imaging, databasing, maintaining spreadsheets etc.
- Publishing: The act of making data sources available in a well known format (standard) and with appropriate metadata for access on the internet.
- Integration: The process of aggregating published data sets, applying consistent quality control routines and normalizing formats.
- Discovery and access: By building network wide indexes, discovery services are offered for users through portals and for machines by extensive web service APIs.

Registry: The registry is a core component of the architecture responsible for providing the authoritative source of information on GBIF Participants (Nodes), institutions (e.g. data publishers), datasets, networks their interrelationships and the means to identify and access them. As a distributed network, the registry serves a central coordination mechanism to (e.g.) allow publishers to declare their existence and for data integrating components to discover how to access published datasets and interoperate with the publisher.

Occurrences: The network that publishes occurrence records through GBIF spans hundreds of publishing institutions worldwide. Data holders manage content in either spreadsheets or databases and then use specific publishing tools to expose those data for querying and access over the internet. The existence of the dataset and the technical protocols required to access the data are entered into the GBIF registry. Aggregators such as the GBIF global portal and national GBIF data portals, crawl datasets and build sophisticated indexes to allow users to efficiently search and access content across datasets. This page briefly describes the architecture and operations performed in the global GBIF portal when crawling and indexing occurrence data for user search and download.

Occurrence processing: Every single occurrence record in GBIF goes through a series of processing steps until it becomes available in the GBIF portal. Internally the processing is glued together by a messaging system that keeps our processing code independent of each other. The process can be divided up into 3 main parts: crawling datasets into fragments, parsing fragments into verbatim occurrences and interpreting verbatim values.

GBIF Tools Overview: The outcome of each of these steps is available through the API. Every single occurrence record therefore has a raw fragment, verbatim and interpreted view. The corresponding timestamps `lastCrawled`, `lastParsed` and `lastInterpreted` indicate the exact last time each step has run. GBIF makes available several free to use, open-source tools and

services. The table below lists GBIF's most widely used and talked-about tools. They span several categories of use, such as data assessment, data cleaning, data publishing, data visualization, and metadata authoring.

**Table 1.** Lists GBIF's most widely used tools

Categories of use	Short Description
Data publishing, Metadata authoring, Data discovery	Publishes primary occurrence data, species checklists and taxonomies, and general metadata about data sources. It can also serve as a repository for data referenced in an article.
Data discovery	Enables participants to establish a simple, GBIF-compliant web presence
Data assessment	Validates that a Darwin Core Archive complies with the Darwin Core Text Guidelines
Data cleaning	Atomizes scientific names, and validates that a scientific name is a well-formed 3-part name

## 1.4. Benefits of joining GBIF

### a) For researcher

GBIF offers free access and unlimited downloads for all records published via our network for use in your research. You can explore them by occurrences, species, datasets and countries by clicking on 'Data' at the top of this window. We just urge you to respect our guidelines for data use and citations. These data are available through the goodwill and hard work of data publishers and they have a right to expect proper recognition and attribution.

### b) For institution or individual with biodiversity data

GBIF offers tools and advice for publishing our biodiversity datasets via the Internet, enabling them to be discovered and cited in research and policy applications. This can raise the profile of our project or institution, attract recognition for those involved in digital data gathering and curation, and help us to comply with legal or regulatory requirements for data management.

### c) For national government

Participating in GBIF makes us part of a global network of collaborators, helping us to meet our country's biodiversity information needs. A range of capacity enhancement activities, including mentoring and training, enable us to benefit from more than a decade's experience and development of free tools to mobilize biodiversity datasets and make them accessible for research and policy. GBIF supports setting up of national biodiversity web portals, and

contributes to data and information requirements for intergovernmental processes such as the Convention on Biological Diversity (CBD) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES).

The following table outlines a wide array of actors, stakeholders and sectors that generate use or need biodiversity data. At present we observe a dispersion and fragmentation of data around the world. GBIF's work is meant to address this issue at the same time actively work to narrow the digital divide. In fact, GBIF's strategy to provide open access to data, and its distributed architecture, effectively contribute to overcoming these barriers, which are particularly prevalent in many developing countries. GBIF can, in the longer term, provide important contributions to the poverty reduction goals of these countries by providing access to a variety of data necessary to support and address poverty alleviation. This potential lies not only within environmental/biodiversity conservation - but also in relation to development of agriculture and fisheries, health improvement as well as development of higher education and research. The table below illustrates some of the main areas where – over the longer term - fully developed national GBIF nodes will be able to support poverty reduction through improved local livelihoods.

**Table 2.** Actors, stakeholders and sectors where GBIF activities can make an impact

Beneficiaries	Areas of Interest
GBIF Participants	GBIF provides useful services that make it easier for them to meet their own strategic needs (e.g., implement national biodiversity strategies and action plans, manage and conserve their own biodiversity, promote scientific research, etc.).
Researchers who use natural history or culture collections	GBIF-mediated specimen- and name-level data are used in research activities such as systematics building predictive models and others; GBIF tools for web-enabled taxonomy facilitate rapid progress in describing new species and collaborative research and preparing monographs.
GBIF Data Providers	GBIF data providers are recognized as sources of assistance and tools related to specimen, observational and names data. Data providers get full recognition and are cited in various scientific publications.
Molecular research (e.g. DNA barcodings, phylogenetic analysis)	GBIF-mediated species-level data and information architecture enable seamless integration between gene or other sequence

	data and voucher specimen data, and from there to ecological context for gene evolution (for example).
Agriculture	GBIF data of use in integrated pest management, measuring the impact of agriculture on biodiversity (and vice versa), locating wild relatives of crop plants, pollinators, etc. and how this in turn address matters to food security and poverty alleviation.
Natural Resource Management (e.g. forestry, fisheries)	GBIF-mediated, easy to access scientific data contribute to good decision-making, support appropriate management of biodiversity resources and address the Millennium Development Goals.
Geospatial / Ecological modelling community (e.g. Climate Change, Spread of Invasive Species, Emergent Diseases)	GBIF's robust data can be used for niche-modelling and other kinds of analyses that address urgent questions and issues which impact the daily lives and quality of life in developing countries.
International biodiversity-related conventions (e.g. CBD, Ramsar, CITES, CMS)	GBIF's primary data underpins the kinds of information needed by countries to address the effective implementation of Conventions (e.g. 2010 targets to reduce the rate of biodiversity loss, monitoring the status to biodiversity, etc.).
National planning agencies or authorities and other Ecosystem managers	GBIF-mediated data are used to compile lists of taxon occurrences in priority areas and underpin policy and natural resource management decisions at national and regional levels while highlighting the services provided by different ecosystems around the world.
Conservation	GBIF-mediated data used to track species and populations, assess the status, and identify areas for priority action and the CBD 2010 target to decrease the rate of biodiversity loss. GBIF data network is also a means to publish and archive survey data and establish base line data against which monitoring activities can effectively be made.
Sustainable development	Such as ecotourism. GBIF-mediated data can be used to plan and target species and areas to produce value-added products and services
General Public	Will use GBIF to seek answers to all sorts of questions about biodiversity (e.g. via Species Banks and others).

(Source: GBIF, 2006)

By becoming members of GBIF, countries benefit directly in several ways, among them:

- Access to GBIF seed money grants to allow countries to apply for funds to digitize their collections and other biodiversity data sources
- Access to training workshops in biodiversity informatics and financial support to attend and participate in these events are provided by GBIF to representatives of its members.
- Participation at the NODES Committee Meetings: These open fora discuss themes of high relevance to the day-to-day work of Nodes, look at ways on how best to address the technical needs and organisational challenges of the GBIF Nodes, share lessons and promote learning from each other's experiences.
- Immediate access to an international network of experts: These experts in biodiversity informatics can provide advice and support in matters dealing with the establishment of national nodes and/or their respective networks as well as other technical aspects.
- Access to mentors: GBIF members who have more experience and/or knowledge in the establishment of national nodes and their networks can provide mentoring support to those Nodes in greater need. GBIF has a programme to foster these activities.
- Participation in projects that deal with repatriation of data to countries of origin. Using GBIF and with a simple query, countries can benefit from getting free and open access to biodiversity data housed in different parts of the world.
- Participation in defining the GBIF Work Programme and its budget: All GBIF members actively participate in the discussions regarding the work programme and its budget.

**d) For member of the public, educator or wildlife enthusiast**

GBIF offers great opportunities to explore and contribute to the global body of evidence documenting the huge diversity of life on our planet. Find out what records are available for our country, region or neighbourhood by exploring the country pages and occurrence data on this portal. Contact your GBIF national node to find out about activities such as bioblitzes and other events that help you to become a 'citizen scientist', and consider sharing your observations or images through networks such as iNaturalist, eBird and the Encyclopedia of Life (EOL).

GBIF.org as a global biodiversity data platform can play an important role in the agrobiodiversity landscape by mobilizing and connecting biodiversity datasets that can support research and development for food security and ecosystem services resilience. As part of a broader global strategy on fitness for use of biodiversity data, GBIF and Bioversity International convened a Task Group on Data Fitness for Use in Agrobiodiversity in March 2015. The Task Group identified the need to bridge ecological and agricultural data that are relevant for agrobiodiversity and agroecology uses. In general, the plant ex situ conservation data are in a good state with developed data and metadata solutions.

## **II. HOW TO JOIN GBIF**

According to the GBIF Memorandum of Understanding (MoU), a GBIF Participant can be a country, economy, inter-governmental or international organization, other organization with an international scope, or an entity designated by them, that has signed the MoU and expressed its intention to observe its provisions. The process of joining is quite simple. Just follow the steps below:

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### **2.1. Choose our category**

If we wish to join GBIF on behalf of a national government, there are two categories to choose from:

**Voting Participants:** countries that are willing to observe the provisions of the MoU and to make a financial contribution to the GBIF budget. These Participants have voting rights on the GBIF Governing Board, as well as other benefits.

**Associate Country Participants:** countries that are not yet making financial contributions to GBIF. Associate Participants may take part in the deliberations of the Governing Board, but may not vote. The category of an Associate Participant Country is a temporary category of up to five years duration from the date when the country signs the MoU. During this period the Associate Participant Country may decide to become either a Voting Participant, or an Observer, or may withdraw from GBIF.

**Other Associate Participants** are international organizations, intergovernmental organizations, other organizations with an international scope, and economies, that are willing to observe the MoU provisions. These Participants may send representatives to the GBIF Governing Board, may endorse data publishers and take part in collaborations such as regional meetings, mentoring programmes and training events. However, they are not eligible to become Voting Participants, and are not required to make a financial contribution to the GBIF budget.

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### **2.2. Send a Letter of Intent**

In order to become a Participant in GBIF an appropriate government agency, or senior representative of an organization, should send an official Letter of Intent to the Chair of the Governing Board (see below), expressing intent to sign the MoU.

The letter should state that the country/organization is, in principle, in agreement with the intentions listed in the MoU and should, in particular, outline the willingness to establish a

Participant Node, share biodiversity data and actively participate in the implementation of the GBIF Work Programme.

Letters of Intent signed by a Minister or ministerial department should include information on the agency or institution that has been designated to sign the MoU and represent the country on the GBIF Governing Board.

If a country wishes to become a Voting Participant it must, in addition, express its willingness to make a financial contribution to GBIF as outlined in Paragraph 9 of the MoU, and establish the details in a financial arrangement with the Secretariat.

The GBIF Executive Committee will consider all petitions for Participant status and will determine if the application meets the requirements of the MoU and GBIF Rules of Procedure. If a petition is granted, a MoU signature copy will be sent. In the case of Voting Participation, the Secretariat will in addition specify the financial contributions in a financial arrangement.

For further details of the procedure see Article IV – Requirements for Participation in the Rules of Procedure agreed by the Governing Board.

The letter of intent should be addressed to:

Chair of the GBIF Governing Board

GBIF Secretariat

Universitetsparken 15

DK-2100 Copenhagen Ø

Denmark

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### **2.3. Sign the Memorandum of Understanding (MoU)**

Once the petition to join GBIF, expressed in the Letter of Intent, has been received and approved by the Executive Committee, the applicant will be informed and the designated minister, official or other representative may sign the MoU. As soon as the signature is received by the Secretariat, the country or organization becomes a GBIF Participant and will be informed about further procedures such as appointing a Head of Delegation and node manager.



### **III. INTRODUCTION AND EXPERIENCES FROM SOME COUNTRIES**

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#### **3.1. Japan**

Japan has participated as a voting member of GBIF since its inception (in 2001). Node Managers have included Dr Keiichi Matsuura, National Museum of Nature and Science (2002-2003); Dr Motomi Ito, Tokyo University (2003-2012); and Dr Tsuyoshi Hosoya, National Museum of Nature and Science (2012- present).

Until 2010, the activity in Japan to provide biodiversity information to GBIF was under the jurisdiction of the Japan Science and Technology Agency (JST). After the tenth meeting of the Conference of the Parties of the Convention on Biological Diversity, held in Nagoya, Japan, in October 2010, biodiversity issues that had been under the Ministry of Education, Culture, Sports, Science and Technology (MEXT) were switched to the Ministry of Environment (MOE). This change in governance resulted in a remarkable change in the governance of the Japan Node (JBIF). In 2012, JBIF was renewed and current structure was established.

##### **a) Vision and mission**

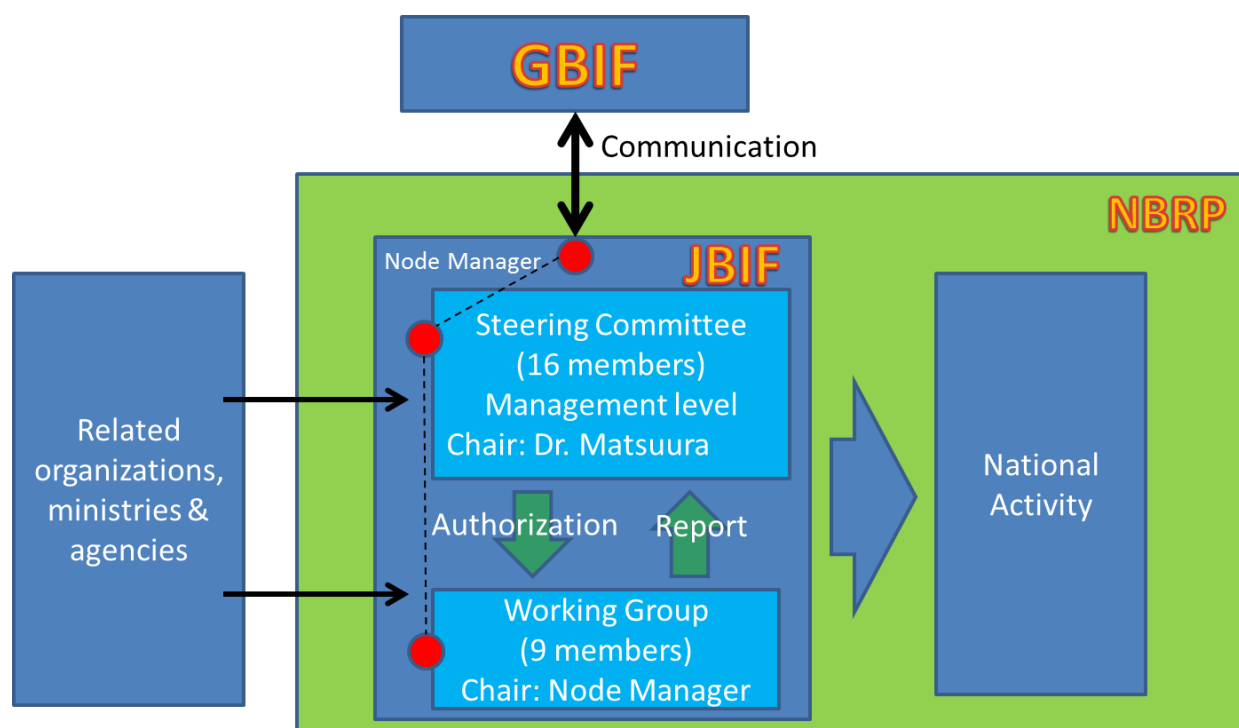
JBIF's aim is to "promote the collection and application of biodiversity information in Japan and accelerate contribution to the international community", based on the following six major strategies: 1) Raise awareness about biodiversity information, 2) Improve museums' abilities to function as repositories of biodiversity data, 3) Raise awareness within the general public and government agencies about the importance of biodiversity information, 4) Enhance the visibility of the Japan Node in the GBIF community, 5) Promote cooperation with related projects, 6) Assume cooperative leadership in Asian activities.

##### **c) Structure**

JBIF has a two-layered structure. There is a higher decision-making group (Node Steering Committee; meeting twice a year) consisting of 16 people from various national institutes, agencies, and local museums, that endorses and directs the activity of the Working Group. The Working Group consists of 09 people from various National Institutes, (meeting on an irregular basis, but at least twice at the occasion of the Node Steering Committee meetings). Some members of Working Group overlap with Steering Committee members in order to enhance communication. All members are participating on a voluntary basis (Figure 3).



The Head of Delegation role is officially assigned to the Ministry of Foreign Affairs. Node manager works as a point person between JBIF and GBIF and manages Working Group. The major supporting agency for GBIF activities in Japan is MOE, while the major institutes involved in the activity are under the jurisdiction of MEXT, namely universities, national institutes, and local and national museums.



**Figure 3.** JBIF organization

### c) National funding

The Government provides funding for data management through the National BioResource Project (NBRP), to the National Institute of Genetics and National Museum of Nature and Science, and domestic activities concerning GBIF are partially supported. Additional funding is being obtained by the members themselves or through their organizations. The basic financial contribution to GBIF is made by the Ministry of the Environment of Japan.

### d) Data publication flow

Japan provides data to the GBIF from the National Institute for Genetics and the National Museum of Nature and Science. The National Museum of Nature and Science receives specimen data from museums across the country and provides it both domestically and internationally through the GBIF and S-Net. The National Institute for Genetics, in

cooperation with the laboratory of Professor Motomi Ito at the University of Tokyo, is engaged in an ongoing effort to assemble the biodiversity information that has already been made public, from article reprints to the results of research projects at various universities and research institutions, and is publishing this information on the GBIF. The Japan Node set strategic targets at the commencement of the third phase of the project (NBRP) in 2012, and improvements in data maintenance and collaboration have been underway since then.

#### e) Japan Node Activities and web portals

##### *S-NET: integrating and disseminating information from local museums and research institutes*

“Science Museum Network”, abbreviated as S-Net, is an information portal for natural history and science museums operated by the National Museum of Nature and Science (URL: <http://science-net.kahaku.go.jp/>). In addition to nature history specimen information provided by 71 domestic museums and research institutions (currently 3.62 million data as of Sept. 2015), you can search for researchers and curators (501 people listed as of Sept. 2015).

To promote the open sharing of data from museums and research institutions abroad, annual workshops are held to exchange views, helpdesk support is offered, and information is aggregated through the Natural History Museum Network of West Japan, a non – profit organization.

##### *Promoting the communication and use of biodiversity information through education*

The Japan Node holds training workshops and practice sessions for biodiversity information providers. The training workshops are led by either the National Museum of Nature and Science or the NPO Natural History Museum Network of West Japan and offer providers practical training in high-level analytical techniques through a mix of technical courses, data utilization, and simulation exercises. The goal is to have museum officials from across the country gather several times a year to exchange views and share ideas about GBIF.

##### *Global Biodiversity Information Facility (GBIF) Japan Node (JBIF) web portal*

Established by the National Institute for Genetics, this website is the official portal for the Japan Node of GBIF. On this page you can find information regarding events on biodiversity and download guidebooks, manuals (some Japanese translations available), and Gbits (in Japanese) – the official bulletin of the GBIF. The main features of this page are as follow:

- Search for biodiversity information (in Japanese)

- Explanations of GBIF data formats and data registration process
- Latest information on research and events
- GBIF publications (guides and manuals)
- Japanese editions of Gbits bulletin
- Links to other useful sites

### *“Science Museum Net” web portal*

Established by the National Museum of Nature and Science, this website enables us to retrieve information from domestic science and natural history museums. We can search (in Japanese) for natural history specimen data (the same dataset is also available on GBIF) from museums and research institutions across Japan as well as for information on their curators and research staff. Additionally, various tools are provided for data maintenance. The main features of this page as follow:

- Retrieve natural history specimens information
- Search curators and research staff
- Tools to search the Red List and dictionaries of place names
- Formatting tools for GBIF

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## **3.2. Australia**

Australia is voting GBIF participant since 2001. The Atlas of Living Australia (GBIF Australia) was initiated by a group of 14 (now 17) partner organisations. The Atlas was formally established through the National Collaborative Research Infrastructure Strategy (NCRIS), which was originally administered by the Australian Department of Science and Innovation – now the Department of Education. The Atlas is hosted by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) and has a partner base including Australian Museums, Herbaria and other biological collections.

The intent was to create a national database of all of Australia’s flora and fauna that could be accessed through a single, easy to use web site. Information on the site would be used to improve understanding of Australian biodiversity and assist researchers to build a more detailed picture of Australia’s biodiversity; and to assist environmental managers and policy makers develop more effective means of managing and sustaining Australia’s biodiversity.

### **a) Vision and mission**

The Atlas of Living Australia’s core mission is to “share biodiversity knowledge”.

The vision is to bring together information on all the known species in Australia - aggregated from a wide range of data providers including at least: museums, herbaria, researchers, community groups, government departments, non-government agencies, consultants, individuals (or citizens) and universities.

#### b) Structure

The Atlas of Living Australia's Management Committee provides strategic guidance for the project. The committee includes representatives from the partner community (museums, herbaria, CSIRO), as well as other NCRIS capabilities, Federal and State agencies. The committee represents and engages with key partners, data publishers and the overall collection and user community.

#### c) National funding

Funding for the Atlas of Living Australia was provided by the Australian Government under the National Collaborative Research Infrastructure Strategy (NCRIS) and the Super Science Initiative (SSI), part of the Education Investment Fund. The Atlas partners have provided considerable in-kind contributions.

The basic financial contribution to GBIF is made by Atlas of Living Australia, CSIRO National Research Collections Australia.

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### **3.3. France**

France is voting GBIF participant since 2001. GBIF France has the mandate to promote GBIF activities and tools at the national level and to represent France in the GBIF community. The node provides information on best practices and standards used by GBIF and helps data publishers to connect data to the GBIF network using the tools developed by GBIF. The node also organizes training events and interacts with all the organizations working on biodiversity at national level. GBIF France also provides support to francophone countries to help them to contribute to GBIF.

The GBIF France node was created in June 2006 and hosted by the Muséum national d'Histoire naturelle (MNHN) in Paris. In the beginning the node was just hosted by the MNHN, but, in 2011, GBIF France was officially integrated into the MNHN and is now under the Direction des collections of the MNHN.

#### a) Vision and mission

GBIF France's missions are to: collect metadata on primary biodiversity data resources; assist connecting data to the GBIF network using GBIF standards, protocols and tools; organize training sessions (data publishing, data quality, use of GBIF-mediated data); inform on GBIF, tools, activities, calls, training material & opportunities; promote and facilitate the use of GBIF-mediated data and tools by biodiversity data users; collaborate with other national and international facilities on biodiversity, and with the GBIF Secretariat; contribute to the development of common tools with the GBIF community; and contribute to the CEPDEC program.

#### b) Structure

The GBIF France node includes two part-time coordinators and four full-time positions (node manager, IT specialists and a data engineer).

The node has a board that meets once a year. It includes representation from four Ministries (Education and Research, Foreign Affairs, Environment and Ecology, and Agronomy) and most of the organisations working on biodiversity at national level.

#### c) National funding

The GBIF France node is funded by the Ministry of Education and Research (Ministère de l'Education nationale, de l'Enseignement Supérieure et de la Recherche, MESR). From 2013 and for four years, GBIF France is funded through a French National Research Agency (L'Agence nationale de la recherche, ARN) project called e-ReColNat.

The basic financial contribution to GBIF is made by the Direction Générale pour la Recherche et l'Innovation (DGRI).

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### **3.4. United States**

United States is voting GBIF participant since 2001. The United States Geological Survey (USGS) hosts the U.S. Node to GBIF since the U.S. joined GBIF in 2001. The USGS-coordinated National Biological Information Infrastructure (NBII) served first as the primary implementation vehicle for the node. Since NBII's cancellation in 2010, the USGS Core Science Analytics, Synthesis and Libraries Program implements the node. The Biodiversity Information Serving Our Nation (BISON) project comprises most node activities.

#### a) Vision and mission

The U.S. node to GBIF represents an integral part of the U.S. Geological Survey's activities to collect, organize and share biological information. As with other initiatives, the U.S. GBIF node streamlines access to U.S. biodiversity information and links it with broader geoscience data to address critical societal issues.

#### b) Structure

BISON is the primary project contributing to the node. It provides a specialized view of GBIF records for the U.S. and assists with provision of U.S. records to GBIF.

The White House Office of Science and Technology Policy (OSTP) coordinates EcoINFORMA, a broader U.S. government effort to organize and share data on biodiversity, environmental health and ecosystem services.

The Biological and Ecological Informatics Working Group is made up of representatives from numerous U.S. government agencies. It helps organize and prioritize contributions to both EcoINFORMA and BISON.

#### c) National funding

Since establishing the node in 2001, the United States Geological Survey has fully funded direct implementation of the U.S. Node to GBIF as a key contribution to its broader biodiversity informatics activities.

The basic financial contribution to GBIF is made by the National Science Foundation, the Smithsonian Institution, the U.S. Department of State and the U.S. Department of Agriculture.

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### **3.5. Tanzania**

The Capacity Enhancement Pilot programme for Developing countries (CEPDEC) has been conducted in Tanzania over three years as a partnership between Global Biodiversity Information Facility (GBIF) and the Tanzania Commission for Science and Technology (COSTECH). The aim of the programme was to build capacity through training, mentoring, and supporting digitalization of primary biodiversity data and information in Tanzanian institutions to make this openly accessible as advocated by the GBIF network. Access to biodiversity information is expected to contribute substantially to sustainable social and economic development in Tanzania allowing for wider exposure of the data for furthering science, conservation and development. In justifying the programme, succinct links were drawn to Tanzania's strategies for growth and the millennium development growth.

CEPDEC in Tanzania was to establish a functional biodiversity data sharing infrastructure integrated in the GBIF framework. To achieve this, the programme followed a road map that highlighted four distinct outputs. As a pilot project to be emulated in other developing countries the process and experiences of the programme summed up as best practises and lessons learnt are consultatively compiled in this report to provide guidance and justification for continued support to the initiative of ensuring open access to biodiversity information globally. For each output a number of activities were projected and the processes of achievement or challenges thereof are documented as the best practise or lesson learnt.

***Output 1: Functional GBIF node in the country to provide long-term, unified access to all relevant sources of biodiversity information for Tanzania to be used in science environmental management. This output included the development of the portal, mentoring and the administrative framework for the national node.***

#### *Best practices*

- Infrastructure for networking developed in accordance with national needs incorporating and/ or utilising existing frameworks enables sustainability
- Appropriate mentor selection considering expertise and capacity (resources) facilitates access to wide variety of supported activities
- Board for oversight of activities affords node acceptance and facilitates stakeholder contribution
- Technical requirements encourages distribution of responsibilities and expertise among participants
- Host node is neutral with mandate for node functions this enables stakeholder buy-in
- Node staff permanently employed by host and node activities incorporated into organisational structure ensures sustainability

#### *Lessons learnt*

- IT Capacity of staff is necessary to ensure functionality of the portal
- Mentor contribution requires careful and collaborative planning to meet programme time lines
- Logistics for instituting and organising board meetings are resource intensive
- Capacity, expertise and time for node activities requires careful planning; resource mobilisation in addition to participant contribution is critical for sustainability of activities
- Permanent staffing for secretariat activities requires re-organisation and/ or employing of staff at the host institution
- Node activities best linked to other institutional functions for appropriate impact
- Exploit options for data acquisition e.g. registered research

***Output 2: National networks of data providers and users of biodiversity information who are able to access and exploit data for scientific, conservation and development questions. Activities for this output included a data providers survey and needs analysis, some digitalisation initiatives and training in data management and analysis.***

*Best practice*

- To initiate the network an effective communication strategy to engage stakeholders facilitates buy-in and participation
- Identification of institutions and organisations with available data (location, format, quantity and utility) establishes basis for sharing
- Aligning needs for data and information with national development policies justifies initiative
- Selecting node host as neutral but competent organisation builds confidence in stakeholders

*Lessons learnt*

- IT requirement for operations and updating of the portal necessary for maintaining dynamism: local software development will provide tools tailored for national needs
- Mechanisms (logistics and training) for digitalisation of non-digital data needed to ensure wider determine priorities for digitisation; consider options for data entry harmonisation; determine harmonisation modes for effective sharing
- demonstrated value for open access biodiversity information a key strategy for stakeholder buy-in
- A viable strategy for digitalisation is necessary for continued publication of data through the portal
- Participant mandates need to be linked to TanBIF activities for complementation

***Output 3: A set of tools and procedures for developing and sustaining a national Node prepared and communicated to existing and potential GBIF members. The activities included adaptation of training materials and availing these to participants. Furthermore specific procedures and manuals were to be prepared.***

*Best practice*

- Viable products such as the Q-GIS tool demonstrate the potential impact that TanBIF can have on biodiversity conservation

*Lessons learnt*

- Products developed for use have to be more than internet based hard copies of some of the products are needed to reach a wider public given the national context for sharing information.



***Output 4: Options and partnerships for funding of GBIF capacity enhancement in individual developing countries identified and facilitated. It was intended that a regional workshop would be held and the best practises shared.***

*Best practice*

- Training of participants to utilise tools for sustainable development is an important outreach strategy for biodiversity informatics; tool testing in young nodes, avails learning opportunity for improvement for GBIF

*Lessons learnt*

- Staffing for outreach is critical for furthering awareness and utility of the tools; digitisation requires resources that need to be considered by participants' operational budgets for sustainability
- In Tanzania, external support to CEPDEC amounted to 425,500 Euros provided by the Royal Danish Government through the GBIF secretariat. Internal support was afforded in kind by COSTECH through staff salary, time and infrastructure.

In general, CEPDEC Project in Tanzania has been very successful. Majority of the expected outcomes were realised. A functional GBIF national node, the Tanzania Biodiversity Information Facility (TanBIF) has been established using a participatory approach. TanBIF continued to expand, and its Participants have realized ownership. Networks of experts were formulated, expanded and supported implementation for CEPDEC project. The Government of the Republic of Tanzania participated fully in TanBIF activities and realized the importance of TanBIF in the biodiversity management. Development of tools such as TanBIF Portal and QGIS Software for biodiversity data and information sharing, repatriation and analysis will aid Tanzania to manage biodiversity sustainably through informed scientific evidence base. The launching of TanBIF Portal and QGIS Tool by high-level government officials position TanBIF in a high national and international platform. It is worth concluding that CEPDEC Project opened a new chapter of sustainable biodiversity information and data management system in Tanzania. Biodiversity stakeholders should take advantage of the tools and infrastructure developed for TanBIF in making sound decision on biodiversity management and its related issues. Additionally, this initiative should be taped and adapted in other developing countries.

## IV. ADVANTAGES AND DISADVANTAGES IN CONSTRUCTION AND MANAGEMENT BIODIVERSITY DATABASE IN VIETNAM

### 4.1. Advantages

Vietnam has become a member country of the Convention on Biological Diversity. In response to the requirement, the Government of Vietnam (GOV) enacted the Biodiversity Law in 2008, which is followed by the National Biodiversity Strategy to 2020, vision to 2030 (approved in 2013) and the Master Plan on Biodiversity Conservation (approved in 2014). Biodiversity database development was mentioned in the Master Plan. Some schemes have been developed to implement it, which also includes a proposal for building national biodiversity database “*Survey inventory and building biodiversity database*”. The Vietnamese Government shows a strong commitment to achieve biodiversity conservation as well as sustainable development.

In recent years, strong international integration has been contributing to capacity building, awareness raising and management supporting for biodiversity database development.

The Biodiversity Conservation Agency (BCA), an arm of Vietnam’s Ministry of National Resources and Environment charged with the management of the country’s biodiversity database, proposes to strengthen national capacity in database management and to promote GBIF in the country as an opportunity for information exchange at the global level.

The National Biodiversity Database System (NBDS) is officially launched in Hanoi in January, 2015. The database system was jointly developed by the Biodiversity Conservation Agency (BCA), the Vietnam Environment Administration (VEA) and the Ministry of Natural Resources and Environment (MONRE), through the "Project for Development of the National Biodiversity Database System" cooperated by the Japan International Cooperation Agency (JICA) since November 2011. NBDS is designed correspondingly to international standards to store nation-wide biodiversity data including lists of species of fauna and flora in taxonomy. The development of NBDS helps BCA implementing effective management on biodiversity by gathering necessary data for assessing, monitoring and reporting the status of biodiversity. NBDS is also expected to provide a base of biodiversity information for decision makers, government officers, researchers and the public as well (<http://www.jica.go.jp/>). During more than 3 years of implementation, the technical cooperation project has developed numbers of results, such as;

- The first stage of NBDS generation has been established. It has been already for storing, importing, exporting and analysing biodiversity database. A Master Scheme of NBDS which is an official proposal to GOV for the entire scope of NBDS development and utilization.
- Prioritized list of required activities and budget.
- Official guideline for developing biodiversity monitoring indications in Vietnam both at national and local level.
- The System Architecture of NBDS that describes every details of structure and design of NBDS. The technical guideline for basic survey and monitoring of coastal wetland based on the basic survey on biodiversity at Xuan Thuy National Park in Nam Dinh province
- Draft circular for collaboration mechanism on data sharing with other agencies.
- The main major stakeholders for the biodiversity information facility been identified including MONRE/VEA/BCA, MARD, MOST, PPC (Provincial People's Committee), DONRE (MONRE), DARD (MARD), national parks, protected areas, research institutes, universities, NGOs, international organizations and individuals.
- An informatics infrastructure (of MONRE/VEA) is in place to support the publishing of biodiversity data from the country's institutions to the Internet.

While remarkable achievements have been seen as above, there still exist challenges and remaining works. In order to ensure further NBDS utilization and development, it is essential that MONRE will soon approve the Master Scheme of NBDS to determine necessary activities and budget to operate and upgrade the database's function. Equal importance is the promulgation of the draft circular on collaboration mechanism among data holders, which enables sharing, exchanging and exploiting biodiversity data.

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## **4.2. Disadvantages**

Construction and management of biodiversity databases in Vietnam are just in the beginning stages. There are some disadvantages as follow:

- The important of biodiversity database are not fully understood. Awareness of the role of the database of the leaders, officials, scientists working in the field of biodiversity are not high.
- The value of biodiversity is not quantitatively assessed at national scale.
- Biodiversity information in Vietnam has not yet standardized, verified by experts.

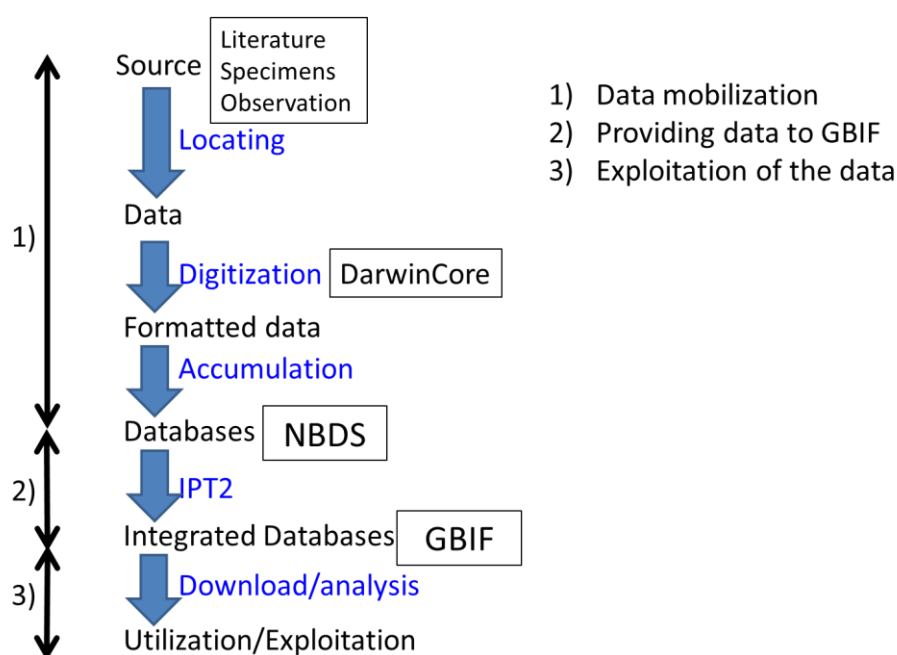
- Biodiversity is scattered all over the country; A considerable portion of the data is still non-digital (i.e. Paper); Most digital data in desktop format (MS-Word, Excel, etc.). It's therefore difficult to search/find nation-wide information on biodiversity.
- Biodiversity information management is not in a uniform way.
- Biodiversity data are not shared between different organizations. There is not any coordination mechanisms in building, using, sharing biodiversity data between agencies, research institutes and universities;
- Monitoring of biodiversity at national scale has not yet been done. There is not any standard method for biodiversity monitoring. Human resource and funding for biodiversity research is very limited.
- The demand for biodiversity information has not yet been fully evaluated. The built databases have not yet meet the needs of users.
- The ability to manage, exploit and use the biodiversity database is limited by the spontaneous and sporadic training. No specialized training staff in IT and on biodiversity database management.
- Although institutions, laws are gradually improved, they has not yet fully met the management of biodiversity data. Guiding documents on building and managing of biodiversity data is very few. There is not any human resources in charge of biodiversity databases. Funding for the projects related to biodiversity database is also not officially mentioned.
- Although the issue of building biodiversity databases have been mentioned in the Master Plan, it did not specific mention on financial and human resources for this work as well as participation in GBIF.
- A node designated to coordinate biodiversity data sharing activities nationally has not yet been designated.
- The national sources of biodiversity data have not yet been documented. The state of national data holdings has not yet been assessed (e.g. digital/non-digital format, approximate size and scope of collections, use of standards).
- A strategy has been initially developed to assist the biodiversity information facility in mobilizing national biodiversity data sources in a systematic way. Nonetheless, data mobilization priorities for the biodiversity information facility have not yet been discussed

and agreed with stakeholders. The strategy assist data holders in making a case for investment in the mobilization of their data (e.g. through addressing known gaps or targeting specific use cases) not yet in use.

- The needs of biodiversity information users have been not yet been assessed at the national level.

- A national biodiversity website has been developing. However, there is a few data in the website and there is not ready to serve user needs. In the future, when website starts to work, it must complements and adds value to other available biodiversity information websites to serve the needs of key (defined) user groups for the biodiversity information facility.

## V. WORK FLOW FOR DATABASING AND PUBLISHING FROM VBIF TO GBIF



**Figure 4.** The workflow for databasing and publishing from Vietnam

Under the support from BIFA project and JICA, NBDS will be continued to develop. The first step of databasing and publishing is identification the main national sources of biodiversity data (literatures, specimens). Meanwhile, a national data mobilization strategy is developed. An infrastructure including VBIF (Vietnam Biodiversity Information Facility) is in place to encourage and support national digitization, accumulation and publication

activities. The data is digitized according to DarwinCore standard. The Integrated Publishing Toolkit (IPT) is used to publish and share biodiversity datasets through the GBIF network. Subsequently, the data is downloaded/analyzed and used by users (Figure 4).

## VI. PARTICIPATORY PROCESS AND DEVELOPMENT (ROAD MAP)

### 6.1. Participatory process and development

#### Discussion before joining GBIF (1 month)

- Understand Participant's **motivation** for joining GBIF. The first task for this group of stakeholders is to define the long term vision, goals and missions for the Participant Node; focus should be on how the Node/BIF will address the Participant's needs and priorities, and how it will complement with other biodiversity-related or information-related initiatives.
- Understand **drivers and priorities** at highest level for establishing a biodiversity information facility.
- Assign **formal roles**: Head of Delegation and temporary node manager.

#### Preparation for participatory process (3 months)

- Agree **roles in the process**: who will lead, who will formulate the final recommendation, need for consultants etc.
- **Preparatory studies**: content needs assessment, data holders inventory, stakeholder mapping etc.
- Identify **relevant examples** from GBIF network
- Identify **key stakeholders** who will be invited to contribute. It is very important for the Head of Delegation to convene a group of representatives from the key biodiversity stakeholder institutions. This will ensure their ownership of the process from the beginning.
- Plan a national **stakeholder meeting**.

#### Participatory process: Scoping the biodiversity information facility and node (1 month)

- Define **priorities** for the biodiversity information facility
- Discuss which parts of the biodiversity information facility are **already in place**
- Define key **roles for the node** in support of the biodiversity information facility
  - Once a biodiversity information facility has been scoped, including the long-term vision
  - and goals for the node coordinating it, the group will need to discuss the
  - implementation plans for the node. These should include aspects such as the collaborative

- framework, infrastructure requirements, governance structure, funding, membership of
- governing and/or advisory bodies, and the node's roles and responsibilities. The key
- decision on where to locate the node will also need to be addressed.

### **Participatory process: Defining implementation models for the biodiversity information facility and node (2 months)**

- Define **formal agreements** (data sharing/use agreements) to supports effective collaboration
- Discuss model for **informatics infrastructure**
- Discuss **governance model** and representation
- Consider **institutional location** for the node
- Discuss **a team for the node** and node manager role
- Discuss **funding models** for the node

After this process, a node must be designed. The responsibility of coordinating a biodiversity information facility is built into the nodal institution's planning. The major stakeholders for the BIF are identified. A strategy for the BIF is agreed with stakeholders. The strategy is resourced. Especially a collaborative framework must be defined and agreed by the relevant stakeholders ad partners to form a biodiversity information facility.

### **Implementing a national biodiversity data mobilization strategy**

The main national sources of biodiversity data are identified. A national data mobilization strategy is developed. The BIF supports national digitization activities. An infrastructure is in place to support data publishing. The BIF provides assistance to data holders in publishing data.

### **Meeting biodiversity information needs to the national level**

The needs of biodiversity information users are (annually) assessed. The BIF analyses the availability of biodiversity data. The BIF promotes data use. The BIF maintains a website to support the user community. BIF service are integrated into research & policy process.

### **Supporting improved management of biodiversity data nationally**

The node has a plan to ensure the mobilized data are fit for use. The BIF supports national data holders in managing their data. The node performs quality checks of published data. The BIF participates in biodiversity information management initiatives.

## 6.2. Potential data holders in Vietnam

Thirty seven institutes, universities, museums, editors and publishers of scientific research and non-governmental organization are considered as holding biodiversity data (Table 1). In which, the organizations having museum and collection are main holders. Beside, around thirty one national parks, sixty four protected areas and thirteen species protected areas also keep a lot of biodiversity information.

Non-government organizations such as World Wildlife Fund (WWF), BirdLife International, and International Union for Conservation of Nature (IUCN) have conducted many projects on biodiversity in Vietnam. Consequently, they have many biodiversity data of Vietnam.

Vietnamese and foreigner experts who working with biodiversity in Vietnam must be also included as data holders.

In 64 provinces and cities throughout Vietnam, Department of Natural Resources and Environment (belong Ministry of Natural Resources and Environment) and Department of Agriculture and Rural Development (belong to Ministry of Agriculture and Rural Development) possess biodiversity information.

**Table 1.** List of institutes, universities, museums, and some organizations holding biodiversity data in Vietnam.

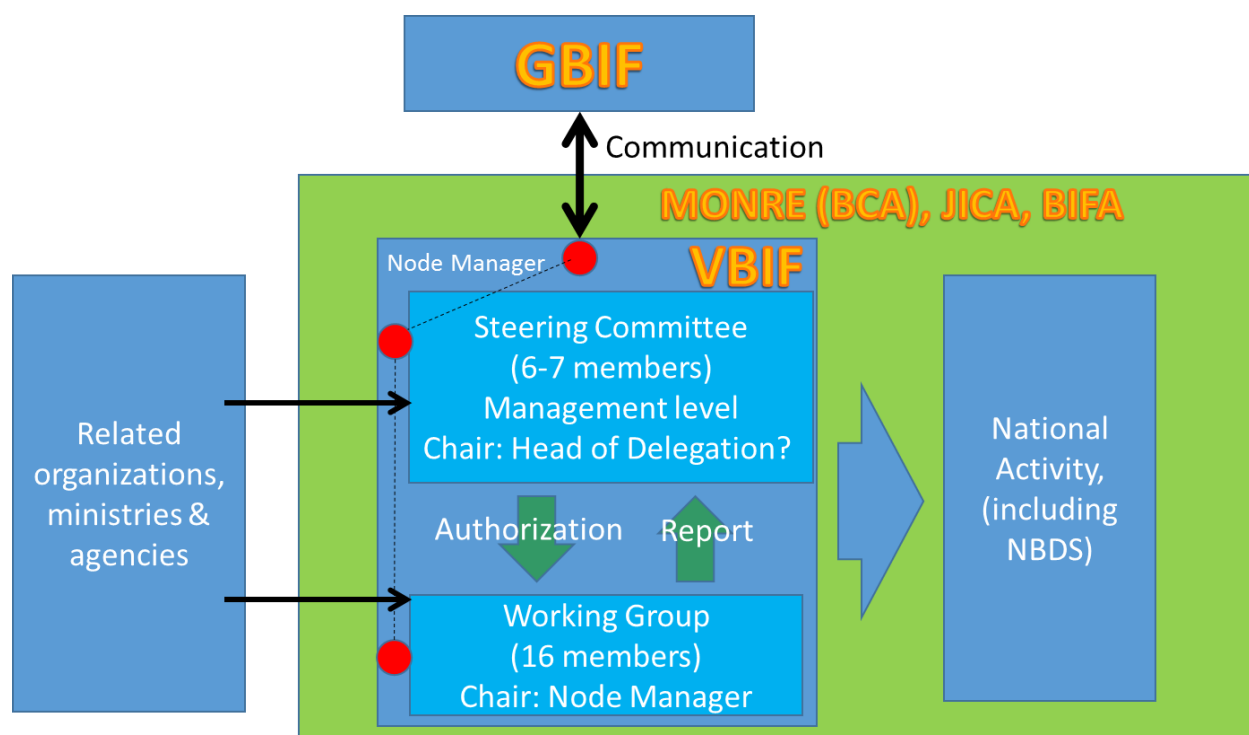
No	Data holder	Museum	Collection
	<b>Vietnam Academy of Science and Technology (VAST)</b>		
1	Institute of Ecology and Biological Resources (IEBR)	X	
2	Institute of Oceanography (IO)	X	
3	Institute of Marine Environment and Resources (IMER)		X
4	The Institute of Biotechnology (IBT)		
5	Institute of Genome Research (IGR)		
6	Vietnam National Museum of Nature (VNMN)	X	
7	Institute of Highland Central (Viện Nghiên cứu Khoa học Tây Nguyên)	X	
8	Southern Institute of Ecology (SIE)		X
9	Institute of Tropical Biology (ITB)		
10	Mientrung Institute for Scientific Research (MISR)		X
11	Institute of Resource, Environment and Development in Hue City		
	<b>Ministry of Natural Resources and Environment (MONRE)</b>		
12	Institute of Strategy and Policy on Natural Resources and Environment (ISPONRE)		
13	Ha Noi University of Natural Resources and Environment (HUNRE)		
14	Ho Chi Minh University of Natural Resources and Environment (HCMUNRE)		
	<b>Ministry of Education and Training (MOET)</b>		



15	Thai Nguyen University of Agriculture and Forest (TUAF)		
16	Thai Nguyen University of Education		
17	Thai Nguyen University of Science		
18	Vinh University		X
19	Hue University of Agricultural and Forestry (HUAF)		
20	Hue University of Science (HUSC)		
21	The University of Da Nang – University of Education		
22	Can Tho University (CTU) (Colleague of Aquaculture and Fisheries (CAF))		X
23	Ho Chi Minh Nong Lam University (NLU)		
24	Ha Noi National University of Education (HNUE)		X
25	Hanoi Pedagogical University 2		
26	Da Lat University		
27	Tay Bac University (UTB)		
	<b>Vietnam National University, Ha Noi</b>		
28	University of Science (HUS) (Faculty of Biology)	X	
	<b>Vietnam National University, Ho Chi Minh</b>		
29	University of Science (HCMUS)		
	<b>Ministry of Agriculture and Rural Development (MARD)</b>		
30	Forest Inventory and Planning Department (FIPI)	X	
31	Vietnam National University of Agriculture (VNUA)		X
32	Vietnam National University of Forestry (VNUF)		X
33	Vietnamese Academy of Forest Sciences (VAFS)		
34	Research Institute of Marine Fishery (RIMF)		X
35	Research Institute for Aquaculture No1 (RIA1)		X
36	Research Institute for Aquaculture No2 (RIA2)		
37	Research Institute for Aquaculture No3 (RIA3)		
	<b>Editors and publishers of scientific research</b>		
38	Journal of Marine Science and Technology (VAS)		
39	Journal of Biotechnology (VAST)		
40	Journal of Biology (VAST)		
	<b>Non-governmental organization (NGO)</b>		
41	International Union for Conservation of Nature (IUCN)		
42	World Wildlife Fund (WWF)		
43	Birdlife		

A survey will be conducted in order to get knowledge about available biodiversity data sources as well as the holders; (1) which kind of collection they are associated; (2) what kind of data they have; (3) If their data are digitized in digital format or digitized database; (4) If they are planning to publish or will be willing to share their data; (5) which are the limited factors for their digitization efforts; etc.

### 6.3. Proposal for organization of VBIF



**Figure 5.** The organization of VBIF

The organization of VBIF will include two layers, steering committee and working group (Fig. 5). The Steering committee is a team of 6-7 people nominated by stakeholders to represent them in GBIF decision making, under the leadership of the Head of Delegation. The steering committee should include representatives of the major stakeholders. The steering committee actively engage in guiding and implementing the node's work and help to ensure that the relevant actors feel ownership of the node's work. Head of Delegation is the person officially assigned by BCA to act as its representative to the GBIF Governing Board, taking part in the global-level decision making. Node manager is the person designated by BCA? to manage the activities of the node to coordinate a biodiversity information facility. He/she works between VBIF and GBIF and manages Working Group. The Working Group consists of 16 people (younger generations) from various organizations (agencies, institutes, universities and museums). They are usually focused on specific areas such as user support, scientific liaison or technical development (Table 2). Some members of Working Group overlap with Steering Committee members in order to enhance communication. All members are participating on a voluntary basis?. The major supporting agency for GBIF activities in Vietnam is MONRE (BCA).

**Table 2.** The list of potential members of VBIF

Nº	Layer	Name	Affiliation
	Steering Committee		BCA (VEA/MONRE) (HoD)
			Department of Nature Conservation (MARD)
			Institute of Ecology and Biological Resources (IEBR, VAST)
			Institute of Oceanography (IO, VAST)
			Institute of Marine Environment and Resources (IMER, VAST)
			Institute of Genome Research (IGR, VAST)
	Working Group		BCA (VEA/MONRE)
			Institute of Ecology and Biological Resources (IEBR, VAST)
			Institute of Oceanography (IO, VAST)
			Institute of Marine Environment and Resources (IMER, VAST)
			The Institute of Biotechnology (IBT, VAST)
			Institute of Genome Research (IGR, VAST)
			Vietnam National Museum of Nature (VNMN, VAST)
			Institute of Highland Central (VAST)
			Southern Institute of Ecology (SIE, VAST)
			Institute of Tropical Biology (ITB, VAST)
			Can Tho University (CTU) (Colleague of Aquaculture and Fisheries (CAF), MOET)
			Ha Noi National University of Education (HNUE), (Faculty of Biology)
			University of Science (HUS) (Faculty of Biology)
			Forest Inventory and Planning Department (FIPI, MARD)
			Vietnam National University of Agriculture (VNUA, MARD)
			Informatics organization (who?)

## VII. POTENTIAL NODE IN VIETNAM

**Table 3.** Potential Nodes in Vietnam with their advantages and disadvantages

Type of host/designated institution	Advantages	Disadvantages
Biodiversity Conservation Agency (BCA)	<ul style="list-style-type: none"> <li>• Very strong mandate, capacity to influence and support policy and decision making</li> <li>• Easily aligned with national biodiversity policies, strategies, and programme</li> </ul>	<ul style="list-style-type: none"> <li>• Challenges to operate at the technical level, and to provide technical support (e.g. to the scientific community)</li> <li>• Easily affected by political changes</li> <li>• May find difficulties in addressing needs from other ministries (e.g. from science or economic).</li> </ul>
Institutes of Vietnam Academy of Science and Technology (VAST), such as: Institute of Ecological and Biological Resources (IEBR), Institute of Oceanography (IO), Institute of Marine Environment and Resources (IMER), The Institute of Biotechnology (IBT), Institute of Genome Research (IGR) and Vietnam National Museum of Nature (VNMN).	<ul style="list-style-type: none"> <li>• Potential for developing capacity on biodiversity informatics easily and quickly</li> <li>• Full knowledge of the biodiversity-research realm</li> <li>• Knowledge of the challenges and requirements to digitize and manage natural history data</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of mandate (a strong and clear institutional mandate in terms of biodiversity database), institutional supports and funding; difficulty to formally engage with government institutions</li> <li>• May not be perceived as neutral by all stakeholders, depending on how the institute fits within the Participant's overall institutional landscape (for example if there is overlap or competition for resources).. It may need big efforts to demonstrate neutrality (e.g. if it is not competing for funds, etc.). Neutrality is essential to build trust in the data sharing activities at all levels</li> <li>• It may find difficulty to engage with other communities holding other types of biodiversity data (e.g. observations, ecological data, etc.)</li> <li>• In some cases it makes it difficult for the Node to serve the needs of users outside the scientific community (e.g. policy makers)</li> <li>• Require some external investments to get the capacity to provide technical</li> </ul>

		<p>support (including knowledge, technologies (e.g. software, hardware), staff (enough experienced personnel to cover all the relevant areas as defined in the Node's work plan, and mandate (the Participant Node should be empowered to perform its duties at the appropriate level))</p> <ul style="list-style-type: none"> <li>• May become very science-driven, putting less emphasis on supporting policy and decision making for the conservation and sustainable use of biodiversity</li> <li>• May become very dependent on funded projects</li> <li>• The Node's staff may get heavily involved in the institution's internal activities</li> </ul>
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A combine between two above options can overcome the challenges and ensure the Node's role as facilitation/coordination. Node team will come from several host situations such as management agencies (BCA, Department of Nature Conservation of MARD) and research institutes (Vietnam Academy of Science and Technology (VAST) (Ecological and Biological Resources (IEBR), Institute of Oceanography (IO), Institute of Marine Environment and Resources (IMER), The Institute of Biotechnology (IBT), Institute of Genome Research (IGR) and Vietnam National Museum of Nature (VNMN)). They will be key biodiversity stakeholder institutions. Of course, Node must include other members such as University of Science (HUS) (Faculty of Biology), Forest Inventory and Planning Department (FIPI, MARD), Vietnam National University of Agriculture (VNUA, MARD), Informatics organization (who?). It is necessary to considering that Node's members not only work for VBIF but also work for NBDS. Because, the node team is divided among several host institutions, one institution must be designate to coordinate node activity and act as the main contact point for interactions with the GBIF Secretariat and the global network. In this case, BCA will be a best choice.

## VIII. SWOT ANALYSIS TO EVALUATE THE NODE FUNCTION OBJECTIVELY

	Positive/Pros	Negative/Cons
Internal elements	<p><b>Strengths</b></p> <ul style="list-style-type: none"> <li>● The Biodiversity Conservation Agency (BCA) was proposes to strengthen national capacity in database management and to promote GBIF in the country as an opportunity for information exchange at the global level.</li> <li>● BCA is recognized at the national level as responsible for coordinating biodiversity data sharing activities nationally.</li> <li>● Human resources: Four staffs. have been trained about GBIF; BCA staffs.</li> <li>● Physical resources: VN has NBDS already.</li> <li>● A circular on collaboration mechanism among data holders, which enables sharing, exchanging and exploiting biodiversity data, has been drafted.</li> <li>● Financial: Funding from MONRE, BIFA?</li> <li>● Activities: Some “open-minded” Data Holders already identified.</li> <li>● As a result of NBDS project, the main major stakeholders for the biodiversity information facility been identified including MONRE/VEA/BCA, MARD, MOST, PPC, DONRE, DARD, national parks, protected areas, research institutes, universities, NGOs,</li> </ul>	<p><b>Weaknesses</b></p> <ul style="list-style-type: none"> <li>● A node has not yet been designated.</li> <li>● Except BCA, there is not any institution responsible for coordinating biodiversity data sharing activities nationally and built this obligation into its planning and function.</li> <li>● The coordination team or node have not yet designed in order to have a communications operational and a comprehensive plan for the biodiversity information facility.</li> <li>● Inter-institutional agreements have not yet in place to support stakeholder engagement in the biodiversity information facility.</li> <li>● A strategy / set of priority activities for the node and biodiversity information facility has not yet been described, agreed and adopted by stakeholders. Long-term purpose of the node with plans for the medium and short term has not yet been stated.</li> <li>● A strategy has not yet been developed to assist the biodiversity information facility in mobilizing national biodiversity data sources in a systematic way. Consequently, data mobilization priorities for the biodiversity information facility have no yet been agreed with stakeholders. The strategy assist data holders in making a case for investment in the mobilization of their data (e.g. through addressing known gaps or targeting specific use cases)</li> </ul>

	<p>international organizations and individuals.</p> <ul style="list-style-type: none"> <li>● Vietnam has become a member country of the Convention on Biological Diversity</li> <li>● Government of Vietnam enacted the Biodiversity Law in 2008</li> <li>● National Biodiversity Strategy to 2020, vision to 2030</li> </ul>	<p>not yet in use.</p> <ul style="list-style-type: none"> <li>● Lack of staffs can work full time.</li> <li>● Few data are housed in NBDS. Data is scattered across a multitude of sources and formats (museum collection specimens, reports, published literature, researchers' own computers).</li> <li>● Funding is not available now. In the future, the funding may be very limited and unstable.</li> <li>● Biodiversity is not an institutional priority.</li> <li>● More data holders need to be identified.</li> <li>● The needs of biodiversity information users have been not yet been assessed at the national level.</li> <li>● The gaps in the available biodiversity data (taxonomic, spatial, temporal, and thematic) have not yet fully identified.</li> <li>● The state of national data holdings has not yet been comprehensively assessed (e.g. digital/non-digital format, approximate size and scope of collections, use of standards). Almost biodiversity data has not yet digitized. Most digital data is on desktop format (MS-Word, Excel, etc.). Digital data were not followed Darwin core.</li> <li>● The use of biodiversity data available through the GBIF network and other institutions has not yet promoted.</li> <li>● Biodiversity data and services have not yet well recognized and used by many research and national agencies (to deal with economic sectors, for example in spatial planning, environmental impact assessment, agricultural policy and public health).</li> <li>● There is little contact (meeting?)</li> </ul>
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		<p>among management agencies, data users and data holders.</p> <ul style="list-style-type: none"> <li>● Sources of biodiversity data (documents, specimens) have not yet been completely located.</li> </ul>
External elements	<p><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>● Future trend: VN economy is growing and the government is concerning to build national database. There will be more resources for building biodiversity database?</li> <li>● Policies, circular, decision may be issued in order to facilitate providing, exchanging and managing biodiversity information.</li> </ul>	<p><b>Threats</b></p> <ul style="list-style-type: none"> <li>● The economic development is unsustainable and does not ensure a stable budget for building national biodiversity database system.</li> <li>● The important of biodiversity database do not fully understand. The policies, circular, decision may be not issued. There is not any coordination mechanisms between agencies, research institutes, museums and universities in building, using, sharing biodiversity data.</li> <li>● A collaborative framework may not defined and agreed by the relevant stakeholders and partners.</li> <li>● There is no specific development strategy for biodiversity database.</li> <li>● The resources for coordinating biodiversity data sharing has not yet allocated to the team or node. No staff members assigned to the node yet. In addition, whether or not the node or coordinating team has sufficient staff members and stable funding sources to implement the strategy has not yet been assessed.</li> <li>● There is not any mechanism in place for national biodiversity data holding institutions to share experience and expertise relating to digitization; to promote incentives for data publishing (e.g. through data management policies attached to public research grants, data paper publishing, use of licenses to share biodiversity</li> </ul>



		<p>information).</p> <ul style="list-style-type: none"> <li>● Limited human resources in charge of biodiversity databases from stakeholders.</li> <li>● Biodiversity data have not yet been shared between different organizations. Data holders is not willing to share their data.</li> <li>● Biodiversity is not quantitative at national scale.</li> <li>● Biodiversity data is scattered all over the country.</li> <li>● Biodiversity monitoring at national scale has not yet been done; lack of human resource and funding; no standard survey methods on biodiversity;</li> <li>● The ability to manage, exploit and use the database is limited due to lack of training.</li> </ul>
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## CONCLUSIONS AND RECOMMENDATIONS

There should be a few workshops with the participation of stakeholders (management agencies, research institutes, universities, museums, non-governmental organizations, publishers, magazines, experts). The objectives of these workshops are:

- To be aware of as well as the benefits of joining GBIF.
- To discuss about the motives.
- To discuss about of the necessary researches, strategies, policies, and priorities at the highest level for the establishment of VBIF.
- To discussion about the road map.
- To discuss about key stakeholders. A memorandum of understanding, which is clearly defined the roles and responsibilities of the participants, is very important.
- To discuss about financial mechanism.
- Assign Head of Delegation, Node Manager, Steering Committee, Working Group.
- The coordination team or node need to been designed in order to have a communications operational and a comprehensive plan for the biodiversity information facility. Inter-institutional agreements is essential to support stakeholder engagement in the biodiversity

information facility. A board and other governance structure must be established to support the work of the node with its stakeholders. The node's governance structure will provide the necessary expertise to guide the development of the biodiversity information facility. A strategy / set of priority activities for the node and biodiversity information facility must be described, agreed and adopted by stakeholders. The resources for coordinating biodiversity data sharing must be allocated to the team or node. The staff members will be assigned to the node. In addition, whether or not the node or coordinating team need to have sufficient staff members and stable funding sources to implement the strategy.

VBIF organization will include representatives of the authorities (BCA (MONRE), Nature Conservation Department (MARD)), some institutes of Vietnam Academy of Science and Technology (VAST) and other universities and institutes. The organization must ensure the participation of key members in the field of management, research and use of biodiversity. They not only work for VBIF but also effort for NBDS.

We need to consider that NBDS is not a huge data, trying to contain as much as possible information on biodiversity. NBDS just store the necessary information for the biodiversity management at the national level, such as information about rare and threatened species, invasive alien species, protected areas and important ecosystems. An important role of NBDS is a hub (center bridge) where linking to other biodiversity databases in the country and globally. Meanwhile, VBIF roles in building and developing the relationship between NBDS with other databases. After all, national biodiversity information facilities are networks of people and institutions that produce, manage and use biodiversity data, together supporting the needs of the country for biodiversity information. This network has not yet been built and developed in Vietnam and we will need to try very hard to do this.

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