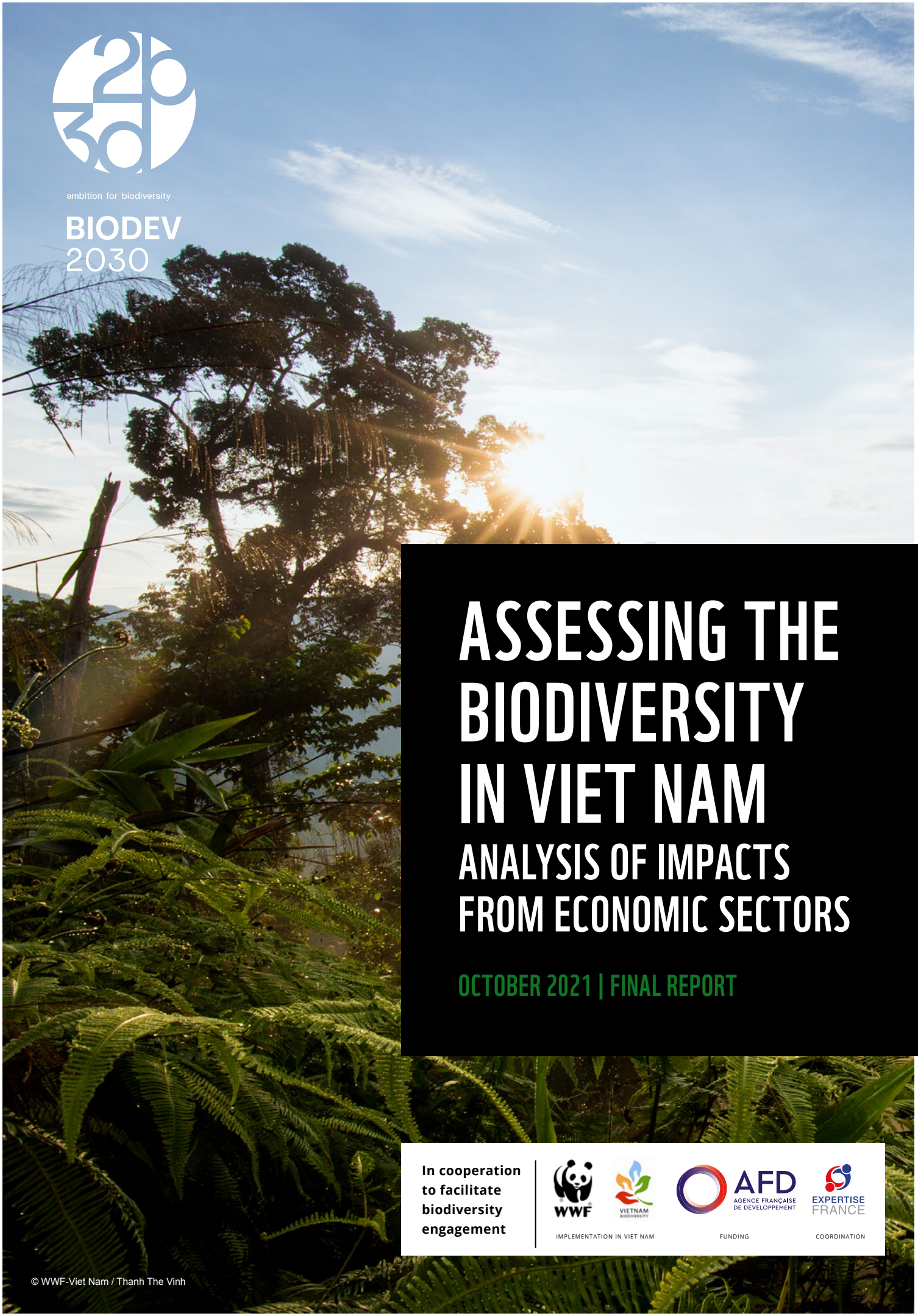

ambition for biodiversity

BIODEV 2030

# ASSESSING THE BIODIVERSITY IN VIET NAM

## ANALYSIS OF IMPACTS FROM ECONOMIC SECTORS

OCTOBER 2021 | FINAL REPORT

In cooperation to facilitate biodiversity engagement

WWF — IMPLEMENTATION IN VIET NAM

VIETNAM BIODIVERSITY

AFD AGENCE FRANÇAISE DE DÉVELOPPEMENT — FUNDING

EXPERTISE FRANCE — COORDINATION

This independent assessment report is one of the research activities under the BIODEV2030 Initiative. The scientific diagnosis is conducted by an independent consortium led by Oréade-Brèche firm.

The views expressed in this report are those of the authors and do not necessarily reflect the views of the Nature and Biodiversity Conservation Agency (BCA) and the World Wide Fund for Nature in Viet Nam (WWF-Viet Nam). This publication serves as a reference for management agencies and organizations involved in biodiversity conservation including BCA and WWF-Viet Nam, and is considered for the development of appropriate policies and regulations on biodiversity conservation in the coming time

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**World Wide Fund for Nature (WWF):** One of the world's largest and most experienced independent conservation organizations. WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature by conserving the world's biological diversity, ensuring the sustainable use of renewable natural resources, and promoting the reduction of pollution and wasteful consumption.

**Nature and Biodiversity Conservation Agency (BCA):** BCA is a functional agency under the Viet Nam Environment Administration (VEA), the Ministry of Natural Resources and Environment of Viet Nam. BCA provides the advisory function to help the Director General of the VEA in government management and law enforcement for nationwide nature and biodiversity conservation.

*The original report is in English. The Vietnamese version is an unofficial translation.*


# FOREWORD

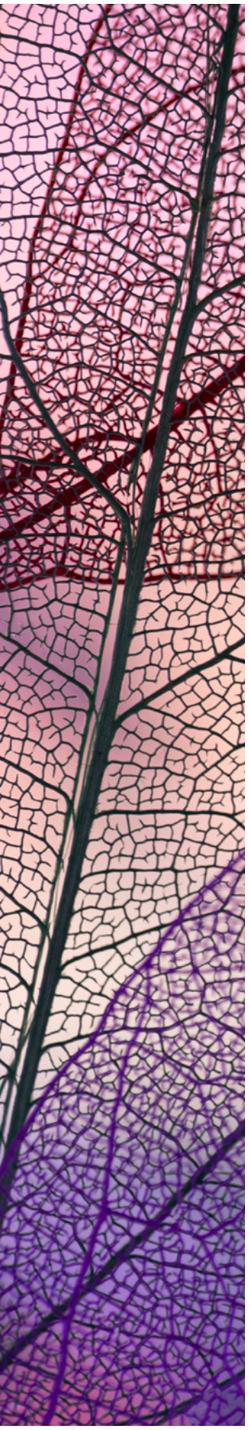
The health of the ecosystem on which we and all other species rely for their survival has been deteriorating at an unpredictable rate. WWF's Living Planet Report 2020 shows an average 68% decrease in monitored vertebrate species populations between 1970 and 2016 of which status is considerably more serious in some key biodiversity hotspots. Biodiversity erosion has been affecting the livelihoods, food security, health and quality of life of people around the world, and also triggering our economic and financial risks. The urgent task now is to reverse the biodiversity loss and preserve ecosystems if we want to achieve the Sustainable Development Goals by 2050.

*"Biodiversity Engagement Facilitation"* Initiative - BIODEV2030 is funded by the French Development Agency (AFD), coordinated by Expertise France. This Initiative has been implemented in 16 pilot countries, of which Viet Nam is the only one located in Asia. In Viet Nam, the Initiative starts from July 2020 under the joint implementation and cooperation of the World Wide Fund for Nature in Viet Nam (WWF-Viet Nam) and the Nature and Biodiversity Conservation Agency (BCA) – an agency under the Viet Nam Environment Administration (VEA), the Ministry of Natural Resources and Environment. One of its ambitious goals is to build voluntary commitment models to transform production methods of at least two economic sectors towards minimizing negative impacts and enhancing positive ones on biodiversity, which will contribute to the process of halting biodiversity loss by 2030 and restoring biodiversity by 2050.

The scientific assessments of the status and drivers leading to biodiversity decline, of the economic activities' impacts on biodiversity, and the analysis of stakeholders as well as the institutional and policy context of the country, will provide an important basis for stakeholders (including government, civil society organizations, businesses, and communities) to engage in dialogues in order to develop appropriate voluntary commitment models. Ultimately, the results from these voluntary commitment models will provide valuable practical experiences to help replicate the commitment models in Viet Nam; and to share with other countries including the Initiative-implementing ones through key international events in the United Nations Decade on Ecosystem Restoration (2021-2030).

The report *"Assessing the biodiversity in Viet Nam – Analysis of Impacts from Economic Sectors"* is the first in a series of scientific diagnosis activities under the framework of the BIODEV2030 Initiative in Viet Nam. Despite certain limitations in the data collection and analysis process, the report has outlined quite clearly the current status of biodiversity in Viet Nam, thereby pointing out the direct and indirect causes leading to biodiversity loss. At the same time, Aquaculture and Forestry have been identified as two sectors with great impacts on biodiversity loss in Viet Nam, which creates the premise for further in-depth studies to determine more clearly the extent, scale, and trend of impacts of these two economic sectors on Viet Nam biodiversity. On that basis, appropriate recommendations will be given for future transformational voluntary commitment models.

We would like to express our deepest appreciation to the assessment team led by Oréade-Brèche company for their great efforts to help us conduct this scientific diagnosis. Our special thanks also go to members of the Core Working Group of the Initiative in Viet Nam, organizations and individuals who have contributed ideas at our two previous consultation workshops and during the development of this report.



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## ABBREVIATION

| | |
|---|---|
| AFD | French Development Agency *(Agence Française de Développement)* |
| BCA | Nature and Biodiversity Conservation Agency |
| CBD | Convention on Biological Diversity |
| CITES | Convention on International Trade in Endangered Species of Wild Fauna and Flora |
| FPD | Forest Protection Department |
| GSO | General Statistic Office |
| IBAT | Integrated Biodiversity Assessment Tool |
| LPI | Living Planet Index |
| IEBR | Institute of Ecology and Biological Resources |
| IUCN | International Union for the Conservation of Nature |
| KBA | Key Biodiversity Area |
| MARD | Ministry of Agriculture and Rural Development |
| MOCST | Ministry of Culture, Sports and Tourism |
| MOIT | Ministry of Industry and Trade |
| MONRE | Ministry of Natural Resources and Environment |
| NP | National Park |
| NR | Nature Reserve |
| NTFP | Non-timber forest products |
| PA | Protected Area |
| SFC | State Forest Companies |
| SFE | State Forest Enterprise |
| SIE | Southern Institute for Ecology |
| STAR | Species Threat Abatement and Restoration |
| VAST | Vietnam Academy of Science and Technology |
| VEA | Vietnam Environment Administration |
| VEPF | Vietnam Environment Protection Fund |
| VFPDF | Vietnam Forest Protection and Development Fund |
| VNFOREST | Vietnam Administration of Forestry |
| UE | Union European |
| UNCCD | United Nations Convention to Combat Desertification |
| UNFCCC | United Nations Framework Convention on Climate Change |
| WWF | World Wide Fund for Nature |

# SUMMARY

# Figures



# Tables

# INTRODUCTION

The BIODEV2030 Initiative “Biodiversity engagement facilitation”, financially supported by AFD (the French Development Agency) and coordinated by Expertise France has started. Its overall goal is to assist sixteen pilot countries in leveraging commitments from economic sectors to stop biodiversity loss over the next decade. In other words, the initiative aims at mainstreaming biodiversity through sector-based commitments emerging from multi-stakeholder dialogue in these countries. The specific objectives of the initiative are to:

- Determine the scientific basis of voluntary multi-actor commitments for biodiversity at national level,
- Support the country formalize voluntary national commitments on integrating biodiversity into economic sectors,
- Contribute to the international debate through the dissemination of commitments and contributions discussed in Viet Nam.

In Viet Nam, the initiative is implemented by WWF-Viet Nam and its partner – the Nature and Biodiversity Conservation Agency (BCA). The country is one of the world’s sixteen most biologically diverse countries. Over 50,000 species have been identified, consisting of nearly 7,500 micro-organisms, 20,000 terrestrial and water plants, 10,500 terrestrial animals, 2,000 invertebrates and freshwater fish, and over 11,000 marine species (UNDP, 2021). Nevertheless, as every country around the World, this biodiversity is strongly impacted by human activities. As part of the BIODEV2030 Initiative, WWF-Viet Nam hired a contractor to perform a study aiming to scientifically assess biodiversity decline, identify drivers, pressures and impacts caused by economic sectors to serve as a base to identify two business sectors targeted for voluntary biodiversity commitments. Specific objectives of this study are the following:

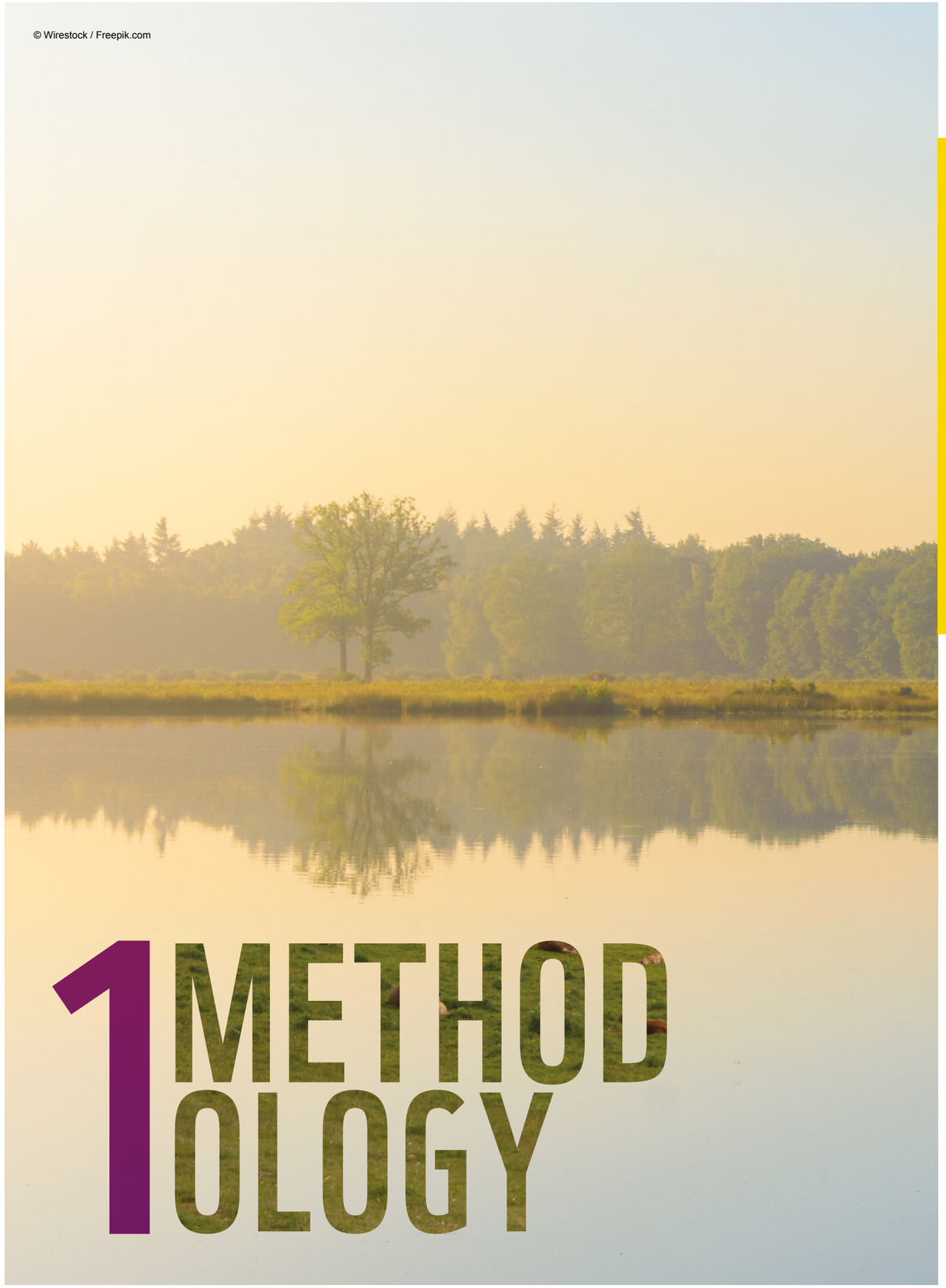
i. Carry out a diagnosis analysis of drivers of, and pressures on, the decline of Viet Nam’s biodiversity caused by impacts of economic sectors by proposing and mobilizing scientific methodologies and assessment tools (e.g., STAR, IBAT, LPI, Ecological Footprint, others) which will help to robustly identify and scientifically measure the level of pressures from different economic sectors,

ii. Pre identify the two economic sectors with the most significant (but politically and economically reversible) impacts on the decline of biodiversity and diagnose the drivers of biodiversity decline for these sectors,

iii. Facilitate multi-stakeholder contributions to the identification of at least two sectors with strong impacts on biodiversity decline.

This analysis has been conducted through three complementary levels:
1. Literature review focused on biodiversity, its threats and biodiversity policies
2. GIS analysis,
3. STAR analysis

This report describes the main outputs of these analyses. It indicates the methodology to collect and analyse data, it presents the key results, limitations of the study and the report propose a discussion.




# 1.1. The approach, at a glance

In order to have a strong and comprehensive understanding of the biodiversity decline, our analyses have been carried out through both a **species approach and** a **habitat approach, using a literature review, remote sensing tools and STAR metrics**.
The analyses have been performed at **national level** for understanding the economic sectors having the most significant and negative impact on biodiversity, but **also** at the **protected areas level and the Key Biodiversity Areas level**, which are nationally and internationally key areas for conserving biodiversity, especially regarding threatened species. Besides, our approach **combines qualitative and quantitative analyses**.

Our approach is based on three complementary methods:
- A **literature analysis** aiming at getting a **first idea of the biodiversity state** (at species and habitat level), its **threats** and the **biodiversity policies**,
- A **remote sensing analysis** aiming at understanding the **drivers of the biodiversity decline at the habitat level, based on a long satellite imagery monitoring (2000-2018).** This tool **provides qualitative and quantitative information on a number of land changes**,
- **A STAR** (Species Threat Abatement and Restoration) analysis, based on scientific information collected by IUCN for **threatened species**.

# 1.2. Literature review

### 1.2.1. Approach to review ecosystem diversity

Biodiversity has been reviewed at 2 of its 3 levels, e.g., ecosystem and species level, since scientific publications on the genetic diversity in Viet Nam are limited and requires additional investigations that are not allowed in the timeframe and budget of this assignment. At the ecosystem level, our aim was to obtain the state of the knowledge of the existing ecosystems in Viet Nam, through the broader literature. For that we are answering the following key questions:

1. **Which ecosystems are available in Viet Nam?**
2. **Where are they?**
3. **How have they changed over time?**
4. **What are the threats to them?**

To understand the ecosystem diversity, we first need an ecosystem classification system that allows us to classify all existing ecosystems. In Viet Nam, usually each biome (e.g., forest, marine etc.) has their own classification system and a system that allows the systematic classification of all existing ecosystems has not been developed. We, therefore, used a global ecosystem classification system that allows us to have an overall and a consistent understanding of the ecosystem biodiversity across the country. The results from using the global classification system also allow us for the first time to compare with the regional and global level of ecosystem biodiversity. In addition, it also enables us to develop a red list of ecosystems in Viet Nam. Having an ecosystem classification system helps us answer the first questions. To answer the remaining three questions, we applied the following three methods for all of them and divided our ecosystem review work into three stages (Table 1):

*Table 1: Methods to obtain details data/information on ecosystem diversity, distribution and threats.*

| STAGE | METHOD | DESCRIPTION | STRENGTH | WEAKNESS |
|---|---|---|---|---|
| **Stage 1 – desk study** | Using the existing literature (literature review) | - Systematic search for the required information in the literature | - With reliable data, this method provides detailed and accurate information at almost no cost.<br>- Some thematic studies from the literature can provide deep understanding about ecosystems | - Very time consuming<br>- We may miss lots of information from the grey literature which hardly can be accessed online.<br>- Can only be focused on the level of protected areas where the existing information/data is available.<br>- Sometime information is outdated and low reliability |
| **Stage 2 – field mission** | Using the information from the government agencies | - The central government agencies (e.g., MARD, MONRE) have basic information of the existing ecosystems under their management (i.e., protected areas). | - High level of details and accuracy<br>- Most updated and quantitative<br>- Highly reliable | - Hard to obtain the information/data from the central government<br>- Inadequate information since some information may need the support from the local government. |
| **Stage 3 – desk study** | Using land use map | - Using the current land use maps to understand the current stage of the land use, while in combination with the land use map of e.g., 10 years ago can reveal the land use change | - Understand at the national scale<br>- Can be updated information<br>- Have systematic information | - Need to acquire land use map over time |

### Threat classification and its scope of study

To answer question 4, we also need to have a threat classification system that allows us to classify all threats. We used the IUCN threat classification scheme (Version 3.2) (IUCN, n.d.) that classify threats into 12 groups as follow:


We assessed threats on the basis of protected areas with the available information from the literature. We also used land cover change maps to identify the areas changed and that also allows us to understand various threats (e.g., no. 1-4, 7, 10 and 12).

At the protected areas level of study (i.e., stage 1 and stage 2), the following data /information have been collected:

1. Areas and distribution,
2. Year of establishment or registration/recognition (applied to regional and international sites)
3. Types of protected area (e.g., national park, nature reserve, landscape protection zone, species and habitat conservation area)
4. State of knowledge about the ecological/biological characteristics (i.e., ecosystem types),
5. Change in areas of the ecosystems,
6. Past and current direct threats to the ecosystem/areas,
7. Economic sectors have direct impacts on ecosystems.

### 1.2.2. Approach to review species diversity

At species level, the key fauna and flora biodiversity taxa investigated are mammals, birds, amphibians, fishes, reptiles and angiosperms, which are also listed under national parks and nature reserves as well as at the National Biodiversity Database System (NBDS, http://nbds.ceid.gov.vn/). Global databases such as the Global Biodiversity Information Facility (www.gbif.org) and the IUCN Red List of Threatened Species (www.iucnredlist.org) were consulted. As long as the data were available, the following information was collected and detailed by taxonomic groups:

1. Area of distribution,
2. State of knowledge,
3. Number of species,
4. Endangered species,
5. Special cases of species conservation in Viet Nam.

Special attention was given to the following species: nationally and/or globally threatened species according to the IUCN Red List, endemic species, species with little information, species for which the state of knowledge is not up to date or not reliable. For these taxa, the following information was collected:

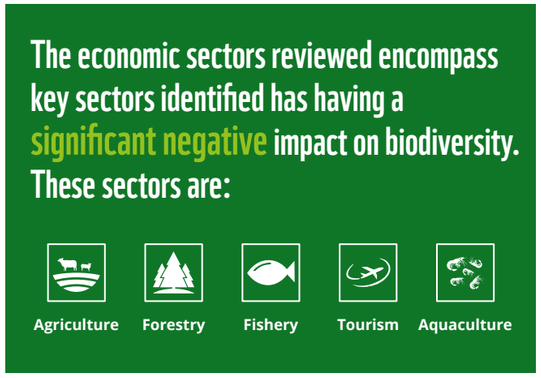
1. Area of distribution,
2. Population and spatial dynamic,
3. Conservation status,
4. State of knowledge,
5. Conservation and research needs.

The threats to the ecosystem and species level, as well as their links to economic sectors, were collected based on the IUCN threat classification scheme (Version 3.2), listed previously.

Results were summarized in the literature review report and in this final report. Illustrating maps were drawn, especially for biodiversity, at the ecosystem level.

### 1.2.3. Approach to review biodiversity-related policies and assess key economic sectors

The review of the biodiversity-related policy has taken into account the major international agreements signed by Viet Nam as well as the main last main national legislation focused on the natural resources and biodiversity conservation.




The assessment of the economic sectors impacting biodiversity was analysed from the review of all relevant papers which stated their commitment to respond to biodiversity loss in Viet Nam. Regarding their commitments, the measurement applied here is to gather all relevant papers which state the orientation or specific commitment of biodiversity conservation (law, degree, strategy, circular, pledge for wildlife, etc.).

In addition, the role of the main Vietnamese institutions linked to the natural resources' management have been described.

### 1.2.4. Data sources

**Ecosystems**

For the stage 1 (desk review), we collected information and data from reliable websites/ organizations to obtain freely available resources. These can be peer-reviewed papers, scientific reports, management reports of government organizations, government decisions, consulting reports from NGOs, theses, etc. The searching approaches are: (1) search by protected area (i.e., using the protected area name as the main keyword); (2) search by topic (i.e., keywords are the topics e.g., wetlands of Viet Nam, marine ecosystems of Viet Nam etc.). The aim of the search by protected area is to collect all required information for each protected area. The aim of the search by topic is to increase the potential to reach more information and data from detailed studies. With this approach, we obtained many valuable resources on the studies relevant to our interested topics. We performed the search on both google scholar and google search.

From the literature review results, we have found out that information from the literature is abundant and can provide a relatively good understanding of the patterns of ecosystem diversity as well as threats. However, to supply the results with more updated and reliable information, we seeked data support from the central government agencies in a field data collection (i.e., stage 2 – field mission).

**Species**

Specifically, for animals, available datasets of the 2020 IUCN Red List (www.redlist.org) and the GBIF (www.gbif.org) for Viet Nam (2021) were freely downloaded and were analysed for extinction rates, threats, impact drivers, population trends, conservation needs, etc. This dataset also provides distribution (point; GBIF) and occurrence (area size; IUCN) data that help to assume species' distribution changes timely along with forest/land cover changes. Other specific and individual data were collected as supplementing data. Especially, data of highly endangered and conservation-concerned species were collected and analysed as cases/evidence of Viet Nam's biodiversity decline and loss.

## 1.3. Remote sensing analysis

### 1.3.1. Land cover and land use changes at country level

Biodiversity loss in terms of land use change was analysed for the 2000 - 2018 period using the Regional Land Cover Monitoring System[1], which has been developed by the SERVIR-Mekong project (Saaha &al., 2020).

A period of 18 years has been chosen

In 2020, D. Saaha & al.,, including international and Vietnamese famous organizations (such as Forest Inventory and Planning Institute, National Institute of Agriculture Planning and Projection, Space Technology Institute -Viet Nam Academy of Science and Technology) drafted a scientific paper entitled *"Primitives as building blocks for constructing land cover maps"* that was released and accepted by the scientific journal such as Elsevier for example *(https://doi.org/10.1016/j.jag.2019.101979)*[2], where further details are provided[3].

1 https://www.landcovermapping.org/en/landcover/

2 In this paper, the authors present further into details the Regional Land Cover Monitoring System (RLCMS) architecture that is customized to create land cover products using primitive map layers. Best practices are presented to create and assemble primitives from optical satellite using computing technologies, decision tree logic and Monte Carlo simulations to integrate their uncertainties.

3 The project and its outcomes have been presented in the context of a regional land cover map based on a shared regional typology with 18 land cover classes agreed on by stakeholders from Cambodia, Laos PDR, Myanmar, Thailand, and Viet Nam.

The imagery resolution is 600 meters per side, that makes it possible to highlight major changes in land use, at the scale of a country.

This system distinguishes the following land cover classes: deciduous forest, evergreen broadleaf, mixed forests, flooded forests, mangroves, shrubland, grassland, wetland and barren areas. Some land use classes are also found: aquaculture, cropland, rice paddies, mining land, orchard and plantation, Built-up areas. Datasets come from SERVIR Mekong[1]. More details on classes are given below:

1 https://servir.adpc.net/

**Therefore, land changes are analysed for the following sectors:**

## agriculture, forestry, urbanization, mining, aquaculture.

| | |
|---|---|
| **'Deciduous forests'** | are dominated by trees of which 60% of canopy cover have a tree height above 5 m. Deciduous tree species make up>60% of the total tree cover, |
| **'Evergreen broadleaf forests'** | is dominated by trees of which 60% of canopy cover are trees above 5 m. Dominant tree species are evergreen broadleaf, |
| **'Mixed forests'** | is defined as habitat with more than 60% tree canopy cover, tree height is greater than 5 m, and the forest composition is mixed such that no single forest type makes up more than 60% of the total tree cover, |
| **'Flooded forests'** | have fresh water inland habitats with more than 10% of tree canopy cover, a tree height above 2 m, and seasonal or permanent flooding, |
| **'Mangrove'** | is defined as coastal sediment habitats with more than 10% woody vegetation canopy cover and the majority of cover is higher than 2m, |
| **'Shrubland'** | are lands where the majority of woody vegetation cover is less than 5m in height and greater than 10% canopy cover. Shrub species can be evergreen or deciduous, |
| **'Grassland'** | are lands with herbaceous cover, where wetland obligate species are scarce, |
| **'Wetland'** | are seasonally flooded regions dominated by herbaceous or shrub vegetation, |
| **'Barren areas'** | are natural and semi-natural lands comprised of exposed soil, sand, and rocks, |

| | |
|---|---|
| **'Aquaculture'** | is the farming of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants. It includes man-made pond systems within fresh and salt water bodies or temporarily flooded regions, |
| **'Cropland'** | includes lands with herbaceous and shrubby crops followed by harvest and a bare soil period (Loveland and Belward, 1997). This category includes single, mixed, multiple, and seasonal cropping systems, |
| **'Rice paddies'** | include irrigated or flooded rice fields and low land paddy fields where rice is intensively planted for more than 1 cycle per year (can be 2 or 3 cycles). Rice is the only plant there, |
| **'Mining land'** | are mostly exposed soil, sand, or rocks originating from mining, gravel production, or other human activity, |
| **'Orchard and plantation'** | include lands cultivated with perennial crops that reach heights above 5m and occupy the land for long periods (Blanchez, 1997). Commercial tree crops in the region are mainly rubber, palm oil, cashew nut, and coconut plantations, |
| **'Built-up areas'** | were defined as cultural lands covered by buildings, roads, and other built structures, |
| **'Surface water'** | was defined as open water larger than 30m by 30m that is open to the sky, including fresh and saltwater. |