



EcoHealth
Alliance



Understanding Wildlife Farming and Zoonotic Disease Management in Viet Nam

FULL STUDY REPORT



ACKNOWLEDGMENT

This report was prepared by the Oxford University Clinical Research Unit and EcoHealth Alliance. The research was led by Trang Nghiem Nguyen Minh, Katrina Lawson, and Hongying Li. A wider team provided a review, including Catherine Machalaba, Rogier van Doorn, Peter Daszak, Siyeun Kim, and Tran Ngo Phan Bao. This work was made possible with the support of the Wallace Research Foundation and the International Alliance against Health Risks in Wildlife Trade implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. We thank the experts who participated in this study and the participants of the consultation workshop for sharing their valuable insights to improve the understanding of this topic and guide policy dialogues.

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ABBREVIATIONS

CIFOR

Center for International Forestry Research

DAH

Department of Animal Health

EIDs

Emerging Infectious Diseases

FAO

Food and Agriculture Organization of the United Nations

MARD

Ministry of Agriculture and Rural Development

MoD

Ministry of National Defense

MoH

Ministry of Health

MoIT

Ministry of Industry and Trade

MoPS

Ministry of Public Security

OHHLEP

One Health High-Level Expert Panel

PFPD

Provincial Forestry Protection Department

VNAF

Viet Nam Administration of Forestry

WHO

World Health Organization

CITES

Convention on International Trade in Endangered Species of Wild Fauna and Flora

DFPC

District Forestry Protection Center

ENV

Education for Nature – Viet Nam

MA

Viet Nam CITES Management Authority

MoD

Ministry of National Defense

MoF

Ministry of Finance

MoIC

Ministry of Information and Communication

MONRE

Ministry of Natural Resources and Environment

MoST

Ministry of Science and Technology

PanNature

People and Nature Reconciliation

SA

Viet Nam CITES Scientific Authority

WCS

Wildlife Conservation Society

WWF

World Wildlife Fund for Nature

INTRODUCTION

Emerging infectious diseases (EIDs) impose significant burdens on public health and socioeconomic development globally. A number of infectious diseases of animal origin have emerged in the past two decades, causing outbreaks of different scales across the world. These include the high-impact Severe Acute Respiratory Syndrome coronavirus outbreak in 2003, the swine flu pandemic in 2009, the Middle East Respiratory Syndrome coronavirus outbreak in 2012, the Ebola virus disease epidemic in West Africa from 2013 to 2016, the Zika virus outbreak in 2015 and, most recently, the COVID-19 pandemic¹⁻³. An analysis of emerging infectious disease events from 1940 to 2004 showed that 63% of the EIDs were zoonotic that can be spread between humans and animals, and 71.8% of these originated from wildlife⁴.

It is common in Viet Nam to use many wild animal species for commercial purposes, including food, traditional medicine, ornament, and fashion product⁵. The government defines wild animals as animals that live or grow in natural or artificial habitats or those reared or grown in controlled environments but not considered as livestock⁶. Wildlife farming has also existed in Viet Nam since the late 1800s⁷, which experienced rapid development since the 1980s as the economy grew⁸. The government currently regulates two types of wildlife farming in Viet Nam. One is for commercial purposes, including any transaction of wild animal species for profit⁹. Another is for non-profit purposes, including activities serving foreign affairs, scientific research, preservation breeding, ornamental breeding, salvage, and exchange among zoos, arboreta, and museums, exhibitions, circus performance, and exchange and return of specimens among CITES management authorities⁶.

The interfaces between humans and animals through these activities create potential zoonotic disease transmission pathways, leading to concerns of disease emergence that require attention and efforts from multiple sectors¹⁰. In addition, human contact with wild animals via daily livelihood or occupational practices can be concerning, particularly in areas where rodent and bat species, known as the hosts of many zoonotic agents, are widely distributed. These highlight the critical roles of wild animal management and relevant regulations in safe wildlife farming and zoonotic disease prevention¹¹, particularly when the knowledge among communities to prevent and respond to these disease risks is limited¹².

Built on existing studies on wildlife farming in Viet Nam^{8,13-17}, this study aimed to understand the legal framework of wildlife farming in Viet Nam with respect to zoonotic disease risk management and examine the implementation of policies and regulations within this framework. The findings would be used to support policy decisions and inform zoonotic disease risk reduction strategies at high-risk human-animal interfaces in Viet Nam, with the following specific objectives:

- Understand the legal framework of wild animal farming in Viet Nam, focusing on zoonotic disease control and prevention.
- Describe the governance structures of wild animal farming and zoonotic disease control in Viet Nam.
- Understand the development of policies on zoonotic disease management with respect to wild animal farming.
- Examine the application of policies in managing wild animal farms with respect to zoonotic disease control and prevention.
- Enhance the communications of research findings with policymakers to inform future policy development.



METHOD



LITERATURE REVIEW

INCLUSION CRITERIA

Time: Published from 2016 - 2022

Keywords: policy, zoonosis, zoonotic diseases, emergence, animal health, wildlife farming, and Viet Nam, động vật hoang dã (wild animals), động vật rừng (forest animals), động vật và thực vật rừng (wild fauna and flora)

Areas of search:

- Forestry
- Fisheries
- Husbandry
- Veterinary medicine
- Quality control

Laws included in the review

- Forestry
- Biodiversity
- Criminal Code
- Fisheries
- Veterinary medicine
- Infectious diseases

SOURCES OF DOCUMENTS

- Portal of the Ministry of Agriculture and Rural Development (MARD) (<https://www.mard.gov.vn>)
- Portal of the Government (<https://vanban.chinhphu.vn>)
- PubMed
- ResearchGate
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)
- Wildlife Conservation Society (WCS)
- Food and Agriculture Organization (FAO)
- People and Nature Reconciliation (PanNature)
- Education for Nature - Viet Nam (ENV)
- Center for International Forestry Research (CIFOR)
- Vietnamese journals

SEARCH STRATEGY

Two types of documents, legal documents and instruction or guideline documents, from the portal of MARD, were searched with different search algorithms (see the result in Figure 1. Search and selection flow of legal documents).

- Legal documents were search with keywords of “động vật hoang dã” (wild animals), “động vật rừng” (forest animals), “động vật và thực vật hoang dã” (wild fauna and flora), and “động vật và thực vật rừng” (forest fauna and flora)
- For instruction and guideline documents were searched with the names of areas and document types with:
 - Report
 - Directive
 - Plan
 - Program
 - Minute
 - Circular
 - Consolidated documents
 - Decision
 - Announcement
 - Correspondence
 - Instruction

Under the areas of:

- Forestry
- Fisheries
- Veterinary medicine
- Animal husbandry
- Quality control

Advanced search functions on PubMed were used. The setting was in Viet Nam, and the publication dates were from January 01, 2016 to 2022 (see the results in Figure 2). Keywords used for searching in English were:

- policy
- zoonosis
- zoonotic diseases
- zoonotic disease emergence
- animal health
- wildlife farming
- Viet Nam

STUDY RECORDS

- Data management:** Zotero software was used to manage records and data for the review. Microsoft Excel was used to track all extractions from the publications.
- Data collection process:** Microsoft Excel was used to manage extracted data from included sources of evidence. Key information was collected from each publication:
 - Title
 - Authors
 - Year of publication
 - Country of focus
 - Aims/objectives
 - Study population/sample size
 - Methods
 - Key findings related to the research question on evidence use and policy development



IN-DEPTH INTERVIEWS

STUDY PARTICIPANTS

Key stakeholders from institutions in charge of issues related to wildlife farming and zoonotic diseases management at district, provincial, and national levels in the North, Central, and South of Viet Nam, and international organizations with experience and expertise in wildlife farming-related issues were invited to participate in the study.

SAMPLING

Stakeholder mapping and analysis were conducted to devise a list of stakeholders based on the literature review and existing networks. The stakeholder mapping considered information such as names, educational backgrounds, work positions, expertise, and experience in wildlife farming management and zoonotic diseases.

The purposive sampling method was used to develop the initial list of potential study participants based on the stakeholder mapping. We selected potential participants based on their work positions, expertise, and experiences managing wildlife farming and zoonotic diseases. We also used snowball sampling during the interviews to identify further participants from the study participants' networks¹⁸.

CONSENT PROCESS

The researcher approached potential participants by email and phone calls and invited them to participate in the interviews. Before the interviews, each participant was provided a copy of the participant information sheet, which explained the study in detail and the participation procedure. The researcher went through the information sheet with

the participants and answered all questions from the participants. Each participant was asked to sign the Informed Consent Form once they agreed to participate in the study.

ETHICAL CONSIDERATION

The study obtained ethical approvals from the Oxford Tropical Research Ethics Committee (OxTREC) in the United Kingdom, the Ha Noi University of Public Health (HUPH) in Viet Nam, and the Human Subjects Research Ethics Review Board of HML IRB in the United States of America before the in-depth interviews were conducted.

INTERVIEWS

All the interviews were conducted using a semi-structured guide, which included questions for study participants' demographic information, their roles, and their perceptions and knowledge on issues related to wildlife farming management and zoonotic diseases emergence (see Appendix 2. Question guide for in-depth interviews). Most interviews were recorded by audio with consent from the study participants. Otherwise, interview information was recorded by paper and pen.

DATA ANALYSIS

Audio recordings and note recordings were transcribed for data analysis. We used a thematic analysis approach to analyse data generated from the interviews, following the steps of familiarizing with data, coding, generating initial themes, reviewing themes, defining and naming themes, and writing up¹⁹. We used NVivo12 Pro software to manage the coding of the data and further analysis.

CONSULTATION WORKSHOP

With the preliminary findings, a consultation workshop was organized in June 2023 to present the results with broad stakeholders in Viet Nam to validate and refine the findings and facilitate further dialogues to identify solutions in addressing the gaps.



RESULTS



LITERATURE REVIEW

LITERATURE REVIEW OF LEGAL DOCUMENTS

SEARCH RESULT

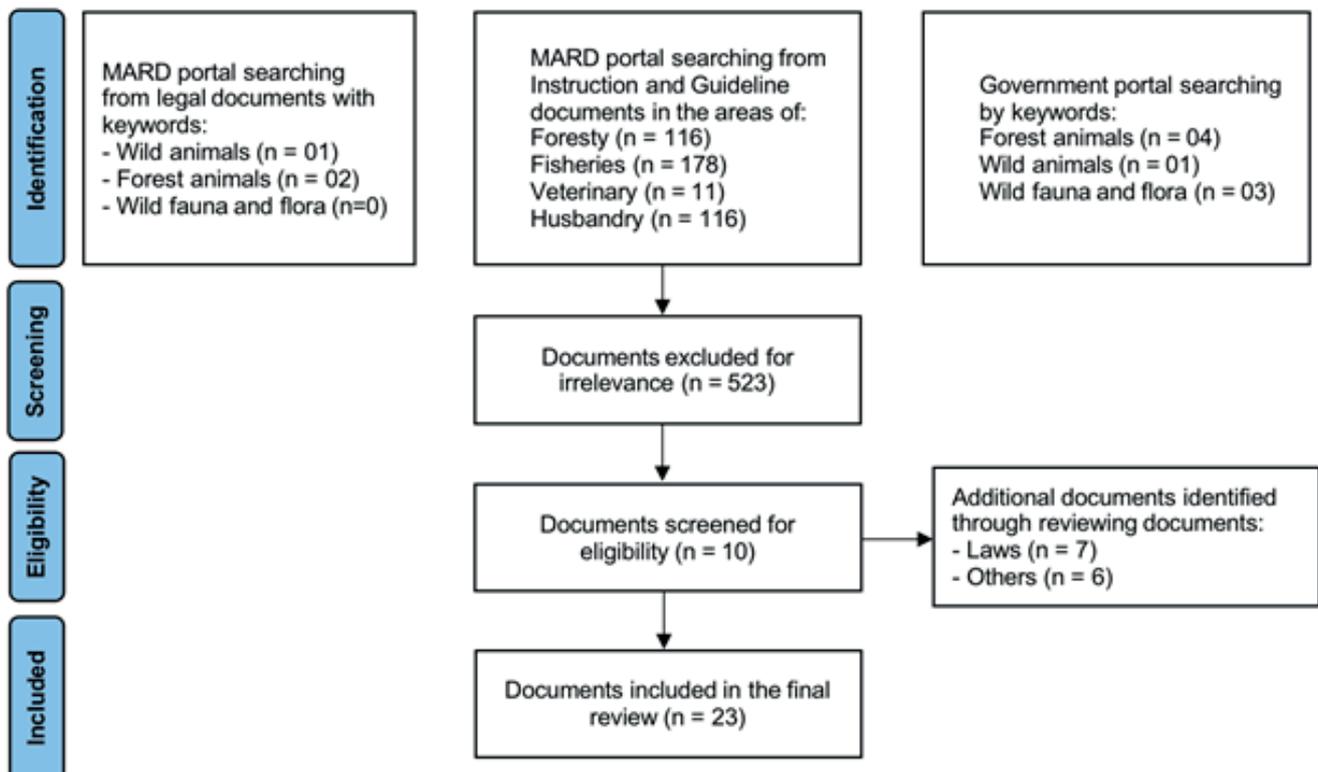


Figure 1. Search and selection flow of legal documents

The review of relevant legal documents provided:

- The definition of wildlife and wildlife farming (Table 1)
- Different lists of wild animals (Appendix 1. Group IB as defined in Decree No 84/2021/NĐ-CP by the government and Appendix 2. Group IIB as defined in Decree No 84/2021/NĐ-CP by the government)
- Criteria for wildlife farming (Table 2)
- Description of the state management of wildlife farming (Table 3 and Figure 2)

DEFINITIONS

Terms	Definition
Wildlife/ Wild animals	<p>Animals that live or grow in natural or artificial habitats or those reared or grown in controlled environments but not considered livestock as defined in the Law on Husbandry (includes cattle, poultry and other farm animals)²⁰, and are one of the following species:</p> <ul style="list-style-type: none"> • Endangered, precious and rare species of fauna prioritized for protection • Endangered, precious and rare species of forest fauna • Endangered species of wild fauna in CITES Appendices • Common species of forest fauna • Other terrestrial animals in the class of aves, mammalian, reptilian or amphibian, except certain species in the lists announced by the Ministry of Agriculture and Rural Development in cooperation with the Ministry of Natural Resources and Environment and relevant agencies⁶.
Endangered, precious and rare aquatic species	<p>Aquatic species that spend majority of or the whole life cycle living in water, are valuable to economy, science, health, ecology, scenery and environment; these species have a small population size or are facing extinction</p>
Farming	<p>For commercial purpose: any transaction of wild animal specimens for profit</p> <p>For non-profit purpose: any activities related to foreign affairs, scientific research, preservation breeding, ornamental breeding, salvage, exchange among zoos, arboreta and museums; exhibitions; circus performance; exchange and return of specimens among CITES management authorities⁶</p>
Farming facility	<p>Any facility rearing and breeding:</p> <ul style="list-style-type: none"> • Endangered, precious and rare species of forest fauna, and/or • CITES-listed endangered species of wild fauna, and/or • Common species of forest fauna⁹

Table 1. Definitions of wildlife and wildlife farming in the legal framework in Viet Nam

List of endangered, precious and rare species of forest fauna

Group IB: including species of forest fauna threatened with extinction and banned from exploitation or use for commercial purpose and species in CITES Appendix I naturally inhabiting in Viet Nam (see Appendix I)

Group IIB: including species of forest fauna that although currently not threatened with extinction but may become so without strict control of exploitation and use for commercial purpose and species specified in CITES Appendix II naturally inhabiting in Viet Nam (see Appendix II)

The list needs to be updated on the basis of a five-year cycle or when there’s any change in the CITES Appendices I and II⁹. CITES Appendices are reviewed and adapted based on the contexts in Viet Nam.

List of endangered, precious and rare species of forest fauna prioritized for protection

This list is used for conservation purposes. Species to be considered for inclusion in the list of endangered precious and rare species prioritized for protection include:

- Endangered precious and rare wild fauna species
- Endangered precious and rare domestic animal breeds²²

CRITERIA FOR WILDLIFE FARMING

“Organizations and individuals breeding forest animals that are endangered or rare, forest animals on the list of the CITES Appendices or ordinary forest animals shall satisfy requirements for legal varieties/breeds, farms ensuring safety for human and livestock, environmental and epidemic safety not having adverse influence on species population conservation in natural environment.”

Criteria	Common forest fauna	For CITES-listed endangered wild fauna	
		For non-profit purpose	For commercial purpose
Origin	Ensure legal origin under law provisions: by exploitation from the nature in Viet Nam, importation, purchase, transfer, donation or confiscation under regulations of laws ²⁴	The breed varieties shall be sourced in a legal manner; specimens shall be seized as per law provisions after handling and endangered species of wild fauna shall be imported in a legal manner or specimens thereof shall be imported from other legal farming facilities ⁹	
Exploitation from the nature		<ul style="list-style-type: none"> • to serve scientific research themes and projects • to generate the origins of original breed for breeding and artificial production purpose • to serve foreign affairs under decisions issued by the Prime Minister⁹ 	<ul style="list-style-type: none"> • the Provincial Forestry Protection Department (PFPD) is responsible for checking, monitoring the exploitation, origins of wild forest fauna under the CITES Appendices I, II • to generate the origins of original breeds for breeding and artificial planting purposes • to serve foreign affairs under decisions issued by the Prime Minister • to serve the purpose of sustainable trade as per law provisions⁹

Criteria	Common forest fauna	For CITES-listed endangered wild fauna	
		For non-profit purpose	For commercial purpose
Safety	Ensure safety of human and animals		
Environment	Ensure environmental hygiene		
Veterinary	Comply with law provisions	Take measures to prevent diseases	
Record	Record of their animals into a logbook		
Report to	Local forestry protection authority within 3 working days from the day on which such fauna is taken to the farm for monitoring and management purposes	Send periodic reports to the provincial state management agency in fisheries and in forestry and stay under their management	
Farming facility		Be suitable for growing characteristics of the farmed species and must ensure safety of human and animals, environmental hygiene and take measures to prevent diseases	
Required documents		There must exist the approved scientific research topic and proposal, and farming plan	There must be a farming plan
Species allowed for rearing/ breeding			<ul style="list-style-type: none"> • Declared by the Viet Nam CITES Scientific Authority to have potential for giving birth to young individuals through generations in the controlled environment • Breeding and rearing of such species have been certified not to produce any impact on the existence of such species and relevant ones in the nature by the Viet Nam CITES Scientific Authority

Criteria	Common forest fauna	For CITES-listed endangered wild fauna	
		For non-profit purpose	For commercial purpose
		CITES Appendices	
		CITES Appendix I	CITES Appendices II and III
Registration for farming facility's code		The Viet Nam CITES Management Authority (MA)	Provincial Forestry Administration Agency Provincial Fisheries State Management Agency
Management and supervision of farming facilities	District Forestry Protection Center (CFPC)	<ul style="list-style-type: none"> Provincial Forestry Protection Department Provincial Fisheries State Management Agency 	
Inspection, audit, handle violations and update information to the Viet Nam CITES Management Authority		<ul style="list-style-type: none"> Forestry Protection Department Fishery State Management Agency Customs Authorities Public Security Border Defense Force Tax agencies Market Management Authorities Veterinary Authorities Animal Quarantine Agencies Environment Protection Agencies Biodiversity Preservation Agencies 	

Table 2. Wildlife farming and management criteria in Viet Nam^{6,9,23,24}

LEGAL FRAMEWORK

Description:

Farmed and captive wild animals in Viet Nam are managed by different sectors. Table 3 below details the responsibilities of each authority in wild animal management from different aspects.

Area	Responsibility	Authority in charge	Legal document
Forestry	Focal point for state management	MARD	Law on Forestry (No 16/2017/QH14, dated November 15, 2017)23
	Collaboration with MARD to manage activities related to forestry	MONRE MoPS MoD Other related ministries	
	Implementation of regulations on forestry management	People's Committee at all levels	
Fisheries	Focal point for state management	MARD	Law on Fisheries (No 18/2017/QH14 dated November 21, 2017)21
	Provide sea areas for persons in charge of scientific research and technology related to fisheries	MONRE	
	Implementation of regulations on fisheries management	People's Committees at all levels	
	Implementation of Vietnamese and international regulations on fisheries exploitation and protection	Fisheries surveillance	
Animal Health	Focal point for state management	MARD	Law on Veterinary Medicine (No 79/2015/QH13, dated June 19th, 2015)25
	Issuance of the list of zoonotic diseases	MARD	
	Managing zoonotic diseases	MoH MARD	
	Managing the trading of animals and animal products	MoIT	
	Managing scientific research and standard development	MoST	
	Managing trafficking via borders, budgeting and ensuring budget for animal outbreaks	MoF	
	Ensuring security of animal outbreak prevention	MoPS MoD	
	Managing trafficking via border	MoD	
	Issuing regulations on environment protection related to animal health	MONRE	
	Communication and warning about animal outbreak	MoIC	
	Controlling the transportation of animals and animal products	MoIT	
Implementation of regulations on animal health management	People's Committees at all levels		

Area	Responsibility	Authority in charge	Legal document
Husbandry	Focal point for state management	MARD	Law on Husbandry (No 32/2018/QH14, dated November 19, 2018)20
	Technology and science related to husbandry	MoST	
	Implementation of regulations on husbandry management	People's Committees at all levels	
Biodiversity	Focal point for state management	MONRE	Law on Biodiversity (No 20/2008/QH12, dated November 13, 2008)22
	Issuing the list of endangered, precious and rare species prioritized for protection	MONRE	
	Issuing regulations on protection of wildlife banned from exploitation from nature; the list of wildlife banned from exploitation; the list of wildlife permitted for conditional exploitation	MARD	
	Implementation of regulations on biodiversity management	People's Committee at all levels	
Infectious diseases	Focal point for state management	MoH	Law on Infectious Diseases (No 03/2007/QH12, dated November 21, 2007)26
	Conducting surveillance on infectious diseases	MoH MARD MONRE and other related ministries	
	Ensuring hygiene in farming, slaughtering, transportation, and destroying of animals	State authority in charge of animal health	
	Implementation of regulations on infectious diseases management	People's Committee at all level	
	Instructing organizations and individuals to apply measures to ensure food safety to prevent infectious diseases	State authorities in charge of food safety	

Table 3. Governance responsibilities of wild animals in Viet Nam

State management of wildlife farming

State management includes several key responsibilities as follows:

- Development of strategies, plans, policies, and legal documents
- Development of national standards
- Guidance and instruction on the implementation of legal documents
- Auditing, monitoring, and handling violations of existing laws

Wildlife farming is related to multiple areas of biodiversity, forestry, fisheries, and animal health. The Ministry of Agriculture and Rural Development (MARD) is the focal point for wild animal management at the state level. Under the MARD, Viet Nam Administration of Forestry (VNAF)¹, the Directorate of Fisheries and the Department of Animal Health (DAH) are respectively in charge of forestry, fishery, and veterinary issues^{23,25}.

VNAF endorses and updates the list of endangered, precious and rare species of wild fauna²³, while the Ministry of Natural Resources and Environment (MONRE) is responsible for appraising, developing, and updating the list of endangered, precious and rare species of wild fauna prioritized for protection. The list issued by MONRE is only applied for breeding and rearing for non-commercial purposes^{22,30}.

Provincial forestry protection departments and provincial fishery management agencies oversee the management and inspection of breeding and rearing facilities. They are also responsible for managing, monitoring, and recording the information into a logbook of animal farming. These agencies then need to report the situation to the Provincial Department of Agriculture and Rural Development and the Viet Nam CITES Management Authority.

The Viet Nam CITES Management Authority (MA) and the Viet Nam CITES Scientific Authority (SA) work directly under the VNAF² and take responsibility for ensuring CITES implementation in Viet Nam. The MA updates the CITES-listed endangered species list or guidance on issuing the code for wildlife farms. The SA provides consultation to the MA on assessment of species population and distribution areas, appraisal of projects on breeding, rearing of wild fauna, supervision of breeding and rearing facilities, and the development of scientific documents and proposals concerning CITES observation⁹.

The Department of Animal Health (DAH) under MARD takes lead on animal health. The responsibilities are decentralized to lower levels. The system includes the DAH on top, down to regional sub-department of animal health, then the Provincial Division of Animal Health under the Provincial Department of Agriculture and Rural Development, and then to the District Veterinary Management Station. At the communal level, the Provincial People's Committee allocates staff in charge of veterinary issues if necessary. The system is responsible for:

- Prevention of animal diseases
- Surveillance of animal diseases
- Control and elimination of prioritized dangerous animal diseases and zoonosis diseases
- Reporting, diagnosis and inspection of animal diseases
- Treatment of animals, and animal diseases
- Reserve and use of veterinary drugs
- Funds for prevention and control of animal disease

The Ministry of Health (MoH), in collaboration with MARD, leads in zoonotic diseases management in humans, including the information relating to zoonotic diseases, treatment of human infections, surveillance, border health quarantine, food safety, and outbreak response according to the law provisions on prevention and control of infectious diseases^{25,26}. The General Department of Preventive Medicine (GDPM), MoH and the DAH, MARD are the focal points responsible for

¹ According to the most updated regulation issued by the government²⁷ regulating functions, responsibilities, rights, and organization structure of MARD, MARD decided to divide the Viet Nam Administration of Forestry (VNAF) into the Department of Forestry Administration²⁸ and the Department of Forestry Protection²⁹. The two decisions have been taken effect since May 5th, 2023.

² According to the latest decision by MARD regulating functions, responsibilities, rights, and organization structure of the Department of Forestry Protection²⁹, MA has been under the management of the Department of Forestry Protection since May 5th, 2023.

managing zoonotic diseases. The management system is decentralized to different levels, from national, to regional, provincial, district and communal levels³¹.

People’s Committees at all levels are in charge of ensuring the implementation of regulations related to wildlife farming in the localities. Other ministries also take a role in controlling wildlife related issues. Figure 2. below summarizes the management mechanism of wildlife farming issues:

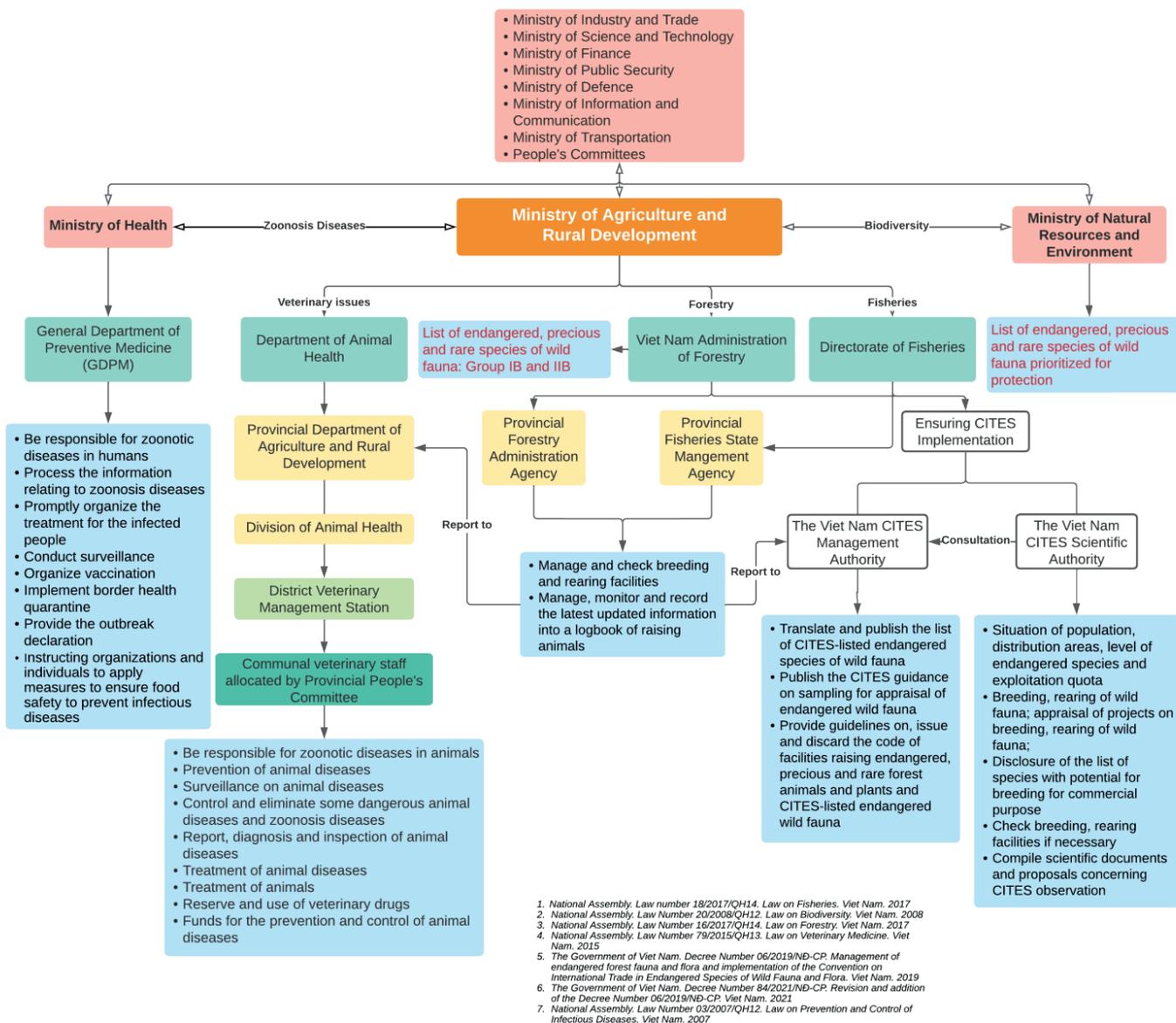


Figure 2. Wildlife farming management structure in Viet Nam

LITERATURE REVIEW OF PUBLICATIONS AND REPORTS

SEARCH RESULT

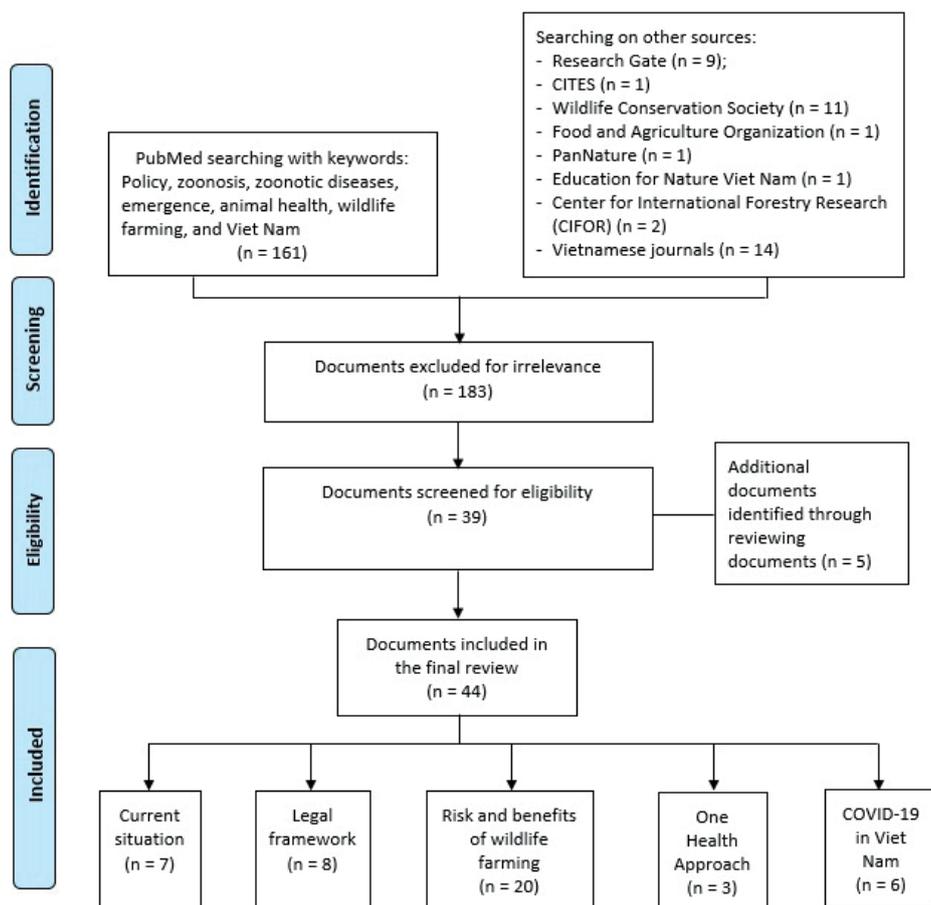


Figure 3. Search and selection flow of publications and reports

There has been a limited number of published studies on wildlife farming in Viet Nam (n = 9), especially about the emergence of zoonotic diseases from wildlife farming (n = 2). Findings of the literature review of publications and reports were categorized into four main themes:

1. Situation analysis
2. Benefits and risks of wildlife farming
3. Strengths and weaknesses of the legal framework
4. COVID-19 and wildlife farming in Viet Nam

CURRENT SITUATION

According to the report of the latest survey on wildlife farms conducted from August 2017 to January 2018 in 23 provinces and cities by the Viet Nam CITES Management Authority³, there were 9,280 legally registered wildlife farms operating

³ An updated report published in 2023 recorded 6,744 captive wildlife facilities in 54 provinces in Viet Nam in 2021, with 1,869,435 individuals in captivity³³

nationwide with 2,189,429 individual animals belonging to 263 species of wild animals of which the most common were Artiodactyla, Primates, and Squamata. Bac Lieu, Nghe An, and Dong Nai were three provinces with the highest number of wildlife farms³⁴. The management of wildlife in Viet Nam was structured following the lists of CITES Appendices³⁵, the List of endangered, precious and rare wild animals (regulated by Decree Number 06/2019⁹), and the List of species prioritized for protection (regulated by Decree Number 64/2019³²)³⁴ based on conservation criteria. Compared to the data collected in 2014 in 12 provinces¹¹, the number of farms and the number of animals bred have decreased in 2017³⁴. One study conducted in 2021 in two provinces of Binh Duong and Ba Ria Vung Tau showed a decrease in the number of wildlife farms and farmed wild animals after the COVID-19 outbreak due to decreasing market demand and travel restrictions³⁶. According to a survey reported by FAO, birds and mammals were considered to pose a higher risk of virus transmission. Although artificial bat roosts for bat guano collection were reported in many areas in the South of Viet Nam, it has not yet been managed or defined as “farming”³⁴.

As reported by FAO in 2015, more than 182 wild animal species were farmed for food, traditional medicine, and wildlife products¹¹. There were concerns that those farms could be a source of viral spillover between wildlife and humans³⁷. Wild meat restaurant owners expressed their support of wildlife farming because the farms can serve as a place for slaughtering or processing animals regardless of the legality of the sources of animals³⁸. It was required by the regulation in Viet Nam that all wildlife farms must have a tracking log to record the change in the number of bred animals and relevant information, including the total number, sex, and changes in the number of each species present in the farms¹⁶. The mixture of legally- and illegally-sourced wildlife and slaughtering wildlife in the farms was very common in Viet Nam^{16,39}. Wildlife farming in Viet Nam was considered unsustainable due to a lack of regulatory mechanisms, poor animal welfare conditions, and weak veterinary care⁴⁰.

BENEFITS AND RISKS OF WILDLIFE FARMING

Wildlife farming has been believed to contribute to wildlife conservation^{38,41-43}. However, wildlife conservation focuses on environmental biodiversity and relevant social benefits, while the primary motivation of most wildlife farming is to seek profit⁴⁴. The contribution of wildlife farming as a conservation tool^{21,22,27,28,30}, and its role in the spillover of zoonotic diseases^{37,40,45-54} have been actively discussed in Viet Nam.

a. Benefits to conservation and local livelihood

The Viet Nam Administration of Forestry (VNAF) presented at a workshop on “Wildlife farming in the context of outbreak and pressure of conservation” that apart from helping to develop the economy, wildlife farming had the potential to conserve animals in the wild as it would help to release pressure on natural exploitation as well as maintain gene pools of rare and endangered species⁴³. It has been believed that wildlife farming will help meet the increasing demands on wild products, reduce the consumption of wild-caught animals, and change the consumers’ preference for wild-caught animals⁵⁰. Wildlife farming helped to improve the accessibility to wild products and create substitutability^{41,50,55,56}, and in Viet Nam, wildlife farming has provided economic benefits to local communities and households^{14,16,38,41-43,45,48,55,57}.

b. Risk of emergence and transmission of zoonotic diseases

Very few wildlife farms in Viet Nam invest in building infrastructure, improving breeding techniques, and avoiding inbreeding or crossbreeding, which are prerequisites for releasing wild animals to the nature. Wild animals were found to be hosts of many pathogens, yet farm owners did not understand veterinary care and potential spillover risks among wildlife, humans, and livestock⁴⁴. As reflected in surveys conducted at wildlife farms in Viet Nam, there was a high density of farmed individuals with multiple species mixed together^{16,40,45,46,52} and low quality of enclosures¹⁶ at farms. And a high rate of consumption of raw animal blood and meat and a low rate of using personal protective equipment (PPE) were reported⁴⁶.

Those findings indicated a low level of awareness among wildlife farm owners and farmers about the potential risk of zoonotic disease transmission through farm management practices.

Wildlife markets, restaurants serving wild animal meat, wildlife farms, wildlife conservation and rescue centers, and habitat areas are considered highly exposed to zoonotic pathogens⁵. According to a study conducted by the Wildlife Conservation Society (WCS), it was common that animal health was not prioritized by farm owners and traders, who did not pay attention to hygiene and animal health care. Slaughtering illegally sourced wildlife was also common in Viet Nam. Moreover, the sanitation and safety conditions of wildlife enclosures and animal disease prevention and responses were neglected in many farms. Research studies evaluating risks of zoonotic diseases among wild animals in Viet Nam were very rare⁵⁸. A wildlife surveillance system in farms and conservation centers and an evaluation of the wildlife management system in Viet Nam are needed^{5,58,59}.

c. Risk of promoting illegal wild farming and trade

Four studies have pointed out that wildlife farming has failed in fulfilling its role as a conservation tool, and instead, it contributed to the increased illegal poaching and exploitation^{42,41,57,38,55}. The reason for this situation is that consumers still prefer wild-sourced animal products over captive ones. The cost of farming wild animals is far more expensive than poaching animals from the wild. A similar situation can be found in Viet Nam, where most bear bile farms were stocked and restocked with poached wild bears⁵⁵. The wildlife farming breeding system in Viet Nam was very poorly managed with insufficient husbandry conditions, legal commercial wildlife farms were often used for storing and trading illegal wild animals¹⁶.

STRENGTHS AND WEAKNESSES OF THE LEGAL FRAMEWORK

a. Strengths

The current wildlife management by the government of Viet Nam covers almost all aspects related to wildlife conservation, including crimes, trade, farming, hunting, and consumption^{15,16,39,40,48,60,61}. Viet Nam has also joined international conventions and signed international treaties as an official member - CITES as an example. Policy documents of Viet Nam related to wildlife conservation comply with international standards, including the CITES appendices^{48,60}. The legal system has been shifting towards multi-sectoral collaboration, demonstrating the joint efforts in wildlife conservation and management (Figure 4). All levels of administration, from the national level including multiple ministries, provincial, district to communal level, are involved in wildlife farming management and wildlife conservation^{9,20,22,23,25,26,32,62}.



Figure 4. Multi-sectoral involvement in wildlife-related policies in Viet Nam

b. Weaknesses

The legal framework that includes a variety of documents covering different aspects of wildlife in Viet Nam brings with it an issue of overlapping responsibilities^{15,48,60,61}. Different authorities in different sectors at different levels are involved and in charge of wildlife trade and wildlife farming. Thus, it is, on the one hand, quite hard for accountable management, while on the other hand, quite easy for farm owners to dodge the laws. In addition, the existing regulations are not either detailed or updated in terms of risk management of wildlife

farming, or the management mechanism is not strong enough to adequately monitor the activities at farming facilities^{15,39,40,43,48,58,60}. As a result, illegal activities at farms could be overlooked, such as mixing illegally sourced animals with registered animals for farming^{16,40,48,55}, and slaughtering both registered animals and illegally poached animals^{38,55,57}. The issues of wildlife farms holding captive animals from the wild, slaughtering, and selling illegal wild animals have been well documented in many reports^{38,48,55-57}. These farming, slaughtering, and trading activities exposed farmed animals and humans to potential zoonotic disease risks^{5,16,37,58,60}.

The literature showed that mixed animals with legal and illegal sources were kept in farms which led to unsustainable management of wildlife farming in Viet Nam^{41,48,55,60}. Monitoring of wildlife farming is inadequate as existing inspection is solely based on paper records provided by farms, without direct auditing or counting of animals at the farms^{15,16,60}. Animal welfare has been neglected in legal documents, management practices, and among farm owners^{15,40,60}. Even though the Law on Husbandry has mentioned animal welfare in farming, slaughtering, transportation, and scientific research, details such as who is in charge of training, managing, monitoring, or ensuring that farms would meet the requirements on animal welfare²⁰ are not mentioned. It is commonly reported that wild animals were stressed and kept in bad conditions with other species or animal individuals from different sources⁴⁰.

Theoretically, all authorities involved in managing wildlife farming activities are expected to be equipped with sound knowledge about the existing regulations and animal husbandry and veterinary medicine. However, little to no relevant training about these topics is provided among forest protection staff who oversee managing and monitoring wildlife farms. There is also a lack of detailed guidelines or standards on wildlife breeding and rearing, housing, and biosecurity in Viet Nam^{16,40,48,58,60}. The area of husbandry and veterinary medicine for wildlife farming seemed to be neglected^{5,15,37,40,43,45,46,58,60}, and the weak capacity in monitoring and managing wildlife farming in Viet Nam highlights the concerns of wildlife farming and trade activities for zoonotic spillover risk^{15,40,48,60}.

Law enforcement was also reported as a challenge for managing wildlife farming in Viet Nam. Local Forestry Protection Departments (FPDs) are in direct charge of managing wildlife farms locally. However, there is a lack of knowledge and skills to distinguish between legal and illegal animals at the farms^{15,16,60}. Animals are seldom counted or checked directly due to the concern of accidental animal injury or death during inspections. Payments from the farms to FPD officials for transportation papers or other required documents were mentioned in a report by the Education for Nature - Viet Nam (EVN). Farmers and FPDs were shown to have good relationships, and farmers were regularly given notices of inspection trips, allowing time for farm owners to be prepared¹⁶. In addition, although breeding and rearing wildlife is meant to help meet consumption demands, studies showed that consumers still preferred products from wild-caught animals rather than captive ones^{38,40-42,55,57}.

COVID-19 AND WILDLIFE FARMING

The emergence of SARS and COVID-19 raised concerns about zoonotic spillover risk in wildlife trade and farming^{63,64}. Meanwhile, the wildlife trade and farming industry have been severely impacted by the travel and trade restrictions due to COVID-19. Impacts on the profits of some wildlife farms were reported due to the loss of international tourism with closed borders and decreased price of wildlife meat. In addition, the increased risk perception among the public may also influence wildlife consumption^{36,64,65}. A survey showed that 84% of Vietnamese consumers believed that closing wet markets and banning wildlife hunting would help prevent future outbreaks, and 94% were very likely or likely to support the government's efforts to close all high-risk markets that sold wild animals. However, 20% of the survey participants still liked to buy wildlife products in the future^{40,66}. Some farm owners also refused to close their businesses despite illegal operations.

One study conducted in wildlife farms in Bac Giang, Dong Nai, and Dong Thap in 2013 - 2014 detected coronaviruses of bat origins in porcupines, bamboo rats, and field rats in the trade chain, indicating the viral transmission risk among different animal species in wildlife trade and farms^{63,67}. Experts in the area of wildlife farming advocated for the need to develop control methods that reduce risks of zoonotic disease spillover, and more studies to evaluate wildlife farming impacts on conservation aspects and community health are needed to inform new policies⁶⁷.

CONCLUSION

Wildlife farming worldwide has been a part of the conservation efforts to reduce the pressure of exploitation of wild animals from nature and maintain the genes of rare, endangered and precious species. In Viet Nam, wildlife farming contributed to reducing poverty and improving livelihood by providing economic benefits to both farmers and local communities. However, the benefits of wildlife farming in Viet Nam need to be further assessed with more studies considering its role in disease transmission and the relation to human and animal health. The legal framework for wild animal management in Viet Nam has shifted toward a multi-sectoral approach covering various aspects. However, overlaps and loopholes still exist, leading to the evasion of laws that bring risks for disease emergence and transmission among wild animals, farmed wild animals, livestock, and humans. Strengthened capacity in cross-sectoral management and improved standards or guidelines are needed for zoonotic risk and animal management for both conservation and health benefits.

Acknowledging the sensitivity of this topic, we interviewed key stakeholders to validate the findings about the state management structure of wildlife farming based on current regulations and to examine the application of structure into management practices, identifying the existing strengths and challenges, and exploring approaches for zoonotic risk mitigation in wildlife farming. By integrating information from the literature review and interviews with key stakeholders, the study aimed to provide a more comprehensive and accurate picture of the wildlife farming legal framework and its application in practices in Viet Nam to inform future development of policy and disease risk mitigation strategies related to wildlife farming.



IN-DEPTH INTERVIEWS

This section will present findings from twenty-one (21) in-depth interviews conducted within the framework of the study. In this section, content will be presented in the following themes:

- Demographic information
- Situation analysis
- Policies and management of wildlife farming
- Wild animal health management
- Expectations and recommendations

DEMOGRAPHIC INFORMATION

Between May and September 2022, we conducted 21 one-on-one interviews with key stakeholders from the animal health and forestry management sectors in Viet Nam (Table 4). Among the twenty-one (21) study participants, ten (10) were from animal health institutions, eight (8) from forestry management institutions, and three (3) from institutions working on interdisciplinary issues across human health, research implementation, and One Health. Three (3) participants were from international organizations, while the others were from State-owned institutions. Individuals who participated in this study were from district, provincial, and national levels in different provinces in the North, the Central, and the South of Viet Nam, twelve (12) of them were in a leadership position in their institutions, and nine (9) were specialists in their area of expertise.

Sector	District	National	Provincial	International organization	Grand Total
Animal Health	3	2	3	2	10
Leader	2	2	2	1	7
Specialist	1		1	1	3
Forestry	3	2	3		8
Leader	2	1			3
Specialist	1	1	3		5
Others		2		1	3
Leader		2			2
Specialist				1	1
Grand Total	6	6	6	3	21

Table 4. Demographic information of interview participants

SITUATION ANALYSIS

DEFINITION

Viet Nam has joined the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) since 1994⁶⁸, and the classification of wildlife from CITES has been widely applied in Viet Nam. The three appendices of CITES⁶⁹ were used to define wildlife by our study participants. One study participant provided the definition of wildlife:

“The definition of wildlife and forest animals... for wildlife, the simplest definition is that animals which are not livestock are wildlife.”

(Provincial Forest Management Specialist)

The MARD issued two lists of endangered, rare and precious species, including group IB and group IIB, according to Decree Number 84/2021 by the government⁶.

“In wildlife farming, the decree number 84 by the MARD should be followed.”

(District Forestry Management Leader)

The MONRE endorsed the list of endangered, rare and precious species prioritized for protection³².

“The list issued by the Ministry of Natural Resources and Environment is served for conservation purpose, for the identification of species in need of conservation.”

(International Organization Specialist)

Bats and some rodents were not included in any list issued by either MARSD or MONRE.

“For example, some animals like mice, rats are not included in CITES appendices or Decree number 84.”

(International Organization Specialist)

Study participants distinguished legal versus illegal wildlife farms and highlighted small-scale wildlife farming. Legal wildlife farms were registered with the relevant authority as required by Vietnamese regulations, and those commercial wildlife farms without registration were considered illegal. Some households raised wild animals because they wanted to try a new farming approach or make use of free space or land. Some households raised wild animals to serve their family and fed wild animals with the leftover livestock feed. These small-scale farms were formed casually and were often left out of the management system.

“The farming is very spontaneous. The farmers just want to do farming, when they find some sources of wild animals, they just try farming, to see whether such wild animals could adapt with their farms or not, whether they could breed or not, and whether they could bring any benefits. If yes, they will do breeding for dispensing.”

(International Organization Specialist)

PURPOSES OF WILDLIFE FARMING

When being asked about the scale of wildlife farms in Viet Nam, study participants from provincial and district levels mentioned that almost all the wildlife farms in their areas were small-scale. Most farms were for commercial purposes from whole animals, animal products, or animal breeding. Some tourist areas raised bears as tourist attractions. In some households, bears were raised for entertainment at home, wild animals were raised for consumption at home or as gifts to relatives, not for commercial purposes.

“Usually, I want to say, all wildlife farms are for commercial purposes”

(National Forestry Management Specialist)

“... here the farms are quite small, so far, no large-scale farm has registered. We provide licenses for the small-scale farms if they meet requirements.”

(District Forestry Management Leader)

BENEFITS OF WILDLIFE FARMING

Many study participants acknowledged the benefits that wildlife farming brought to households and local areas, as described in the literature. Wildlife farming was a livelihood for many households in the areas where we conducted this study.

“Wildlife farming in Viet Nam has contributed a very important part in people’s livelihood.”

(International Organization Specialist)

“It’s a livelihood action that people have selected and that the government has encouraged over a number... a couple of decades, especially.”

(International Organization Leader)

The government and the local authorities also had policies to encourage wildlife farming to increase income for the households and the areas. Although there were no written-down policies, the government provided loans from local budgets for households to start wildlife farming.

“For those species not prioritized for protection, the government also encourages farming. For example, for farming one species for economic development, the government doesn’t ban, but tries to manage. How is the encouragement manifested? For example, they provide loans for the farmers to raise this species or that species. They haven’t had any policy in paper; however, they have encouraged wildlife farming for economic development and diversification of income sources.”

(International Organization Specialist)

Wildlife farms and forestry management staff usually supported each other to create favorable conditions for farm registration, monitoring, and the export of farmed wild animals.

“I think ... they made favorable conditions for me to do monitoring, so I also should create favorable conditions for them, for example, like when they asked for permission for transportation of wildlife or when they wanted to give wildlife as a gift for the others, I think I should help them.”

(District Forestry Management Specialist)

COMMON SPECIES FOR FARMING

We interviewed forestry management and animal health staff at both district and provincial levels in three provinces in the North, the Center, and the South of Viet Nam. In the Northern province, species that were commonly mentioned in interviews were snakes, civets, bamboo rats, ostriches, and deer. Meanwhile, deer, wild boar, bamboo rats, pheasants, peacocks, civets, snakes, and porcupines were listed as common species farmed in the Central provinces of Viet Nam.

Crocodiles, porcupines, snakes, monitor lizards, bamboo rats, civets, and deer were commonly reported species being farmed in the Southern provinces. Bears were reported being farmed in all three provinces, but in small quantities, with just a few bears in each of the three provinces as reported. In the Southern provinces, bears were farmed as tourist attractions, and several households in the Northern province had raised bears for a long time for entertainment at home. Most wildlife farmed in the South were exported to China, while those farmed in the Central were to supply domestic markets. Study participants in the Northern province were unsure about the need for farmed wildlife in their area.

“Currently, in our province, they farm crocodiles, snakes, very few monitor lizards, some bamboo rats, civets, and porcupines. Porcupines used to be very expensive so many farms raised porcupines, but now just a few.”

(Provincial Forestry Protection Specialist)

WILD ANIMAL HEALTH AND FARM OWNERS’ SEEKING FOR VETERINARY SERVICES

As reported by study participants, the general health conditions of wild animals were better than livestock. It was rare for wild animals to get ill. Some study participants credited this partially to the fact that farm owners had often carefully learned about wild animals before deciding to farm wild animals. Because the value of wild animals was high, farmers had a better awareness of disease prevention and control among wild animals than other livestock. In villages with a long history of wildlife farming, all farmers knew about disease prevention for their animals.

“Possibly because wild animals do not get ill as frequently as livestock.”

(Provincial Animal Health Leader)

Two study participants working at the district level monitoring wildlife farms revealed that they had never seen wild animals transmitting diseases to humans over the last 34 – 35 years of experience working in the areas at the positions.

“As far as I understand about zoonotic diseases, the farmers themselves said there has not been any zoonotic diseases, no outbreak has ever happened in their area. When there has been no outbreak, they could not transmit diseases.”

(District Forestry Management Leader)

“I have visited many farms but I have never heard anyone talking about their wild animals transferring diseases to humans, no one has ever said so.”

(District Forestry Management Specialist)

Study participants working in the animal health sector at the district level reported that common diseases found among wild animals were anorexia, diarrhea, respiratory diseases, and skin diseases. Farm owners rarely sought animal health services when their animals were ill. They treated their animals themselves based on the experience of farming livestock or information learned from other wildlife farms, animal suppliers, or online resources. Antibiotics or anti-parasitic drugs

were often used to treat their animals by farmers. These drugs could be bought directly from animal drug stores, where farmers also sought consultation.

“In fact, when they saw their wild animals ill, if it was mild, they would keep it. They have experience in wildlife farming, so if the animal was serious, they would kill it.”

(Provincial Animal Health Specialist)

In some rare cases, farmers asked for veterinary care from the communal and district veterinary staff. Study participants who have dealt with these cases reported that they were also based on their experience treating livestock to prescribe antibiotics for treatment and prevention along with some vitamins.

“When I worked at the district level, when one animal was ill, I suggested them treating it with antibiotics. Luckily, it also recovered.... In terms of prevention, I told them to mix antibiotics with food for animals for disease prevention.”

(Provincial Animal Health Specialist)

Three study participants mentioned the role of private veterinary services in wildlife farming. While little service was provided by local veterinary staff, private veterinarians or private veterinary companies seemed to play an important role in preventing and controlling diseases among wild animals in Viet Nam.

“In terms of management, as you see in other areas, forestry protection sector is the main manager, but diseases of wild animals are still left empty.”

(District Animal Health Leader)

“I feel like while the department of animal health, local veterinarians do not play any role, private veterinarians play very important role because all of the farms I know have signed contracts with private veterinarians or private veterinary companies to implement diseases prevention and control for wild animals.”

(International Organization Specialist)

In a province in the North of Viet Nam where we conducted this study, one study participant working at the District Animal Health and Husbandry Center reported that wildlife farm owners had never contacted him as government staff, but through work with a veterinary pharmacy, he had frequently been consulted by farm owners about the sickness of animals. Private veterinarians were involved in wildlife farming by providing disease treatment, prevention services, and consultation on animal health. The study participant also mentioned insufficient knowledge about wild animal diseases and the reliance on knowledge, experience, and drugs for livestock for wild animal health. Reported treatments usually used for wild animals include antibiotics for respiratory diseases, antibiotics with environmental cleaning for skin diseases, and anti-inflammatories and other supplements.

“About consultation, as I’ve said, first, I do not have much knowledge about wildlife. However, I have basic knowledge about animals in general. Secondly, I also sell animal drugs, based on which I can consult how to use specialized drugs, and drugs that are used for treatment of livestock could also be used for wild animals, same same. For example, aquatic animals having skin diseases should be treated with antibiotics together with treatment of environment... During the treatment process, it is necessary to add supplements like antipyretics in case of fever, electrolyte, enzyme, or liver detoxification.”

(District Animal Health Leader)

MANAGEMENT OF WILDLIFE FARMING

REGISTRATION REQUIREMENT TO FARM WILDLIFE

As required, the licensing authorities for wildlife farms are decentralized from national to provincial and down to district levels. As for Decree No. 06/2019⁹ and Decree No. 84/2021⁶, each level provides licenses and approval for households to farm different groups of wildlife. Households to farm common species of forest fauna not on protected lists need to register with the District Forestry Protection Center (DFPC). Households to farm wildlife covered by CITES Appendices II and III or Appendix IIB of Decree No. 84/2021 need to register with the Provincial Department of Forestry Protection (PDFP). To farm wildlife under CITES Appendix I or Appendix IB of Decree No. 84/2021, households need to register with the Viet Nam CITES Management Authority (MA). Each farm registered with the PDFP and CITES MA would be assigned a unique code, while farms raising common species of forest fauna would not have such codes but only the tracking log. (Figure 5.)

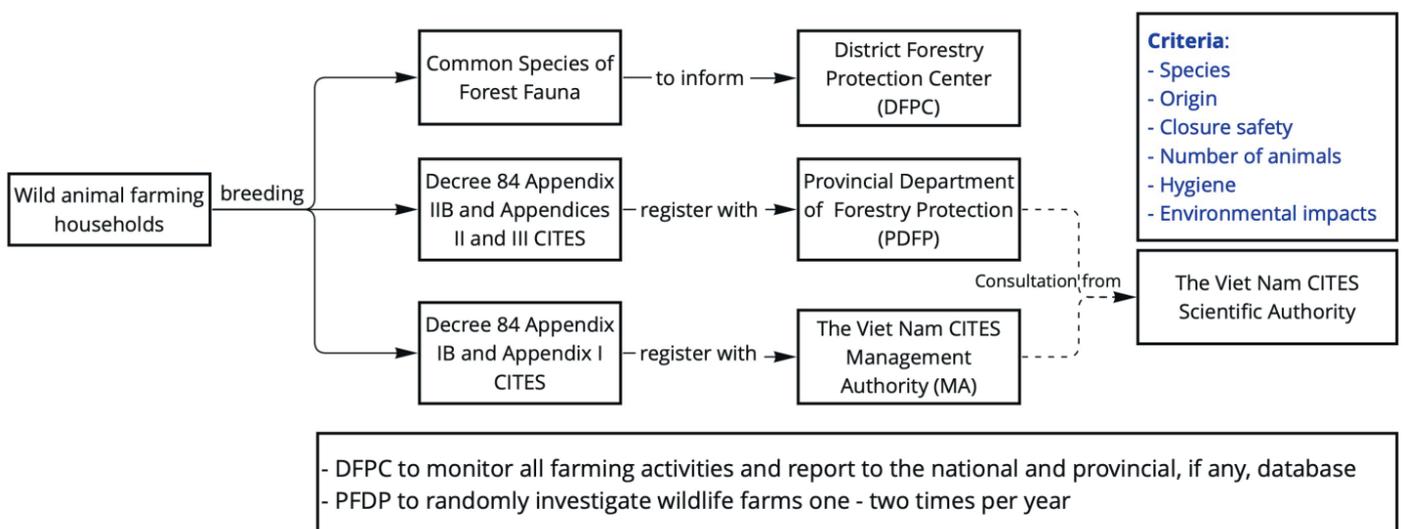


Figure 5. Regulation of wildlife farm registration with different authorities in Viet Nam

REGISTRATION AND LICENSING PROCESS

Farm owners need to register with relevant forestry protection management authorities to start wildlife farming, as regulated in Decree No 84/2021 (as described in Figure 5. Regulation of wildlife farm registration with different authorities in Viet Nam above). The registration process is illustrated in Figure 6. Registration process to start a wildlife farm in Viet Nam below. Those who plan to farm common species of forest fauna need to inform the DFPC within three days of animals being present at the farms. To farm wildlife under the CITES Appendices and Decree 84/2021 Group IB and IIB need to submit a farming proposal to relevant authorities. The farm owner develops the farming proposal with support from forestry protection staff, and the proposal will be submitted to the CITES Scientific Authority (SA) for scientific consideration and consultation. The CITES SA reviews the proposal and provides comments and feedback to either the PDFP or the CITES MA who sent the proposal. Based on collected information from this study, CITES SA reviews and assesses the proposals based on paper without actual visits to the farms. With confirmation and approval from the CITES SA, the relevant forestry protection authority will assign the farm a unique code and inform the DFPC for following farm monitoring and management. Each farm is given a tracking log (Appendix 5) by the DFPC, and farms are required to use this tracking log to record all animal changes at the farm. The DFPC staff visits the farms monthly to monitor farming activities based on the approved proposal. The DFPC needs to report data to the PDFP monthly, and the PDFP will report to CITES MA.

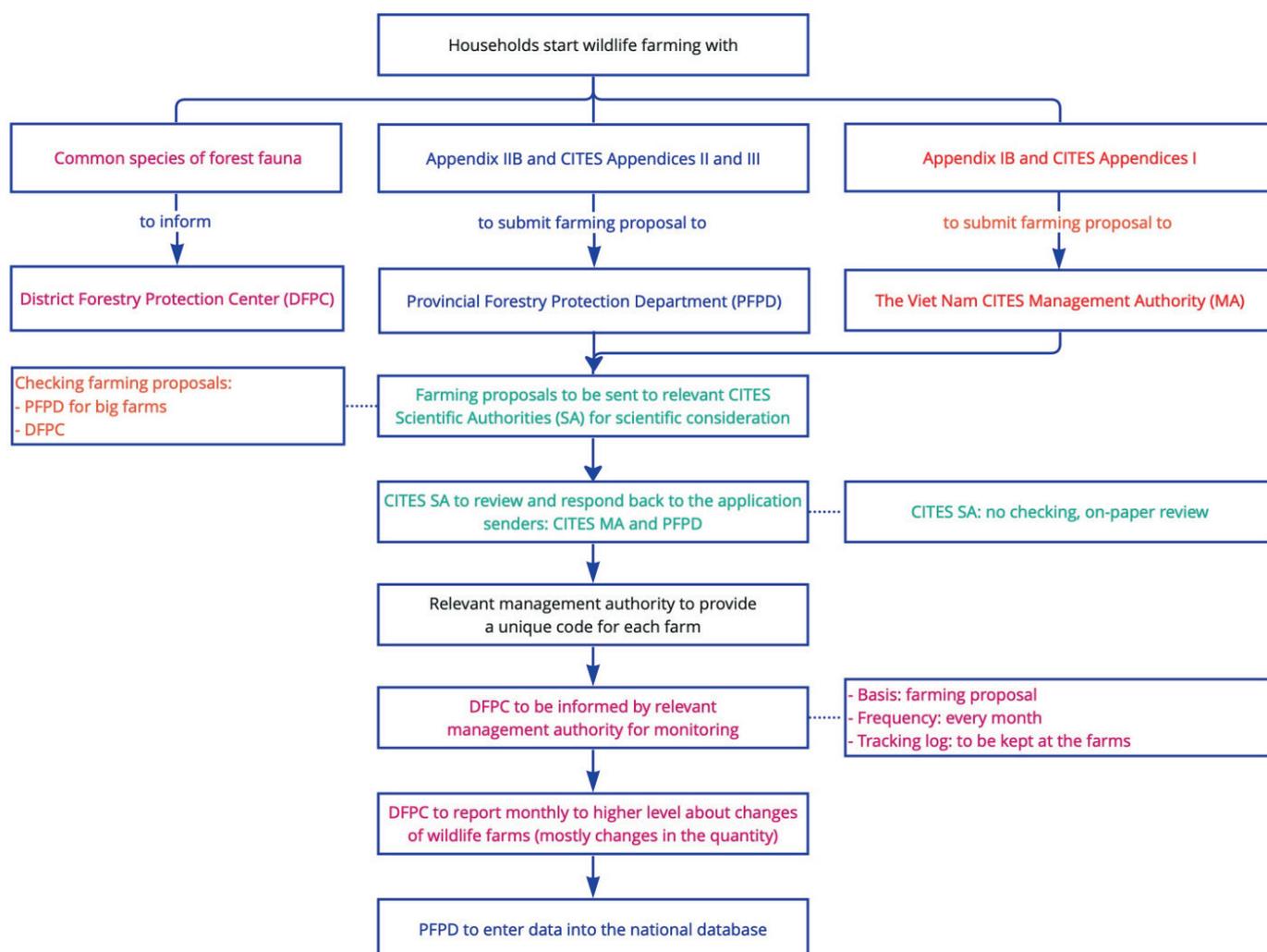


Figure 6. Registration process to start a wildlife farm in Viet Nam

Study participants reported that local authorities encouraged wildlife farming in their areas to develop the local economy. Therefore, local forestry protection staff intended to create favorable conditions for wildlife farms.

“Because farmers want to try a new method of economy development and in fact, we have tried to create favorable conditions for them.”

(Provincial Forestry Protection Specialist)

In one province we conducted this study, one study participant mentioned that wild boars were farmed across the whole province, but not all of the households or farms were registered with relevant authorities.

Study participant: Wild boars are farmed in the whole province.

Interviewer: The whole province?

Study participant: It means that their farming several or more than ten wild boars is common.

Interviewer: But do they register? Do they inform the forestry protection staff or any local authority?

Study participant: In fact, it is currently a gap.”

(Provincial Animal Health Leader)

The farm registration follows the Appendix IV of Decree No 84/2021⁶. A farming proposal needs to provide the following information:

- Demographic information: Name and address of farm, name of farm owner, date of farm establishment
- Species to be farmed
- Purposes of farming: commercial or non-commercial purposes
- Documentation of animal origin: Legal origins as regulated
- Quantity, sex, and age of farmed animals
- Breeding capacity
- Evaluation of sources of breeding animals
- Main outputs/products
- Description of infrastructure:
 - Dimensions of main enclosures and isolation enclosures (if any)
 - Density of animals
 - Other description

- Description of farming methods:
 - Food
 - Drink
 - Other description
- Veterinary care and disease prevention for wild animals
- Environmental hygiene
- Methods of recording information
- Farming activities and commitment to conservation
- Risks and risk control measures
- Approaches to ensure animal welfare

It is concerning in the farming proposal that there have not been guidelines or regulations related to veterinary care and disease prevention or environmental hygiene, which presents a big challenge for local forestry protection staff to conduct evaluation and monitoring of farms.

“Basically, regulations are quite adequate, but not detailed enough. For example, the regulations for other sectors are very general, for animal health, they just have a very general sentence saying that they need to ensure hygiene and safety of the enclosures.”

(District Forestry Protection Leader)

DIFFERENT SECTORS INVOLVED IN WILDLIFE FARMING MANAGEMENT

The forestry protection sector takes primary responsibility and serves as the focal point for wildlife farming management in Viet Nam. The CITES MA performs overall management and reporting to higher levels within MARD, and the Provincial Forestry Protection Department, District Forestry Protection Center, and Communal Forestry Protection staff are directly in charge of managing wildlife farming at localities. The animal health sector is involved in the species identification of confiscated animals, investigation of death among confiscated wildlife, and health checks before animals are released into the wild. Still, their role in wildlife farming stays within the quarantine, and staff from animal health sectors have yet to be involved in wildlife farm monitoring or inspection.

“Q: Have you ever collaborated with the animal health sector in appraising or monitoring wildlife farms?”

A: No, in wildlife farming, we don’t collaborate with animal health because there is no regulation requiring this collaboration.”

(Provincial Forestry Protection Specialist)

Table 5 below describes how the study participants perceived the roles of different stakeholders in wildlife farming management, with little collaboration or coordination between animal health and forestry departments:

Roles	CITES MA	CITES SA	PFPD	DFPC	CFP staff	Animal health	Environment	People's Committee
Leading management authority	✓							
Checking farms for approval			✓					
Approval and code issuance	✓		✓					
Monitoring				✓	✓			
Reviewing and evaluating registration form	✓	✓	✓					
Reviewing and evaluating export application			✓					
Animal quarantine						✓		
Forestry product inventory			✓	✓	✓			
Reporting about changes of animals at farms			✓	✓	✓			
Identification of confiscated animals						✓		

Roles	CITES MA	CITES SA	PFPD	DFPC	CFP staff	Animal health	Environment	People's Committee
Releasing confiscated animals						✓	✓	✓
Destroying dead confiscated animals						✓	✓	✓

Table 5. Roles of different sectors in the management of wildlife farming

All study participants from the animal health sector reported that they did not have information about wildlife farms or access to the wildlife farm database. As a result, it was very hard for them to implement disease prevention and control measures for wildlife farms. Meanwhile, when study participants from the forestry protection sector were asked about their willingness to share data about wildlife farms with the animal health sector, they all provided positive responses.

“We are willing to share all with them, whenever they need information, we will share all management information with them.”

(District Forestry Protection Leader)

In addition, diseases specifically related to wildlife were not known or prioritized in the surveillance system. There were no documents detailing tasks for the animal health sector in managing wildlife farms. Therefore, health concerns related to wildlife had not been accounted to receive allocated time and resources.

“The appendices attached to the Circular No 074 hardly mentioned anything related to wildlife.”

(Provincial Animal Health Leader)

“As far as I know ... I have participated in many projects... the forestry protection sector doesn't know about diseases, or outbreaks, they just manage the origins of animals, manage farms, they don't have expertise in diseases. In contrast, the animal health sector has expertise in diseases and outbreaks but doesn't manage this area.”

(District Animal Health Specialist)

DATABASE RELATED TO WILDLIFE FARMING AND WILD ANIMAL HEALTH

The forestry protection sector takes full responsibility for managing the wildlife farming database. The forestry protection staff at the district level enter data into an Excel file and submit it to the provincial level every month. Data within the province would be aggregated by the PFPD and presented to the CITES MA annually. The CITES MA aggregates information

4 Circular Number 07/2016 is the regulation on prevention and control of terrestrial animal diseases, issued by MARD in 2016.

at the country level and reports to MARD (Figure 7). The Excel file includes information similar to what is included in the tracking log used by the wildlife farms, including quantity, species, sex, import/export, etc. No information about animal sickness or diseases was recorded or reported to the database. A new online database had been developed and piloted in some provinces. The new database would be available from the district to national levels. Anyone with an account would be able to access the database.

“About animals’ illness or diseases, we did not request recording.”

(Provincial Forestry Protection Specialist)

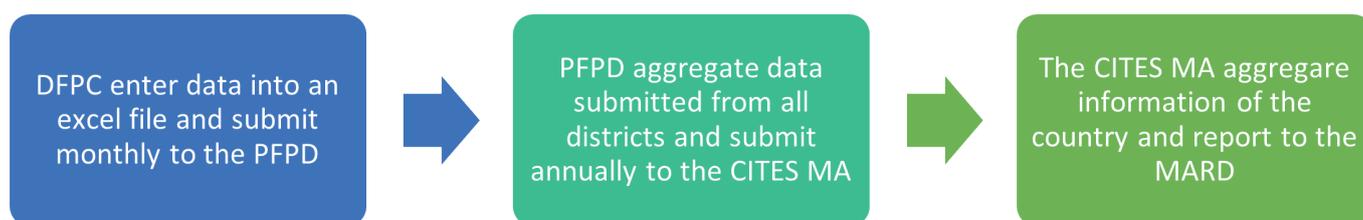


Figure 7. Current wildlife farming reporting system

Changes in the number of farm animals are reported but without the detailed causes of such changes. For example, the number of deaths is reported, but there is no investigation or record about the causes. There is also no regulation on reporting death cases, and the local authority is not often informed about animal death at farms in a timely manner, so forestry protection staff could not see the dead animals or know how the farm owners dealt with such cases.

“Q: When they report to you that they have a dead animal, do you investigate or check causes of death?”

A: No. We just record the reduction in the quantity of animals, which means that one dead case means they’ve lost one animal.”

(Provincial Forestry Protection Specialist)

The animal health sector has a separate reporting system called VAHIS – Viet Nam Animal Health Information System, accessed by staff working at the provincial and national levels with accounts. An animal health specialist at the provincial level reported that whenever an outbreak was happening in the area, they would need to report it to the system.

“Yes, we have VAHIS which is the system of the animal health sector nationwide. Therefore, whenever any outbreak happens in the area, zoonotic diseases or infectious diseases, we all need to report into the system. Even the program I am working on, I also need to report into the system. The fishery sector also needs to report to the system”

(Provincial Animal Health Specialist)

A study participant working in the animal health sector at the national level reported that VAHIS currently only had a database of influenza and rabies surveillance, and they were developing databases of other disease surveillance.

“On this database system, there has been database of influenza and rabies surveillance. Database for surveillance on other diseases are being developed.”

(National Animal Health Leader)

One study participant from the provincial animal health sector reported that they still used a paper-based reporting system to report any cases in their province, while study participants from other provinces reported the availability and use of VAHIS. When we asked which diseases were commonly reported among wildlife, all study participants indicated the system did not include any information about wild animal health.

“Q: So whenever having information or disease....

A: It is compulsory for us to upload information to let other provinces know to prevent.

Q: But still no diseases related to wildlife?

A: Only rabies in dogs, cats, and for cattle, we have dermatomyositis and foot-and-mouth disease. We don't have anthrax. And African swine fever and other classic swine fever, in general, many diseases, and when any diseases happen, we will need to report such diseases.”

(Provincial Animal Health Specialist)

STRENGTHS AND WEAKNESSES OF WILDLIFE FARMING MANAGEMENT

Item	Strengths	Weaknesses
Collaboration	Good collaboration of animal health and forestry protection sectors at the provincial level because they both were under the Provincial Department of Agriculture and Rural Development	No collaboration mechanism among multiple sectors No regulations requiring the involvement of other sectors, rather than the Forestry Protection, in managing wildlife farming
Support	A lot of support from forestry protection staff towards farmers, and vice versa, a lot of support from wildlife farms towards the management work of forestry protection staff	There was no support from the government in terms of outputs and consumption markets, resulting in a big problem for farm owners during COVID-19
Network	Decentralized responsibilities in the management of wildlife farming in the forestry protection system	It was very difficult to request for the involvement of the environment sector
Technical guideline	Technical guidelines for farming several wild animals are available, and for some others are being developed	No detailed guidelines, or technical standards on farming conditions, enclosure standards, veterinary hygiene, animal health quarantine, and common animal diseases, except those for tigers

Item	Strengths	Weaknesses
Legal system and regulations	<p>Multi-sectoral approach in government legal system</p> <p>Encouragement policies from governments and local authorities for the farming of other species rather than the precious, endangered and rare species for economic development</p> <p>Overlaps in legal documents were removed</p> <p>Species prioritized for protection: clear and strict regulations and enforcement by the government</p> <p>Circular on collaboration mechanism between human health and animal health sectors (Circular No 16/201370)</p>	<p>Weak enforcement of the government's legal system</p> <p>No direct checking of wildlife farms before issuing approval, just a paper-based evaluation of the licensing application</p> <p>No detailed regulation on wildlife surveillance, no document on wildlife and wildlife diseases</p> <p>No detailed guidelines, procedures, or standards on enclosures, veterinary hygiene, farming, or environmental hygiene, which caused difficulties for lower levels in managing and monitoring the implementation of legal frameworks</p>
Capacity	<p>Good laboratory capacity within the animal health sector</p>	<p>Lack of capacity in differentiating captive wild animals and registered ones</p> <p>Lack of knowledge on wild animal health and diseases</p> <p>No training curriculum on wildlife's health for veterinary students or medical students</p>
Resources	<p>Forestry protection network from communal, district, provincial to national level</p>	<p>High workload but limited human resources</p> <p>No specialized animal health staff at communal level</p> <p>Low salary</p>
Reporting system	<p>Available data reporting systems of both forestry protection sector and animal health sector</p>	<p>The forestry protection sector did not have any requirement on reporting data about animal health</p> <p>No data sharing mechanism among different sectors</p>

Table 6. Strengths and weaknesses of wildlife farming management in Viet Nam

“There hasn’t been any collaboration mechanism, but when being invited, the animal health sector still participated. We have invited them to join several times, we very much want them to join, they would give us many comments in the management of environmental hygiene, in instructing wildlife farms in terms of safety. The presence of animal health staff would be much respected.”

(District Forestry Protection Leader)

MONITORING OF WILDLIFE FARMING

The district forestry protection centers are responsible for monitoring wildlife farming activities. They also prepare the farm tracking log and provide instructions to wildlife farms. Monitoring of wildlife farms primarily focuses on the number of animals, provincial import and export, enclosure safety, hygiene, and waste disposal. Animal health or welfare is outside of the scope of monitoring, which is one of the reasons that the animal health sector is not involved in monitoring wildlife farming activities.

“After issuing a code to the wildlife farm, we would inform the district forestry protection center for them to make a tracking log. After making the tracking log, they would manage and monitor wildlife farms. When any animal dies, or they want to sell animals, they would need to work with the district forestry protection center to process.”

(Provincial Forestry Protection Specialist)

Study participants reported that the wildlife farming monitoring happened every month at the district level and every six months or every year at the provincial level. It is a routine activity for forestry protection staff at the district level to conduct monitoring activities at little cost. However, coordinating a monitoring trip with other sectors requires human and financial resources.

“Mostly people from Provincial Forestry Protection Department join annual monitoring. Several years ago, we also invited the environment and animal health sector to join our monitoring visit, but we had to deal with expenditure issues, and they did not have time. To be frank, now due to the issue of cutbacks in every sector, if we invite them to join with us, they would need to assign a person and would need to spend time.”

(District Forestry Protection Leader)

One issue raised among the study participants was that many households in the area raised a few or several wild animals for self-consumption instead of sale, many of these were not registered. In addition, there was no quarantine requirement to sell wild animals within the province. Monitoring these unregistered farms and trade within provinces has been a challenge.

“But declaration is just very general, but doesn’t clarify domestic pigs or wild boars, so I am not very clear. As far as I know, they have declared, but not adequately. For example, when they started, they would declare, but during the farming process, they would not declare all changes of their animals. Or they stopped for several years, and when they restarted their farming, they did not register.”

(Provincial Animal Health Leader)

GOVERNANCE OF WILDLIFE FARMING

The administrative management of wildlife farming is described in the following Figure 8. The CITES MA is central in supporting the Department of Forestry Protection and MARD to oversee the overall management of wildlife farming^{71,72}. Under the CITES MA is the provincial, district-to-communal forestry protection network. Each level of the forestry protection sector is assigned detailed authorities and responsibilities as mentioned in Decree Number 06/2019⁹ and Decree Number 84/2021⁶. The Viet Nam CITES SA supports the forestry protection authorities at the provincial level and provides technical consultation to the CITES MA⁹.

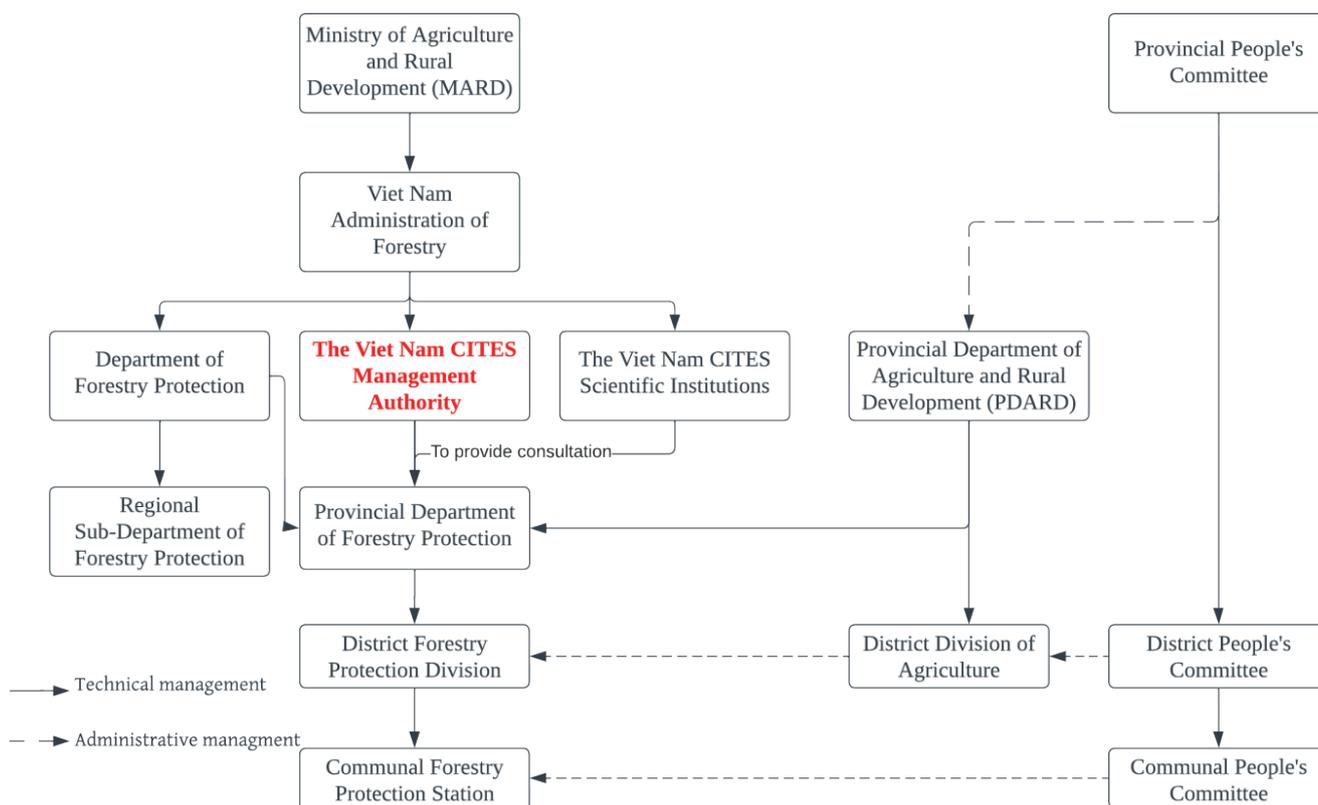


Figure 8. Governance structure of wildlife farming in Viet Nam

CONCERNS ABOUT WILDLIFE FARMING

As mentioned above, although the legal system to manage wildlife farming was quite comprehensive, covering all related aspects, detailed guidelines, instructions, criteria, and enforcement mechanisms for effective enforcement are needed. For example, the criteria to evaluate environmental or veterinary hygiene at wildlife farms is needed, even if such evaluation criteria for livestock are already available. Some study participants suggested the development of such evaluation and technical guidelines for some commonly farmed wild animal species.

“For example, to evaluate pig farms, or chicken farms, currently MARD has a regulation, and has issued guidelines, on which we can base to evaluate. But for wildlife, they just have a very general sentence, something like veterinary hygiene must be assured.”

(Provincial Animal Health Leader)

Study participants also pointed out the gap in breeding management due to the concerns of breeding degeneration that may impact wildlife conservation.

“Breeding management, we are much concerned about breeding management. But we haven’t done anything with it, it must be very time-consuming. Because the current wildlife labelling approach is very difficult. Almost all wild animals are very fierce. It is very difficult to label a wild animal.”

(District Forestry Protection Leader)

As part of the wildlife supply chain, the risks of emerging infectious diseases from wildlife farming were a cause of concern among study participants, who emphasized the importance of strict management of wildlife farms in Viet Nam.

“However, wildlife farming contains quite a lot of risks related to wildlife consumption from the nature, would have impacts on conservation as well as risks related to outbreaks. Thus, strict management and better management of wildlife farming would be very important to Viet Nam and it would also impact conservation work as well as prevention of risk of outbreaks globally, not just in Viet Nam due to many transportation activities to Viet Nam and from Viet Nam to other countries.”

(International Organization Specialist)

Meanwhile, given the concerns of emerging infectious diseases from wildlife farming, knowledge and detailed guidelines were needed to treat some common wildlife diseases.

“The law is available, now it is necessary to have under-the-law documents to provide detailed instructions, and then procedures. What should be considered veterinary hygiene? And guidelines for some species that are commonly farmed, and guidelines on some diseases in order to have measures.” (Provincial Animal Health Leader)

WILDLIFE FARMING-RELATED POLICIES

In this section, we will present the policies related to wildlife farming in Viet Nam based on the findings from the interviews, including:

- Wildlife farming policy development process
- Regulations of wildlife farming
- Multiple-sectoral collaboration

POLICY DEVELOPMENT PROCESS

Relevant policies for wildlife farming were developed according to the government’s regulations, as required by the Law on Endorsing legal documents⁷³. Study participants described the development as a continuous process, encompassing multiple stages from agenda setting, establishing committee and writing groups, drafting, document finalization, approval, and endorsement. Each stage in the process and the roles of related actors are visualized in Figure 9 and will be described in detail in this section.



Figure 9. Wildlife farming policy development process in Viet Nam

AGENDA SETTING

The agenda might be set upon requests from MARD based on situational analysis, proposals from lower levels based on societal needs, or certain route maps following the requirements from the Law on endorsing legal documents⁷³. Developing a new policy or revising a current one would come from the needs of the society, existing practices in localities, or national and international events.

“It must be done according to the law on endorsing legal documents, which includes certain processes, which a state management agency needs to follow to develop a policy. Of course, it also depends on actual needs, for example, it comes from practices, comes from Viet Nam’s joining in international treaties like CITES, which required Viet Nam to have a law for the implementation. That’s why we need to consult, to develop a legal document to implement such treaties. And also, actual management practices also require us to manage social needs.”

(National Forestry Protection Leader)

According to the law on endorsing legal documents, before developing a new policy or revising a current one, it is compulsory to conduct a situational analysis and policy impact evaluation to see the strengths and weaknesses of such policy as well as to see what should be revised to solve existing problems and thus, better the policy implementation. The law also provides policymakers at the ministerial level with a route map for policy revision⁷³.

“So, to revise or develop a new legal document, it is compulsory to have a policy impact evaluation. So before revising a policy, we have to develop a report to see the current obstacles.”

(National Forestry Protection Leader)

“Or for some issues, they also need to have a roadmap, for example, when will they need to revise the Decree Number 065? They might have heard of the needs for its revision, for example. So, they would need to have a plan. Additionally, why do they need to revise Decree number 06? Because they might have heard many locals complaining about its application into actual practices, and they see too many issues happening after piloting the decree for a while. So, they receive all feedback from the locals. And then they would decide to revise it in the coming year or next. And they need to make a roadmap.”

(International Organization Specialist)

Lower-level authorities or implementers who directly implemented policies could also propose policy revisions. When weaknesses or obstacles were identified in the implementation, they could propose changes and solutions to the central level, and the central level would aggregate all feedback and make plans for policy revision or development.

“When they plan for revision, we just propose what we want to revise. And based on proposals from areas within the province and from other provinces, the central level will aggregate information.”

(Provincial Forestry Protection Specialist)

As a consultation institution, CITES MA can propose policy development or revision and submit the proposal to higher levels. The role of proposing and submitting requests is decentralized. CITES MA submits proposals to MARD, and MARD submits proposals to the government and the national assembly.

“As a consultation institution, CITES MA needs to propose. Decree should be signed by the government, and thus MARD needs to submit. When MARD submits, there should be an institution to play the role of consultant for the MARD in submitting proposals, and so VNAF and CITES MA should play such role.”

(National Forestry Protection Leader)

5 Decree 06/2019 by the government regulated the management of endangered forest fauna and flora and implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora

COMMITTEE ESTABLISHMENT AND ENDORSEMENT

As requested in the Law on endorsing legal documents⁷³, an editorial committee and a writing group will be established with members from relevant institutions and sectors to develop the document.

“This has been clearly indicated in the Law on endorsing legal documents. It means that for example, to develop a decree, we must establish an editorial committee, a writing group with members from different institutions, related sectors, including research institutions.”

(National Forestry Protection Leader)

The writing group drafts the content of legal documents and presents them to the editorial committee for approval. Comments on drafts are usually collected via workshops with experts from related institutions and international organizations in Viet Nam, or from the public by uploading the drafts onto a public website. After collecting comments and feedback, the writing group revises the drafts and submits them to the editorial committee for approval, and the approved version will then be submitted to the higher level for approval and endorsement.

“Of course, they can definitely join, via direct workshops or sending us comments. For example, the CITES MA has received comments and feedback from international organizations like WWF, WCS, ENV, etc., many organizations, they’ve all joined. That’s their right. In fact, we haven’t got any particular mechanism but for legal documents, we could provide feedback and comments, could directly join in workshops and training with the participation of related stakeholders.”

(National Forestry Protection Leader)

REGULATIONS RELATED TO WILDLIFE FARMING

The legal framework was comprehensive and adequate in the views of study participants working in the forestry protection area at the national level. The challenges lie in the implementation capacity and multi-sectoral collaboration. Study participants reported existing regulations on collaboration between human health and animal health sectors, but the regulation related to collaboration between forestry protection and any related sector in managing wildlife farming or zoonotic diseases was lacking. In the provinces where this study was conducted, all study participants from the animal health sector mentioned the signed annual agreements with the provincial Viet Nam Centers for Diseases Control and Prevention (VN CDC) regarding controlling and preventing zoonotic diseases, with a primary focus on livestock.

“Under the Law, we have circulars, including Circular number 07 regulating control and management of terrestrial animals’ diseases, issued in 2016. In terms of expert, we have circular on animal quarantine. Additionally, we also have circulars on disease safety. But those documents mainly focus on livestock.”

(National Animal Health Leader)

Despite the existing collaboration mechanisms between human health and animal health sectors, Viet Nam doesn't have mechanisms to control zoonotic diseases originating from wildlife in general or from wildlife farming. For wildlife farming, there is no regulation to require monitoring or reporting animal health status when the animals arrive at the farming facilities.

“Current regulations do not require the animals must be healthy at the time of entering the households.”

(National Forestry Protection Leader)

MULTIPLE-SECTORAL COLLABORATION IN WILDLIFE FARMING

Study participants were aware of Circular number 16/2013⁷⁰ regulating the collaboration between the human and animal health sectors. The Circular stated the functions, responsibilities, and authorities of each stakeholder under the lead of GDPM, MoH and DAH, MARD. Study participants from the animal health sector at the provincial level also mentioned the annual agreement or MoU between the Provincial Department of Animal Health (PDAH) and VN CDC on bilateral collaboration in zoonotic disease prevention and control. In such documents, five zoonotic diseases are listed as the prioritization for both the health and agriculture sectors:

- Avian influenza/H5N1
- Rabies
- Streptococcus suis
- Anthrax
- Leptospirosis

“Our department [of animal health] collaborates with VN CDC, we signed for collaboration. Now the two institutions are still collaborating.”

(Provincial Animal Health Specialist)

In practice, the animal health and human health sectors inform each other of cases of the five prioritized zoonotic diseases, of which rabies and avian influenza were the most reported. Apart from bilateral collaboration on zoonotic diseases, the government has approved a national action plan on rabies prevention and control from 2022 to 2030⁷⁴. However, this system has only been applied in managing zoonotic diseases among livestock, not wildlife.

“In fact, in terms of rabies, we also have the national action plan on rabies prevention and control, we are still collaborating with each other. For example, when they have any case getting rabies vaccination, they often immediately inform us. We then will do an investigation to evaluate its risks, and investigate such cases.”

(Provincial Animal Health Specialist)

However, documents about the collaboration between the forestry protection sector and other relevant sectors were not mentioned. Study participants from international organizations reported their support to the CITES MA in developing

a document facilitating the collaboration between forestry protection and animal health sectors, which had not been finalized and issued.

“There has been no collaboration mechanism between forestry protection and animal health. We have helped them to develop a collaboration mechanism between the two sectors but they have not signed. It means the document has been drafted but has not been signed for outbreak responses between the two sectors.”

(International Organization Specialist)

“This center of animal health has not collaborated with the forestry protection sector about wildlife diseases.”

(District Animal Health Leader)

WILD ANIMAL HEALTH MANAGEMENT

WILD ANIMAL HEALTH MANAGEMENT STRUCTURE

As mentioned in the previous section (Legal framework), in terms of animal management, wild animals listed as terrestrial animals are under the management of the animal health sector. The animal health sector is in charge of disease prevention, foci investigation, pathogen detection, and providing education and training to farmers. The management structure of the animal health sector is described in Figure 10 .

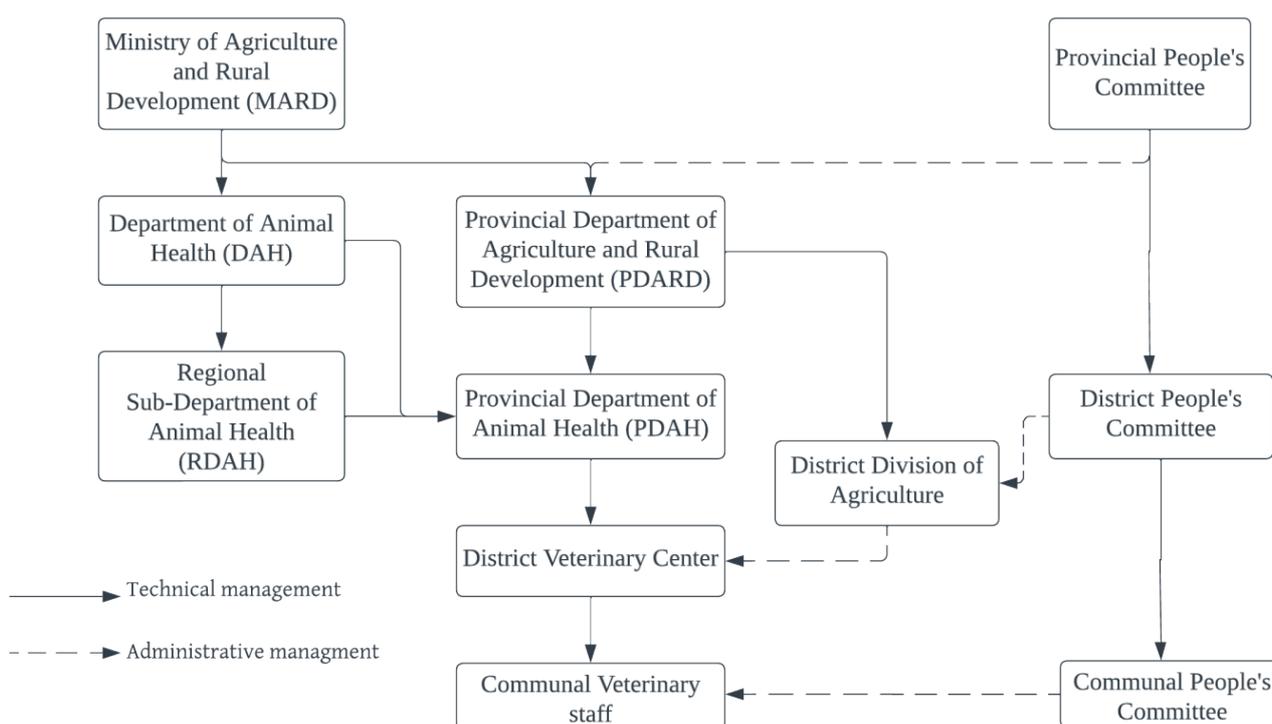


Figure 10. Animal health management structure in Viet Nam

“To be frank, as regulated by laws, the responsibility of supporting farmers in wild animals’ diseases prevention and control, foci investigation, and pathogen identification belong to the animal health sector. However, in our province, we haven’t played our role. For example, when there is any case, the wildlife farmers often think of rangers rather than veterinarians.”

(Provincial Animal Health Leader)

Although this structure is supposed to be applied to both livestock and wild animals, it has been primarily applied in livestock management in practice. In particular, there is no mechanism to monitor the health of farmed wild animals or to conduct relevant surveillance among farmed wild animals. There is a lack of collaboration between the health sector and the forestry protection sector that directly manages wildlife farming. The animal health sector has only been involved in the disposal of dead wild animals, quarantine, and providing veterinary care when releasing animals into the wild.

“In short, I feel like veterinary work related to wildlife is very inceptive.”

(Provincial Animal Health Leader)

“Q: Is there any mechanism ... has the forest protection staff called you, invited you to participate in monitoring activities with wildlife?

A: Yes, firstly, for releasing wild animals back to forests, the forest protection center has invited the animal health center to monitor releasing wild animals back to forests. Secondly, we have collaborated in destroying dead animals confiscated by forest protection staff. The animal health center would join in destroying dead animals as regulated.

A: Has any wildlife farm called you or consulted you when their farmed wild animals are ill?

Q: For over my 30 years working here, no wildlife farm has ever called the animal health center to tell us about any case of dead farmed animals. No one has ever informed us at our center.”

(District Animal Health Leader)

Study participants pointed out several challenges the animal health sector faces in managing wildlife farms. Information about wildlife farms was not accessible by the animal health sector.

“In terms of wildlife, the most important issue is where wildlife farms are. So I think we should know where wildlife farms are. Firstly, they should have the statistics of where wildlife farms are, from which they will be able to start their plan. Once they know where wildlife farms are, they will be able to initiate communication interventions.”

(International Organization Specialist)

The lack of a mechanism to collaborate with the forestry protection sector impeded the animal health sector from monitoring the health of farmed wildlife. The animal health sector is usually only informed about confiscated wild animals,

including death cases or animals to be released back into forests. Moreover, the knowledge about wild animal health among staff needed to be strengthened, given the limited literature on wild animal disease diagnosis and treatment that can be found in Viet Nam. Wildlife health is left uncovered by any sector in the overall governance.

“About management, as you can see in other areas, even though the forestry protection sector takes the main responsibility of management, the issue of disease is still left uncovered.”

(District Animal Health Leader)

CAPACITY OF THE ANIMAL HEALTH SECTOR TOWARDS WILDLIFE

Many study participants reported that neither the forestry protection sector nor the animal health sector had extensive knowledge of wild animal health or zoonotic diseases originating from wildlife. Although the animal health sector was officially in charge of terrestrial animal diseases, including wildlife diseases, their capacity to provide consultation, diagnosis, and treatment for wildlife was limited. Local veterinary staff only received training on livestock diseases and were not confident about their capacity to deal with wild animals' diseases. This prevented some local veterinarians from treating wild animals because of the concern of losing their prestige.

“That’s why there is still a gap in managing wild animals’ diseases, no one knows how to tackle it. The rangers say they don’t know how to treat this animal’s disease, they don’t do it. The animal health and livestock production sector say they don’t know anything about such issue. Therefore, when a wild animal has any diseases, no one knows how to deal with it.”

(International Organization Specialist)

“The difficulty is knowledge, to be frank, veterinary staff’s knowledge on wild animals is very weak. Therefore, when anything happens, they don’t know there has been any outbreak happening with wildlife.”

(Provincial Animal Health Leader)

“I myself do not have much knowledge about wild animals, so my consultation is often based on their experience, based on drug information, and based on my experience in management and learning, and based on what I meet in my daily life.”

(District Animal Health Leader)

“We have been trained on livestock, we also have investigation activities with livestock and domestic animals like chicken and pigs. I’ve heard that the animal health sector is also partially in charge of wild animals. We have had training on animal diseases, but livestock diseases only, not wildlife diseases.”

(District Animal Health Specialist)

“Because allowance for local vet is very low, they work for their prestige. So only once they see the curability do they agree to treat. But if they feel the animals could not be cured, which might damage their prestige, they will not agree to treat.”

(Provincial Animal Health Leader)

Strengthening the capacity of the animal health sector to address wild animal diseases was considered important to improve disease control and prevention at wildlife farms. Study participants emphasized the need to improve knowledge and skills among animal health staff for wild animal disease diagnosis and treatment, providing consultation to wildlife farms, including developing regulations and guidelines on sampling, vaccination, and disease treatment for wild animals.

“This issue is called specialty in pathogen identification. It belongs to the area of capacity building for animal health sector to better play the role of animal health sector in providing consultation to farmers, so farmers will know there is an institution having qualified capacity, having specialty in providing consultation to them. It would help the animal health sector to conduct activities more easily as they also need our help.”

(Provincial Animal Health Leader)

ANIMAL HEALTH QUARANTINE

The animal health quarantine procedure is illustrated in the following Figure 11. Selling farmed wild animals within the province does not require registration or approval from any authority. An animal health quarantine certificate issued by the Provincial Department of Animal Health (PDAH) is required to export farmed animals to other provinces within Viet Nam. To obtain an animal health quarantine certificate, farm owners need to register with PDAH and pay all related fees. The PDAH will check relevant documents, including farming permits, vaccination certificates, animal health, and enclosure hygiene, before issuing the certificate.

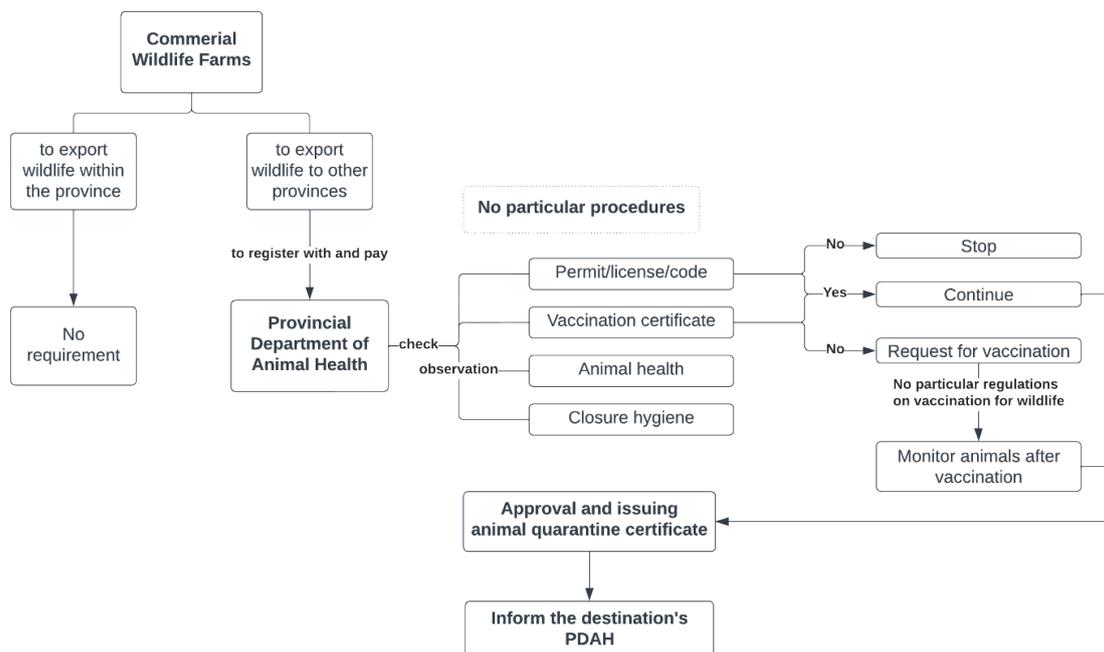


Figure 11. Animal health quarantine process

Study participants mentioned that there was no detailed procedure for animal quarantine or criteria to evaluate veterinary hygiene. The evaluation was only based on observation and their feelings.

“For wildlife, there is only one very general sentence saying that it is compulsory to ensure veterinary hygiene. But how? If we feel okay, we just write down okay in the form. There are no criteria for evaluation.”

(Provincial Animal Health Leader)

According to Circular number 25/2016 regulating quarantine procedures for terrestrial animals and terrestrial animals' products⁷⁵, the authorized Provincial Animal Health Department is in charge of conducting animal quarantine, who will conduct:

- Clinical examination
- Sampling for testing as regulated in Circular number 25/2016, which did not require testing for wild animals
- Sealing the locks of the enclosures
- Instructing and monitoring disinfection during storage and transportation
- Issuing animal quarantine certificate
- Informing the destination animal health authority
- In case of unqualified veterinary hygiene, no animal quarantine certificate will be provided, and penalty would be processed as regulated⁷⁵

As for the regulation, there was no requirement for taking samples from farmed wild animals, which prevents animal health staff from sampling farmed animals. Some animal health staff did not want to touch wild animals at farms, worrying about being injured by wild animals. Moreover, wildlife farms are valued properties of households, and animal health staff may worry about the responsibility for any trouble caused by the sampling.

“Farm owners are afraid. We need to show them an introduction letter from our institution saying about our visit objectives, we also need to collaborate with the local authority, communal people's committee in order to visit farms. And if by chance, we bring some pathogens to their farms, with such a big property, we could not pay for it. It is very difficult to visit farms for checking.”

(District Animal Health Specialist)

When discussing animal quarantine procedure, study participants mentioned the check on the vaccination certificates, but there have not been any regulations on mandatory vaccination for wild animals, nor regulations on the vaccines that wild animals need to have.

“A: To apply for the animal quarantine certificate, they need to have their animals vaccinated, have to follow regulations, many things. When they meet all requirements, we will process.

Q: Which kinds of vaccines are wild animals required to have?

A: There is actually no requirement for wild animals.”

(Provincial Animal Health Leader)

“Q: Do you know any regulations about vaccination for farmed wildlife?

A: As far as I know, there has been no vaccine for wildlife.

As I mentioned earlier about the case of antibiotic treatment, we applied the treatment for cats and dogs to treat civets and bamboo rats, like injections. There hasn't been any treatment guidelines for wildlife, either.”

(Provincial Animal Health Specialist)

Concerns were raised among the study participants regarding the current regulations and practices on animal health quarantine:

- Lack of regulation or guideline or procedure on animal health quarantine
- Lack of regulation or instruction on vaccination for wildlife
- Need for guidelines or criteria on enclosure hygiene or animal health qualified for obtaining the animal health quarantine certificate
- Observation-based inspection on animal health and enclosure hygiene

“So, it means ... for example, when we check, in the minutes, it stated that the farm has met the requirement of veterinary hygiene, for example, we will check from the clinical perspective, just through subjective evaluation. It is very general, but there has been no particular procedure.”

(Provincial Animal Health Leader)

One study participant at the provincial level of forestry protection mentioned that there was no regulation on animal health quarantine, and they just checked the quantity and the source of the animals. A study participant at the provincial Department of Animal Health reported never receiving any application for animal health quarantine.

“Up to now, I haven't seen any regulation that they would need to do animal health quarantine. We often check the quantity, and origin of wildlife only.”

(Provincial Forestry Protection Specialist)

“For wildlife, I have never issued any animal health quarantine certificate.”

(Provincial Animal Health Specialist)

Study participants raised questions about the current animal quarantine procedure regarding disease transmission:

- Does an animal health quarantine approval mean the animals are healthy and host no pathogens?
- How to address the risks of viral/bacterial/parasite transmission and new disease emergence?
- What is the requirement for wildlife vaccination?
- How can the animal health sector and forestry protection sector be aware of and address the issue of mixed animals from illegal and legal sources?

“From the animal health sector, I am very surprised that the animal health sector has issued such certificate which is to certify animal disease safety.”

(Program Leader at National level)

SURVEILLANCE SYSTEM

The animal health surveillance system in Viet Nam is managed by the Department of Animal Health (DAH). The joint Circular number 16/2013 by the MoH and MARD clearly defines the roles and responsibilities of each institution under the two ministries for zoonotic disease prevention and control³¹. The DAH takes overall responsibility for terrestrial animal health. Study participants also mentioned the responsibilities of the DAH in leading the animal health surveillance system as mentioned in the Law on Veterinary²⁵, Joint Circular number 16/2013⁷⁰, and Circular 07/2016⁷⁶.

“Now, it is pretty clear that the Department of Animal Health is in charge of health issues for terrestrial animals, including wildlife.”

(International Organization Specialist)

“Q: So, the surveillance program is led by MARD?”

A: It is managed by the Department of Animal Health (DAH). There are two types of surveillance: one is led by MARD, the DAH proposes activities, then directs lower levels. Another channel is from research institutions, universities who have projects, they also do surveillance.”

(National Animal Health Leader)

The surveillance system among livestock has been well established and has been operating effectively with support from higher levels and farm owners. But there has not been any system set up for wildlife surveillance. Several projects conducted by the WCS or FAO initiated some wildlife surveillance activities, but those activities have not been adopted into a routine surveillance system. Wildlife health was again highlighted as a gap in surveillance practices. The inadequate wildlife health monitoring by the animal health sector, together with the lack of requirement for reporting sickness or relevant investigation at wildlife farms by the forestry management sector, created considerable obstacles to conducting surveillance.

“I think one of the advantages with livestock is that every year, they have a program, a plan to take samples from chicken to test for H5N1, which can transmit dangerous diseases to humans. Samples are taken from each farm, even from small farms. For pigs, cows and buffalos, samples are taken for foot and mouth disease testing. Samples then will be sent to labs for testing, which helps us to better deal with diseases and outbreaks. Another advantage is that our higher levels often create favorable conditions for us, and we also have support from farm owners.”

(District Animal Health Specialist)

“But today, they do not have a surveillance system or resources to actually conduct surveillance on wildlife.... So, of the government, there’s no surveillance of pathogens of wildlife - on farms or in the wild. There’s no system that is, you know, every month or every year, certain numbers of animals must have health checks and samples submitted. There’s no system.”

(International Organization Leader)

With an established surveillance system, operated by the animal health sector and led by the DAH, MARD, an annual program and plan are developed for livestock surveillance, including active and passive sampling and testing of livestock. The MARD regulates the control and prevention of diseases of priority for terrestrial animal⁷⁶, in which the government covers relevant costs, so farm owners do not need to pay for any cost incurred by this activity. However, households need to pay for sampling and testing costs for diseases outside the priority. One study participant clarified two types of surveillance on animal diseases in Viet Nam, active surveillance for proactive detection of pathogens and passive surveillance conducted after cases or outbreaks were identified. Traditional markets, markets in border areas, high-risk workplaces like farms, and previous foci were prioritized for surveillance. Environmental samples, throat swabs, and feces were often collected for testing. PDAHs perform surveillance activities under the instruction and guidance of the DAH.

“About this, every year, the department of animal health develops an outbreak prevention and control plan, including sampling plan. There are two types: one for active surveillance sampling in which we try to detect pathogens and another for passive surveillance in which we collect samples when there’s any foci detected.”

(Provincial Animal Health Leader)

The laboratory system of the animal health sector is high-quality and was very effective during the COVID-19 pandemic. The laboratory system of the animal health sector includes eight laboratories under the regional sub-departments of animal health across the country, six of which are certified by the MoH to be qualified for SARS-CoV-2 testing with both human and animal samples.

“About SARS-CoV-2, 6 out of 8 laboratories have got certified by the MoH to be qualified for testing SARS-CoV-2.”

(National Animal Health Leader)

The two diseases most commonly mentioned by study participants in the surveillance system were rabies and avian influenza, mainly in domestic animals. Foot and mouth disease and African swine fever were also prioritized under the surveillance system. Several surveillance activities have been conducted among wild animals with funding from international organizations.

“In short pathogens of rabies, influenza, SARS-CoV, African swine fever, Corona and respiratory pathogens have been conducted through projects funded by CDC, WCS, and California University.... For example, SARS-CoV-2, rabies, or influenza have all been done on wildlife. In the past, we did surveillance on birds, testing influenza on birds. And we also did surveillance with dogs and cats, with rabies, funded by US-CDC.”

(National Animal Health Leader)

The animal health sector has established its network from the national level to provincial, district, and downward to communal levels. The network has been running surveillance among livestock but has not conducted any surveillance among wild animals. Furthermore, farm owners are hesitant to inform animal health staff about the sicknesses of farmed wildlife because of the insufficient knowledge among local veterinarians about wild animal disease diagnosis, treatment, and consultation. As a result, it is challenging for animal health staff to stay informed of death cases of farmed wildlife.

“The network, in fact as regulated, the animal health sector includes of 3 levels: provincial, district and communal level. Each commune has an animal health network. And animal health staff are in charge of disease prevention and control for terrestrial animals, including wildlife. The important factor is that farmers haven’t informed us and we haven’t done anything with wildlife, we haven’t done our entire job yet.”

(Provincial Animal Health Leader)

“When their animals were ill, they came to ask the local vet, but the local vet could not consult them about such diseases. Therefore, in traditional villages, they often know how to prevent diseases, that’s why case reporting is quite difficult.”

(International Organization Specialist)

Similar to animal health quarantine, the lack of requirement for in-province transportation makes surveillance highly challenging. In addition, the concern of a limited budget for surveillance was mentioned.

“One reason is that the budget is limited while there are a lot of pathogens originated from livestock, dangerous pathogens. But our budget is limited.”

(National Animal Health Leader)

Our study participants recommended establishing a surveillance system on wildlife to better manage and control risks of emerging infectious zoonotic diseases.

“It is said that prevention is better than cure, it is compulsory to allocate funding for surveillance, surveillance is very important, and also costly, we haven’t got much funding to conduct surveillance. Anyway, surveillance is the first thing we should do, active surveillance like what we do at markets in order to detect pathogens. If so, we will have better preparation for forecasting, prevention and control.”

(Provincial Animal Health Specialist)

ONE HEALTH APPROACH FOR WILDLIFE FARMING AND EMERGING ZONOTIC DISEASES

Viet Nam has established the One Health Partnership (OHP) program, including members from all related sectors like human health, animal health, environment, industry, agriculture and rural development, embassies, and international organizations.

One project focusing on wildlife farming with a One Health approach was piloted in Viet Nam for:

- Risk assessment of disease transmission from wildlife to livestock and humans
- Database development to facilitate data sharing among relevant sectors
- Biosafety capacity building
- Development of collaboration mechanisms among relevant sectors

Study participants expected to approach wildlife farming broadly from a health perspective to propose comprehensive solutions and mentioned the needed training curriculums with such One Health approach for human health and animal health students.

“During the first phase, we concentrated much on training, and changing training curriculums so that all sectors will see health issues in a broader perspective, provide more comprehensive solutions, in order to prevent the fact that only when something happens with their sector will they start looking for solutions.”

(National Program Leader)

Some study participants witnessed the successes of multisectoral collaboration in outbreak responses in Viet Nam, in particular SARS-CoV-1, influenza A/H5N1, and COVID-19, and hoped to establish a multi-sectoral collaboration mechanism to provide joint efforts in managing wildlife farming and related risks of zoonotic diseases.

“Moreover, in terms of outbreaks, in recent years there have been many outbreaks since 2002 or 2003, SARS in 2002 and H5N1 in 2003. And with such activities, Viet Nam was one of the most successful countries with the collaboration between human health, animal health, and livestock.”

(National Program Leader)

The forestry protection sector had information about the location, quantity, and species of wildlife farms but not knowledge about wildlife diseases. By contrast, the animal health sector had expertise in wildlife diseases but not information about wildlife farms. Multisectoral collaboration was believed to be able to make critical contributions to improving the management of wildlife farming and risks of diseases. One Health is considered an appropriate approach to control and prevent emerging zoonotic diseases, but little action has been taken.

“Additionally, many research studies in the world showed that up to 75% of pathogens of emerging infectious diseases originated from animals. So, the question is, we should target to early prevention, starting from the origin of pathogens.

In order to deal so with pathogens, it is necessary to have a multi-sectoral collaboration mechanism.”

(National Program Leader)

“Q: So, in terms of wildlife, has there been any action towards wildlife from the one health network that you participate?”

A: Not yet anything particular.”

(National Animal Health Leader)

RISK OF ZONOTIC DISEASES FROM WILDLIFE FARMING

We discussed the risks of zoonotic diseases from wildlife farming with twenty (20) study participants. Eleven (11) of them strongly affirmed that wildlife farming imposed high risks of emerging zoonotic diseases and acknowledged that wildlife was hosts of many pathogens including viruses, bacteria, parasites, and fungi.

“Sure, because you see, for example, wild animals... many research studies in the world have shown wild animals are the reservoirs of many pathogens, viruses, bacteria, parasites, fungi.”

(National Animal Health Leader)

“Zoonotic diseases, as you know, are diseases that go between animals and people. So yes, there’s a risk of zoonotic diseases from wildlife farming. Absolutely.”

(International Organization Leader)

Some participants mentioned the low awareness of zoonotic disease risks and disease prevention among wildlife farms and attributed this low awareness to the observation of no outbreak in Viet Nam that was shown to originate from wildlife farming.

“There has been evidence of zoonotic disease transmission from those species, but it is not from Viet Nam, so households’ and managers’ awareness is not good.”

(International Organization Specialist)

The inadequate risk awareness was also reflected in the practices at wildlife farms. It was reported by study participants that farmers did not usually wear any personal protection equipment (PPE) in their daily routines of feeding wild animals or treating sick animals, some even used dead animals for food. Farmers might feel lazy about putting on and taking off PPE. The distance between the farming and the human housing areas was close, creating concerns about disease transmission risks.

“In fact, the so-called biosafety level, the biosafety barrier between animals and humans now is very weak.”

(Provincial Animal Health Leader)

“Most of farmers are lazy of using, putting on and off the PPE, feel like very complicated”

(District Forestry Protection Leader)

Six (6) study participants thought that there should be some risks but did not have clear evidence. Even though wildlife had been reported to be the hosts of many pathogens, there was little scientific evidence showing disease transmission from wildlife to humans.

“Risks of transmitting diseases to humans are not clear, not clear.”

(Provincial Forestry Protection Specialist)

“In fact, no study or evaluation has provided evidence proving for diseases transmitted from wild animals to humans. However, risks exist. Currently, there hasn’t been any evaluation or any impact, or any evidence. However, it has potential risks, that’s why you need to do research.”

(National Forestry Protection Leader)

Three (3) study participants did not think that wildlife farming had any risk at all, because they did not see any outbreaks happening from wildlife farms in their experience, so that animals who were not sick could not transmit diseases to humans.

“As far as I understand about zoonotic diseases, as our farmers said, currently wild animals haven’t transmitted diseases. There has not been any outbreak. If wild animals do not have any outbreak, they can’t transmit diseases.”

(District Forestry Protection Leader)

“I have visited many farms, but I haven’t heard from anyone saying about wild animals transmitting diseases to humans, no one has ever said so.”

(District Forestry Protection Specialist)

“I know that wild animals can transmit diseases to each other, but I haven’t heard anyone saying wild animals transmit diseases to humans. And I see that wild animals are very healthy; very rarely do they get ill.”

(Provincial Forestry Protection Specialist)

The following Figure 12 summarizes the perceived zoonotic risk from wildlife farming among the study participants:

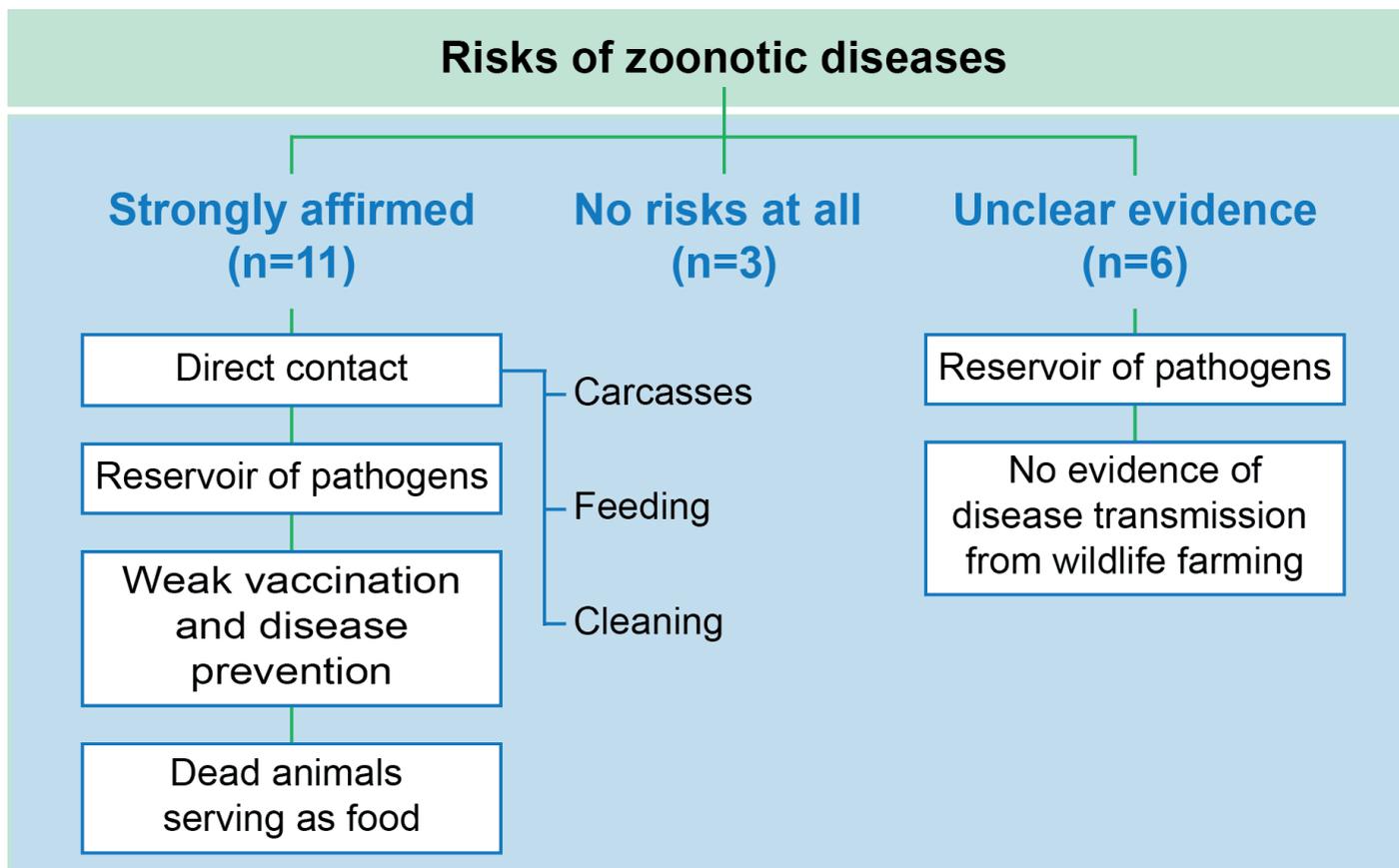


Figure 12. Perceptions on zoonotic disease risk in wildlife farming among 20 study participants

With the increasing awareness of risks from wildlife farming, some actions have been taken by the UN agencies, embassies in Viet Nam, and international organizations from conservation and zoonotic disease fields. The Pandemic Prevention Task Force (PPTF) was established in 2020 with members from the French embassy, Australian embassy, FAO, WHO, WCS, Traffic, PATH, GIZ, PanNature, WWF, and US CDC, among others. The PPTF has three technical working groups of science, legislation, and communication, aiming to contribute to the development and revision of policy related to the management of disease transmission risks from wildlife farming and wildlife trade in Viet Nam. One of the outstanding achievements that the task force has made was their proposal for the endorsement of Directive number 29/CT-TTg regarding urgent solutions for wildlife management⁷⁷.

“This Task Force has submitted a proposal to the Prime Minister for the endorsement of Decree number 29 regarding the management of wildlife farming and wildlife trade in Viet Nam in order to mitigate risks of disease transmission from wildlife.”

(International Organization Specialist)

EXPECTATIONS AND RECOMMENDATIONS

Unlike livestock farming which is managed by the Department of Animal Health and Livestock Production, wildlife farming is managed by the forestry protection sector with little collaboration with the animal health sector, making it challenging to address health issues related to wildlife farming. Wildlife health has also been neglected with the absence of the forestry protection sector in many relevant regulations on animal health, environmental and veterinary hygiene, or diseases.

“Firstly, about collaboration, because having 2 sectors working together should be more difficult than one sector. For example, here, the department of animal health and livestock production is responsible for both animal health and livestock production. Livestock production here just covers domestic animals, which is easier for control and prevention, because we just have one leader. But now, the forestry protection sector is in charge of farming, controlling quantities, and controlling origins of animals, while the animal health sector is responsible for disease control. However, we have not got any collaboration mechanism, which means that when any problem happens, we have not had any regulation in details, resulting in difficulties in implementation.”

(Provincial Animal Health Leader)

To address these gaps, study participants expressed their expectations and proposed several recommendations to better manage wildlife farming and zoonotic diseases, including:

- Develop a collaboration mechanism between the forestry protection sector and other relevant sectors, especially animal health, environment, and human health at all levels from national to communal levels.

“It is necessary to create a collaboration mechanism among sectors, for wildlife, we know obviously that we need the involvement of forestry protection, animal health, and centers of diseases prevention and control in human health sector.”

(National Program Leader)

- Develop standards and guidelines on enclosure safety, environmental hygiene, veterinary hygiene, animal quarantine, in-migrated animal check, and farming management criteria.

“There should be a joint document between 2 sectors, instructing what the animal health sector has to do, and what the forestry protection sector has to do. Then the animal health sector would say in order to do this and that, they would need to issue this and that, or if they want to do farming, they would need to ensure this and that. Just like domestic animals, how many wild animals will be farmed in that enclosure, how the sewage system should be. Only when there are detailed and clear regulations will they be able to handle it.”

(District Forestry Protection Leader)

- Develop strategic plans for wildlife farming management, including financial planning for public health emergencies and surveillance, multi-sectoral planning, and human resources planning.

“The first issue is financial planning for public health emergencies, or budget planning for active surveillance focusing on high-risk pathogens from wild animals, for some particular groups. For example, viruses have high risks so we should invest more in this group. There must be a collaboration in order to do so, which we don’t have any at this moment. One obstacle is that even if the collaboration mechanism is set up, we still don’t have money to implement it. Budget will be allocated by the Ministry of Planning and Investment or Provincial Department of Planning and Investment, Provincial Department of Finance under the Provincial People’s Committee.”

(National Program Leader)

- Call for support and investment from international organizations to improve wildlife farming management in Viet Nam because wildlife farming was not a prioritized issue in Viet Nam, and Viet Nam did not have adequate resources specifically for wildlife farming management.

“In order to better manage wildlife farming, I think it is necessary to have joint support of international organizations, international resources because Viet Nam’s resources are still limited and saved for other priorities. Human resources for forest management and farming management are not enough, and there are still many limitations. We haven’t talked about managing risks of zoonotic diseases from wildlife farming.”

(National Animal Health Leader)

CONCLUSION

Wildlife farming has been practiced in Viet Nam for a long time and brought significant economic benefits to local communities in many provinces across the country. With developed regulations and policies, the government of Viet Nam has requested the participation of all related sectors in a joint effort to manage wildlife farming. However, detailed instructions on implementing such regulations and enforcement are still insufficient to manage wildlife farming effectively. A multi-sectoral approach is manifested in the government's policies, but it has not been adequately implemented. Collaboration has been established between the animal health (livestock) and human health sectors for zoonotic disease control, but the forestry protection sector managing wildlife farming is absent from most regulations or collaborative networks for zoonotic disease management. As a result, wild animal health and relevant zoonotic disease risks are neglected in the monitoring systems in both animal health and forestry protection sectors. By focusing on the legal framework and management of wildlife farming and zoonotic diseases within the framework, information about wildlife farming outside the legal framework (e.g., at illegal farms) was not collected. Further studies complementing information from more aspects will provide a more comprehensive picture of wildlife farming and zoonotic disease risk management in Viet Nam.

During this study, most study participants and stakeholders clearly recognized the existing gaps and expressed strong interest in improving the management of zoonotic disease risk in the wildlife trade and farming. Key actions identified from this study may contribute to the strategic planning of wildlife farming and disease risk management:

- Establish a continuous information flow mechanism between forestry and animal health departments.
- Conduct risk assessments based on specific taxonomic groups and value chain contexts to allow for a more precise understanding of the levels of risk (including information gaps) and prioritization of management measures.
- Design a plan for systematic monitoring and surveillance for pathogens, diseases, and wildlife species in wildlife farming and trade (with corresponding investment and sustained financing as needed) to address knowledge gaps, enable early detection of threats, and monitor the effectiveness of interventions.
- Develop a list of species (or broader taxonomic groups) regulated on the basis of disease risk. For example, the U.S. Centers for Disease Control and Prevention regulates the importation and trade of bats, primates, and some rodent species on the basis of risk to public health, apart from other agencies' species listings on conservation or invasive species considerations.
- Develop instructions, criteria, and standards for wildlife farming, including enclosure safety, veterinary hygiene, occupational health and safety, and animal quarantine procedures.
- Review and refine mandates and capacity as necessary, e.g., to develop a continuous veterinarian training scheme on wildlife health, to expand MARD's priority zoonotic diseases to include wildlife pathogens of concern and enable its work on wildlife farms.
- Use a One Health lens to consider the trade-offs and co-benefits of possible decisions related to wildlife farming and trade to optimally balance livelihoods, health, conservation, and other priorities of the population.

A photograph of a rabbit in a field, with a tree and a blue sky in the background. The rabbit is positioned on the left side of the frame, looking towards the right. The tree is on the right side, and the sky is a deep blue. The overall scene is a natural, outdoor setting.

APPENDIX

APPENDIX 1.

GROUP IB AS DEFINED IN DECREE NO 84/2021/NĐ-CP BY THE GOVERNMENT

No	Scientific Name		
REPTILIA			
CROCODILIA			
1	Crocodylus porosus	2	Crocodylus siamensis
SQUAMATA			
3	Cnemaspis psychedelica	5	Varanus nebulosus (Varanus bengalensis)
4	Shinisaurus crocodilurus	6	Ophiophagus hannah
TESTUDINES			
7	Batagur affinis	12	Mauremys annamensis
8	Cuora bourreti	13	Platysternon megacephalum
9	Cuora cyclornata (Cuora trifasciata)	14	Pelochelys cantorii
10	Cuora galbinifrons	15	Rafetus swinhoei
11	Cuora picturata		
AVES			
COLUMBIFORMES			
16	Caloenas nicobarica		
PELECANIFORMES			
17	Egretta eulophotes	20	Platalea minor
18	Gorsachius magnificus	21	Pseudibis davisoni
19	Peiecanus philippensis	22	Thaumatibis gigantea

No	Scientific Name		
FALCONIFORMES			
23	Falco peregrinus		
CHARADRIIFORMES			
24	Calidris pygmaea	25	Tringa guttifer
SULIFORMES			
26	Anhinga melanogaster		
GALLIFORMES			
27	Arborophila davidi	31	Polyplectron bicalcaratum
28	Lophura edwardsi	32	Polyplectron germaini
29	Lophura nycthemera	33	Rheinardia ocellata
30	Pavo muticus	34	Tragopan temminckii
CICONIFORMES			
35	Ciconia episcopus	37	Mycteria cinerea
36	Leptoptilos javanicus		
BUCEROTIFORMES			
38	Aceros nipalensis	40	Rhyticeros undulatus
39	Anorrhinus austeni	41	Buceros bicornis
ANSERIFORMES			
42	Asarcornis scutulata		
OTIDIFORMES			
43	Houbaropsis bengalensis		
PASSERIFORMES			
44	Ianthocincla konkakinhensis	46	Trochalopteron ngoclinense
45	Laniellus langbianis	47	Trochalopteron yersini

No	Scientific Name		
GRUIFORMES			
48	<i>Grus antigone</i>		
ACCIPITRIFORMES			
49	<i>Aquila heliaca</i>	51	<i>Gyps indicus</i>
50	<i>Gyps bengalensis</i>	52	<i>Sarcogyps calvus</i>
MAMMALIA			
DERMOPTERA			
53	<i>Galeopterus variegatus</i>		
PROBOSCIDEA			
54	<i>Elephas maximus</i>		
PRIMATES			
55	<i>Nomascus annamensis</i>	65	<i>Pygathrix nigripes</i>
56	<i>Nomascus concolor</i>	66	<i>Rhinopithecus avunculus</i>
57	<i>Nomascus gabriellae</i>	67	<i>Trachypithecus crepusculus</i>
58	<i>Nomascus leucogenys</i>	68	<i>Trachypithecus delacouri</i>
59	<i>Nomascus nasutus</i>	69	<i>Trachypithecus francoisi</i>
60	<i>Nomascus siki</i>	70	<i>Trachypithecus germaini</i>
61	<i>Nycticebus bengalensis</i>	71	<i>Trachypithecus hatinhensis</i>
62	<i>Nycticebus pygmaeus</i>	72	<i>Trachypithecus margarita</i>
63	<i>Pygathrix cinerea</i>	73	<i>Trachypithecus poliocephalus</i>
64	<i>Pygathrix nemaus</i>		

No	Scientific Name		
ARTIODACTYLA			
74	<i>Axis porcinus</i>	79	<i>Muntiacus vuquangensis</i>
75	<i>Bos gaurus</i>	80	<i>Pseudoryx nghetinhensis</i>
76	<i>Bos javanicus</i>	81	<i>Rucervus eldii</i>
77	<i>Capricornis milneedwardsii</i> (<i>Capricornis sumatraensis</i>)	82	<i>Moschus berezovskii</i>
78	<i>Muntiacus truongsoneensis</i>		
PERISSODACTYLA			
83	<i>Rhinoceros sondaicus</i>		
PHOLIDOTA			
84	<i>Manis javanica</i>	85	<i>Manis pentadactyla</i>
LAGOMORPHA			
86	<i>Nesolagus timminsi</i>		
CARNIVORA			
87	<i>Canis aureus</i>		<i>Arctictis binturong</i>
88	<i>Cuon alpinus</i>		<i>Prionodon pardicolor</i>
89	<i>Vulpes vulpes</i>		<i>Viverra megaspila</i>
90	<i>Helarctos malayanus</i>		<i>Catopuma temminckii</i>
91	<i>Ursus thibetanus</i>		<i>Neofelis nebulosa</i>
92	<i>Aonyx cinereus</i>		<i>Panthera pardus</i>
93	<i>Lutra lutra</i>		<i>Pcmthera tigris corbetti</i>
94	<i>Lutra sumatrana</i>		<i>Pardofelis marmorata</i>
95	<i>Lutrogale perspicillata</i>		<i>Prionailurus viverrinus</i>

APPENDIX 2.

GROUP IIB AS DEFINED IN DECREE NO 84/2021/NĐ-CP BY THE GOVERNMENT

No	Scientific name	No	Scientific name
INSECTA			
COLEOPTERA			
1	<i>Cheirotonus battareli</i>	2	<i>Cheirotonus jansoni</i>
LEPIDOPTERA			
3	<i>Teinopalpus aureus</i>	5	<i>Troides aeacus</i>
4	<i>Teinopalpus imperialis</i>	6	<i>Troides helena</i>
AMPHIBIA			
CAUDATA			
7	<i>Paramesotriton</i> spp.	8	<i>Tylototriton</i> spp.
REPTILIA			
SQUAMATA			
9	<i>Gecko gecko</i>	14	<i>Ptyas mucosus</i>
10	<i>Goniurosaurus</i> spp.	15	<i>Python brongersmai</i> (<i>Python curtus</i>)
11	<i>Naja atra</i>	16	<i>Python molurus</i> (<i>Python bivittatus</i>)
12	<i>Naja kaouthia</i>	17	<i>Python reticulatus</i> (<i>Malayopython reticulatus</i>)
13	<i>Naja siamensis</i>	18	<i>Varanus salvator</i>
TESTUDINES			
19	<i>Amyda cartilaginea</i> (<i>Amyda ornata</i>)	28	<i>Heosemys grandis</i>
20	<i>Palea steindachneri</i>	29	<i>Indotestudo elongata</i>
21	<i>Cuora amboinensis</i>	30	<i>Malayemys subtrijuga</i>
22	<i>Cuora mouhotii</i>	31	<i>Manouria impressa</i>
23	<i>Cyclemys dentata</i>	32	<i>Mauremys mutica</i>
24	<i>Cyclemys oldhami</i>	33	<i>Mauremys nigricans</i>

No	Scientific name		
25	Cyciemys puichristriata	34	Sacalia quadriocellata
26	Geomyda spengleri	35	Siebenrockiella crassicollis
27	Heosemys annandalii		
AVES			
COLUMBIFORMES			
36	Columba pnnicea		
PELECANIFORMES			
37	Threskiornis melanocephalus		
FALCONIFORMES			
38	Falconiformes spp. (trừ loài Falco peregrinus đã liệt kê trong nhóm IB)		
STRIGIFORMES			
39	Strigiformes spp.		
GALIFORMES			
40	Arborophila spp., Lophura spp. (Trừ loài Arborophila davidi đã liệt kê ở nhóm IB)		
CICONIIFORMES			
41	Ciconia nigra	42	Leptoptilos dubius
BUCEROTIFORMES			
43	Bucerotidae spp. (trừ các loài Buceros bicornis, Aceros nipalensis, Rhyticeros undulatus và Anorrhinus austeni thuộc Nhóm IB)		
ANSERIFORMES			
44	Aythya baeri	45	Mergus squamatus
PASSERRIFORMES			
46	Emberiza aureola	49	Leiothrix argenteauris
47	Garrulax spp., Trochalopteron_spp., Pterorhinus spp., lanthocincla spp.	50	Leiothrix lutea
48	Gracula religiosa	51	Pitta spp., Hydronis spp.
GRUIFORMES			
52	Heliopais personatus		

No	Scientific name		
ACCIPITRIFORMES			
53	Accipitriformes spp. (trừ các loài <i>Aquila heliaca</i> , <i>Gyps indicus</i> , <i>Gyps bengalensis</i> , <i>Sarcogyps calvus</i> đã liệt kê trong nhóm IB)		
PSITTAFORMES			
54	<i>Psittacula</i> spp.	55	<i>Loriculus verianis</i>
MAMMALIA			
CHIROPTERA			
56	<i>Pteropus hypomelanus</i>	58	<i>Pteropus vampyrus</i>
57	<i>Pteropus lylei</i>		
RODENTIA			
59	<i>Laonastes aenigmamus</i>	61	<i>Ratufa bicolor</i>
60	<i>Petaurista philippensis</i>		
PRIMATES			
62	<i>Macaca arctoides</i>	65	<i>Macaca leonina</i>
63	<i>Macaca assamensis</i>	66	<i>Macaca mulatta</i>
64	<i>Macaca fascicularis</i>		
ARTIODACTYLA			
67	<i>Muntiacus puhoatensis</i>	69	<i>Tragulus kanchil</i>
68	<i>Rusa unicolor</i>	70	<i>Tragulus versicolor</i>
LAGORMORPHA			
71	<i>Lepus sinensis</i>		
CARNIVORA			
72	<i>Arctonyx collaris</i>	77	<i>Paradoxurus hermaphroditus</i>
73	<i>Arctogalidia trivirgata</i>	78	<i>Viverra zibetha</i>
74	<i>Mustela strigidorsa</i>	79	<i>Viverricula indica</i>
75	<i>Nyctereutes procyonoides</i>	80	<i>Felis chaus</i>
76	<i>Paguma larvata</i>	81	<i>Prionailurus bengalensis</i>

APPENDIX 3.

LIST OF ZONOSIS DISEASES REGULATED BY MARD⁷⁶

1. Avian influenza
2. Animal rabies
3. Streptococcus suis (type 2)
4. Anthrax
5. Spirochaetae
6. Trichinosis
7. Bovine tuberculosis
8. Brucellosis

APPENDIX 4.

QUESTION GUIDE FOR IN-DEPTH INTERVIEWS

About the stakeholders and their awareness about wildlife farming/zoonotic diseases:

1. To ask about demographic information: age, gender, job title, education level/background, career path and how long have you been in that position?
2. What is the main area that you are responsible for?
3. What was your role in developing or implementing government's regulations on wild animal farming and zoonotic diseases?
4. Would you please tell us what do you know about wildlife farming in Viet Nam?
 - What animals are defined as 'wild animals' in Viet Nam?
 - What wild animals have been farmed in Viet Nam?
 - Is wildlife farming good or concerned in Viet Nam? Why?
 - Have you heard about zoonotic diseases? Do you think it is related to wildlife farming? Why/why not?
 - Are you concerned about it for Viet Nam?

Development of regulations on wild animal farming/zoonotic diseases:

1. How are regulations on wild animal farming/zoonotic diseases developed?
2. Who participate in the development processes? What are their roles?
3. What do you think should be changed in the development process?
4. How are surveillance networks on wild animal diseases and zoonotic diseases regulated in Viet Nam?
5. What are the differences of different lists of wild animals applied in Viet Nam? What level of impacts does the CITES appendices have on formulating regulations on wild animal farming in Viet Nam?

Management mechanisms of wild animal farming/zoonotic diseases:

1. Could you please describe the management mechanisms of wild animal farming/zoonotic diseases in Viet Nam?
 - Who is involved in the process?
 - How are the records kept?
1. What are the strengths and weaknesses of such management mechanisms?
2. What should be done to improve such management mechanisms?

Application of regulations in managing wild animal farming/zoonotic diseases:

1. What do you generally think about the application of available regulations in managing wild animal farming and zoonotic diseases in Viet Nam?
2. What are the challenges of applying the current management mechanisms in real life?

3. How does the surveillance and/or the reporting system of wild animal diseases and zoonotic diseases work in Viet Nam?
1. How can reports on zoonotic diseases, wildlife farming and surveillance data be disseminated and be accessed?
2. Is there any overlapping in the management systems of wildlife farming and zoonotic diseases?

Proposal for improvement of wild animal farming and zoonotic diseases:

1. What should be done to improve the prevention and control of zoonotic diseases emergence from wild animals?
2. How should study findings be communicated to policymakers for their consideration for future policy development?

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