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# Wildlife Trade Governance and Zoonosis in Indonesia: Gap from Source to Market Place

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**Abstract**

Indonesia is a major hub for domestic and international wildlife trade. Illegal and unregulated trade threatens species survival and public health through potential zoonotic disease transmission. Effective governance, including strengthened legislation and enforcement, is essential to address these issues. This paper scrutinizes the laws and policies governing wildlife trade and zoonosis prevention in Indonesia, spotlighting the regulatory path from source to marketplace transactions. By conducting a legal review of existing regulations at both national and local levels, with a focus on Jakarta and Bandung as case studies for local regulation, this study aims to clarify the management of legal wildlife trade, the responsible actors, and their legal duties throughout the supply chain. The findings highlight a disconnect between upstream monitoring and downstream marketplace activities. Furthermore, the discussion reveals a critical regulatory loophole- the lack of regulations addressing standards for a healthy non-livestock wildlife market and the often-overlooked role of local government agencies, which, despite playing a marginalized role in wildlife trade monitoring strategies, are at the forefront of zoonotic disease surveillance responsibilities.

Keywords: wildlife trade, zoonosis, law and policy, bird markets

## 1. Introduction

Indonesia is a known hub for both the domestic and international wildlife trade [1]. In the domestic market, huge numbers of live birds and other wildlife are sold daily to satisfy the demand for pets [2,3]. Pet keeping is extremely popular in Indonesia and is particularly prevalent in Java where it has been estimated that around one-third of Java's 36 million households keep birds [2,4]. It is a tradition with deep cultural roots that keeps a central place in the urban culture of modern Indonesia [2,3]. Live-animal or wildlife markets, often referred to as 'bird markets' in Indonesia due to the predominance of birds on sale, can be found in most major cities throughout the country [5]. These bird markets, range in scale, from small-scale local pet shops to large, multi-story markets, such as Pramuka Bird Market in Jakarta, which contains over a hundred individual shops and is one of the biggest live animal markets in Southeast Asia [3].

Trade in species that are protected under Indonesian law [6] is prohibited unless they are second-generation offspring that have been bred in approved facilities and are accompanied by the appropriate legal documents [7]. For species not afforded protection, capture from the wild and trade are permitted but are regulated by a quota system set annually by the Scientific Authority that dictates which species can be captured, how many individuals, and from which provinces [8].

The illegal and unregulated wildlife trade poses a significant threat to the survival of hundreds of species in Indonesia [9]. Legal and illegal trade have a complex relationship and are often difficult to distinguish due to loopholes in regulations, overlapping markets, and partial enforcement of laws. Nijman et al. (2022) discuss the interconnectedness of legal and illegal trade in Indonesia's domestic markets and the importance of distinguishing between both forms to better understand how legislation can be enforced equitably and effectively [10].

Wildlife trade also presents significant zoonotic disease transmission risks (e.g., outbreak of salmonellosis, avian influenza, etc, including the COVID-19 pandemic). Risks are highest in unregulated and illegal trade that lacks veterinary checks and sanitary safety standard inspections [10,11]. Threats are particularly acute at the large markets in most major Indonesian cities, which meet the demand for pets and meat from wild-caught birds, reptiles, primates, and other mammal species [12]. Public health, welfare, and conservation standards are regularly disregarded in these markets [10,11].

It is widely acknowledged that improved governance – notably strengthened legislation and policies, and their enforcement – is key to reducing the threats that the commercial trade in wild animals and their parts presents to biodiversity conservation [13] and the threats presented by the spillover of diseases into livestock and human populations [14]. This includes a broad call for increased restrictions and bans on trade, but also a more nuanced argument that calls for improved governance to ensure that trade is legal and formally regulated – and thus potentially less of a threat to conservation, welfare, and public health [14–16]. Although there is considerable literature exploring the governance of international trade, notably compliance with the Convention on International Trade of Endangered Species of Fauna and Flora (CITES), there is comparatively less attention focused on compliance with national and subnational legislation; "these are often vital efforts, but potentially belie the complexity of national and subnational legislation (laws, regulation policies, plans) that govern wildlife harvest, management, trade, taxation, processing, and use" [17]. The nuances of and interactions among domestic legislation are key to operationalizing global calls for improved wildlife governance [18]. In Indonesia, the legal mechanics of trade can be unclear; based on our experience, they are often poorly understood by people in the sector and involve different policies and processes run by various ministries at the national level. Clarifying the rules, responsibilities, and processes is key to supporting a legal trade.

Governing wildlife trade is traditionally considered part of Conservation Law and the responsibility of the Ministry of Environment and Forestry (MoEF) and its directorates [19], except for marine species, which are governed by the Ministry of Fisheries and Marine Affairs. Although this is true of many key conservation challenges, governing wildlife trade – and its related zoonotic disease risks – involves several different pieces of legislation and government agencies. The Conservation Law and its enforcement mainly focuses on protected species. There are fewer provisions and implementing regulations governing the legal trade of unprotected species.

The overlapping risks of wildlife trade and zoonotic disease are often attributed to illegal behavior and weak government enforcement. Although these are indeed key contributing factors, there is frequently considerable ambiguity and uncertainty over the exact rules and procedures that enable legal trade and responsible disease management. This is especially complex because the trade-disease nexus involves multiple government agencies, requiring the coordination of government actions, permits, monitoring, and enforcement across entire value chains. The resulting complexity and confusion not only help to explain lapses in implementation but also present a context in which "business as usual" operations retrench weak governance and continue to allow for high disease-risk wildlife trade.

This study aims to clarify the key domestic legal rules governing legal wildlife trade in Indonesia, from the point of sourcing to domestic sale at physical marketplaces, which remain common in Indonesia and many other countries [20,21]; online sites, although important [22], are beyond the scope of this analysis. It focuses on the legal permits and public health monitoring steps required to have a legal and transparent domestic trade, considering not only national but also sub-national legislation, and not only conservation rules but also public and animal health. It further clarifies the agencies responsible for different monitoring activities to ensure these rules are upheld and the sanctions associated with non-compliance; understanding these legal responsibilities is an important first step toward improvement implementation.

## 2. Methods

We conducted a review of relevant laws and regulations in multiple sectors, such as environment, conservation, forestry, customs, health, quarantine, and trade, at both national and local levels [17]. Both national-level and local-level regulations were obtained through online searches on official government websites. For local-level regulations, we focused on regulations from Jakarta and Bandung. Considering the resources these two local city governments possess to translate national legislation mandates into the local context, along with their experience in dealing with some of the largest wildlife markets in the country (Jatinegara and Pramuka in Jakarta; and Sukahaji in Bandung), we expected Jakarta and Bandung Regency would have suitable regulations to use as examples for this study. We aimed to obtain market-level Standard Operating Procedures (SOP) to scrutinize market management on the ground, but were unable to acquire any either online or through direct request. The data collection yielded 40 laws and regulations: eight Laws, nine Government Regulations, seven Local Government Regulations, seven Ministerial Regulations, six Official Decrees, and three other types of regulations (Appendix 1).

This study clarifies all responsible agencies along the wildlife trade chain and those in charge of zoonotic surveillance and case monitoring through normative analysis of related laws, regulations and policies. For each key set of actions in the legislation, we identified the government agency responsible for managing wildlife resources, human activities (e.g., enforcement, education), and the marketplace environment. We also assessed the coordination mechanisms present between these agencies. We focused on identifying the rules and the roles of relevant agencies related to the issuance and monitoring of permits, which are a central part of any legal trade system. Moreover, permits are crucial to zoonosis tracking and management because they enable the tracing of animals and diseases back to their source. Furthermore, the analysis then focused on identifying gaps that limit healthy legal trade and practicable interventions that could help to address these gaps.

The focus of this research was on terrestrial wildlife trade conducted through traditional supply chains such as physical markets. Although important, this study excluded online trade and marine wildlife trade, which are governed partly by different sets of regulations and enforcement mechanisms. By narrowing the focus, the research aimed to provide a more detailed and coherent analysis of the specified trade chains and their respective zoonotic surveillance and monitoring systems.

## 3. Results and Discussion

### 3.1. Result

The 40 laws and regulations collected during this study could be grouped into three themes which were regulations focusing on wildlife, market and trade aspects, and human health and zoonosis prevention. The legislation on wildlife trade was deemed to be lacking in comprehensiveness because there are no unified or at least interconnected “wildlife trade" regulations. Instead, there are separate legislations on wildlife and trade. The wildlife legislation is more conservation-oriented, including provisions on wildlife utilization such as trading, but it does not regulate in detail how wildlife should be traded (e.g., the treatment of wildlife in the market, health, biosafety, etc.). Conversely, the legislation on trade and marketplace is aimed at regular commodities, whereas wildlife, as a special "commodity," requires special treatment. The regulations concerning human health and zoonosis were expected to consolidate these themes, but they primarily focus on livestock and domesticated animals. Moreover, these three regulatory themes – wildlife, trade, and human health - are overseen by different ministries and agencies at the local level. Therefore, there is a missing link between these three regulatory themes in terms of substance and the connection of agencies that implement them.

The legislation reviewed revealed a complex system for legal wildlife trade, centered around the issuance of a series of permits to harvesters, intermediary traders, small-business owners, and market sites where wildlife is traded. It also highlights a recently developed chain of monitoring responsibilities focused on both animal and human health, reflecting the

considerable internal “mechanics” of national and subnational governance. Nevertheless, many key regulatory details are delegated to sub-national level regulation.

As illustrated through examples from Jakarta and Bandung, sub-national level legislation primarily addresses marketplace regulations. However, these regulations are not specifically tailored to wildlife markets, which require different treatment compared to general markets. There is no specific local regulation governing wildlife trade, possibly because it is assumed to fall under the jurisdiction of the Ministry of Environment and Forestry (MoEF) rather than local environmental agencies. This provided interesting insights into the division of regulatory responsibilities and the need for more tailored local legislation for wildlife trade.

3.1.1. Responsible Agencies

The governance of the wildlife trade, including associated disease and zoonotic risk management, is the responsibility of multiple government agencies. Although governing wildlife trade is typically associated narrowly with government conservation agencies, we identified ten key government bodies with legal obligations related to wildlife trade as stated in legislation (Table 1). These relate to the governance of not only wildlife resources but also domestic animals, human activities (e.g., enforcement), and the governance of marketplaces.

**Table 1.** Agencies and Their Legal Responsibilities in the Governance of Wildlife Trade and Associated Zoonotic Risk. (Detailed explanations in Appendix 2)

| No | Agency | Governance Aspect | | |
|---|---|---|---|---|
| | | Animals | Human | Market |
| National Level | | | | |
| 1 | Ministry of Environment and Forestry (MoEF) | V | V | V |
| 2 | Ministry of Agriculture (MoA) | V | V | V |
| 3 | Ministry of Health (MoH) | X | V | V |
| 4 | Coordination Team for the Prevention and Control of Zoonoses and New Infectious Diseases | X | V | X |
| Local Level | | | | |
| 1 | Environment agency or the equivalent agency | V | V | V |
| 2 | Health agency or the equivalent | X | V | V |
| 3 | Agriculture, livestock, and animal welfare agency or the equivalent | V | X | V |
| 4 | Trade agency | X | V | V |
| 5 | Local government secretariat | V | V | V |
| 6 | Market operator companies | X | V | V |

*V = has related legal responsibilities. X = does not have strong related legal responsibilities

Wildlife governance primarily falls under the responsibility of the MoEF and includes issuing permits for sourcing and distributing wildlife, carrying out conservation actions, conducting wildlife health surveillance, and managing related information systems. Local environmental agencies support the MoEF in carrying out these tasks, although they do not have explicit direct responsibility. Many of their responsibilities concerning wildlife comprise coordinating with the MoEF's Natural Resource Conservation Agency (BKSDA). Meanwhile, the Ministry of Agriculture (MoA) governs domesticated animals, including livestock health surveillance. The MoA also has overlapping tasks in wildlife management through its quarantine agency, which ensures compliance with legal documentation for importing and exporting wildlife and conducts necessary quarantine actions.

Interestingly, unlike local environmental agencies, which mainly support the MoEF in wildlife matters, local agriculture and livestock agencies play active roles in managing livestock health and do more than just “support” the MoA. Local governments also employ authorized veterinarians responsible for making decisions on post-mortem examinations for suspected zoonotic diseases, implementing biosecurity procedures, and temporarily closing facilities during outbreaks.

Governance of human activities in markets includes law enforcement of wildlife and environmental compliance violations and public education by the MoEF. Meanwhile, the

MoH and local health agencies play a key role in maintaining community health by observing designated zoonotic disease priorities, conducting community health surveillance, and monitoring market hygiene. The local health agencies are the first responders to an incident on the ground.

In addition, local trade agencies ensure compliance with trade regulations while market operators manage daily operations to adhere to market health standards such as those for hygiene, waste management, and disease control. These two entities are often overlooked when talking about wildlife trade management, as their role seemingly focuses on just trade, but these "trade" related responsibilities can extend to compliance with conservation regulations when the commodities being traded in the market are wildlife.

3.1.2. Issuing and Monitoring Permits Across the Trade Chain

Governance responsibilities (**Table 1**) center around the issuing and monitoring of a series of permits (**Figure 1**). The general principle in Indonesia's administrative law is that those who issue the permit have an obligation to monitor and enforce compliance with the permit's terms and conditions. These help ensure legal trade and reduce the illegal trade of protected species.

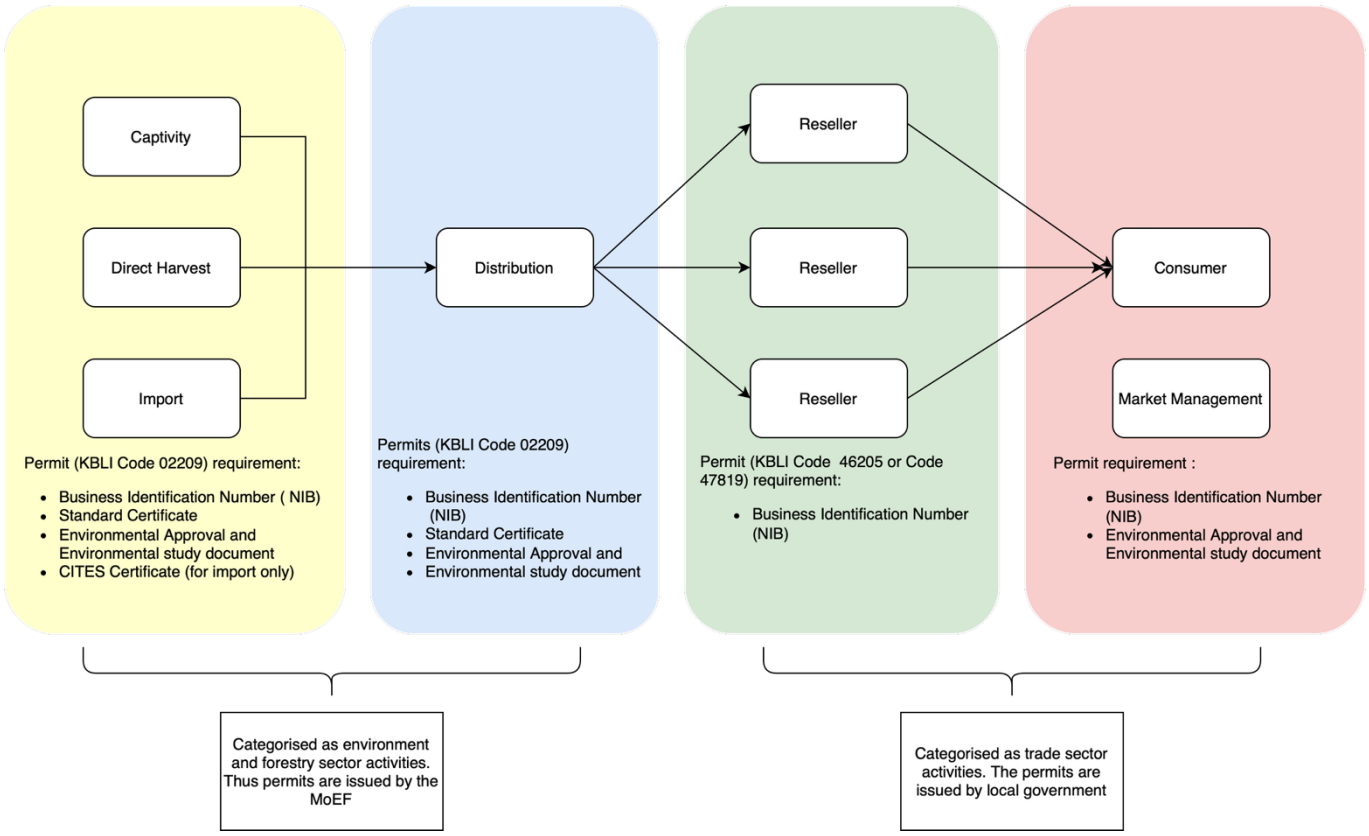


**Figure 1.** Types of permits required along Indonesia's legal wildlife trade chain, from source (yellow) to distribution (blue), resale (green), and final sale to customers in the marketplace (red).

1. Permits for Sourcing Wildlife

Wildlife trade is only permitted for species classified as non-protected by the MoEF (**Figure 1**). Protected species can be traded if they are the offspring of second-generation (F2) or subsequent generations, as proven by an F2 certificate and tagging under captive breeding conditions. The MoEF establishes annual quotas for non-protected species, which includes the number of individuals that can be harvested from the wild, sourced through captive breeding, and sourced through import [8].

Sourcing activities, including wild harvest, captive breeding, and import, are classified as Forestry Sector activities that require a specific business permit issued by the MoEF Directorate General of Natural Resource Conservation and its Ecosystem (KSDAE). To obtain these permits, applicants must first apply for a Business Identification Number (NIB) through the Online Single Submission Risk-Based Approach (OSS-RBA) system. They must then submit a standard certificate of business activities, which the MoEF verifies through the OSS-RBA system. Additionally, an Environmental Impact Assessment (EIA) must be conducted to secure Environmental Approval (*Persetujuan Lingkungan*) from either the MoEF or the local government, depending on the scope of the impact. In the case of imports, a CITES certificate of origin and a Health Certificate are also required [23].

Sourcing animals via all three of these points of origin is considered a mid-to-high-risk activity under the law [23,24], and thus requires Environmental Approval to obtain the permit. Environmental Approval requires the applicant to conduct an Environmental Impact Assessment (EIA), which produces either an Environmental Impact Statement (EIS, also known as AMDAL) or an Environmental Management and Monitoring Plan (EMMP, also known as UKL-UPL), depending on the scale and magnitude of the impact. Small-scale captive breeding operations that require less than a 1-hectare area are exempt from this obligation unless they are breeding carnivorous animals [25,26].

The MoEF's KSDAE through BKSDA monitors compliance with business permits for sourcing animals, and the MoEF's Law Enforcement Directorate monitors compliance with environmental approval through its Environment Supervisor Office (PPLH). For animal' import, the MoA's Quarantine Agency monitors compliance with Health Certificates and other import documents. Additionally, the Customs plays a role in monitoring imported wildlife by enforcing customs duties and verifying the legality of shipments in accordance with trade regulations.

2. Permits for Distributing Wildlife

Commercial wildlife trade often involves medium or large-scale intermediaries that serve distributing roles, including transporting wildlife from the source to various markets [27] or directly to customers. This requires a Distribution Permit (Permit KBLI Code 02209) issued by the MoEF's KSDAE, which the distributor usually acquires at the same time as the permit to source the animals. This distribution activity is also considered a mid-to-high-risk activity, so the permit requires an EIA to be conducted [25].

To secure the permit, applicants must submit an integrity pact, an EIA (i.e. UKL-UPL) along with Environmental Approval, and a detailed business proposal. Additionally, an inspection must verify compliance with technical standards, ensuring the availability of essential facilities, including an office, warehouse, animal cages, feeding and health equipment, and waste management systems. The employment of experts for handling live animals is also necessary. Furthermore, applicants must obtain a Business Identification Number (NIB) and provide proof of the species' legal origin, which may include a captive breeding permit, harvesting permit, certificate of captivity quality, or a transportation permit (SATS-DN) from another region.

After acquiring the Distribution Permit, the distributor must also obtain a transportation permit (SATS-DN) from BKSDA whenever they transport animals from one place to another. The SATS-DN is a one-time permit valid for single use, within 2 months of issuance. Local BKSDA monitors the compliance with SATS-DN at both the region of the animal's origin and the destination. The maximum number of species issued in all SATS-DN issued by BKSDA in one year should not exceed the annual quota set for that region.

The KSDAE, through BKSDA, is obliged to monitor compliance with the obligations listed in the Distribution Permit, including maintaining proper facilities based on the technical standards, formulating an annual business plan, and reporting all trade transactions to BKSDA. In addition, the MoEF's Law Enforcement Directorate monitors the Environmental Approval compliance of the permit holder through its Environment Supervisor Officer (PPLH). In practice, this relies on self-reporting by the permit holder and occasional site inspections if or when concerns are raised.

3. Permits for Reselling Wildlife

Wildlife trade often involves further reselling, frequently from a medium/large-scale distributor to smaller-scale market vendors (**Figure 1**). It is unclear whether these (often smaller) reselling vendors also need to obtain a distribution permit, especially as the process may be onerous for them. It is likely that they instead require a Permit for Resellers and Market Stalls that Sell Forestry and Hunting Commodities (KBLI code 47816), and/or a Permit for Pet Animal Resale (KBLI code 47816). As both activities are categorized as low-risk activities, they require only a Business Identification Number (NIB) and no environmental study document. These activities are classified as being under the "Trade Sector", rather than the "Environment and Forestry Sector", so the authority responsible for granting and monitoring permits is the Local Government through its Trade Agency [23].

4. Permits for Marketplaces Where Wildlife is Sold

Wildlife is often traded in public market settings, managed by private or government-owned companies. For example, Jakarta's Pramuka Market is managed by the government-owned company, Perusahaan Umum Daerah (PD). These market operator companies must obtain a Public Market Management Permit (*Izin Usaha Pengelolaan Pasar Rakyat* (IUPPR)), which is issued by the local government and compliance with which is monitored by the Local Trade Agency. Running a marketplace is considered a mid-to-high-risk activity, so it requires an EIA (i.e. UKL/UPL) and an Environmental Approval from the Local Government, with compliance monitored by the Environmental Agency. The company then has the authority to manage traders in the market by establishing market regulations and space-rent contracts that often include clauses requiring them to obey applicable laws and regulations.

The Ministry of Trade (MoT) categorizes public markets based on their operational hours, area, and number of traders [28]. Markets can be categorized as either general public markets, which sell general daily commodities, or as thematic public markets, in which the traders sell specialized goods [29]- including wildlife. In practice, however, wildlife is sold at both types of markets.

The general public market should aim to meet the Public Market National Standard (SNI Pasar Rakyat 8152: 2015 jo SNI 8152: 2021) as detailed in **Table 2**. However, this standard does not apply to thematic markets. The National Standard includes general requirements for legal documents, suitable market locations (e.g., not in disaster-prone areas or near hazardous facilities like chemical factories), hygiene conditions, and basic customer safety and comfort (e.g., layout for easy mobility and appropriate building materials). It also specifies minimum technical requirements for market facilities, such as space allocation based on commodities and necessary public facilities (e.g., offices, toilets, CCTV, security, and a health center for first aid). Additionally, market management companies must have several Standard Operating Procedures (SOPs) outlining how the market will be operated.

Furthermore, market operator companies are obligated to submit annual reports on their business management to the stakeholders. These reports serve as a means of transparency and accountability, outlining financial performance and operational status. For markets managed by a government-owned company – like the case of Pramuka Market in Jakarta and Sukahaji Market in Bandung-, the reports are submitted to the governor through Trade Agency. These reports are consolidated and submitted to the Ministry of Trade (MoT).

The regulations specify the minimum content required for market management reports [28,30–32]. While most of this content is not directly related to wildlife trade, certain components could be modified and extended to aid in wildlife trade monitoring. For instance, some of the obligatory components of the report are the list of traders' names and the commodities sold as well as the current condition of facilities, infrastructure, and services at the market.

3.1.3. Zoonosis Surveillance and Responses

The Coordinating Ministry of Human Resource Development and Culture (*Kementerian Koordinator Bidang Pembangunan Manusia dan Kebudayaan*) hosts a National Coordination Team with overall responsibility for zoonosis and infectious disease prevention and control [33]. It is assisted by the Local Coordination Team at the Provincial and Regency level, which

is guided and supervised by the Ministry of Internal Affairs. Surveillance data are integrated into the National Information System on Zoonoses and Emerging Infectious Diseases (Sistem Informasi Zoonosis dan EIDs/*SIZE*).

**Table 2.** General Public Market National Standard Requirement Categories.

| Requirements | Detail Explanation |
|---|---|
| General requirement | a. market legality<br>b. market location<br>c. hygiene and health<br>d. safety and comfort |
| Technical requirements | a. kiosk and trading space<br>b. accessibility and zoning<br>c. re-measuring post and trial tera<br>d. public facilities<br>e. building elements<br>f. safety in buildings<br>g. lighting<br>h. air circulation<br>i. drainage<br>j. availability of clean water<br>k. wastewater management<br>l. waste management<br>m. information and communication technology facilities digitization of public markets |
| Management requirements | a. SOP for human resource management and development<br>b. SOP for facilities and infrastructure management and maintenance<br>c. SOP for market commodities quality and safety monitoring<br>d. SOP for sustainable management |

In practice, local government agencies are the primary actors in surveillance and response to zoonotic diseases. Local agencies who have legal mandates on this issue are the Agriculture, Livestock and Animal Welfare Agency (*Dinas Peternakan dan Kesehatan Hewan*) which monitors animal traffic, animal products, and animal disease [34], and the Health Agency (*Dinas Kesehatan*), which monitors marketplace compliance to healthy market environment standards enacted by the MoH [35]. Even though these two agencies do not have permit-issuing authority in the wildlife trade chain, they are on the front line and the main agencies responsible for handling zoonosis cases at the local level [36].

Local governments were already mandated to establish a Local Commission on Zoonosis Control in 2011 [37]. Therefore, each province should have established its own Local Committee by now. Jakarta, as one of the study areas in this research, has enacted Governor Regulation No. 142 of 2014 on the Jakarta Zoonosis Control Commission. This Commission involves multi-agencies at every government level -from provincial, municipalities, districts, and wards- each with its responsibilities stated in the regulation (**Table 3**). The agencies that play key roles in surveillance are the Health Agency (*Dinas Kesehatan*/*Dinkes*) and the Food Security, Maritime Affairs and Agriculture Agency (*Dinas Ketahanan Pangan, Kelautan dan Pertanian/DKPKP*). These two agencies are also mandated to formulate the overall policy on zoonosis control. Although there is no explicit mandate to monitor wildlife trade in the Zoonosis Commission, the Environmental Agency (*Dinas Lingkungan Hidup*) is mandated to draft technical guidelines on animal waste management in public markets and slaughterhouses, and to supervise and assist with waste management in these areas.

The minimum responses required by municipalities in the handling of national priority zoonotic diseases include early detection, responses within 24 hours of the report, and treatments that include case handling procedures for isolation, medical treatment,

**Table 3.** Key Roles of Local Government Agencies in Jakarta Involved in Zoonosis Control.

| Local government agency | Key roles |
|---|---|
| Health Agency | - Develop a more enhanced checklist for healthy market inspection tailored to the wildlife market.<br>- Educate the traders and customers on a healthy lifestyle that can prevent zoonosis disease. |
| Animal Husbandry and Animal Welfare Agency | - Conduct health inspections for animals in coordination with BKSDA.<br>- Educate the traders and customers on animal welfare. |
| Environment Agency | - Provide technical guidelines on how to handle waste from the wildlife market<br>- Provide specialist waste management service. |
| Trade Agency | - Obligate market operator companies to include information on traders and animals being traded in their annual reports.<br>- In coordination with the MoEF, assist for market operator companies to improve practice in legal wildlife trade. |

immunization, and risk communication [36]. Local health agencies and animal health-related agencies are designated responsible authorities. Although the formal Standard Operating Procedure for the zoonosis case handling issued by DKPKP, Food Security and Agriculture Department (DKPP), Jakarta's Health Agency (*Dinkes* Jakarta), and *Dinkes* Bandung City could not be found online, an example of the Guidelines on Nipah Virus Control available from the MoH illustrates what these might look like (**Figure 2**).

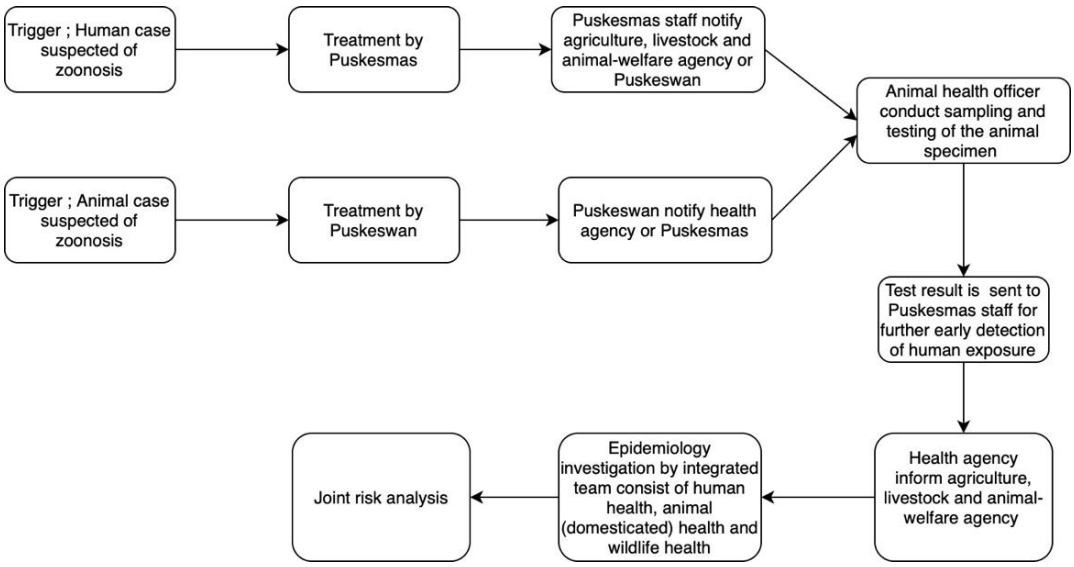


**Figure 2.** Zoonosis case response procedures and agency responsibilities for Nipah Virus control [38].

Furthermore, each institution is also required to report hierarchically according to their chain of command and report to the Zoonoses and EID Information System (SIZE) database according to their sector (**Figure 3**).

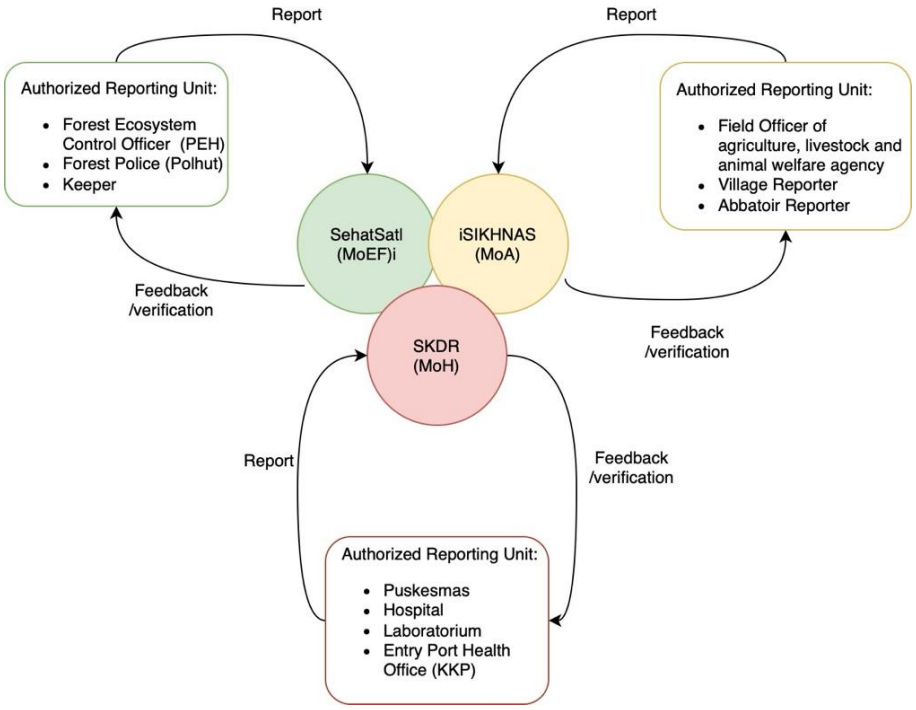


**Figure 3.** Zoonosis case reporting mechanism by the Ministry of Environment and Forestry (MoF), Ministry of Agriculture (MoA), and Ministry of Health (MoH) [39].

### 3.2. Discussion

Our research underscores the importance of clarifying the rules and processes involved in the legal wildlife trade, as well as identifying who is responsible for them. A clear and accessible regulatory framework is essential to ensure accountability, compliance, and effective oversight across all levels of governance. Nevertheless, we struggled to obtain some of the legislation at the sub-national level, that was not available online. It was even more challenging to obtain market-level regulation, which is often operationalised through internal policies by managing companies and is rarely made public.

Even after reviewing the available legislation in detail, there was some confusion about exactly what permits are required to participate in the legal trade. Clarifying these types of details is important, not only to close loopholes, but also so that relevant agencies, traders, and consumers have a reasonable opportunity to comply with the legislation and participate in legal, lower-risk trade. We identified five key gaps in existing regulations that could be realistically addressed to improve legal trade and reduce illegal trade in ways that mitigate environmental and zoonotic risks.

#### a. Lack of clarity about the permits required for market vendors

Regulation of a legal wildlife trade relies on clarity of permits that underlie the system. The government introduced the Online Single Submission system in 2018 to make it easier for permit applications [40]. However, it is also important that the MoEF and the Trade Agency clarify the type of permit arrangements that traders require. Notably, it is unclear whether market vendors who obtain wildlife from distributors and then resell it require a Reseller Permit (KBLI code 46205) or a Distribution Permit (KBLI code 02209). This is important, especially for the small-scale vendor-traders who represent a vast majority of traders across Indonesia's wildlife markets and most of the stakeholders in the markets reviewed.

Because the distribution of wildlife is categorized as a mid-to-high-risk business, it requires several documents and technical approvals (e.g. EMMP and Environmental Approval) that are likely to be burdensome and costly for small traders. As such a Distribution Permit is not likely intended for small resellers, for whom a Reseller Permit would be more appropriate given the more accessible requirements and lower cost. However, unlike the Distribution

Permit, the Reseller Permit does not require the applicant to disclose the source of their animals. This fundamentally limits the scope for determining the legality of the animals and tracing the origins of diseases. In practice, some resellers report that their trade is covered under the Distribution Permit held by the traders from whom they bought their wildlife. However, this arrangement may pose difficulties in verifying quotas, checking paperwork, and determining the responsible person in charge when a violation occurs.

Assisting traders to obtain the proper permits is one of the key components of supporting legally regulated trade. This approach offers a constructive alternative to punitive approaches to wildlife governance that focus narrowly on sanctioning offenders [17,41–43]. By helping traders navigate the permitting process, the government can provide them with greater legal certainty and reduce the risk of unintentional non-compliance. Moreover, a legally acquired permit will help government agencies to clarify their monitoring and enforcement requirements and provide useful data for designing better policies.

There are several possibilities for clarifying the permit requirements to better regulate the distribution and resale of wildlife. One option is to require all traders to have a Distribution Permit (*Izin Edar*) issued by the MoEF. This permit is already required for wildlife distributors and serves as an official authorization for legal trade. However, as discussed, it may not be affordable or accessible for small-scale resellers, which could lead to unintended barriers for those operating on a smaller scale. Without an alternative solution, small traders may struggle to comply with legal requirements.

Another possibility is to require them to apply for a Reseller Permit for Forestry Products (*Izin Usaha Perdagangan Eceran Kaki Lima* dan Los Pasar *Komoditi Hasil Kehutanan Dan Perburuan*) issued by the Local Government. The requirements for securing this permit are more reasonable for small traders. It does not require any technical documents, such as an EMMP; the applicant only needs to submit administrative documents, including an ID card, tax number, and a self-declared business standard certificate. However, that could mean the process would fail to identify the legal source of animals. Any future use of this permit for this purpose would require disclosing the supplier of their animals and their Distribution Permit Number (the supplier should have a distribution permit).

The last approach is to use a contract between distributors and resellers. This could allow a reseller to function formally as an agent of the distributor holding the Distribution Permit. Under these arrangements, animals held by the reseller would belong to the permit holder, who is responsible for the legality of the animals. In addition, the MoEF will need to ensure that the distributor is a legitimate permit holder and that they fully understand the legal consequences of delegating the sale of animals to someone else on their behalf.

**b. Disconnects in compliance monitoring along the wildlife trade chain**

There are key disconnects between the agencies issuing and monitoring permits along the wildlife trade chain. Sourcing and distributing wildlife activities legally require permits that are issued and monitored by the MoEF (see **Figure 1**). Meanwhile, the actions of reselling wildlife and operating markets where wildlife is sold are categorized as trade sector activities with permits issued and monitored by the local government's trade agency. However, there is no coordination or exchange of information between these two institutions. Introducing coordination and information exchange between these two institutions and leveraging the local trade agency as a strategic partner, would help ensure the legal flow of wildlife along the trade chain (**Figure 4**). For example, data on the actual number of animals traded in the markets could serve as a reference for the MoEF to check compliance with its quota system.

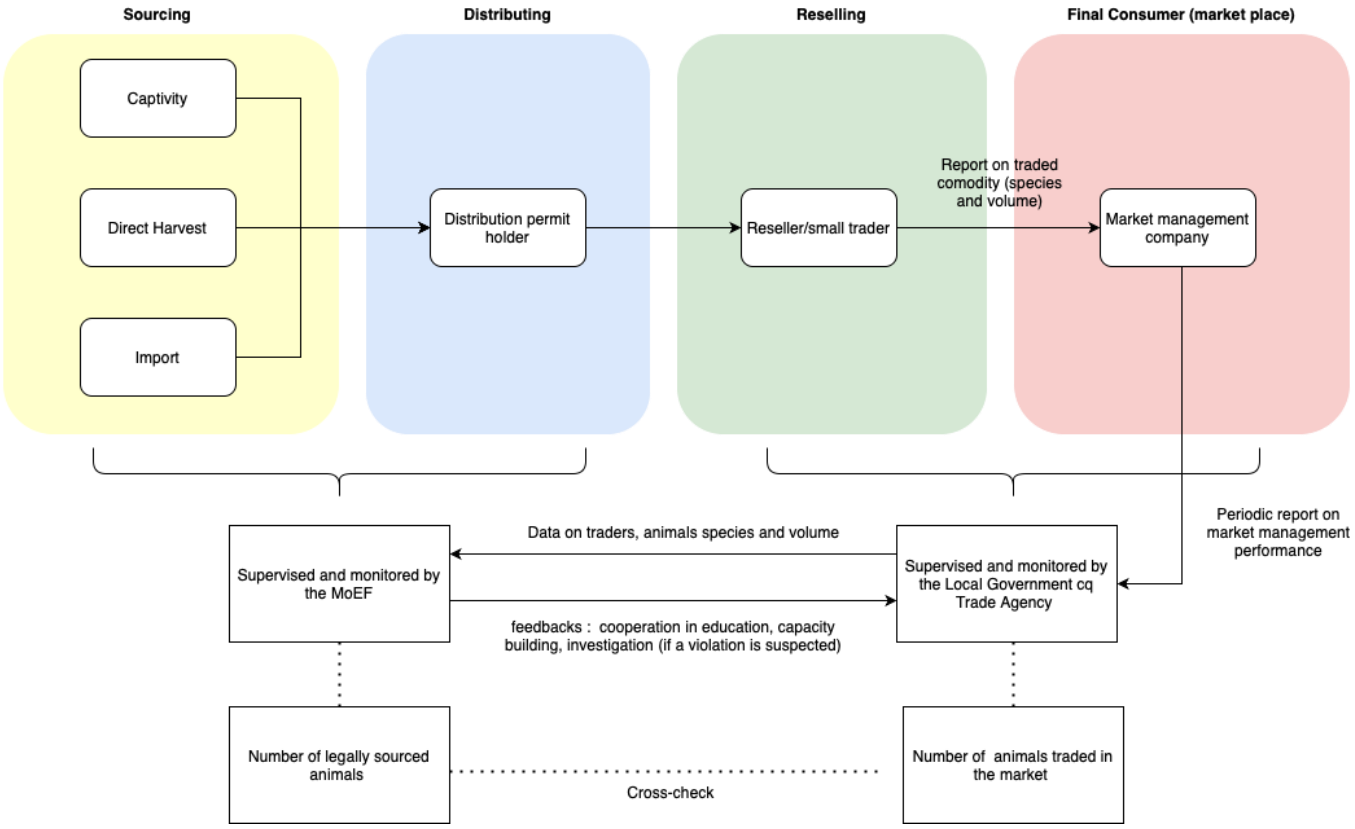


**Figure 4.** Potential Coordination and Information Exchange Between MoEF and Local Government Trade Agency Along the Wildlife Trade Chain.

### c. No specific standards for wildlife markets

The public market must meet several requirements stated in the National Standard of Public Market (SNI Pasar Rakyat 8152: 2015 jo SNI 8152: 2021; **Table 2**) such as the standard of waste management, safety equipment on the premises, the availability of clean running water, adequate ventilation, and proper toilet facilities. However, this National Standard does not apply to thematic public markets, such as the animal markets that specialize in selling wildlife and livestock, like the Pramuka bird market and Sukahaji animal market. Several local governments have issued standards for animal markets, but are explicitly focused on livestock, not on wildlife [44].

There is a need to review these requirements to suit better markets that sell wildlife, regardless of whether they are designated public markets, or specialist “thematic” markets. Jakarta has mandated the Jakarta Environment Agency to draft technical guidelines on animal waste management in public markets [45]. However, such guidelines cannot be found online, making it difficult to assess their scope and effectiveness.

In the future, new tailor-made standards on market health, likely issued by the local government Health Agency, could refer to the Ministry of Health regulations on market health standards [35] that set general standards for water, air, soil, food, facilities, and buildings, vectors, and disease-carrying animals. The regulation also obligates market operators to take proactive measures to prevent diseases and health problems caused by environmental risk factors. Such measures include sanitation efforts to maintain clean water, air, soil, food, facilities, and buildings. Biosecurity measures must also be implemented, ensuring that garbage and waste are managed in accordance with relevant regulations. Furthermore, vector and disease control should be conducted through bioecological observations, investigations, and regular market disinfection. These actions help mitigate potential health risks in markets where wildlife is sold.

The guidelines or standards for a healthy wildlife market are necessary as a reference not only for market management companies and traders but also for related local government

agencies with supervisory duties over the market activities. Ideally, all related standards, including those issued by relevant government agencies, should be adopted by the National Standard Agency (BSN) and formally enacted as one of the national market standards (SNI). Since obtaining an SNI certificate is one of the goals for market operators, having the standard formalized as SNI will motivate the market operators to implement it. However, in the short term, the Local government, as supervisors of marketplaces, could issue these guideline standards by enhancing and modifying the current general standards for healthy markets suitable to their local context.

Several key aspects should be regulated under this guideline. First, there should be minimum standards for animal welfare, ensuring that wildlife in markets are treated humanely and provided with adequate care. Second, biosecurity measures are essential, including proper waste management protocols to minimize the risk of disease transmission. Additionally, basic hygiene standards for wildlife traders must be enforced to ensure that traders maintain a clean and safe environment. Finally, spatial measures should be implemented to mitigate zoonotic risks, such as separating animals by species and distinguishing between domesticated and wild animals, as well as those intended for food versus pets. These measures would help mitigate health risks and promote the sustainable and ethical trade of wildlife. As a reference, the MoEF's Conservation Director issued a circular letter that established key standards, including the implementation of animal care standards; biosafety and biosecurity measures, and reporting of disease incidents 46 [46]. However, this regulation only applies to facilities under MoEF supervision (e.g., zoos, safari parks, and animal rescue centers), not marketplaces.

**d. Underutilized role of market operator companies**

Market operator companies play a significant role not only in regulating market conditions and the goods being sold, but also in organizing and supervising traders. These roles have not been fully optimized when it comes to regulating vendors or the wildlife they sell. A more active role by market operators can support public authorities in enforcing wildlife trade regulations and monitoring the market more effectively. There are four strategic roles that market operators could enhance to strengthen wildlife trade governance at the site level.

The first step is that market operators should include wildlife trade data in their periodic reports. The market operator is mandated to submit a periodic report to the Ministry of Trade via the Local Government Trade Agency. [28] Jakarta and Bandung regulations further regulate this same obligation. The market operators, PD Pasar Jaya in Jakarta and PD Pasar Juara in Bandung, are government-owned companies; therefore, their reports to the government also serve as accountability to their shareholders. The report is mainly used to analyze the financial and business conditions of the market operator company. For MoT, the report is essential for monitoring staple goods prices and supply stability. However, this report can be a strategic document for the MoEF to monitor the wildlife supply in the market. Therefore, the MoT or Trade Agency could optimize this periodic report by instructing market operators, whose markets involve wildlife as a trade commodity, to include wildlife trade data (type and number of wildlife, traders, and source of animals). The MoT or Trade Agency should then share this report with the MoEF to ensure the flow of information along the chain of wildlife trade monitoring (Figure 4)

The second role to be enhanced is the market operator's role in determining the terms and conditions of traders that could operate in their space. To date, the standard provisions in traders' contracts typically address rental fees, terms and conditions for space usage, the duration of the contract, sanctions for non-compliance, termination terms, and general hygiene requirements. [47] However, it could be expanded to address both traders' legal requirements when selling wildlife, as well as other aspects, such as standards of animal care, animal waste disposal, and management of biosecurity risks. Market operators could also require traders to disclose the sources and permits of the animals before entering into a contract, ensuring they are legal.

Furthermore, market operators have a mentoring role for their traders, providing capacity building. Market operators, in partnership with local government agencies, BKSDA, or conservation NGOs, may be required to conduct capacity-building sessions for traders on

aspects such as ensuring legality throughout their business processes, animal welfare, first aid for animal bite accidents, and biosecurity. This could link to the existing zoonotic surveillance and response mechanisms (**Figure 2**). Lastly, Market operators should provide facilities and measures that ensure a healthy market environment. However, this requires clear guidelines from the government, which brings us back to the problem of the absence of health standards for wildlife markets, especially for non-livestock wildlife.

**e. Opportunity for local government agencies to play a more active role in wildlife market management**

The MoEF is the general authority on wildlife management, but marketplaces are not under the MoEF and they have no authority to set or monitor standards or codes of conduct at points of sale. The supervision and monitoring of marketplaces rely on the local government through its Trade Agency and the Animal Husbandry and Animal Welfare Agency. However, local government agencies do not have direct responsibilities related to wildlife trade monitoring; however, they are at the forefront of zoonosis prevention, both under the previous local Zoonosis Commission and now through the Local Coordination Teams of the Coordinating Ministry for Human Development and Culture Regulation. This suggests that local government agencies should also play a larger role in ensuring that the wildlife trade is conducted in a responsible manner. Although details of related local roles and SOPs are not available for most local government agencies, the Jakarta regulation on the Zoonosis Commission already breaks down the duties of each agency (Table 3). This provides a model for other regions. Moreover, there is a need to ensure that duties are carried out correctly.

## 4. Conclusions

There appear to be some gaps in the monitoring of wildlife along the trade chain as it moves from upstream (sourcing and distribution of animals on a large scale) to downstream (end-user transactions in the marketplace). Monitoring of the downstream portion is primarily dependent on local government agencies; however, these agencies are often overlooked in wildlife trade monitoring strategies. Interestingly, the zoonosis policy places the local government agencies at the frontline of surveillance and case response. Therefore, there is a need to optimize the role of local government agencies to ensure compliance in marketplaces. Another significant loophole that needs to be addressed is the lack of regulation governing the market as a forum to trade wildlife. The current standards for marketplaces are not designed for the wildlife trade yet.

## Author Contributions

**RF**: Data Collection, Conceptualization, Writing; **JP**: Writing - Review & Editing, Supervision; **RM**: Writing - Review & Editing; **WP** and **YKG**: Data Collection.

## Conflicts of interest

There are no conflicts to declare.

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