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## **LESSON LEARNT IN LAOS NATURAL** FOREST RESTORATION POLICIES

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### SUMMARY

Laos owns a large natural forest area of 14.7 million hectares, accounting for 95% of the country's total forest area. Although there has been an apparent decline in forest area and quality since the 1940s, with the Government's exceptional attention to forest restoration with relevant policies and programs, Laos' forest cover has recorded significant growth, from 49% in 1982 to 58% in 2015 and 62% in 2019. With the quite similar natural conditions and forest developments of Laos and Vietnam, analysing policies and experiences in natural forest restoration of Laos is necessary to draw lessons learned for Laos and other nearby countries, including Vietnam. The ultimate goal is to develop natural forests sustainably and effectively for both countries. The tools of participatory action research (PAR) and SWOT were used for collecting information and analyzing policy of Laos. The research results show that the key lessons learnt from Laos' Government include: (i) Conducting forest statistics according to current status, including forest area and potential forest area, helping Lao managers and planners identify the right priority areas to implement restoration solutions. (ii) Promoting the zoning of bare and degraded land areas to apply the appropriate restoration measures for forest development; (iii) Strengthening the management and inspection of exploitation, transportation and trading of wood, including banning the export of unfinished wood products exploited from natural forests in Laos without closing natural forest.

Keywords: Natural forests, forest restoration, Laos forest policies

## NHỮNG BÀI HỌC KINH NGHIỆM TRONG CÁC CHÍNH SÁCH PHỤC HỎI RỪNG TƯ NHIÊN

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### TÓM TẮT

Lào sở hữu diện tích rừng tự nhiên khá lớn với 14,7 triệu ha, chiếm 95% tổng diện tích rừng cả nước. Mặc dù đã chứng kiến sự suy giảm rõ rệt về diện tích và chất lượng rừng từ sau những năm 1940, nhưng với sự quan tâm đặc biệt của chính phủ trong việc phục hồi rừng với những chính sách và chương trình liên quan, độ che phủ rừng của Lào đã ghi nhận sự tăng trưởng đáng kể, từ 49% năm 1982, lên 58% năm 2015 và 62% năm 2019. Với điều kiện tự nhiên cũng như diễn biến phát triển rừng khá tương đồng của Lào và Việt Nam, việc phân tích các chính sách và sáng kiến trong phục hồi rừng tự nhiên của Lào là cần thiết để rút ra bài học kinh nghiệm không chỉ cho Lào mà còn cho cả Việt Nam. Mục tiêu cuối cùng là phát triển rừng tự nhiên một cách bền vững và hiệu quả cho cả hai nước.

Từ khóa: Rừng tư nhiên, phục hồi rừng, chính sách

### I. INTRODUCTIONS

Laos is located in the centre of the Indochina peninsula, surrounded by five countries: China to the north, Cambodia to the South, Thailand to the West, Myanmar to the Northwest, and Vietnam to the East, Laos is one of the countries with the highest forest cover in Southeast Asia and has seen steady growth in forest cover in recent decades. An estimated 80% of the population depends on forests for their livelihoods. Laos' forests are diverse with Evergreen forest types, Mixed deciduous forests, Dry Dipterocarp forests, Coniferous forests, Mixed coniferous and broad leaf forests, and bamboo. Laos' vascular plants have found 245 genera, 1,611 families and 5,748 species (Lumxay et al., 2021).

Forests covered over 70% of Laos' land area in the 1940s. However, Laos's forest cover has decreased rapidly to 49% in 1982 and 40.3% in 2010. With the new forest inventory method, Laos' forest area also recorded a gradual decline, with forest coverage in 2000 being 60.9%, equivalent to 14.43 million hectares. In 2015, it decreased to 58% with 13.73 million hectares; in 2019, it was recorded to increase again with 62% or 14.7 million hectares. According to Globalforestwatch, from 2002 to 2023, Laos has lost 1.17 million hectares of primary forest, equivalent to about 24% of lost coverage. In 2023, Laos lost 436,000 hectares of natural forests, equivalent to 237 Mt of CO<sub>2</sub> emissions. Deforestation is due to infrastructure development such as hydropower, mining, roads, and conversion of forests to agricultural land due to population growth and expansion of commercial crop production.

With such a severe decline in forest area, especially in natural forests, Laos' Government aims to increase forest coverage to 70% by 2035, mainly through special forest restoration programs focusing on degraded forest areas. The State of Lao PDR has issued many policies

as well as applied measures for sustainable management and forest ecosystem restoration. They are the revised 2019 Forestry Law, Decree on Sustainable Management (No. 59/PM, 2002), Decree on Plantation Promotion Forests and Reforestation (No. 247/PM, 2019), Order of the Minister of Agriculture and Forestry (No. 15/MAF, 2016), Laos Forestry Strategy to 2020 and vision to 2035, Green Development Strategy to 2030, etc.

With relatively similar natural conditions between Laos and Vietnam, the successes and lessons learned of Lao PDR in natural forest management and restoration will be an essential basis for Vietnam in applying sustainable forest development. This article is the research result of the project "Research on policies to promote natural forest restoration towards sustainability in Vietnam and Lao PDR" carried out with financial support from the Asia-Pacific Network for Sustainable Forest Management and Rehabilitation (APFNet).

#### II. METHODOLOGIES

- Collect a system of current policies related to natural forest restoration and management in Laos, such as Laws, Government Decrees, Decisions of the Prime Minister, Decisions of the Ministry of Agriculture and Forestry and the Ministry of Natural Resources and Environment, etc. About 15 legal documents were gathered.
- Conduct an analysis of contents related to natural forest restoration of Laos' current policies, including the following specific contents: (i) Natural forest management; (ii) Protect and restore natural forests; (iii) Investment policies in natural forests; (iv) Research on natural forests; (v) Technical solutions to restore natural forests.
- Analyse and evaluate the advantages and disadvantages of Laos' natural forest restoration policies, thereby drawing lessons for Vietnam.

### III. RESEARCH RESULTS AND DISCUSSIONS

# 3.1. Review and assessment of existing policies related to natural forest restoration in Lao PDR

Facing the significant natural forest degradation, the Laos government has promulgated a range of policies and initiatives focusing on forest restoration and management. The related key policy documents include, (i) Order No. 15/PM of the Prime Minister dated 13/05/2016 on strengthening management and strict inspection of wood exploitation, transportation and trading, and strictly bans the export of unfinished wood products harvested from natural forests; (ii) Order No. 13/PM, dated 11/6/2012 of the Prime Minister on the Moratorium of mining and land

concession for rubber and eucalyptus plantations; (iii) Order No. 31/PM, dated 5/11/2013 of the Prime Minister on the temporary suspension of logging in production forest, until the development of production forest management plans is completed; (iv) Order No. 05/PM, dated 8/5/2018 of the Prime Minister on strengthening the management and inspection of protected wildlife and wild plants; (v) Order No. 09/PM, dated 2/7/2018 and Decree No. 247/PM, dated 20/8/2019 of the Prime Minister on the promotion of tree plantations; and, other relevant legislations.

Relevant forest policies have been reviewed and analysed to identify the most relevant support for the natural forest restoration in Lao PDR, as shown in Table 1 below:

**Table 1.** Analysis of Legal framework supported on natural forest restoration

No	Legal document	Key contents relate to Natural Forest Restoration
1	Agreement of the National Executive Committee of the Lao PDR, Ref. No. 26, dated 03 August 2017	This agreement addressed the necessary measures and actions to ensure I
2	National Master Plan of Land Management to 2030, Ministry of Natural Resource and Environment (Decision No 098/NA dated June 28, 2018)	LCOVER 30% OF THE TOTAL NATIONAL IAND AREA
3	Forest Law 2019, National Assembly No. 08/NA, date 13 June 2019	Chapter III, Article 14: Forests are classified into three categories, including protection forests, protected forests and production forests.  In Chapter IV, Section 3, "Forest Development", there are a number of articles that effectively support the implementation of natural forest restoration, such as:  Article 54: forest regeneration and tree plantation  Article 55: Article 55: procedures for forest regeneration: Forest generation and forest enrichment, which can be applied in abandoned forests and degraded natural forest areas by using diverse measures such as forest fire and forest and forest land encroachment prevention.  Article 56 (revised): plan for forest regeneration and tree plantation  Article 57 (revised): identification of forest regeneration areas, tree plantation areas and selection of tree species to be planted

No	Legal document	Key contents relate to Natural Forest Restoration
		Article 58 (revised): The State encourages individuals, households, legal entities, and organisations to restore degraded natural forests and abandoned young forests in areas allocated by the Government using natural regeneration measures and enrichment planting for forest restoration. Such actions can benefit from State incentive policies, such as honorary awards, recognition of the right to protect and benefit from using wood and non-timber forest products, forest carbon trade and forest ecosystem services according to regulations.  Also, some articles in Chapter V, section 5, "Lease or concession of forestland", provide guidelines on implementing natural forest restoration and plantation.  Article 89 (new): lease or concession of forestland for regenerating forests
4	Land Law 2019, National Assembly No. 14/NA, date 21 June 2019	and planting trees and Non-Timber Forest Products (NTFPs).  The Land Law 2019 addresses crucial land restoration issues by promoting tree planting to improve soil quality and avoid land degradation.  Chapter III, clause 3, Article 25 mentions 'the conversion of land type,
		especially the degraded land which is not able to naturally regenerate, the government promote conversion to the activity of forest plantation establishment, as mentioned in sections 2 & 3 of Article 29 & 30'.
5	Forest Strategy 2035 and vision to 2050 (Decree 302/PMO, date June 19, 2024)	Mention the goal to increase forest coverage to 70% by 2035 by promoting afforestation on 200,000 hectares and restoring natural forests nationwide 1,800,000 hectares in 2025
6	Decree on the Promotion of Commercial Tree Plantation No. 247/PM of the Prime Minister, dated August 20, 2019.	There are 4 clauses and 13 articles comprised in this decree. Clause 2 mentions the "measures on management, promotion and responsibility for reforestation and planting trees"; Article 7 mentions the "management of plantation and planted trees," Article 8 mentions the "promotion of planting trees", and Article 9 mentions the "responsibility of planting trees." Although this decree mainly promotes tree plantation, it is associated with contributing to the effort of natural forest restoration. At the same time, there are further procedures for avoidance of disturbing potential forests and directly promoting planting trees in severely degraded forest land.
7	Instruction on the National Registry of Forest Plantation and certified planted trees, Ministry of Agriculture and Forestry, Ref. No. 2492/MAF, dated December 23, 2020.	The decree addressed the essential issues on tree plantation promotion for commercial, which promotes the restoration of the severely degraded forest area for commercial tree plantation.  This Order has indicated clear measures to avoid incidents of illegal tenure of natural forest land.
8	Order No. 15/MAF, Ministry of Agriculture and Forestry, dated 11 Feb. 2021	This Order is significantly alight and supports the natural forest restoration across the country. It proposed delineating and demarcating degraded forest and barren land in production forest areas while demarcating degraded land and barren land in national protection forests and protected areas to restore natural forests by enrichment planting and natural regeneration to preserve upstream forest areas and environmental protections. The proposed plan must follow the 5 years plan for each year from 2021 to 2025 by using the village and district demarcate boundary in the GIS system.  In five years from 2021 - 2025, the MAF proposed to promote afforestation on 200.000 ha and restore 1.800.000 ha of natural forests nationwide
9	Decree No. 11/PM of the Prime Minister's office, dated 21 July 2023	This recent support policy significantly promotes implementing natural forest restoration, primarily to ensure that potential forest areas are maintained and protected with proper and effective law enforcement.
10	Decree No. 356/PMO, Prime Minister office, date 21 August 2024	

In general, there are plenty of measures and policies which significantly support implementation of natural forest restoration: (i) amendments to the Forestry Law in 2019 through the development of by-law documents; (ii) forests and forest resources are better protected through strengthening sustainable management of three types of forests; and (iii) the implementation of Directive No. 15/PM dated May 13, 2016 of the Prime Minister on strengthening management and inspection of exploitation, transportation and trading of wood, which prohibits the export of unfinished wood products exploited from natural forests.

The most recent Prime Minister Order No. 11/PM, dated July 21, 2023, instructs on the scaling up of the effective implementation of protection, management, development, utilisation of forest and forest land, in association with strictness to avoid and prevent illegal forest land tenure and forest fire. This Order guides ministries in raising awareness of protecting and managing forest and forest land nationwide. The important thing is to instruct key implement sectors to check and redemarcate the current land and forest land to zone the forest land areas into three forest categories and outside three forest categories for further conservation, and to indicate degraded areas for natural restoration as well as land area for forest plantation.

There are some key points drawn from research results on natural forest restoration and management of Lao PDR:

- Regarding natural forest management, according to Laos' Forestry Law, "Natural forests and forestry land are national assets. The State is the agency assigned to uniformly manage forests and forestry land throughout the country with the participation of organisations

and people in the management, protection and use of forests and forestland according to the provisions of law". The Department of Forestry (specifically, functional divisions: 03 Production Forest Division, Protection Forest Division and Protected Forest Division) will help the State manage 3 types of forests. Local forestry departments will be responsible for managing areas outside the three types of forests. Laos does not assign natural forests to entities for management leading to limitations in investing in forest restoration and benefiting from forests, therefore not attracting businesses and individuals to manage forests.

- Regarding natural forest restoration, the Laos government has given this issue special attention, evidenced by the promulgated programs and initiatives, of which two following initiatives were outstanding. Firstly, Order No. 15/MAF of the Lao MAF has had a significant effect and supported the restoration of natural forests nationwide with proposals to zone and identify degraded forests and bare land in production forest areas. Besides, this country also has delineated degraded land and bare land in national protection forests and conservation areas to restore natural forests through enrichment planting and natural regeneration to preserve and protect the watershed environment. Thanks to that, from 2017 to 2022, Laos has restored more than 95,000 hectares of natural forests yearly and is expected to restore 362,360 hectares of degraded forest land by 2024. Compared to the target of restoring 1.8 million hectares of natural forests by 2025, Laos has reached 14.38% of the set target. Although the program's progress has been considered relatively slow, this is a potential activity for Lao and other countries to meet the national

target of forest cover growth. Secondly, faced with pressure on natural forests, the Lao Government also issued a policy to strengthen management and strict inspection of wood exploitation, transportation and trading activities, including banning the export of unprocessed wood from natural (Directive No. 15/PM of the Prime Minister of Laos dated May 13, 2016). However, the Lao Government does not prohibit logging from natural forests (Article 26, Forestry Law). According to Article 63, the State allows villagers to use wood in their area for construction and house repair, according to family needs, but permission from competent authorities is required. The 2019 Forestry Law also mentions that "Forest regeneration in Laos can be carried out in two approaches, namely natural regeneration and enrichment planting, both of which can be carried out in abandoned forests and degraded natural forests by applying various measures such as preventing forest fires and encroaching on forests and forestry lands (Article 55). Nonclosure of natural forests has created favourable conditions for the country to implement forest restoration measures.

- Regarding investment policies, Laos has almost the only financial source of State capital called the "Forest Development Fund". According to the Decree 002/PPT dated September 19, 2021, of the Prime Minister on Fees and Services, the forest management and protection LAK/ha/year cost is 20,000 (equivalent to 1 USD/ha). The cost for protection and promoting regeneration without additional planting is 6,500,000 LAK/ha/year (equivalent to 295 USD/ha/year); the figure for additional forest planting is 12.000.000/ha/year

(equivalent to 545 USD/ha/year). Besides, a small and unstable fund can be mobilised from domestic and international organisations. Laos has tried the payment policy for forest environmental services for several years, which ended in 2014. Laos is in the early process of trying the carbon credit model. The Ministry of Natural Resources and Environment (MONRE) is the key agency coordinating the NDC and is developing a Decree on Carbon Credits. Being dependent on state funding leads to a low investment rate for planting and restoring forests. creating challenges for forest development.

Thus, it can be seen that the Lao government has applied quite a lot of measures and policies to significantly support the implementation of natural forest restoration, especially forestry law, land law and land management master plan by 2030. Other supporting regulations in the law consistent with implementing natural forest restoration. The recent Prime Minister's Decree No. 11/PM, dated July 21, 2023, is a supportive tool to enhance the delineation of forest areas after the recent severe destruction of cassava cultivation throughout Southern Lao PDR.

However, the results of natural forest restoration seem challenging to measure due to weak law enforcement to avoid disturbance and vandalism in restored areas. In addition, the monitoring and reporting system limitation has resulted in the low identification of the appropriate solutions for each problem. Lack of human resources, support and incentive facilities are the main causes of limitations in managing and protecting restoration areas.

## 3.2. Analyzing the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of Natural Forest Restoration

Table 2. SWOT analysis of supported policies on natural forest restoration

Strengths	Weakness
The Government provides guidance to the agriculture and forestry sector at all levels in implementing programs, action plans and projects as set out in the Forestry Strategy on a regular and continuing basis. As a result, forest and forestland have been systematically managed following a step-by-step process.	Commercial tree plantation is still a weakness, which relies on the exported timber due to the ineffective forest management of 3 forest categories, causing illegal forest land tenure, forest fires, and forest degradation. Therefore, determining land for forest restoration is still a challenge.
The organisational structure of the forestry sector is periodically updated to be consistent with changing conditions. The capacity of administrative, managerial and technical staff has been continuously improved and upgraded through in-country and overseas training.	Scientific, technological and innovative research results were less applied in the management, monitoring and inspection of forests and forestlands.
Legal frameworks were in place for accessibility and implemented by stakeholders	Enforcement of laws, regulations and decrees is weak and ineffective in some situations.
There is an Action Plan for natural forest restoration from 2021 to 2025	Measure on monitoring and reporting is limited and insufficient to cover across the country.
Opportunities	Threats
Cooperation, technical support and funding from domestic and international development partners have been received, and support from individuals, legal entities and domestic and foreign organisations continues to increase.	Available funds and implementation stakeholders are inconsistent, which does not ensure sustainability.
There are valuable contributions, improved coordination and more vital ownership from relevant sectors and other social organisations, particularly the Lao people of all ethnic groups.	Alignment and mainstreaming policies into sectors mandatory are challenges.
National Strategy REDD+ and some subnational strategies for REDD+ are in place and ready to implement, and the natural forest restoration approach is prioritised.	It requires a longer time and enormous financial resources to implement.
A national forest inventory and planning program helps to manage and plan the restoration action plan across the country for periods.	Local communities have traditionally used natural forest areas across the country, which requires a sensitive solution.

# 3.3. Lesson learnt in natural forest restoration and management of Lao PDR

### 3.3.1. Natural forest management

- Facing the context of forest degradation, the Laos government has promptly issued policies to limit the negative impacts on its forests. The Prime Minister's Directive on strengthening management and strict inspection of wood exploitation or the MAF's Order on proposing delineating and demarcating degraded forest and

barren land in production forest areas are the significant policies that help reduce the pressure on Lao's natural forests. Compared to Laos, the Vietnamese State has also early implemented key policies supporting the sustainable forest restoration. The timely promulgation of these policies helps the two countries quickly recover their forest area and quality.

- Like Vietnam, Laos divided its forests into three types: protection forests, special-use

forests and production forests. In addition, Laos also conducted forest statistics according to the current status, including (i) forested area (current forest), potential forest area (including bamboo forest and secondary forests) and other forest land (savana, grassland, fallow regions). This initiatives have made it more convenient for Lao managers and planners to identify potential areas for investment in forest restoration. Therefore, the Lao Government can easily choose appropriate measures for their forests. However, Laos' third forest inventory has yet to end. As a result, Laos still has 1/3 of its area outside the three types of forests leading challenges for Lao PDR in forest management and restoration.

- For Lao PDR, natural forests and forestry land are national assets and are uniformly managed by the State throughout the country. The Forestry Department will help the State manage three types of forests: protection forests, specialuse forests and production forests. Local forestry departments will be responsible for managing areas outside the three types of forests. For Vietnam, natural forests are owned by the entire people, with the State as the owner's representative responsible for ensuring resources for the management, protection and development of natural forest areas. To manage natural forests, the Vietnamese State has assigned seven entities. Laos' unallocating natural forests to forest management entities has caused limitations in investing in forest forests, restoration and benefiting from therefore attracting businesses not and individuals to manage forests.

### 3.3.2. Natural forest restoration

- Regarding natural forest restoration, Laos does not entirely close natural forests like Vietnam but only limits the exploitation of natural forests through a policy of strengthening management and strict inspection of wood exploitation, transportation, and trading activities and prohibits the export of unprocessed wood originating from natural forests (Directive No. 15/PM of the Prime Minister). Moreover, according to Article 55 of Forest Law, this country can implement afforestation and natural forest restoration programs, which can apply silvicultural techniques. Facilitating forest restoration measures in natural forests helps Laos state achieve its national goal of forest cover growth more quickly.

- Order No. 15/MAF of the Laos MAF with the proposal to 'zone and identify degraded forests and bare land in production forest areas; together with delineating degraded land and bare land in national protection forests and conservation areas to restore natural forests by planting enrichment and natural regeneration to preserve and protect the watershed environment have significant effects and support the restoration of natural forests nationwide. The evidence is that Laos's natural forest area has steadily increased yearly, although program's implementation is considered slow. Vietnam has no policy focusing on the degraded forest area/land identification.

# 3.3.3. Investment policies in natural forest restoration

- Funding for investment in Laos' forest development is mainly allocated from the "Forest Development Fund" managed by the National Administrative Office of the Lao Forestry Department at a reasonably low rate. In addition, there are unstable and limited sources mobilised from domestic and international donors. Similarly to Lao PDR, Vietnam also has a state fund for forest management and protection titled the "Vietnam Forest Protection and Development Fund". Moreover, Vietnam's forest restoration and management program also depends on other funds, including PFES, which help reduce the pressure on the State budget.
- Regarding forest environmental services, Laos has only implemented a pilot program on

Payment for Forest Environmental Services (PFES) for several years, ending in 2014. Regarding carbon credits, the Ministry of Natural Resources and Environment (MONRE) is the key agency coordinating the NDC. This agency is currently in the process of developing a Decree on Carbon Credits. The lack of revenue from forest environmental services has put tremendous pressure on the state budget, and therefore, investment rates for forest restoration are meagre. In contrast to Laos, Vietnam has applied the pilot PFES policy since 2008 and officially implemented it widely across the country since 2011. During the implementation of the policy on PFES over the past 12 years, this funding source has been used for forest management, protection, and forest restoration is quite large, with 3,700 billion VND in 2022 (mainly from water maintenance and providing services). Moreover, Vietnam is implementing several pilot projects to sell carbon credits, mainly concentrated in the Central region of Vietnam. In 2023, Vietnam sold 10.3 million forest carbon credits for the first time and earned 51.5 million USD. These policies are being increasingly developed in Vietnam to support forest protection and restoration programs.

### IV. CONCLUSIONS

- Laos's forest cover has declined but has increased in recent years thanks to the government's attention, which mainly focuses on natural forest restoration. From 2017 to 2022, Laos has restored more than 95,000 hectares of natural forests yearly and is expected to restore 362,360 hectares of degraded forest land by 2024. Compared to the target of restoring 1.8 million hectares of natural forests by 2025, Laos has reached 14.38% of the set target.
- Some main policies are said to have a substantial impact on the restoration of Laos' natural forests such as the revised Forestry Law, the Prime Minister's Directive No. 15/PM, dated

May 13, 2016, on strengthening management strict control and inspecting the exploitation, transportation and trading of wood, which strictly prohibits the export of unfinished wood products exploited from natural forests; the Forestry Strategy 2035 and vision 2050; the Decree No. 11/PM dated July 21, 2023 of the Prime Minister directing the promotion of implementation of effective protection, management, development and use of forests and forestry land, associated with strict handling of prevent illegal appropriation of forest land and forest fires, etc. Laos' policies focus mainly on critical groups of issues such as (i) forests and forest resources are better protected through strengthening sustainable management of three types of forests; (ii) strengthening management and inspection of exploitation, transportation and trading of wood, including banning the export of unfinished wood products exploited from natural forests in Laos; (iii) promote zoning and identification of degraded forests and bare land in production forest areas; together with delineating degraded land and bare land in national protection forests and conservation areas to restore natural forests through enrichment planting and natural regeneration to preserve and protect the watershed environment.

- Consolidated lessons learned from Laos' forest restoration management include: (i) Laos conducts forest statistics according to current status, including forest area and potential forest area, helping Lao managers and planners identify the right priority areas to implement restoration solutions. (ii) Laos is promoting the zoning of bare and degraded land areas to apply the appropriate restoration measures for forest development; (iii) Laos State strengthened the management and inspection of exploitation, transportation and trading of wood, including banning the export of unfinished wood products exploited from natural forests in Laos without closing natural forest. (iv) Therefore, Laos can apply technical measures to promote forest regeneration or enrichment. The Laos Government has promptly issued the programs or policies, thereby limiting forest degradation and promoting sustainable forest restoration.

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