Rapid Trade and Environment Assessment (RTEA)

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Background Research Papers

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To inform the *Rapid Trade and Environment Assessment* for Lao PDR, seven background papers covering nine key economic sectors were commissioned by the RTEA Expert Advisory Panel, a body consisting of key government and private sector stakeholders established to provide overall guidance to the assessment process. These papers provided vital background information and illuminated key sector-specific policy recommendations for the main assessment and are seen as a valuable contribution to the growing body of in-country research focusing on the complex dynamics between trade and the environment in Lao PDR.

This research exercise was coordinated by the Science, Technology and Environment Agency and IUCN – The World Conservation Union in Lao PDR.

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Environmental Impacts of Trade Liberalization in the Wood and Wood Products Sector, Lao PDR

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Introduction

Wood and processed wood products play a significant role in the economy of the People's Democratic Republic Lao (Lao PDR). In the 1990s, wood and wood products accounted for 40 percent of export earnings, almost half of which was from the export of logs (CPI & UNDP 2006). During this period, the forestry sector grew faster than the rest of the economy, with an increase in log extraction from 300,000 m^3 in 1990 to 734,000 m^3 in 1998. Due to concerns about the low value of exports of raw logs and the depletion of the country's precious forest resources, the Government of Lao PDR (GoL) put a ban on the export of raw logs in 2001. As of 2004, the GoL ordered a reduction of the export of sawn wood, which reduced the annual harvest to approximately 150,000 m^3 in 2004/05, and subsequently increased it to 370,000 m^3 in 2005/06, with additional wood sourced from the Nam Theun 2 Dam (NT2) hydropower project area.

The GoL now strongly promotes downstream processing and export of finished or semi-finished wood products, which has led to the growth of the wood processing industry in Lao PDR. However, while there are some secondary wood processing factories, reform has been slow to date; Lao PDR's wood industry is still at an early stage of development, consisting mainly of small and medium-sized saw mills, plywood mills and other wood processing plants.

In 2004, manufactured wood product exports (mainly floor tiles, furniture, wood accessories, plywood and other processed timber products) accounted for US$6 million. However, the bulk of exports are wood or basic sawn and planked wood (despite the order to reduce), with not much value added (144.9 million in 2004). High-value exports such as furniture remain extremely low, between 1.7 - 3.2 percent (CPI & UNDP 2006) (for more detail see Annex 1). In addition, the *National Human Development Report* notes that the informal export of logs continues and in fact has been increasing in recent years (CPI & UNDP 2006).

Regional demand for wood is high. The main importers of Lao wood and wood products are Thailand, Vietnam, China and Japan. Significant demand is now coming from China, with imports of timber products to that country rising from 14 million to 45 million cubic metres in just 10 years (White et al. 2006). Annex 2 provides a more detailed summary on wood and processed wood exports to Thailand for the 2001-2004 period (MoIC & ITC 2006). It is clear that Lao PDR must continue to reduce the export of low-value wood products and work towards adding value to its domestic wood processing sector. To do so, understanding, integrating and increasing relationships with regional and international markets is vital.

Currently, many developing countries are involved in a large and increasing number of negotiations designed to integrate them into the international trading system. Lao PDR is an example of this trend; the country is in the process of World Trade Organization (WTO) accession and is involved in a host of bilateral negotiations. As a member of the Association of Southeast Asian Nations (ASEAN), Lao PDR is implementing the ASEAN Free Trade Area (AFTA) by 2008 and is involved in negotiations between ASEAN and China on a Free Trade Area (CAFTA) to be completed by 2010.

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The story of trade development in Lao PDR is an archetypal economic development scenario: a least developed country working to liberalize its economy, suffers from a worsening trade imbalance, external debt and growing account imbalance. At the same time, significant growth in exports is occurring – primarily through the extraction and sale of the country's natural resource wealth – specifically, Foreign Direct Investment (FDI) driven growth in the mining sector. Exports of cash crops, forest products and hydroelectricity are additional components of the highly-concentrated economic development now taking place in Lao PDR.

This paper examines the environmental impacts of trade liberalization in the wood and processed wood products sector, focusing on the wood processing industry and its supply of wood from natural and plantation forests. This paper is a contribution to the development of a Rapid Trade-Environmental Assessment tool. It also aims to define the strategic interest of Lao PDR in international negotiations and policy formulation with respect to trade and environment, which is based on extensive consultation and assessment of the domestic linkage between these two key elements.

Section 1:

Overview of the wood and wood products sector

1.1 Moving to higher value wood processing and exports

The GoL's *National Export Strategy 2006-2008* highlights the potential of the wood processing industry to grow and increase the value of exports from this sector (MoIC & ITC 2006). However, it also highlights many challenges, among them, issues with the supply of raw material, low access to finance, low skills in furniture-making and design, and a lack of technology to enhance the domestic wood processing industry and contribute to increasing value-added exports in the sector.

In 2001, there were 160 sawmills, two plywood mills and 1,269 small furniture manufactures in Lao PDR, most which were located in the central and southern provinces. The total estimated annual capacity was approximately 1.2 million m^3 of log inputs (Southavilay 2002). There are concerns that many of these businesses were operating inefficiently, producing sub-standard products and placing an additional burden on the country's forest resources through the illegal sourcing of timber. It is estimated that only 20 percent of the 1,269 small furniture factories in Lao PDR meet the GoL's standards and requirements for finished wood processing factories. As part of a recent effort by authorities, substandard factories in several provinces are being ordered to close or merge with others in an effort to increase efficiency (*Vientiane Times* 2007).

The GoL policy is to encourage the modernization and integration of wood processing industries in an effort to maximize operating capacity and conversion factors. However, despite heavy investment in the wood-processing sector, the GoL's efforts have not met expectations due to the intermittent supply of raw materials. The large-scale wood industry being attracted to Lao PDR is highly capital intensive and generates relatively little employment in the production of primary wood processing, for example in sawn wood and veneer.

1.2 Supplying the local wood-processing sector

In addition to challenges faced by the wood-processing sector to meet higher product value production requirements, there are also significant concerns regarding the supply of lumber to this sector. The installed capacity of the wood industries is currently very high, and far in excess of the Annual Allowable Cut (AAC). A risk associated with such a large processing capacity is that investors pressure the GoL and provincial authorities to secure more raw material supplies to operate their mills profitably, at the expense of the sustainable management of forest resources.

The annual logging volume is set by logging quotas issued by the Prime Minister, however since the

implementation of the New Economic Mechanism in 1986, the provincial authorities also have the authority to issue logging permission for additional wood use, mainly for provincial revenue. This has added to the annual quotas and has made the system unclear. Also, there is a lack of a sustainable forest management plan (production forests), including unknown growth and yield data, and currently, timber and wood is sourced from unauthorized areas, including some from national protected areas and protection forests.

By 2020, it is estimated that domestic consumption of timber and plywood will increase to approximately 300,000 cubic metres per annum, assuming an equivalent per capita consumption. This is equivalent to round wood of approximately 600,000 cubic metres at 50 percent conversion. If the current level of sawn timber exports is maintained, total log removals of more than 1 million cubic metres will be required. Given probable sustainable log removals of approximately 300,000 cubic metres per annum, plantation wood will have to supply a large proportion of logs for both domestic consumption and export (MAF 2005).

1.3 Environmental concerns in the sector

The wood-processing sector in Lao PDR sources its raw material from either natural forests under a quota system or plantation forests. Therefore, key environmental concerns associated with the sector include:

- Deforestation;
- Loss of watershed protection; and
- Loss of biodiversity.

Lao PDR is particularly well endowed with valuable, productive and ecologically unique forests in comparison with neighbouring countries. However, this forest cover is declining at an increasingly rapid rate. A significant cause of this decline is logging, and the clearing of primary and secondary forests for plantations to supply the wood and wood products sector. An *Assessment of Forest Cover and Land Use during 1992-2002* (DoF & MAF 2005) indicates that in 1992 forests covered 47 percent of the country, with canopy density of 20 percent or more. However, by 2002, canopy density occupied only 41.5 percent, with quality on the decline. At this rate, the forest cover will be approaching 30 percent by 2020.

Forest decline is also associated with the loss of biodiversity (both species and ecosystems) and has negative effects on watersheds. This decline can impact heavily on local communities and local economies. There is growing concern over the adverse social and economic impacts of the decrease in forest cover, downward from 70 percent in 1940, particularly given that deforestation and forest degradation affects most severely the poorest segments of the population, who live in the forests and rely directly on forest resources for their livelihood improvement.

1.4 Policy and regulatory framework for the wood and wood products sector

In the past, the implementation and enforcement of laws and regulations dealing with forest management have been weak due to a lack of unity in perspective, awareness and implementation at the different levels of decision making..This is leading to the violation of forestry rules and regulations. Many local organizations (at the provincial and district levels) do not strictly comply with forestry regulations, especially those governing logging and export of wood, such as cutting/logging wood in excess of the approved quota or issuing permits for wood export without respecting the relevant regulations.

Forests, production forests and plantations are all regulated by the Ministry of Agriculture and Forestry (MAF). Until recently, wood-processing factories were also regulated primarily by MAF. However, following a revision of the *Forestry Law* and the *Processing Industry Law*, as endorsed by the *National Assembly* in 2005, wood-processing factories are now regulated by the Ministry of Industry and Commerce (MoIC). The key aspects of the GoL policy in this sector are:

- **Overarching policy**
  - The *National Socio-Economic Development Plan 2006-2010* calls for the harmonization of economic development with the protection of natural resources.
  - The Decision of the Prime Minister to endorse the outcome of the National Forestry Conference held on 01/03/2007 (25/PM) 2007.
  - The Order of the Prime Minister to enhance forest management and conservation, as well as to promote the production of finished products in the wood processing industry (31/PM) 2006.
- **Forest types (Production Forests and Village Forests)**
  - The *Forestry Strategy to the Year 2020* outlines strategies for production forests, tree plantation development, harvesting, logging, developing the wood processing industry and implementing sustainable management and conservation of forests, biodiversity and watersheds (MAF 2005).
  - Decree 59/PM/2002 provides for the establishment and management of large, contiguous tracts of production forests known as Production Forest Areas (PFAs).
  - The Forest Law of 1996 designates production forests, conservation forests and PFAs.
  - The Land and Forest Allocation Program allocated village forests.
  - The Forest Law Article 28 and MAF Regulation No. 535 on the Management of Village Forests sets out the participation of villages in forest harvesting, use and participation in commercial logging and other production forest management activities when a PFA exists within their boundaries (Phanthanousy & Sayakoummane 2005).
  - PM Orders No. 11/1999, 10/2000 and 15/2001 ban exports of logs and institute a reduction in sawn timber exports.
- **The wood processing industry**
  - PM Order No. 10/2000 and MAF Instruction Nº 267/2000 concerning the wood industry sector, including provisions related to:
    - producing semi-finished or finished products;
    - using high technology and high-productivity machinery that is appropriate for the production of semi-finished or finished products;
    - demonstrating superior environmental protection, safety and welfare;
    - operating with appropriate management; and
    - maintaining a good record of law abidance.
  - PM Order Nº 18/2002 concerning the closure of some sawmills and furniture companies.
  - PM Order Nº 18/2002 to promote the export of semi-finished and finished products and to ban log exports..The subsequent PM Order No 25/2004 allows the export of select semi-finished wood products.
  - PM Decree Nº 46/2001 bans foreign investment without joint venture arrangements into the secondary processing industry to protect domestic producers of semi-finished and finished products and to mitigate pressure on natural resources.
  - PM Decree Nºs 300 and 301 promote tree plantations for future timber supply.
  - PM Order Nº 18/2002 requires wood-processing factories to establish tree plantations.

Annex 4 provides a Matrix on trade and environment in the wood and wood processing sector.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

2.1 Analysis of the impacts of increased trade in wood and wood products

This report has already outlined the significant amount of wood and wood products that Lao PDR provides the region. As highlighted in the *National Human Development Report* (CPI & UNDP 2006) and the World Bank *Economic Monitor* (2006), while measures have been taken to ensure that more value from such exports is retained in-country, a number of issues such as illegal logging and timber exports (reducing supply for local businesses) and an underdeveloped, under-resourced local wood-processing industry are hampering this effort, and fuelling environmental issues such as forest decline, biodiversity loss and loss of watershed services.

Using the Rapid Trade and Environmental Assessment (RTEA) matrix, a tool developed for this assessment (see Table 3.1) (IISD & IUCN 2007), this section examines the impacts that trade liberalization for example in ASEAN, AFTA, AFTA-China and bilateral trade agreements could have on this sector, and in turn, on the natural environment in Lao PDR. Three categories are used in this analysis of trade effects and the environment, including:

- Scale effects: trade may lead to an increase in the scale of production of wood processing from natural and plantation forests;
- Structural effects: trade may lead to changes in the demand for wood and wood products and in turn the structure of the sector; and
- Technology effects (product effects): trade may lead to an increase in new investment that brings new technologies for wood processing with the increased yield or efficiency of wood-processing products. It may of course have the opposite effect, bringing old technology and outdated, less-productive processes.

2.1.1 Scale effects: Rising regional demand for processed and unprocessed wood products

Trade liberalization may lead to an increase in the scale of production in the Lao PDR wood-processing industry.

In the absence of trade, Lao PDR would presumably only produce enough forest products for domestic use; while under a trading scenario, it increases production of wood products for export, and in turn increases the contribution of the forestry sector to the national economy. In reality, Lao PDR is increasingly integrating into the trading system, and the rising demand for wood in the region, most notably from China, has the potential to scale up and speed up the current rate of forest decline.

Environmental concerns to consider with respect to scale effects are:

- Increased pressure on the natural forestry resource base as a result of increased logging to meet the demand for timber for wood processing, especially for certain key species.
- Decreasing biodiversity and pressure on specific forest species.
- Increased conversion of native forests to plantations to provide wood for the downstream wood processing industry.

Without appropriately-implemented environmental policies for plantation creation and wood processing, an increase in the scale of production in the sector could lead to accelerated harvesting of natural forests at unsustainable levels.

According to a survey conducted by MAF & NAFES (2005) of sawmills in four southern provinces where

most large scale wood processing factories are located, only 13 of approximately 150 timber species are commonly used for processing. A rising demand for only certain commercial species as inputs to domestic wood processing factories will entail a shift in the composition of forests.. This has both negative and positive potential impacts. On the positive side, an increasing volume of currently non-commercially preferred species will be available for companies who can adapt their processes and are able to create market demand for new lesser known species. On the other hand, the changing stand composition in many forests will result in threats to, and changes in the structure and biodiversity of the Lao forests, including potential loss of wildlife and plant habitats.

Increased land for cultivation and plantation can means increased pressure on land use and conflict in converting both natural forests and agricultural land. The environmental impacts from large-scale plantations lead to impacts on land use for other sectors, such as land available for agriculture and food crops. This will also bring about changes in landscape and the composition of forest resources. These impacts include increased soil erosion and sedimentation from opening up large areas through unplanned and accelerated logging; changes in species composition and size structure; decreases in stocking densities of forest; and reductions in wildlife and plant populations, including non-timber forest products (NTFPs). When the forest cover is changed especially in the case of tropical forests, forest soil on steep slopes is particularly prone to degradation and erosion.

While plantations and their use in local wood processing have been promoted by government policy, concerns regarding their environment and social impacts are emerging. Recently, in response to these issues, the Prime Minister announced a moratorium on land concessions until policy in this area can be strengthened. The GoL has a window of opportunity now to look into innovative policy options that regulate and encourage appropriate land use planning and sustainable managed plantations.

In order to ensure a sustainable resource base for the wood and wood products sector, it is also essential for existing forests to be better managed. Currently, there are 59 PFAs in Lao PDR with a total area of 3.6 million hectares, among which eight PFAs have been officially established and have management plans; 29 PFAs have been agreed to by Provincial governors and are now under government consideration; and the remaining are currently being studied. Without a clear legal basis for boundary location and management planning, these forests are at risk of overexploitation and environmental degradation.

2.1.2 Structural effects: Changing from low-value to high-value exports

Trade that leads to changes in the demand for products and hence the structure of a sector to meet this demand is the most interesting effect to examine in the wood and wood products sector. Currently, Lao PDR is experiencing the negative impacts of illegal trade and low-value product exports, which is resulting in the depletion of forests for low economic gain. The issue here is that there is a demand for relatively unprocessed wood from Lao PDR to feed into the wood processing sectors in other countries (CPI & UNDP 2006). While this issue has been recognized by the GoL and leading companies in the sector, Lao PDR has yet to produce higher-value products on a significant scale.

One possible scenario is that during negotiations, Lao PDR ensures that trade agreements compliment existing National Government policy on wood and wood products. This in turn could facilitate the trade situation that the sector needs for the domestic production and export of higher value wood products, bringing benefits such as:

- Reducing import barriers to foreign markets (e.g., lowering tariffs under ASEAN);
- Facilitating transparent customs processes (e.g., the recent Vietnam/Lao PDR single customs check agreement);
- Increasing foreign investment (e.g., ASEAN Investment Area); and
- Constructing better, more-cost effective transport routes (e.g., GMS economic corridors and Thai/Lao friendship bridge agreements).

While trade-led expansion of the wood products sector has the potential to negatively impact the

environment through increased scale (see above), it also has the potential to bring many positive effects. If wood resources, currently exported as low-value (e.g., sawn wood) to countries such as Thailand, Vietnam, China and Japan are instead channelled into the domestic wood processing industry, there may be no significant additional burden placed on the country's forest resources. In fact, under this situation, forest resources may benefit, as the domestic industry becomes more reliant on wood resources and more likely to assist in efforts to stop illegal logging and trade. Government revenue from the sector would be increased under this scenario and could be directed back into policies and programmes, such as sustainable forest management plans and forest management agreements with industry to promote sustainability of the resource.

2.1.3 Technology effects: Advantages and disadvantages of Foreign Direct Investment

The final effect of trade on the environment that this paper considers is the technology effect. Trade liberalization has the potential to bring new investment and new technology from abroad. For example, Lao PDR as a member of ASEAN benefits from regional cooperation and agreements to strengthen its domestic investment and business climate through for example the ASEAN Investment Area, as well as private sector led initiatives, such as the ASEAN Chamber of Commerce. As integration into ASEAN is strengthened, it is envisaged that regional investment will increase.

New investment and technology can have both positive and negative impacts on the environment. Lao PDR may attract foreign investors that bring technology that increases the yield or efficiency of wood-processing products (in terms of quality) and in turn leads to a reduced demand for raw materials from natural forests. It may also attract companies that bring with them high management standards such as supply chain polices which incorporate environmental concerns (e.g., to ensure timber is harvested from sustainably managed forests and obtains sustainable forest certification). However, at the same time, FDI can attract companies that are looking to take advantage of low standards or a weak policy environment which allows them to bring cheap, outdated and environmentally unfriendly technology and perform their operations in ways that their home country does not allow.

Developing effective policy to promote positive investment is a complex endeavour, requiring a careful balance of objectives and priorities. The GoL is currently undertaking a reform of the wood processing sector. Low value addition and inefficient factories are being ordered to close down or merge to become more competitive enterprises (*Vientiane Times* 2007) and factories are being asked to adopt better technology to add value to their operations. To this end, the government is promoting foreign investment in the wood processing sector. Through the Law on the *Promotion of Foreign Investment,* the government provides support to Lao industry and ensures the sustainability of Lao PDR's natural forests, by limiting foreign investment to ventures that source wood from plantation forests.

2.2 Case study of the wood and wood products sector: Certified forests

Trade has the potential to provide Lao PDR with the opportunity to improve the sustainability of the wood and wood products sector through responding to market demands abroad. Increasingly, companies across the globe are committed to supporting responsible forestry and sustainable forest management. An example is IKEA, the large Swedish multinational, which, through its purchasing policies, has a policy of sourcing wood and wood products (e.g., furniture) that can be certified as sustainably managed (IKEA 2007).

Sustainable production of timber has been a major policy objective of the GoL since 1975 and MAF has taken a number of significant steps towards bringing the country's remaining natural forests under sustainable management. The GoL has initiated preparations to enable forest management certification in Lao PDR under internationally accepted criteria. As a result, criteria and indicators for sustainable forest management were developed in 1999 and 2000 through a one-year pilot Forest Certification project under the Forest Stewardship Council (FSC), an internationally accredited certification agency, in Savannakhet and Khammouane provinces. In 2003, two natural forests covering approximately 50,000 hectares in these provinces were FSC certified by SmartWood, an accredited certifier and programme of the Rainforest Alliance Tropical Forest Trust (see www.rainforest-alliance.org). The GoL

plans to apply these experiences to other production forests throughout the country. These certified forests are jointly administrated and managed by a Sustainable Forest Management Group (SFMG) at the provincial and district levels using the village forest model as the basis of forest management; villages are given long-term rights to use forests under the condition that they form management plans with local authorities and implement these accordingly.

Certification serves to guarantee that wood products are from sustainably managed forests - with endorsed management plans and effective implementation structures - and thereby allows premium prices and/or higher sales. While certification remains a new and developing concept in Lao PDR, it provides one option for ensuring that the country's forest resources are sustainably managed. It also presents a good opportunity for local wood product manufacturers to source timber that can then be used to make higher-value premium products for sale on the international market.

This scenario may, however, not happen unless the wood processing industry responds to market requirements, and starts creating chain-of-custody (CoC) systems. Large parts of natural production forest areas are already under sustainable forest management, and a significant forest area is also certified under the Forest Stewardship Council certification scheme. Timber from these areas can only be marketed to export markets as certified since forest industry enterprises in Lao PDR have yet to obtain CoC verification. Currently, only a few enterprises are aware of the opportunities of developing CoC and certification. With appropriate mechanisms in place, Lao PDR has the potential to become a largest supplier of certified wood products in Southeast Asia. If properly designed, CoC systems can contribute to enhancing environmental protection and reducing unauthorized harvesting and trade in illegal timber.

Most important to note for the Lao PDR wood and wood products sector is that the demand for certified sustainable timber has gained significant momentum; this green 'niche' international market may soon become the only way in which wood products will be accepted in some countries.

Section 3:

Conclusions and strategic policy recommendations for the wood and wood products sector

3.1 Conclusions

Since the implementation of the New Economic Mechanism in 1986, decentralization replaced the traditional economic planning process and Lao PDR started to move toward an opened market economy. During this process, the GoL also has set its goal to eradicate poverty and graduate from the list of Least Developed Countries by 2020 (GoL 2004).

The wood processing industry is growing quickly. The total number of sawmills (160 in 2001) and wood processing factories (260 in 2001) is high compared to the supply capacity of raw materials, including log exports and log consumption (620,000 m^3 per year) (Sugimoto 2006). While the capacity of wood-processing factories is estimated to be high, up to 1,165,700 m^3 per year (RCFTC 2007), the efficiency of factories is low due to the prevalent use of old machinery, low technology with low recovery rates and low value-added products. Moreover, there is a lack of certification of processed wood products for exports.

The wood products sector in Lao PDR is currently in the process of significant development. In this context, trade liberalization creates the potential benefits of increasing value in the wood and wood products sector, potentially stimulating sustainable forest management and sustainable forest certification in order to increase efficiency in the sector. At the same time, the potential exists to enhance the capacity and skills of Lao producers to put in place international standards and requirements, and thereby increase the opportunity to access new markets.

To benefit from regional and international trade agreements, there is a need to further develop a wood-processing strategy in line with the *National Export Strategy* for Lao PDR (MoIC & ITC 2006). This strategy will necessarily include enhancing the competitiveness of the sector through increasing efficiency and quality control systems; setting up and implementing national standards; increasing value addition; and fostering diversification for processed wood products to meet international market requirements.

3.2 Strategic policy recommendations

The GoL's goal is to ensure a balance between the supply and demand of timber and reduce impacts on forest resources and the environment. To this end, wood processing factories need to be reformed with proper criteria and transparent procedures. Recommendations for the GoL are listed below:

- **Encourage value-addition to stimulate processing indusries and obtain greater economic returns while minimizing resource use, through:**
  - Continuing to reform the national wood processing sector;
  - developing proper criteria and procedures for wood-processing factories, publicizing and conducting necessary closures/mergers in a transparent manner;
  - continuing to implement the Prime Minister Orders banning investment in wood and NTFP processing based on natural raw material and foreign investment in natural forest concession to protect domestic producers of semi-finished and finished products, and to avoid pressure on natural resources; and.
  - in addition to regulatory measures, developing incentive schemes to encourage the local wood-processing industry to use wood from forest plantations and from sustainably-managed production forests.

- **Strengthen dual policies on plantations and production forests to ensure a sustainable supply of timber for the wood and wood products sector, through:**
  - completing the establishment of a nationwide sustainable management plan for each Production Forest Area (PFA) together with law enforcement;
  - continuing to support the formation of Village Forest Management models;
  - ensuring logging operations are based on scientifically-based annual harvesting quotas;
  - declaring the temporary closure of forest areas where heavy logging beyond supply capacity of forests has occurred. Permanent closure would apply to riparian or watershed areas;
  - promoting efforts to rehabilitate degraded areas inside and outside Production Forest Areas.
  - establishing clear land and forest land allocation and classification criteria throughout the country in order to prevent conversion of forest land to other land uses;
  - clarifying regulations, including agreed steps, procedures and approval to facilitate plantation investment; and
  - Improving data collection and monitoring and the implementation of forest management policies, also to encourage species diversification.
- **Promote the scaling up of forest management certification**
  - continuing to promote and scale-up forest management certification through the development of a network on forest and wood exports, based on sustainable forest management; and
  - Continue building awareness of forest of national C&I for sustainable production forest management, develop criteria and indicators for plantation forestry

- Build Awareness and develop CoC Verification in industry:
- Carry out awareness building campaigns and organise training to enterprises in forest certification, and CoC verification (see Annex 3)

- **Continue to improve law enforcement in the forestry sector, through:**
  - strengthening implementation of polices and regulations on illegal logging and illegal log exports;
  - cooperating with trading partners in Europe and in the region on law enforcement, good governance and trade;
  - cooperating with customs, police and special task forces in the region to control trade in illegal timber;
  - strengthening monitoring of logging outside authorized areas to discourage unauthorized logging; and
  - strictly implementing the ban on the export of raw logs in order to ensure that only processed wood products are exports, contributing to the objective of adding value to downstream processing industries in the sector; and
  - ensuring logging quotas are strictly approved based on harvesting plans and that harvesting does not take place without approved quota.
- **Promote cooperation mechanism between public and private sectors, including in forestry, plantations and wood processing, through:**
  - continuing to work with the Lao Wood Processing Association on quota allocation schemes;
  - creating private/public sector fora in order to better engage all actors on forestry, plantations and wood processing issues;
  - improving funding and incentive mechanisms for activities that promote sustainable management practices undertaken by the private sector; and
  - developing strategies for ensuring environmental concerns are incorporated into the private sector decision-making process.

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Annex 1: Value of Timber Exports (US$ millions as a percent of total exports, 2000-2004)

	2000		2001		2002		2003		2004	
	US$ (mill)	%	US$ (mill)	%	US$ (mill)	%	US$ (mill)	%	US$ (mill)	%
Timber Exports	70.1	18.1	106.8	26.6	114.3	28.4	128.4	25.7	144.9	24.7
Total Exports	387.9	100	401.8	100	402.6	100	500.2	100	586.6	100

Source: CPI & UNDP 2006.

Annex 2: Wood and Processed Wood Exports to Thailand

Lao PDR Exports of Wood and Wooden Articles to Thailand 2001-1004 (US$)					
	2001	2002	2003	2004	2004 Share
Fuel Wood	768,337	19,601	18,908	100,818	
Wood Charcoal	1,928	10,131	12,011	28,245	
Raw Logs	15,218,683	1,474,031	1,107,663	3,080,099	
Rail (tram) way Sleepers	61,228	59,258	22,253	1,185	
Wood sawn or chipped lengthwise	**50,230,112**	**71,950,059**	**73,955,863**	**61,311,098**	**74.45%**
Sheets for veneering and plywood	185,581	412,585	1,750,491	1,560,211	
Wood (including strips for parquet flooring) not assembled, shaped, whether or not planned	1,232,079	1,368,765	3,758,369	4,924,991	

Plywood, veneer, panels	813,663	852,409	3,369,489	11,170,973	
Furniture, prefabricated buildings	**36,033**	**55,400**	**114,500**	**170,180**	**0.21%**
TOTAL	**68,547,644**	**76,202,239**	**84,109,546**	**82,347,800**	

Source: MoIC & ITC 2006.

Annex 3: Possible steps to develop certification and chain-of-custody verification

- Carry out a survey of willingness of the enterprizes to obtain CoC or quality management systems;
- Carry out an initial review in the selected enterprizes that have shown interest in their operations including wood procurement, and established management procedures including record keeping. Based on this prepare an analysis and summary. Discuss with the industry on application for quality management system/CoC verification or and invite tenders from international verification organizations;
- Assist the selected enterprizes to create management systems which can be audited and/or CoC systems that can be verified;
- Provide financial support to the best performing enterprizes (criteria to be established) to cover the cost of CoC verification; and
- Promote and build capacity of the industry through the Wood Industry Association to improve the recovery rate in the industry as part of the environmental management in the sector.

Annex 4: Matrix on Trade and Environment in the Wood and Wood Processing Sector

Category	Driving Force	Pressure	Impacts	Mediating factors	examples
Scale effects	Increased foreign markets for wood and wood products	Increased scale of the processing of wood from natural forests and plantation forests	Increased logging and demand for timber for wood processing means high pressure on natural resources Increased land for cultivation and plantation means increased pressure on land use – conflict to convert both natural forests and agriculture land for plantations	Scientific-based assessments to determine quota systems (annual logging management plans – logging quotas) Encourage diversification of wood species Encourage use of wood from sustainably managed forest plantations	See case study of unsustainable harvesting/ quota system
Scale effects	Decreased export barriers – lower tariffs – reduced subsidies	Increased quality and quantity of wood products	Encouraged use of other tree species, including branches and other residues, and from plantation forests Expanded land for improved natural forests /production forests/ village forests	Develop a strategy for the entire cycle of wood processing to reduce unsustainable deforestation and to promote sustainable forest management Enhance capacity of the Lao Wood-Processing Association to negotiate increased market access for processing wood product exports	Preparation of national trade and export strategy
Technology effects	Increased foreign markets for wood and wood products	New investment brings new technologies for wood processing that increase yield or efficiency	Reduced consumption of raw material from natural forests, use of plantation forests in the future		Forest certification that can lead to sustainable forest management
Structural effects	Trade leading to expanded wood products for high productivity and less waste to meet standards and requirements in foreign markets	Local businesses require more wood	Increased demand for timber from: 1) natural forests; 2) plantation forests; or 3) Wood currently exported as low value (e.g., sawn wood) is channelled into the domestic industry	Need adequate timber regulations and implementation: – review existing system for adequate technology for wood processing; and - promote development of skills for wood processing	Improved technology will lead to more efficient processing and enable international standards and market requirements to be met

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Environmental Impacts of Trade Liberalization in the Silk Handicrafts Sector, Lao PDR

by Somphong Soulivanh*

Introduction

The silk handicrafts sector is an ancient sector of the Lao People's Democratic Republic (Lao PDR), which continues to play a vital role in the national economy. This sector has a strong domestic market, as Lao women use silk material for making clothes and traditional decorations. In addition, the naturally dyed and often handmade material has become synonymous with Lao culture throughout the world. As a result, demand from regional and international markets for Lao silk handicrafts is growing steadily and providing key export earnings and potential opportunities for domestic producers. In 2004, handicraft exports totalled US$13 million, accounting for 1.6 percent of total exports (MoIC & ITC 2006). The Third Lao PDR *National Human Development Report* notes that exports are expected to have reached US$15 million in 2005-06, with growth in this sector expected to continue (CPI & UNDP 2006).

Current trade liberalization efforts are helping to open new markets for this sector. The Government of Lao PDR (GoL) has now become a member of the Association of Southeast Asian Nations (ASEAN) and in turn a party to the ASEAN Free Trade Area (AFTA) and is also working towards accession to the World Trade Organization (WTO). However, the most important development for this sector has been the resumption in 2005 of Normal Trade Relations with the United States – now a key export market for Lao silk handicrafts (CPI & UNDP 2006). Other key international markets for Lao-produced silk handicrafts include Japan, the European Union and Australia. The silk handicrafts sector has also expanded due to a dramatic increase in tourism to Lao PDR over the last decade, as well as an expansion of regional trade with China, Thailand and Vietnam. In most of the key markets, including ASEAN, Lao handicrafts enter duty free under the Generalized System of Preferences (GSP), or face very low tariffs. Therefore, market access is not a problem for these products. However, supply of materials (increasing the scale of operations), ensuring quality and certifying origin and certifying the use of natural and traditional processes are key constraints in meeting the international demand for silk handicraft products.

It is in this context that this paper identifies environmental concerns and potential opportunities that may result from trade-related growth in the silk handicrafts sector in Lao PDR. Strategic recommendations to guide the sustainable development and growth of this sector are then outlined.

Section 1:

Overview of the silk handicrafts sector

1.1 Hurdles to overcome in the silk handicrafts sector

The handicrafts sector consists predominately of small family businesses spread across the country in rural and urban areas. It is common for rural people to produce handicrafts, especially when communities are not engaged in their primary occupation of agricultural production. Small family businesses, including producers, buyers and sellers and retail stores are also common in urban centers. Mainly due to the small and dispersed nature of these businesses, the sector remains largely unorganized and there are presently many barriers to supplying international markets. A few key issues

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include:

- *Supply of raw material:* In 2002, the land area used for mulberry plantations was 644 hectares in total, producing around 6.5 tons of silk per annum. In 2003, this area grew to 805 hectares with an estimated production of 9 tons of silk. During 2002-2003, the average amount of raw silk used in Lao silk handicraft production totalled about 120 tons, with an additional 20 tons per year of chemical silk products (Saphangthong 2006). These figures demonstrate the lack of capacity in the domestic market to supply the silk handicrafts sector, and the current need to import raw silk from countries such as China and Vietnam.
- *Supply of end products:* While a key competitive advantage to the sector in terms of using natural and traditional processes, the size and nature of silk handicraft businesses limit the amount of silk handicrafts that can be produced. Most businesses are family-run or small and medium-sized enterprises (SMEs), which do not have the production capacity to supply increases in demand for silk products.
- *Quality assurance and a national standard:* The GoL's *National Export Strategy 2006-2008* sets out the objectives of adding value and fostering diversification of the silk handicrafts sector (MoIC & ITC 2006). One key aspect identified is the need for quality assurance. Despite the fact that there has yet to be a quality control system or national standard for raw silk and silk fabrics, the Lao Handicraft Association is working towards creating awareness on the need for labels and certification. For example, the Japan External Trade Organization (JETRO) is cooperating with the Lao Handicraft Association to develop the quality of Lao silk textiles to be able to meet the Japanese market requirements through the brand name "Chai Lao" (MoIC & ITC 2006).
- *Certification:* Consumers in foreign markets not only demand quality, they often want to know that the products they are buying are traditionally-made with natural, 'green' inputs. Certification of products and production processes is important to capturing markets and obtaining premium prices. High quality, traditionally-made Lao silk handicrafts are premium products with a significant external demand. In this respect, there is significant risk that if the Lao silk handicrafts sector continues to source the majority of raw silk from other countries, and/or increases the size of production with non-traditional practices, the value of the Lao brand would be reduced. It is therefore critical at this point in time to assess how to develop the sector, while keeping the good reputation and quality that this product has begun to establish in international markets.

1.2 Overview of environmental concerns in the sector

In further developing the silk handicrafts sector, consideration should also be given to the potential environmental impacts. This sector is viewed as having a low environmental footprint at present due to predominately organic sericulture and natural and traditional methods of production. Nevertheless, as the sector attempts to scale-up its production to meet increasing demand, there is a strong likelihood that environmental impacts will ensue.

Key environmental impacts outlined in Section 2 include the potential for:

- Positive impacts arising from increased international demand for natural 'green' silk handicrafts produced in an environmentally-sound manner;
- Negative impacts of increased water consumption and water pollution as production increases; and
- Negative impacts of increased land use for the plantation of mulberry trees for silk cultivation.

1.3 Policy and regulatory framework for the silk handicrafts sector

The Ministry of Industry and Commerce (MoIC) has devised a *National Export Strategy* to develop the silk handicrafts sector (MoIC & ITC 2006). This export strategy has been combined with the previous, more general handicraft strategy that was not geared specifically to increasing exports.

The Government's policy for the silk handicraft sector, outlined in the *Industrial and Handicraft*

Development Strategy toward 2020 (MoIC 2004) identifies the following objectives and key priorities:

- To stimulate production to supply domestic and export demand, and, at the same time, contribute to job creation, increase incomes and alleviate poverty step by step;
- To develop the handicraft and artisan sector over the next 20 years to be a key employer and to contribute to local and human development;
- To reach the target for the handicraft and artisan sector of US$10 million in 2005; US$15 million in 2010 and US$20 million by 2020, which would represent an average growth rate of approximately 14 percent per year;
- To develop the handicraft and artisan sectors together with the preservation of cultural heritage, human resource development and commercialization;
- To promote local participation in the artisan sector and promote family businesses or SMEs; and
- To promote environmentally sound production processes in the silk handicraft sector by reducing raw material use, energy and waste, while increasing production.

To manage potential environment impacts and control wastes from industrial developments, the GoL has promulgated several laws and regulations, including:

- Forest Law, 1996.
- Water and Water Resources Law, 1996.
- Land Law, 1997.
- Environmental Protection Law, 1999.
- Environmental Impact Assessment Regulation, 2000.

The Ministry of Industry and Commerce is also responsible for aspects of laws and regulations concerned with environmental management, such as:

- Industrial Processing Law, 1999.
- Environmental Impact Assessment Regulation, 2005.
- Waste Water Discharge Regulation, 1994 and 2005.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

2.1 A general qualitative evaluation of the environmental impacts of trade

The *Industrial and Handicraft Development Strategy* (MoIC 2004) sets a 14 percent-per-annum growth target for the sector. If barriers such as supply, quality and certification can be overcome, the strong demand for Lao silk handicrafts abroad will most likely lead to the strengthening and growth of the industry in order to meet this target. Taking this growth scenario, this section provides a preliminary evaluation of some of the key impacts that should be considered to ensure that growth is sustainable, both economically and environmentally.

2.1.1 The growth of an environmentally-friendly industry

Sericulture in Lao PDR is inherently environmentally friendly. Mulberry plantations are organically grown to feed silkworms, and Lao silk textile processing often uses natural dyes with no chemical processing.

This gives Lao silk producers a unique selling proposition and an opportunity for the Lao silk handicraft sector to access regional and international premium niche markets (MoIC & ITC 2006). The demand for these 'green' products abroad has the potential to have a significant positive impact on Lao PDR's environment as more silk and silk handicrafts are produced in this way. Moreover, the lower value, higher impact option of producing high-input goods is foregone (e.g., chemical fertilizers and pesticides in mulberry growing). Indirect effects such as increased environmental awareness may also occur.

On the other hand, increased trade of silk products in international markets requires more domestic production, and, in order to achieve this objective and meet demand, the industry will need to grow by increasing inputs of raw materials, water and energy. Increasing the scale of silk handicraft production raises a number of environmental concerns, especially concerning water and land use.

2.1.2 Water resources

Water is a key resource which supports socio-economic development in Lao PDR, especially the hydropower and irrigation sub-sectors. Efficient use of water resources is a critical factor in realizing the Government's dual strategic objectives of poverty reduction and sustainable economic growth. Sustainable water management will become an increasingly important issue as more and more sectors develop and compete for the right to use clean water resources. Ensuring water quality and availability is thus vital to Lao PDR's development prospects. These aspects have been recognized by the Government and reflected in legislative and other measures aimed to encourage efficient and sustainable use of water resources.

Even though Lao silk production primarily uses natural dyeing, the sector does necessitate the use of some chemicals for bleaching for certain colours of silk. At present, silk production methods use a significant amount of water in the process of bleaching and dyeing, and these activities create wastewater. In addition, wastewater treatment systems, if they exist, often do not meet the best available technical standards and small handicraft companies often lack the time, experienced staff and financial resources to upgrade. As a direct consequence, wastewater facilities end up discharging this waste into the public sewer system without adequate treatment. It is not common for either water or chemicals to be recycled during the production process.

Wastewater and chemical use will invariably increase when production is increased. In order to maintain water and environmental quality in Lao PDR, appropriate measures and management practices will need to be adopted in relation to increased production in the silk handicrafts sector. Government legislation such as the *Environmental Impact Assessment Regulation 2005* and the *Waste Water Discharge Regulation 1994 and 2005* already exists. These laws distinguish between different business operations; requiring different levels of environmental diligence and allocating responsibility to different levels of authority based on the size of a business operation. Small businesses, such as those in the handicrafts sector, are often under the responsibility of district authorities. It is, therefore, important that these details are known and that regulations are enforced.

2.1.3 Land resources

The Lao silk handicrafts sector relies on mulberry plantations for raw silk, although the majority of this raw material is not sourced from Lao farmers but imported from neighbouring countries (MoIC & ITC 2006). To capture more of the high-value market abroad, the Lao silk sector will either need to increase domestic production of silk, or ensure that imported raw silk is of the highest quality in order to compete in the international silk trade.

The Government's *National Export Strategy* recommends a substantial increase in domestic raw silk production (ITC 2006). According to STEA's *Environmental Performance Assessment Report* (2006), Lao PDR has about 5.9 million hectares of potentially cultivable land, of which 800,000 hectares are cultivated for rice or secondary crops in lowland areas. Upland areas, identified in Lao PDR as landscapes with a slope greater than 12 percent, cover between 80-85 percent of the country's area. The land areas for planting rice and supplementary crops are limited. Land-use planning and land

classification for industrial plantation are necessary to avoid inappropriate industrial plantations on the areas for vital for food production (e.g., rice paddies). As highlighted in the *National Export Strategy*, the demand for Lao silk handicrafts and the need to ensure standards of quality and rules of origin could lead to the rapid expansion of mulberry plantations throughout the country; hence, the strategy calls for promotion of national sericulture through the development of new technology and extension services to farmers (MoIC & ITC 2006). If this occurs there will be a need to allocate proper areas for mulberry plantations to avoid or mitigate negative impacts. There will also be a need to ensure that there is sufficient incentive for environmentally-friendly production methods.

There is also the potential to import raw silk if there is insufficient domestic supply for the Lao silk handicrafts sector. This, however, is not a preferred option, as using Lao silk in Lao silk handicrafts is more marketable. Also, the use of imported silk would make it difficult to monitor quality assurance, gain organic credentials and meet rules of origin requirements. The use of imported raw silk will however reduce pressure on land resources for the production of silk.

2.2: Case study: A step towards better environmental practices in the Lao silk handicrafts sector

Nikone Handicraft was established in 1992 as a privately-owned handicraft centre that produces locally-made textiles and fashion accessories (MoIC 2005). The centre is located in Dongmieng village, Chanthabury district, Vientiane, and currently employs 51 labourers. Nikone Handicraft produces a wide range of products and is recognized as one of the leading natural dyeing centres in Lao PDR, using only traditional methods and natural materials in its production processes.

At Nikone Handicraft, silk is primarily dyed using dyeing liquids obtained from natural materials, such as bark, leaves and fruits. According to Nikone Handicraft, the centre uses water for bleaching, dyeing and rinsing. A three-step rinsing process is employed through the use of a dual water tank system. This entails that approximately 240 litres of water are used during each rinsing step, which amounts to a discharge of 720 litres for the three-step rinsing process that runs directly into the surrounding environment. In one day, the centre uses about six cubic metres of water in the silk production process.

Wastewater discharge is generated mostly during the bleaching and dyeing processes. Data collected during a survey of Nikone Handicraft suggested that wastewater was the major source of waste generated by the centre. In order to reduce wastewater generation, several causes that lead to high water consumption and wastewater generation were identified. In this centre, it was found that poor dye fixation and an obsolete washing technology were the main contributors to wastewater generation.

The centre cooperated with the MoCI to conduct experiments to reduce water consumption. The results of the experiment found that the rinsing water used during the final two steps of the processing system could be reused. The process was then modified accordingly.

It is a case in point that Nikone Handicraft - one of Lao PDR's best known handicraft centres - is striving to be more environmental friendly. Using materials that mostly derive from the natural environment certainly helped the centre in its quest to be more environmentally friendly. Despite the fact that the centre uses natural materials, its use of obsolete and inefficient technology resulted in a large quantity of wastewater discharge. It was concluded that bleaching and dyeing processes are the source point of wastewater generation. Efforts are currently being made to address these issues, however a number of constraints associated with small business, including the lack of access to technical skills and to finance, were cited by the project research as impediments.

Section 3:

Conclusions and strategic policy recommendations for the silk handicrafts sector

3.1 Conclusions

The key environmental concern related to this sector is wastewater. Wastewater discharge does not currently have a significant environmental impact due to the small size of the sector and the fact that it is predominately composed of small family businesses. Other environmental concerns at present are minimal; sericulture in Lao PDR is environmentally friendly by default and uses natural dyes during processing. Presently, the GoL is promoting a policy of encouraging cleaner production and processing methods to ensure the least impact on the environment.

Sericulture in Lao PDR is fundamentally environmentally friendly, since mulberry is organically grown to feed silkworms. Moreover, Lao native silk weaving is naturally dyed with little or no chemical processing. This gives Lao silk a unique selling proposition and an opportunity for the Lao silk handicrafts sector to access international niche markets.

3.2 Strategic policy recommendations

As set out in this paper, there is a significant potential to develop the Lao silk handicrafts sector, particularly traditional silk textiles, and to add value and foster diversification in the sector. Several recommendations below outline actions the Government could take to realize this potential:

- **Implement the *National Export Strategy* and work with the Lao Handicraft Association and the Lao National Chamber of Commerce and Industry through the creation of a silk handicraft fund to promote this sector.**

  The GoL and private sector may consider developing training programs to encourage members of the Handicraft Association to improve processing and natural dyeing techniques and ensure quality certification to make silk products more competitive and help producers meet international standards.

- **Redesign waste water treatment systems, reduce water used in the production process by recycling waste water and up-grade to technologies that have fewer environmental impacts.**

  Possibilities for future work include:

  - as the case study of Nikone Handicrafts demonstrates, reusing water from the various rinsing steps in order to increase the efficiency of water use in the processing of silk handicrafts;
  - further research on other environmentally-sound production and processing methods to reduce raw material and energy consumption; and
  - working with the Lao Handicraft Association to promote cleaner production and processing techniques and technologies.

- **Enable the Lao silk handicrafts sector to grow sustainably through:**

  - creating awareness of environmental management practices and encourage their use;
  - ensuring that small to medium-scale silk handicraft centres employ, or have access to environmental specialists to monitor quality and control wastes;
  - providing market information as to quality and designs for silk handicraft products;
  - fostering value-addition and diversification by linking this sector to other sectors, such as agriculture and, importantly, tourism;

- establishing a National Production Centre for sericulture to improve and develop as well as disseminate traditional and improved techniques;
- creating annual environmental performance awards to recognize quality and raise awareness of Lao brand-name silk products following the example of “Chai Lao”. The Lao Handicraft Association and the Lao National Chamber of Commerce and Industry are well-placed to establish such an award each year;
- facilitating quality control system for raw silk and fabrics as well as finished silk handicraft products through certification, including the “G-Mark” and ISO 14000, in order to capture premium niche markets both at the domestic (through tourism) and international levels;
- increasing capacity building and training in this sector to improve environmental performance and techniques for weaving, making silk string, dyeing, marketing and quality control; and
- establishing a Silk Handicraft Fund to encourage the development of the “One Village One Product Movement,” given the importance of this sector to rural agricultural family businesses and to preserve traditional techniques.

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Environmental Impacts of Trade Liberalization in the Tourism Sector, Lao PDR

by Sounh Manivong & Somxay Sipaaseuth*

Introduction

The development of the tourism industry in Lao PDR over the last two decades has been striking. In 1990, over 14,000 people visited the country, providing tourist revenue of over US$2.2 million. In 2006, arrival numbers reached 1.21 million and generated US$173.2 million for the Lao PDR economy. This export income placed tourism earnings higher than the revenue from garments, electricity, wood products, coffee, agricultural products, and handicrafts (LNTA 2006).

Major regional markets currently include Thailand, Vietnam and China, which make up 54 percent of total arrivals. Other key markets include Europe, the United States, Australia and Japan, and although these countries account for just over 25 percent of tourist arrivals, they account for over 78 percent of total expenditures (CPI & UNDP 2006). Priority regions identified by the Lao National Tourism Administration (LNTA) include: (1) Europe; (2) Asia and the Pacific; and (3) the Americas (LNTA 2006).

The rise of the tourism industry in Lao PDR can be attributed to a number of factors including: economic liberalization and integration policies, starting with the opening of its borders to independent tourism in 1990; successfully implemented tourism development polices such as the current *National Ecotourism Strategy 2005-2008* (LNTA 2005); multilateral and bilateral assistance from donors such as New Zealand, France, the Asia Development Bank (ADB) and the World Trade Organization (WTO); and, importantly, Lao PDR's key assets - the country's natural environment and renowned hospitality of the Lao people.

The *National Export Strategy 2006-2008* (MoIC & ITC 2006) identified tourism as a priority export sector for Lao PDR. As the country moves into a new era of regional and international integration through membership in the Association of Southeast Asian Nations (ASEAN) and the expected accession to the WTO, the tourism sector is expected to continue to grow. What will be the impacts of trade liberalization in Lao PDR? What role can the tourism sector play in ensuring conservation of the natural environment? This paper, commissioned for the Rapid Trade and Environment Assessment (RTEA) Project, seeks to identify some of the key impacts, both positive and negative of this sector and outline strategic policy recommendations to ensure the increase in tourism results in a sustainable industry that enhances the surrounding environment.

Section 1:

Overview of the tourism sector

1.1 History of tourism

Tourism has been a significant sector of the Lao economy since the country gained independence in 1975. During the period from 1975 until 1986, Lao PDR followed a centrally-planned economy, in which most tourists were official delegations and group tourists. The main purposes of receiving tourists were, in particular, to exchange lessons and experiences in sport and culture, and to create solidarity especially with the former socialist countries. As a direct result, tourism services were not initially aimed

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at generating revenue and income, but served political and social-cultural purposes and was financed by the Government of Lao PDR (GoL).

In 1986, the GoL introduced the New Economic Mechanism (NEM) to move from a centrally-planned economy to a market-orientated economy. In 1990, the country opened its borders to independent tourism. Since then, the tourism sector has grown substantially and now caters to more than one million tourists each year (see Annex 3).

1.2 The development of ecotourism

Ecotourism is a large component of Lao tourism development, recognizing the country's strong competitive advantage – its natural environment. Ecotourism is defined in the LNTA (2005) as "*Tourism in rural or protected areas that minimizes negative impacts and is directed towards the conservation of natural and cultural resources, rural socio-economic development and visitor understanding of, and appreciation for, the places they are visiting*." The country has an extensive system of 20 National Protected Areas (NPAs), covering over 14 percent of the country (IUCN 2007), which the ecotourism industry has come to rely on as its primary business asset.

Popular activities in and around these protected areas include trekking, ethnic village home-stays, rafting, boat trips, canoeing, kayaking, visits to waterfalls, sightseeing, bird-watching safaris, mountain-biking, elephant-riding, photography, and camping. Furthermore, local people have key roles in the ecotourism sector, for example, as tour guides, natural resource managers, producers of traditional goods such as food and handicrafts, in the accommodation sector, and also play a role in protecting ecotourism resources.

The LNTA has established eight ecotourism projects in cooperation with international partners. There is the UNESCO-LNTA Nam Ha Ecotourism Project in Luang Namtha Province's Nam Ha NPA; the Phou Xang Hae Ecotourism Project in Sannakhet Province; the Phou Hin Boun Ecotourism Project in Khammoune Province; the Sustainable Tourism Programme in Luang Prabang Province; the Phou Khao Khouay Tourism Development Project in Bolikhamxay Province; and the Xe Pian NPA Ecotourism Project in Champasack Province. There are also other, smaller ecotourism projects established together with regional partners. However, in some of these the concept of "ecotourism" has been loosely defined.

All of the above projects work to conserve biodiversity and culture by creating various types of ecotourism activities, not only for tourists but also local people, capturing the tourist revenue while contributing to nature and cultural preservation..

1.3 Overview of environmental impacts in the sector

By definition, ecotourism is environmentally friendly; however poorly-planned tourism can lead to adverse changes in culture and destruction of the environment. This section outlines some of the positive and negative impacts of the tourism industry building on the results of studies conducted by Schipani (2007) and Schipani & Marris (2002). The positive and negative impacts of tourism are summarized below:.

1.3.1 Positives impacts of tourism

- Nature is an ecotourism business asset - It is in the best interests of those in the tourism industry to protect this asset and the profitability of their businesses.
- Conservation advocacy – Ecotourism and its economic benefits can be used to advocate for the continued protection of key resources such as National Protected Areas. The tourism sector is currently concerned about inappropriate rubber development in the Nam Ha Protected Area, Luang Namtha (Schipani 2007).
- Villager involvement – Tourism involves people and communities at all levels. One of the positive impacts of involving villages is the alternative income it provides, leading to lesser pressures on resources, the potential creation of nature reserves around villages to preserve tourist assets and/or

the adoption of conservation contractual agreements between communities and other key stakeholders. In Luang Namtha, 50 villages have signed such agreements with the local tourism authority.

- Funds for protected area management – Tourism has the potential to generate funds that can be spent on nature conservation and management (see Annex 1).
- Presence of tourism reduces threats to resources – The very presence of tourism operators can hinder and even prevent illegal resource activities that deplete the natural environment. The Gibbon Experience in Bokeo run by local villages patrols over 25 percent of the Bokeo Nature Reserve (Gibbon Experience 2007).
- Conservation, education and awareness-raising - Ecotourism provides a means for raising awareness of the importance of nature and its conservation among tourists, guides, business owners/operators, government and local communities.

1.3.2 Negatives impacts of tourism

There are also potential negative impacts on the environment that can arise from tourism, mostly concerned with unplanned and unregulated development. A key concept to note is the carrying capacity of an area – this refers to a threshold level of tourist activity beyond which damage to the environment will occur (Mason 1990). In other words, there is a limit to how many natural resources an area can supply and the level of impact that an area is able to process or absorb. There are two broad impact categories that should be considered:

1. Impact on the quality of natural assets resulting from tourism operations, including:
   - Habitat/forest destruction (e.g., destruction of sensitive vegetation);
   - Solid waste generation and poor disposal practices;
   - Water pollution (e.g., increased sewage effluent released into the environment) and poor treatment/disposal;
   - Aesthetic pollution (e.g., unsightly building and infrastructure development); and
   - Noise pollution.
2. Impact on the availability of natural resources, including:
   - Water availability;
   - Energy availability; and
   - Food availability.

To avoid these negative impacts on the environment, the GoL has strongly promoted ecotourism and established both broad policy and specific guidelines for its development. These guidelines emphasize careful capacity management, the sustainable use of resources, respect for cultural and nature diversity and the involvement of local communities in the decision-making process.

1.4 Policy and regulatory framework for the tourism sector

The LNTA is the leading agency in the development and management of the tourism sector in Lao PDR (GoL 2004c). It is an independent authority at ministry level. Accordingly, it is obligated to draft tourism development strategies, regulations and laws related to the tourism industry. The administration is also responsible for implementing these strategies, regulations and laws once they have been adopted by the GoL.

The LNTA maintains a networked coordination with all local authorities at the provincial and district levels, in which local tourism offices are established. Those offices are obligated to consult the local government to develop tourism in accordance with tourism development policies, regulations and laws

adopted by the central government.

To manage and develop the tourism sector effectively, the GoL has adopted a number of laws and regulations related directly or indirectly to tourism, which can be viewed in Annex 2. These policies are strongly correlated with the key sustainable growth and poverty reduction objectives outlined in the *National Growth and Poverty Eradication Strategy* (NGPES) 2020 (GoL 2004a).

There are three key policy documents that guide the development of the tourism industry in Lao PDR, all of which mainstream environment and social considerations:

- National Tourism Development Strategy 2006-2020
- National Ecotourism Strategy and Action Plan 2005-2008
- National Export Strategy for Lao PDR 2006-2008: Sectoral Strategy – Ecotourism

Today, the main objectives of tourism development policy in Lao PDR are to contribute to economic growth; conserve and develop socio-cultural heritage, traditions and livelihoods of the Lao people; and protect the environment.

The *National Ecotourism Tourism Strategy and Action Plan 2005-2010* (LNTA 2005) pinpoints four objectives for developing tourism in Lao PDR, namely:

1. To strengthen governance, planning and research;
2. To improve service quality, education and training;
3. To diversify products based on Lao PDR's unique natural attractions; and
4. To take into account equity considerations, including ways to spread the benefits to remote and minority communities.

The main aim of this strategy is to focus on the sustainable development of ecotourism, culture, historical tourism, and archaeological tourism to become the first choice of destination for tourists bound for Asia.

In addition, the Ministry of Industry & Commerce (MoIC & ITC 2006) has recognized the importance of tourism in the development of the country and has highlighted it as a priority sector in the *National Export Strategy for Lao PDR 2006-2008.* The vision of this strategy is:

To develop sustainable tourism and achieve poverty eradication by distributing benefits to local people and communities through the development of backward linkages between sectors in relation to the tourism industry and conservation of natural and cultural and historical sites, and to disseminate Lao cultural and historical heritage information around the world.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

According to the World Tourism Organization, significant growth in international arrivals to Southeast Asia will occur over the coming decade (MoIC & ITC 2006). Future estimates of the number, revenue and average stay of tourists visiting Lao PDR in the coming years, provided by the NTA statistics unit, predict up to a 20 percent growth over the next three years (see Annex 3). Much of this growth is expected to result from increased regional cooperation in the tourism sector, which is striving to make the region more attractive to both ASEAN and international tourists.

In 1997, Lao PDR became a member of ASEAN and in turn a party to the ASEAN Free Trade Area (AFTA). These closer regional ties have helped to develop the tourism industry. To promote tourism regionally, ASEAN leaders signed an ASEAN Tourism Agreement on November 4, 2002 in Phnom Pen, Cambodia with the aim of enhancing integration and cooperation in tourism between members, to strengthen the tourism industry in ASEAN, and to compete with countries outside the region. For example, ASEAN has jointly implemented projects to promote tourism under the slogan “Promoting the region as a single destination”. The agreement also aims at getting rid of barriers and to provide mutual conveniences, such as Entry-Exist visa exemption for some ASEAN citizens. A single-entry visa for all ASEAN countries is also on the agenda. Cooperation among private and public sectors, such as cooperation through the ASEAN Tourism Enterprise Association, the ASEAN Association of Restaurants and Hotels and ASEAN Aviation, are also important developments for the industry.

The outcome of this cooperation between ASEAN member countries can be highlighted by the latest tourism figures. In 2005, the ASEAN region welcomed more than 50 million international tourists; 15.7 million from Malaysia, 11.7 million from Thailand, 1.4 million from Cambodia, 1.1 million from Lao PDR, 1 million from Brunei, and 656,000 from Myanmar (ASEAN Secretariat 2007). Continued regional cooperation and strengthened trade relationships internationally are set to aid in the continued growth of the sector. Recent developments include:

- Exemption of visa requirements for Japanese nationals (April 2007).
- The completion of the Lao/Thai Friendship Bridge 2 in Savannaket in 2007 and agreements to build other major transport infrastructure with regional neighbours, such as a 3rd bridge across the Mekong in Bokeo, current construction of road links between China and Thailand in Northern Lao PDR and Vietnam and Thailand in Southern Lao PDR, and the extension of key airports in Luang Namtha, Luang Prabang, Pakse and Savannaket.
- The World Tourism Organization, in which Lao PDR has been a member since 1975, has also agreed to support three community-based tourism projects in Lao PDR commencing in 2007. The New Zealand Government has committed US$5 million to develop ecotourism over the next five years and the 2nd phase proposal of the ADB Greater Mekong Subregion Tourism project is currently under consideration.
- Strengthening of domestic policy, such as the establishment of a one stop investment process for foreign investors seeking to invest in Lao PDR, which is likely to draw a wave of new investment in the sector (GoL 2004b).

Given the expected growth in the ecotourism sector, it is useful to flag some of the positive and negative impacts that may arise. This paper draws on a series of case studies that have been completed by researchers in recent years to highlight priority areas of concern, and examples of enhanced environmental protection that should be replicated.

3.1 Potential negative impacts of tourism

Section 1 lists some of the negative impacts on the environment that tourism can bring. This is mainly the result of unplanned and ill-informed development. While such a situation is yet to occur in Lao PDR, Vang Vieng, a prime ecotourism destination, is now showing signs that stronger efforts must be made to minimise impacts and thus ensure the sustainability of the local industry.

Case study: Vang Vieng

Nestled in a beautiful valley surrounded by impressive limestone mountains, Vang Vieng town and district is one of the most visited tourist attractions for nature-based tourism in Lao PDR. Over 80,000 tourists visit annually and there are now over 70 hotels and guest houses providing accommodation.

While Vang Vieng has enjoyed rapid economic expansion, infrastructure improvements and increases in local income and living standards, at the same time there are also noticeable negative impacts in the district. For example, the once quiet, rural town is becoming quickly urbanized and crowded. Noise and air pollution are increasing, and the amount of solid waste produced by the district rises each year

without the existence of a municipal landfill. With the recent completion of a concrete bridge spanning the Song River, there is concern that urban sprawl will cross the river, resulting in a reduction in the attractiveness of the town if the view of the surrounding karst landscape is obstructed.

Perhaps the most troublesome issue is water pollution in the Song River – the premier tourist attraction in the area. There are no adequate facilities to treat increased volumes of liquid waste and sewerage. Currently, this waste is discharged by guesthouses and hotels into the river mainly untreated. While there are various government policies and regulations in place, such as Article 65 of the *National Law on Tourism* (2003) which provides that all tourism businesses are legally required to be responsible for environmental issues associated with their operations and hence install on-site treatment facilities, little progress has been made in dealing with this issue.

These impacts should be taken seriously. In a recent survey of tourists in Vang Vieng, Phiapalath (2007) found that tourist were concerned about over-development and did not want to see hotels constructed on the west side of the river. Those interviewed also noted solid waste and declining river health as important issues that needed to be better addressed. It is therefore important for the government and private tourism operators in Vang Vieng to ensure that the level of tourism is balanced with the area's carrying capacity. If not, there is a risk that over-development and increased impacts on the key attraction – the environment - will ultimately lead to the collapse of the local industry.

Several innovative management interventions are outlined in Phiapalath (2007), including:

- The establishment of an Environmental Trust Fund, led by the GoL but steered by the community, which would take contributions from local tourism businesses and allocate funds to addressing key environmental issues.
- Local certification or a 'green label' scheme for businesses, which encourages the adoption of better environmental performance measures. Businesses would be rated and tourists informed about the system. Tourists would then provide the catalyst for change.

It is also important that the GoL continue to provide better services to the sector. In the case of liquid waste and sewage, the LNTA has recently submitted a proposal to the ADB for Phase 2 of the Greater Mekong Subregion Tourism Project which requests loan assistance for the construction of sewage and water treatment infrastructure in Vang Vieng (APP 2006).

3.2 Potential positive impacts of tourism

Case Study 2: Nam Ha Ecotourism Project (SNV 2002)

The Nam Ha Ecotourism Project involves travel to natural destinations in Luang Namtha district, where there are many forest treks and river excursions on offer. Overnight treks are conducted in the buffer zone surrounding the Nam Ha National NPA, visiting Khmu, Lataen, Hmong and Tai Dam and Akha ethnic minority villages.

Nam Ha treks use only existing forest trails and require that tourist consume only local food and products. Each tour generates less than one kilogram of non-biodegradable waste, by using reusable water containers and solar electricity for overnight tours. Regulations are also in place limiting group size and departure frequency.

One of primary objectives of the Nam Ha Project is to ensure that tourism contributes to the conservation of the natural and cultural heritage of Lao PDR. This objective could not be met without the environmental awareness program that the project team has put firmly in place. The Nam Ha Project also has direct financial benefits for conservation (see Annex 3). All tourists who enter the Nam Ha Pa on treks or rafting tours are charged a US$1 per day user fee that is bundled into the price of their trip. A permit is also required for the overnight buffer zone treks. Since the permit system was introduced in October 2000, over US$10,000 in fees has been collected.

To ensure carrying capacity is not overextended, the Nam Ha Project is based on small groups and small–scale business models. Each overnight trek is restricted to 2-3 departures per week and the group size is generally limited to 8-10 tourists.

Good ecotourism should not only set out to limit environmental and cultural impacts, but also actively work towards enhancing the natural resource base that supports it. The Luang Namtha Provincial Tourism Office and Nam Ha National Protected Area Management Unit are the government agencies that have taken the lead in monitoring the ecotourism operations. To finance monitoring activities under its jurisdiction, the Provincial Tourism Office (PTO) imposes a 5 percent tax on provincial tourism operators, including the Nam Ha Eco-guide Service. Guides, NPA staff and the PTO perform regular biodiversity threat and cultural impact monitoring funded by this tax.

The broader role of the tourism industry as an advocate for environmental protection can be viewed in the latest edition of Juth Pakai, in which Schipani (2007), an ADB consultant to the LNTA, highlights the growing concern of rubber cultivation inside the Nam Ha NPA. Schipani (2007) argues that ecotourism should be viewed as a more economically, environmentally and socially beneficial industry in these nationally protected areas which by law have been set up to conserve biodiversity and protect watersheds. While tourism can work in harmony with these goals (as seen above), other industries, such as rubber, which require the clearing of forest and subsequent loss of biodiversity and watershed value, cannot and should be conducted in more suitable areas. Schipani (2007) calls for better land-use planning and enforcement to ensure that both industries can continue to contribute to the sustainable development of the province.

Section 3:

Conclusions and strategic policy recommendations for the tourism sector

3.1 Conclusions

This paper outlined some of the key environmental concerns and opportunities arising from regional integration and trade liberalization in the tourism sector. Key conclusions are as follows:

- The tourism sector in Lao PDR is growing, as a result of better regional integration through ASEAN, increased relationships with countries beyond Asia such as the US, Europe and Australia, and successful national policies and projects. However, the country's natural assets form the cornerstone of this growth, and every effort must be made to ensure their conservation.

- Tourism in Lao PDR is a key sector which meets all of the GoL's key development objectives by generating a substantial amount of foreign currency each year. It is labour-intensive, thus providing jobs, is inherently pro-poor as earnings are made by many small businesses including poor villages in and around key attractions, and above all works in harmony with nature.

- Tourism, if done well, can have many positive effects on a country's natural environment, but without careful planning and a strong commitment by all stakeholders, negative impacts affecting the very asset on which the industry relies, can arise. The domestic framework for investment in tourism needs to be firmly set in place to avoid jeopardising the growth potential of this key sector to contribute to sustainable livelihoods.

- Ecotourism can be an advocate for conservation, particularly in those areas designated by the GoL as NPA, due to the economic, social and environmental benefits that the industry brings to an area.

3.2 Strategic policy recommendations

The LNTA (2006) forecasts 2 million tourist arrivals per annum by 2010. This is a doubling of tourist

arrivals in just five years and it is important that the country is well-equipped to handle the environmental impacts of these increased numbers. While current policy, legislation and projects are all providing good direction, they will need to be strengthened to meet this growing market. Specific recommendations include:

- **Continue to engage closely with the regional and international community to facilitate and promote the regional adoption of policies, practices and approaches to ecotourism.**

  Through mechanisms such as ASEAN (the ASEAN Tourism Agreement), the ADB GMS Tourism Project and the WTO, representatives from the LNTA, senior levels of government and the private sector should continue to represent Lao PDR at international tourism conferences and meetings. It is recommended that provincial and district stakeholders be given the opportunity to scale up experiences from the ground to this international level. It is also suggested that environmental governance be strengthened at the regional level to deal with cross-border concerns related to tourism in general, as well as to foster regional harmonization of environmental policies and standards.

- **Strengthen the Lao National Tourism Authority's ability to engage with the private sector and investment decision-makers.**

  The GoL's relatively new 'one-stop' investment policy (GoL 2004c) has the potential to provide further encouragement to foreign investors, and if forecasted tourist arrivals are going to be met with services, investment will have to increase.

  - During the next five years, it will be extremely important to improve ways of engaging with the private sector to ensure that the ecotourism ideas present in the ecotourism strategy, and government and civil society projects like the Nam Ha Ecotourism, project are maintained. This could be done through a combination of regulatory (monitoring) and incentive-based tools (e.g., certification).
  - The LNTA could usefully facilitate national and international investment in ecotourism activities, including the identification of sites with strong ecotourism potential, and taking potential investors to identified sites; liaise with regional actors concerned with tourism promotion (Pacific Asia Travel Association); organize and participate in investment workshops nationally and regionally; and seek to develop partnership agreements to link investors with local communities, protected area management bodies, NGOs and development agencies.
  - Increased cooperation between the Committee for Promotion and Management of Investment and relevant sections of the LNTA at central and provincial levels will be required. Currently, two staff members have been delegated this liaison task. It is recommended that staff resources and mediums of communication/collaboration be strengthened.

- **Explore the potential of certification for the tourism industry in Lao PDR both at the national and provincial levels.**

  Certification can be a useful tool in ensuring that core principles of ecotourism are being met by stakeholders in the sector. In addition to current standards, such as the minimum standard of guest houses (see Annex 2), it is recommended that the GoL explore and test options such as international and national certification and the institutional arrangements needed for successful programs in Lao PDR. Such a scheme will not only yield benefits in ensuring a high standard of ecotourism practices, but may also help attract more visitors to Lao PDR.

- **Strengthen central/provincial cooperation in the tourism sector.**

  The LNTA, together with the Netherlands Development Organization (SNV) has put a great effort into ensuring cooperation between central and provincial institutions, not only in the tourism sector but also with the conservation community and forestry officials through the multi-sector ecotourism taskforce and the Sustainable Tourism Network. It is recommended that forums bringing together provincial and central level government, civil society and the private sector continue to be supported, and knowledge and experiences from these forums are scaled-

up to the regional and international level (see first recommendation above).

- **Continue to support conservation with particular emphasis on National Protected Areas and linking with regional initiatives that promote tourism and conservation in the Greater Mekong Subregion and ASEAN.**

  Finally, it is important that the ecotourism sector, in Lao PDR continues to contribute to the conservation of its key business asset – the environment. The following areas of work are recommended:

  - Working with provincial and district governments to ensure that knowledge of the benefits of ecotourism are known and considered in land use planning decisions.
  - Continuing to raise local awareness of the relationship between ecotourism activity and good conservation practice.
  - Continuing to develop and promote ecotourism funding mechanisms for protected area management. One possibility is to develop and test the concept of a government-led, community-administered Environmental Trust Fund in key tourist areas such as Vang Vieng, which could be used to contribute to efforts to improve and maintain natural assets.
  - Strengthening conservation advocacy at the national and local levels and increasing vigilance against illegal activities.

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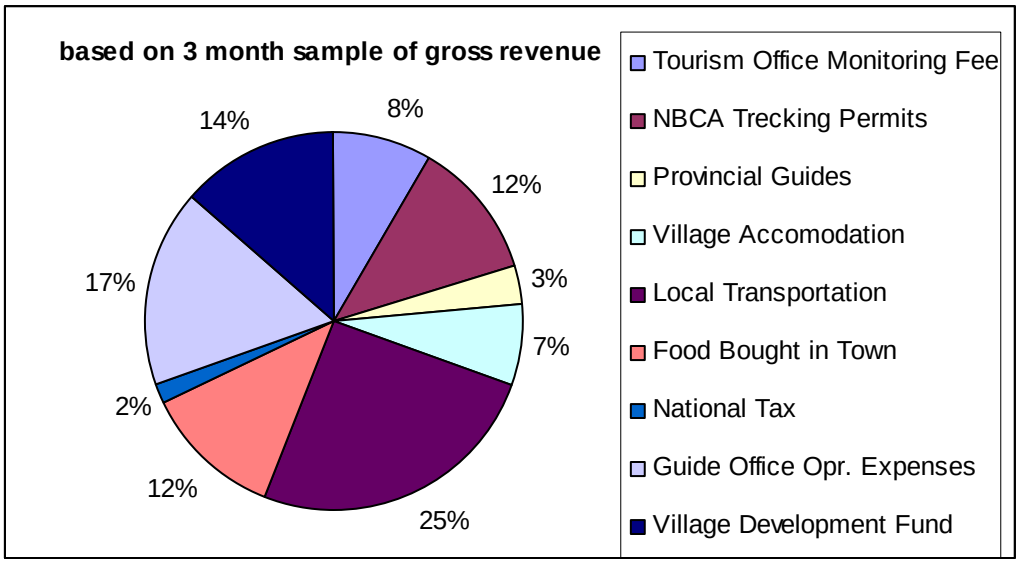
Annex 1: Distribution of gross revenues NHEP Eco-tours

(source: Schipani & Marris 2002)



Annex 2 : Laws and regulations in the tourism sector of Lao PDR

(source: LNTA 2006)

- Law on Tourism, September 9, 2006
- Regulations Number 1150/PMO on Establishment and Business Activities of Tour Service Enterprises, October 25, 1993
- Regulation Number 81/CPMO on Immigration of Tourists, January 21, 1994
- Instruction Number 02/PM on Improving Tourism Management on February 14, 1995
- Regulation Number 1107/LNTA on Minimum Standard of Guest Houses
- Regulation Number 159/PMO, on Hotel and Guest House Management, June 30, 1997
- Regulation Number 626/LNTA on Standard of Tour Guides
- National Tourism Development Plan, Lao PDR, November, 1998
- National Tourism Development Strategy 2005 to 2015 (draft)
- National Socio-Economic Development Plans (2001-2005, 2006-2010)
- Industrialization and Modernization Strategy (2001-2020)

Annex 3: Future estimate of the number, revenue and average stay of tourists to visit Lao PDR

(Source: LNTA Planning and Cooperation Department Statistic Unit, 2006)

Year	2005	2006	2007	2008	2009	2010
tourist arrivals	1,095,315	1,215,106	1,400,000	1,606,000	1,840,000	2,000,000
revenue (US$)	146,770,074	173,249,896	193,000,000	220,000,000	253,000,000	290,000,000

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Environmental Impacts of Trade Liberalization in the Organic Agricultural Products Sector, Lao PDR

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Introduction

Since the implementation of the "New Economic Mechanism" (NEM) in 1986,,the Government of Lao PDR (GoL) has been making changes towards transforming the centrally-planned economy to a market economy. Consequently, the economic relations with foreign countries have been growing little by little with the opening up of the country to trade. Lao PDR became a country member of the Association of Southeast Asian Nations (ASEAN) in July 1997 and is a signatory to AFTA (ASEAN Free Trade Area). The country applied to join the World Trade Organization (WTO) on July 16, 1997 and is currently working towards membership. Moreover, Lao PDR has been granted generalized system of preference (GSP) privileges from the European Union (EU) and has established Normal Trade Relations status (NTR) with the United States. The more important trading partners for Lao PDR are its Asian neighbours, including Vietnam, Thailand and China. Thailand is the largest trade partner, accounting for about 19 percent of all exports and over 60 percent of all imports in 2004 (CPI & UNDP 2006).

Trade liberalization is an opportunity for Lao products to be exported, especially green and niche products such as organic produce. The GoL has therefore defined the *National Export Strategy 2006-2008* (MoIC & ITC 2006) with a focus on six priority sectors, including organic products.

Trade liberalization is some cases may be good for environment, and in other cases bad, or both at once (Cosbey 2004). The relationships between trade and environment are complex. The goal of this research paper is to present the main environmental impacts, positive and negative, of trade liberalization on the export sectors prioritized in Lao PDR, with particular focus on the organic agricultural sector. The objective of this research paper is to provide an analysis of national experiences in improving environmental management in the organic agricultural sector as an input to a Rapid Trade and Environment Assessment (RTEA) project led by the Committee for Planning and Investment (CPI), the International Institute for Sustainable Development (IISD) and The World Conservation Union (IUCN).

The first part of this report will make an introduction of environmental concerns for the agricultural sector, and will then present the main environmental impacts in Lao PDR, and the country's experiences in improving environmental sustainability in this sector. Finally, it will identify areas where better support is needed, and propose recommendations for strategic policies to strengthen environmental sustainability.

Section I:

Overview of the organic agricultural products sector

1.1 Environmental concerns in the sector

In 2005, agriculture accounted for 47 percent of the GDP and employed 77 percent of the labour force (STEA & UNEP 2006). Agricultural land covers 3.6 percent of the total land area (STEA & UNEP 2006). Almost all production, even of livestock and coffee, is undertaken by small family farms. Rice is the most important agricultural commodity, followed by maize and peanuts. Rain-fed rice is the main

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production system in the lowlands, while shifting cultivation is the major production system used in the upland environment. An estimated 280,000 families practiced slash-and-burn cultivation in 1989, an average of 300,000 ha, however this activity is slowly decreasing (STEA & UNEP 2006). In 2004, the area under slash-and-burn cultivation had decreased to 61,097 ha (STEA & UNEP 2006).

Agriculture remains the main source of income and livelihood for the Lao people, but this is slowly moving from subsistence to commercial production (STEA & UNEP 2006). We can find two agricultural systems: upland agriculture, which is characterized by low input, low outputs and limited market-orientation – which this paper defines as "organic by default". Lowland agriculture with irrigation is larger and tends to use more inputs (such as chemical fertilizers and pesticides).

On the one hand, agriculture plays a positive role in ecosystem management by maintaining landscapes and biological diversity. On the other hand, environmental resources are under pressure from problems such as shifting agriculture. One cause of land degradation in Lao PDR is shifting cultivation, particularly in areas where the fallowing period is too short. Moreover, if shifting agricultural practices use uncontrolled fires, this is a treat to biodiversity in a given area and can destroy habitats for plant and animal species.

Other environmental damage is caused by irrigation systems on lowland cultivation; irrigation is the largest user of freshwater. In 2002, agriculture with irrigation systems accounted for 82 percent of total freshwater withdrawals, against 10 percent for industry and 8 per cent for domestic use (STEA & UNEP 2006). Besides this, agricultural runoff and seepage of fertilizations and pesticides are significant sources of groundwater pollution. The intensive livestock operations have grown so large that they pose problems of waste management and disposal, and are sources of air and water pollution.

In the face of forest degradation, mainly through shifting agriculture, the GoL has formulated the Land Resource Management Policy in 1995. The policy was translated into a Land Use Planning and Land Allocation Policy in the *National Environmental Performance Assessment* (EPA) (STEA & UNEP 2006). Stabilizing shifting agriculture is included in the GoL's (2004) *National Growth and Poverty Eradication Strategy* (NGPES) presented below.

1.2 Policy and regulatory framework for the organic agricultural products sector

The GoL is determined to eradicate extreme poverty and move beyond the category of Least Developed Country by the year 2020. To achieve this, the GoL has adopted the NGPES as a comprehensive framework for all its development and poverty eradication programs.

The national development goal of the GoL for 2020 (GoL 2004) is focused on a strategy of sustainable economic growth and people-centred equitable development. The target aims to eradicate poverty for which the GoL has identified two broad strategies (MoIC & ITC 2006); high economic growth with equity with access to social services, and markets for everybody, particularly those in rural areas.

Concerning the agricultural sector, the rural development program and human resource development program conducted the Common Country Assessment (CCA) in December 2000 (CPI & UNDP 2006). The objectives for the agricultural sector include:

- Achieving food self-sufficiency;
- Increasing agriculture exports through diversification, commercialization and processing (cash crops, livestock, forest products); and
- Stabilizing slash-and-burn agriculture by land allocation for upland framers, terracing, and supporting alternative agricultural activities including agro-forestry and livestock.

Moreover, the GoL is promoting and supporting the production of organic agricultural products, especially organic rice. Organic practices make Lao rice more competitive with neighbouring countries, such as Thailand and Vietnam. However, the legal environment for organic products is not yet developed. Currently, there are no certification bodies or certification systems for organic agricultural products in Lao PDR. Mostly, Lao agricultural products are considered "organic by default".

Currently, the Department of Agriculture is in charge of issuing “Phytosanitary Certification”, which certifies that the plants or plant products to be exported have been inspected and found to be free from quarantine pests and substantially free from other injurious pests. The certification also requires the exporter to declare the “Disinfection and/or Disinfection treatment”.

Organic certification for export from Lao PDR is currently carried out by international certification bodies to meet the requirements of importing countries. For example, the Lao Arrowny Corporation rice is certified by a Japanese agency, and the Lao Farmer’s Products Co. products are tested by European Union (EU) laboratories to ensure quality control. The certification cost is very high; obtaining the organic certification for one farm or group can mean paying a fee of about US$3,000 per year (Sakdavong 2005).

In the area of quality, the product’s registration method is not based on international guidelines. The current method is based on the International Organization for Standardarization (ISO) guide 654 and expanded to a third party product certification. This is the limit of its use, because it rarely meets international standards. There is no legislation covering the setting up of an accreditation board and issues related to ISO 9000 management standards and ISO 14000 environmental management standards. Lao PDR has no locally-based certification bodies to make the export operation with quality control and application of appropriate standards. The Lao Agro Industry Co. Ltd., exporting processed foods (bamboo shoots, sugar palm, tamarind, etc.) to the EU, is the first company in Lao PDR to obtain Good Manufacturing Practices (GMP) certification. Increasing exports to EU countries and Japan can be promoted by establishing certification systems and adopting hygienic and good practices.

It seems that the current legal systems (policies and regulations) are insufficient to meet the requirements of international standards. The international standards and regulations required by Lao PDR’s main trading partners, such as the ASEAN countries, China, Japan, the EU and the US have to be studied to better align Lao PDR policies and regulations to meet international standards. Lack of regulations, certification bodies, and certification systems to comply with standards imposed by exporters and trading partners can make market access difficult and be barriers to achieving the export of Lao agricultural products

Today, many non-government organisations (NGO) are promoting and supporting the creation of organic regulations and legislation. The most visible is the project for the Promotion of Organic Farming and Marketing in Lao PDR by Helvetas (Switzerland) and the Lao Agriculture Department in the “ProRice project” (Roder et al. 2006). This project is filling the gap by developing standards and legislation for organic agriculture and a certification system for Lao PDR. The French Government and the National Agriculture and Forestry Research Institute (NAFRI) are collaborating in this project of National Agro-Ecology (PRONAE), which is working on a pilot project in Sayabury and Xieng Khouang provinces.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

2.1 Flagging the potential impacts of increased trade on the natural environment

The Generalized System of Preferences (GSP) from the EU, Normal Trade Relations (NTR) established with the United States (US), free trade and economic integration in ASEAN and future accession to the World Trade Organization (WTO) represent opportunities for Lao PDR to increase exports of agricultural products, including organic agricultural products. Moreover, several tariffs will be reduced significantly. Organic agriculture is well-suited to Lao PDR, both for in-country consumption and for export. It is the assumption of this paper that as a result of this more favourable trade environment, the organic produce sector will grow substantially if barriers to meeting international certification standards can be met.

What will be the impacts of this growth on the natural environment in Lao PDR? This section uses the Rapid Trade and Environment Assessment (RTEA) matrix, a tool developed by IISD (see Annex 1) (IISD & IUCN 2007). In developing and assessing trade liberalization scenarios, the RTEA can highlight the potential environmental consequences of trade liberalization in the organic agricultural sector. The RTEA matrix separates the key trade/environmental effects into the five different categories outlined below (IISD & UNEP 2005):

- Scale effect: Trade will lead to increased scale of economic activity;
- Structural effect: Trade will lead to changes in the structure of the economy allowing the country to make more of the goods it makes well or has in abundance;
- Technology effect: New or old technologies have a positive or negative impact;
- Direct effect: Direct environmental effects are caused by the very fact that trade is occurring;
- Regulatory effect: Trade will affect the national regulatory environment (e.g., regulations from other countries imposed on imports).

2.1.1 Scale

The main impact of Lao PDR's current trade liberalization on the organic agricultural products sector is an increase in access to foreign markets in the EU, the US and with neighbouring ASEAN countries (Thailand, Vietnam and China) (MoIC & ITC 2006). This is particularly the case for Lao organic rice due to a decrease in export barriers (non-tariff barriers) and bilateral agreements between Lao PDR and its trading partners which allow Lao PDR produce to enter foreign markets more easily. Consequently, it will enhance the potential to increase the scale of organic production. Increased scale of production of organic agricultural products for export can lead to an increase in the amount of land required for production, with possible negative environmental impacts such as deforestation (including shifting cultivation and protected area encroachment).

2.1.2 Structural

Lao PDR already produces much of its agricultural produce organically by default. In this case, it could be argued that a structural effect of trade is not one of changing the agricultural sector to produce in other ways but enhancing and standardizing the agriculture that is already currently practiced. Ensuring and certifying organic agriculture production therefore has the ability to reduce or prevent the up take of agricultural practices from abroad that often cause with environmental pollution. This benefit is found in all crops under organic production.

2.1.3 Technology

Trade liberalization is also leading to greater openness to Foreign Direct Investment (FDI). As Lao PDR's competitive advantage for the production of organics becomes more widely known and the business environment becomes more conducive (e.g. certification is made easier, government support is strengthened) the potential for increasing FDI in this sector will rise. FDI has the ability to bring better technology and expert knowledge to the sector, increasing production and helping to link produce with key markets, ultimately promoting a less environmentally-impacting agricultural industry.

2.1.4 Structural and technology impacts combined

Structural changes to the Lao economy, coupled with increased investment in better organic technology, production and processes, has the ability to take the place of investment that may bring heavy-input agriculture practices (using chemical fertilizers and pesticides or intensive farming practices). In this sense, organic investment prevents impacts that can be caused from standard agriculture including:

- Pollution caused by chemicals used in production;
- Introduction of genetically modified organisms (GMO) into Lao's natural environment; and
- Intensive farming creating large-scale land use changes, including deforestation.

2.1.5 Regulatory effect

The organic agricultural standards imposed in the markets of some of Lao PDR's trading partners can

be viewed as an informal trade barrier. Increased market demand for safety and quality from foreign buyers will also put pressure on the GoL and exporters to upgrade existing regulations and quality to meet export standards. Actually, Lao agricultural products are considered ”organic by default”, but with no formal in-country certification available at present, this is not recognized on the international market. Domestic regulation is not yet appropriate for the export of organic agricultural products.

Seeking and obtaining international certifications of organic production can increase difficulties for export, but also offers access to new markets, which often pay premium prices for these products. Capacity building is needed to maintain and improve market access and improve competitiveness.

2.1.6 Organic agriculture and the environment in Lao PDR

Organic products are a new concept for Lao people. Currently, it is hard to identify impacts of organic agricultural products on the environment. Nevertheless, one knows that organic agricultural practices are following a natural process, using natural raw materials without the use of chemical fertilizer or pesticides in order to promote and enhance soil fertility, and manage ecological interactions within an agro-ecosystem. Consequently, one can imagine environmental benefits from organic agricultural practices as below:

- Preventing soil erosion: conserve top soil, preserve soil moisture and reduce runoff; and
- Improving water quality: use organic fertilizers that rapidly dissipate in soil and water.

In neighbouring countries, some environmental benefits have already been demonstrated. For example, farmers in Yen Bai province in Vietnam say that the use of organic fertilizers made from rice straw in addition to a mixed micro-organism called VIXURA helps to improve rice quality and increase soil fertility. Moreover, with organic fertilizer, they can produce an equivalent capacity of 280-290 kilogram per hectare (Vananh 2004).

2. 2 Case study: organic agricultural products

Developing Lao organic agricultural products for export will have a positive impact on the national economy, as currently farming represents 80 percent of the Lao workforce (PTP 2006). At present, organic agricultural businesses are mainly managed only by local people, who sell their products to a restricted number of customers. There is no assistance from a domestic agency to provide training on quality control to meet the requirements of the importers. The certification for export in Lao PDR is carried out by the certification bodies of the importing countries. There are several private companies operating in Lao PDR that have started generating organic products specifically for the export market. Products include rice, mulberry leaves, processed fruit and coffee. Some examples are briefly described below:

Rice: Lao rice is often considered “organic by default”, meaning no chemical inputs. The private company Lao Farmer’s Products Co exported 300 tons of non-certified organic rice in 2005 to Europe under the Fair Trade Label Max Havelaar (PTP 2006). The company is working towards certification so as to access the organic market abroad. Moreover, Lao Arrowny, a Japanese-Thai company, is collaborating with farmers in Vientiane province to produce non-certified organic Japanese rice to export to Japan. In 2004, this company exported 200 tons (PTP 2006). Aside from the private sector, many NGOs are already promoting sustainable or organic agriculture (PTP 2006).

Coffee: Coffee is an important export product, accounting for 19,206 tons in 2002 (Sakdavong 2005). According to the Coffee Exporters’ Association, in 2004 Lao PDR earned about US$23 million from coffee exports (Sakdavong 2005). The organic Arabica coffee is considered an organic niche product for consumers and retailers in Australia, the EU, Japan and the US. There are currently 28 companies registered under the “Coffee Group” of LNCCI (Sipaseuth 2005) and Sinouk Coffee and Dao Coffee have already had some success exporting to these niche markets. Some coffee is already traded as “Lao Organic Coffee”, but this is done without formal certification. Currently, only Sinouk Coffee exports organic coffee, and is planning to use an international accredited organization (Ecocert) (Sipeuseuth 2005).

Tea: Paksong Green Tea is grown in Boleven Plateau. Lao Farmer's Products Co. exported 50 tons of non-certified organic tea in 2005 to Europe under the Fair Trade Label Max Havelaar (PTP 2006).

Vegetables: The Japan-based Lieu Tou Industry Co. imports around 400 to 500 kgs of organic vegetables per week to Japan from Lao PDR and plans to increase imports to twice a week (Pongkhao 2006). The company grows organic products on 12 hectares of farmland in Xaythany district, Vientiane (Pongkhao 2006).

Section 3:

Conclusions and strategic policy recommendations for the organic agricultural products sector

3.1 Conclusions

"*Is trade good or bad for the environment? The answer is no, trade is not good for environment, nor is it bad for the environment. The actual relationship is too complex to be described by such general truisms. Trade and trade liberalization can in some cases be good for the environment, and in other cases bad, or both at once. The final impacts in any given country will depend on the sector's economic characteristics*." (Cosbey 2004)

Trade liberalization makes evident the potential benefits of increasing value in certain sectors and expanding green niche markets. For the agriculture sector, trade liberalization gives incentive to grow organic to supply export demand. This is a good opportunity for Lao producers, many of which already grow organic produce by default, to access new markets. Even so, Lao PDR has only recently penetrated the organic agricultural products market. The export performance is still under-developed and it might have an undesirable effect. Not enough goods are produced to meet the demand. This problem might generate a move to intensive agriculture with increased use of fertilizers and chemicals that may have a negative impact on the environment. As a result, trade liberalization has to take into account some barriers for export performance for organic agricultural products, such as:

- Irregular supply: Lao PDR still has no capacity to export organic agricultural products with regular supply. Only a few small traders and exporters are active in the organic sector. The products are sold with irregular prices. This is due to a lack of market information on quantity, quality, price and other factors which would allow traders to export competitively.

- Lack of quality control: The country has no system for certification (organic or otherwise); there is neither a certification for geographic origin, nor a laboratory equipped for certification activities. Due to the practice of farmers of not using chemicals (or very little), organic farming is a possible niche market for Lao PDR. Lao PDR does not yet have a certification body for quality assurance systems, such as ISO 9000, ISO 14000 or Hazard Analysis Critical Control Points (HACCP). Moreover, there are no programs to promote ISO, HACCP, Good Manufacturing Practices (GMP) or Good Agricultural Processes (GAP) among producers/processors. Enterprises that want certification are dependent on foreign providers.

- Lack of organic cultivation: The concept of "organic agriculture products" as formally defined by foreign markets was only recently introduced in Lao PDR. The implementation and the technology are still narrow and only few private enterprises have developed organic cultivation and products formally.

- Administrative and transport costs: Being a landlocked country, Lao exporters face additional administrative and transport costs, making it more difficult to compete in the international market. The main competitors in the region presently are Vietnam and Thailand. Small producers, poor infrastructure (roads, processing) and a lack of prior experience in the export market will present a tremendous challenge in the efforts to have products with consistent quality.

3.2 Strategic policy recommendations

The GoL is committed to supporting the development of the organic agriculture sector, and for the future, it is recommended that the GoL and other concerned stakeholders in the agricultural sector consider working together to develop strategy, policies and regulations appropriate to organic agricultural products, including:

- Promoting and organizing “farmers’ groups” - To meet the export demand, Lao producers may consider forming groups to lobby for support of the sector. Establishing farmers’ groups may make it easier for exporters and trade partners to have a contact with producers and also meet the requirements for organic certification.

- Seeking and obtaining “formal organic certification” - The GoL, through relevant agencies like the Ministry of Agriculture and Forestry (MAF), should consider ways of supporting Lao producers to compete in international markets by having a formal organic certification process. The ProRice project is a good initiative and it is recommended that these types of programmes be expanded to new areas and producers, so that the idea of a national certification body for organic products in Lao PDR continues to be explored (Roder et al. 2006).

- Promoting quality assurance systems - Lao PDR has no locally-based certification bodies to carry out export operations with quality control and the application of appropriate standards. There is a need to consider options for addressing this issue, including legislation covering the setting up of an accreditation board and issues related to ISO 9000 and ISO 14000.

- Strengthening supply - While the GoL is trying to resolve the problem of irregular supply by organising farmers’ groups or farmers associations, it is still proving difficult to have the quantity and quality of product to meet the current demand in international markets. It is recommended that the GoL consider developing policy and programmes to support the supply chain for increasing the quantity of organic products sold in domestic and international markets, with premium prices for organic and fair trade products sought in these markets.

- Building a supportive regulative and policy environment - Current policies and regulations related to this sector are inadequate and require urgent strengthening. A key next step for the GoL and the development of the organic agricultural sector is to draft laws and regulations to implement policies for organic agriculture, food safety and food quality assurance. This is a major task which requires the study of international standards and regulations of Lao PDR’s main trading partners, such as ASEAN countries, China, Japan, the EU and the US. Without such regulations, the country may be ill-prepared for participation in international trade following its international obligations.

- Ensuring organic production is environmentally friendly - The above recommendations all support the development of the organic sector with the assumption that organic production is environmentally friendly. However, some negative impacts such as deforestation, protected area encroachment and other land use changes may result. It is therefore important that these impacts are recognized and minimized. Some recommendations include:

    - incorporating environmental and social considerations into the developing regulatory and policy environment in the sector; and
    - Ensure organic standards and certification criteria include key criteria for environmental protection.

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Annex 1: RTEA Matrix for Organic Agricultural Products

Source: IISD & IUCN, 2007 (adapted from IISD & UNEP, 2005).

Category	Driving Force	Pressure	Impacts	Mediating Factor(s)
Scale effect: Trade will lead to increased scale of economic activity.	Increased foreign market access in EU for Lao organic produce.	Increased scale of organic agriculture.	Incentive to grow organic produce to supply the export demand results in increase of land under production with possible increase in deforestation.	GoL policy is developed to promote and support organic agriculture and ensure that it is well planned and sustainably driven. GoL and the private sector ensure that organic production also includes key criteria for environmental protection.
Structural effect: Trade will lead to changes in the structure of the economy, causing the country to make more of the goods it makes well or has in abundance.	Increased market access in EU for Lao organic produce. Lao organic by default and has ability to meet demands.	Increased demand for green/organic products. Potential to increase market share of Lao products.	Incentive to grow more organic produce to supply the export demand results in increase of land under production. Reduced use of chemical fertilizers in organic agricultural production reduces chemicals in the environment.	GoL policy is developed to promote and support organic agriculture and ensure that it is well planned and sustainably driven. The GoL prioritizes organic agriculture over intensive, high-input agriculture.
Technology effect: Traded products themselves have an impact on the environment.	Greater openness to FDI Greater attractiveness for FDI due to foreign market access.	New investment brings in better technology and production processes.	Better technology can improve production processes and help meet organic standards, minimizing the impact on the natural environment.	If the new technology imported is used in a sustainable way, it can reduce environmental impacts.
Structural effect– a substitution effect & **Technology effect**	Increased market access in EU for Lao organic produce Greater attractiveness for FDI due to foreign market access.	New investment brings in better technology and production processes and takes the place of investment that brings heavy input agriculture practices (using chemical fertilizers and pesticides or intensive farming practices).	Investment in organics prevents impacts that can be caused by standard agricultural practices including: • Pollution from chemicals used in production • Introduction of Genetically Modified Organisms into the natural environment • Intensive farming creating large-scale land use change & deforestation.	
Direct effect: Direct environmental effects are caused by the very fact that trade is occurring.	Increased trade flows, economic activity	Increased exports of organic agricultural products result in increased road infrastructure and air and road transport to get produce to markets.	Habitat loss from infrastructure construction. Contribution to land-use issues related to climate change.	
Regulatory effect: Trade will affect the national regulatory environment.	Standard international investment agreements.	Seeking and obtaining international certifications of organic production.	Increased non-tariff barriers in export markets on Lao products. Deceased competitive advantages for Lao products.	Domestic regulation is not yet appropriate for organic agriculture means increased export barriers. Need capacity to increase number of certified farmers.

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Environmental Impacts of Trade Liberalization in the Medicinal Plants & Spices Sector, Lao PDR

by Kongmany Sydara*

Introduction

The potential biomedical validity of traditional medicines has attracted growing attention and discussion in recent years, particularly in response to the adoption of the 1992 Convention on Biological Diversity (CBD 2007). Consequently, this has led to an intensified focus on biodiversity-rich countries by many institutions that come bearing sophisticated technologies in search of new biologically active chemical compounds to be developed into drugs for clinical use.

Many groups of people use and rely on medicinal plants in Lao PDR, from individuals to commercial companies. Some processing companies focus on selected medicinal and aromatic plants, such as *Coscinium* spp and *Aquilaria* spp. *Coscinium* is a well-known plant in Lao PDR because of its broad medicinal properties, including use as an antioxidant and as an antiseptic. *Coscinium* is also the main source of berberine which is good for the treatment of diarrhoea and dysentery. *Aquilaria* or Agarwood is a raw material used for the distillation of Agarwood oil, an aromatic oil popular in the Middle East.

Farnsworth et al. (1985) found that approximately 60-80 percent of the world's population still depends on traditional knowledge and medicines for the treatment of common ailments and diseases. In recognition of the usefulness of traditional medicines, the Government of Lao PDR (GoL) has established the Traditional Medicine Research Centre (TMRC) under the Ministry of Public Health to study and incorporate the use of medicinal plants and traditional Lao medicines into the modern healthcare systems of Lao PDR (Libman et al. 2006). The TMRC has found that traditional medicines in Lao PDR include predominantly herbal medicines, and to some extent oils used for aromatherapy, massages and saunas (Sydara et al. 2005). A list of commonly-traded wild medicinal plants of Lao PDR can be viewed in Annex 1. Growth in the traditional medicines sector has been fuelled largely from international demand, particularly to countries such as China, Vietnam and Thailand (MoIC & ITC 2006).

The influence of the market economy on the trade and use of medicinal plants is growing year by year. The future accession to the World Trade Organization (WTO), Normal Trade Relations established with the United States, Generalized System of Preferences privileges from the EU, and free trade and economic integration in ASEAN are creating opportunities for Lao PDR to export medicinal plants and spices with larger market share (MoIC & ITC 2006). The influence of these changes on the medicinal plants sector is reflected in the increased production of traditional medicines in pharmaceutical factories (both in the public and private sectors). For instance, experts at the TMRC have observed that the number of traditional medicine products produced by the Pharmaceutical Factory No. 2 of the Ministry of Public Health has increased significantly in recent years (TMRC 2007). This growing demand, coupled with Lao PDR's rich medicinal plant resources, are among the key factors that have led to the identification of this sector in the *National Export Strategy 2006-2008* (MoIC & ITC 2006) as a key growth sector for trade.

The development of medicinal plants and spices for export can help to generate increased income among farmers, reduce poverty, stimulate entrepreneurship, and create a favourable business environment to integrate into the global marketplace. However, at the same time, this significant

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expansion requires significant resources and has raised some concerns about the inappropriate and unplanned use of medicinal plants, leading to the diminution of the richness of the country's biodiversity.

This paper will provide a history on Lao PDR's use and trade of traditional medicines, with support of a number of case studies, and suggest measures to be taken to ensure the sustainable use of Lao PDR's natural resources for the harvesting of traditional medicines and spices.

Section 1:

Overview of the medicinal plants and spices sector

1.1 Status of medicinal plants and spices

Lao PDR's floral resources are commonly viewed as plentiful and rich in diversity, with an estimated 8,000-11,000 flowering species (MAF & STEA 2003). There is however a lack of scientific information that describes in detail this resource (CBD 2007). Taxonomic works of the Lao's flora began at the start of the 19th century, with the work of the "Flore Générale de l'Indochine" (1907-1951) and the "Flore du Cambogde, du Laos et du Viêtnam" volumes compiled by Petelot (1952; 1953; 1954). These volumes list around 1,350 plant species, of which about 600 species are found in Lao PDR. Since 1975, some institutions have carried out surveys on medicinal and aromatic plants; twenty-nine of the most commonly-used wild medicinal and aromatic plants are listed in Annex 2 (MAF & STEA 2004; TRMC 2007) with those plants used for the distillation of essential oils listed in Annex 3 (Vasist & Vishavjit 2003).

The majority of these resources are still collected from the wild, and this collection is supposed to be carried out in compliance with annual quotas set by the Ministry of Agriculture and Forestry (MAF) and outlined out in the working draft of the *National Export Strategy for Lao PDR 2006-2008: Sectoral strategy for medicinal plants and spices* (see Annex 4) (MoIC & ITC 2006). In addition to harvesting from the wild, a small but growing percentage of medicinal plants is also cultivated (see Annex 5). For example, agarwood plantations have been booming in recent years and can be found in many provinces, such as Savannakhet, Bolikhamxay and Vientiane.

1.2 Use of medicinal and aromatic plants

In Lao PDR, traditional remedies have a long-standing history in many communities, and continue to provide useful tools for treating diseases (Baird 1995; Southavong 1997; Condominas 1998). The use of traditional medicines and medicinal plants continues to be an important part of the culture of Lao communities, and will be for many years to come, in response to the steady growth in international export demand for medicinal products. The GoL recognizes the value of traditional medicine and has implemented a number of policies to support and encourage the application and use of traditional medicines and spices both in the public and private sectors.

1.3 Overview of environmental concerns in the sector

Lao PDR is consciously working to liberalize its economy, but suffers from a worsening trade imbalance, external debt and growing account imbalance. In response, the GoL supports all sectors with the potential to produce for export. Trade, however, can have complex and wide-ranging impacts (IISD & IUCN 2007). Prior to the new trade promotion policy of the GoL, the impacts of activities dealing with medicinal plants and spices on the environment were minor, because the scope of the activities at that time covered a very limited area. Since 1986, the impact of the market economy on the use of medicinal plants has increased year by year, with medicinal plants harvested not only for domestic consumption, but also for the international market (MoIC & ITC 2006). Insufficient planning and the inappropriate use of this valuable resource, could lead to a severe reduction in the country's biodiversity. TMRC staff have observed that some important medicinal plants such as *Coscinium* sp. and the rare orchid species *Anoectochilus* sp. are under threat. Already *Coscinium* sp. processing factories in the north have to move further south in response to the decreasing availability of this resource. *Anoectorchilus* sp., which

is usually exported to markets such as China and Japan, is becoming harder to source from the forests. There is a need to strengthen current laws and regulations, and their implementation, to ensure the protection of this vital resource bank, and the natural environment which supports it.

1.4 Policy and regulatory framework for the medicinal plants and spices sector

All GoL policies now refer to the eradication pf poverty as their primary objective, as outlined in the *National Growth and Poverty Eradication Strategy* (NGPES) (GoL 2004). The value of medicinal plants to the livelihoods of local people is clearly stated in this strategy. So too is the GoL's decision to promote cooperation between traditional medicine and modern medicine. Key policy decisions include the promotion of traditional medicine for local consumption and research into expanding its use; cooperation with trading partners to develop local production and export; and the development of the law for the protection and management of medicinal plants, as outlined in the GoL most recent strategy, the *National Export Strategy 2006-2008: Medicinal Plants and Spices* (MoIC & ITC 2006). This Strategy identifies the medicinal plants and spices sector as having key growth potential, and thus the potential to meet poverty reduction and development targets.

Due to the nature of medicinal plants and spices, other key policies and regulations are outlined in the health, forestry and agriculture sectors. These include:

The health sector (Ministry of Health)

- Law on Drugs and Medical Products, 01/NA, 8 April 2000 - This law defines principles, rules and measures relative to the management of cultivation, growth, protection, exploitation, production, importation, exportation, distribution, possession and use of drugs and medical products, in order to ensure the availability of high-quality, safe and appropriately-priced drugs and medical products for preventing and treating diseases and ensuring good health for the population. Article 2 stipulates that the State should promote the development of medical resources by cultivation, growth, protection, exploitation, purchase, research, preparation and production of modernized drugs and traditional medicines to be used locally, to substitute imports and to be exported. Article 3 notes that the State should widely promote the production and the use of modernized drugs in combination with traditional medicines in preventing and treating diseases.

- Decree No. 155 of the Prime Minister, 30 September 2003 - This Decree defines measures related to the promotion, management, exploitation, production, growth, and use of natural resources to protect the country's medicinal natural resources and rich biodiversity, and to ensure the sustainable use of medicinal natural resources. The Decree classifies medicinal plants in three categories: Category I encompasses rare and endangered species, Category II includes species that have a high commercial value and can be used for domestic consumption and for exportation, and Category III covers plant species that are available in abundance throughout the country. For harvesting and collection of medicinal plants in Category 1, approval of the Ministry of Health and other competent authorities is required. For Category 2, harvesting and exploitation are also to be certified by the Ministry of Health and concerned authorities, but can be obtained by providing a management plan for harvesting and replanting. The exploitation of Category 3 plants is not restricted since they are abundantly available in nature. However, the classification is not static. The plants in Categories 2 and 3 may be put in Category 1 in the future if management is inadequate.

The forestry sector (Ministry of Agriculture and Forestry)

- The forestry sector, which in turn is integral to the medicinal plants and spices sector, also provides important guidance to the sustainable growth of this sector. Important goals of the forestry sector include the alleviation of poverty, increasing the forest area from the current coverage of approximately 40 percent to 70 percent (MAF 2005), protecting the environment and making sustainable use of the country's natural forests.

- Forestry Law, 13/NA, 9 April 2005 - This law defines the basic principles, rules and measures related to the management, protection and use of natural resources and forestry land. It promotes

the rehabilitation, growth and extension of natural resources in the Lao PDR to ensure a balanced environment and sustainable forests and to protect water resources, prevent soil erosion, protect biodiversity and the environment, and contribute to the socio-economic development of the country.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

Current trade liberalization policies implemented by the GoL are opening up new possibilities for international trade of medicinal plants. Over the last decade, several products have been exported to neighbouring counties, Europe, Japan and the United States. The increasing demand in these foreign markets is spurring increased harvesting and production of medicinal plant and spice resources in Lao PDR.

Trade can provide many benefits to Lao PDR, particularly in the economic sector. Trade in forestry products in 2001 contributed 3.2 percent of the GDP and 25 percent of the total national export value, contributing substantially to the Lao PDR national budget (MAF 2005). Forestry also provides employment and fosters relationships for the transfer of knowledge and new technologies and management systems (STEA & UNEP 2006). On the other hand, forestry, if not managed appropriately can have significant negative impacts on Lao PDR's natural environment, and ultimately the Lao economy that is largely dependent on natural resources. Unsustainable harvesting of forest products leads to a loss of biodiversity, as well as associated deforestation affects such as increased production-related pollution, including air, water and soil (STEA & UNEP 2006). If not managed properly, these issues will ultimately have negative impacts on the environment, economy and livelihoods Lao PDR people.

2.1 Analysis of the impacts of increased trade in medicinal plants and spices on the natural environment

It is predicted that due to this foreign demand and national government policies for growth, this sector will continue to grow, and subsequent demand on the natural resource base will continue to increase. Determining and understanding the potential impact on natural resources is key to the sustainability of the sector and Lao PDR's environment as a whole.

An analysis of impacts of this situation requires the examination of numerous linkages between trade and environment. The *Trade and Environment Handbook* (IISD & UNEP 2005) outlines four categories of physical and economic impacts on environment and development resulting from trade flows and trade liberalization, including scale, structural, product (technology) and direct effects. Further information on these categories can be found in Annex 6. These categories, coupled with key environmental concerns sourced from the GoL's Environmental Performance Assessment (EPA) report (STEA & UNEP 2006) are listed in Table 1. This Table provides a useful platform for the analysis of the potential impacts of increased trade and investment, and highlights some of the potential impacts, including land clearance, increased cultivation, over-harvesting, destruction of natural habitat and loss of biodiversity; potentially leading to increased water consumption, erosion, more intensive use of chemical fertilizers and pesticides and pollution.

Table 1: Matrix illustrating the linkages between trade and environment in the medicinal plants and spices sector

Category	Driving force	Pressure	Impacts on natural resource	Mediating factors	Example
Structural effects - Trade can lead to changes in the composition of an economy, causing it to produce more of the goods it makes well or has in abundance and less of those it does not.	Increased foreign market demand for medicinal plants and spices (see Annex 1).	Increased demand for cultivation and plantation land to supply medicinal plants and spices.	Demand for land leads to decreased natural forest areas; Cultivation of invasive species may threaten indigenous species and lead to a decline in biodiversity; Selection of key species may lead to the opening and harvesting of new forests.	Specific plans for cultivation and sustainable harvesting are developed and implemented widely.	See example below: Distillation of Essential Oil from Aquilegia wood (agarwood)
Product effects (also known as technology effect) - Traded products themselves can have an impact on the environment.	Greater openness to FDI	New investment brings new technologies for cultivation that increase yield or efficiency of processing.	Reduced consumption of raw materials from the wild and energy inputs; reduced polluting emissions (air, water, soil) per unit of output.	If the environmental regulatory regime is strong and promotes good technology, it increases the odds that any new technology imported will be the best available.	See note below on certified sustainable harvesting or ecologically-sound cultivation.
Scale effects - Trade leading to expanded levels of economic activity can have positive impacts in terms of the wealth it creates or negative impacts in terms of increased scale of production without appropriate control.	Increased foreign market access from lowering tariffs and non-tariff barriers. .	Increased scale of production of medicinal plants and spices.	Increased wild harvesting and, in turn, pressure on natural resources; Increased cultivation and pressure on land, water resources.	If the environmental regulatory and policy regime is adequate there is little negative effect – including scientific information on the resource and sustainable harvesting or cultivation plans implemented, and/or private sector ensures sustainability of resource extraction.	See example below: unsustainable extraction of berberine.
Structural effects - Trade can lead to changes in the composition of an economy, causing it to produce more of the goods it makes well or has in abundance and less it does not.	Increased foreign market access from lowering tariffs and non-tariff barriers.	Increased demand for “green” goods such as organically cultivated or sustainably harvested medicinal plants leads to more environmentally sound cultivation and production techniques and sustainable harvesting.	Reduced consumption of raw materials and energy inputs; Reduced polluting emissions (air, water, soil).	If the private sector is aware of the value of catering to this market, certification can prove to be a powerful tool in sustainable development of this sector.	See note below on certified sustainable harvesting or ecologically-sound cultivation.

Source: Adapted by the author from IISD & UNEP 2005.

The analysis also highlights the potential for importing better technology and better processes which could reduce impacts on the environment. The analysis also indicates that if an appropriate and well-implemented policy and regulatory environment exists, the growth of the medicinal plants and spices sector in Lao PDR can be sustainable, and can bring many benefits to the country and its people.

With this in mind, it is important to note some of the threats that the sector is facing at present, including:

- No systematic and scientific approaches to harvesting;
- No specific plans for cultivation;
- No strict enforcement of laws and regulations;
- Weak collaboration amongst concerned authorities, between central and local authorities, and between public and private sectors; and
- Limited awareness among rural people on the preservation of biodiversity.

2.2 Case studies in the medicinal plants and spices sector

The following case studies focus on the trade in *Coscinium* sp. and *Aquilaria* sp. The example of trade in *Coscinium* sp. shows some of the impacts of unsustainable harvesting. In contrast, the trade in *Aquilaria* sp. is a good example of how an industry is using cultivation to ensure the sustainability of the natural resource upon which it relies. Finally, the example of certification of medicinal plants in Nepal is highlighted as an interesting tool being used to protect the resource.

Unsustainable extraction: berberine

According to surveys in the previous years (TMRC 2007), numerous factories in many provinces (such as Bolikhamxay, Luang Prabang, Huaphanh, Khammuane, Savannakhet and Xekong) are extracting berberine from the liana of *Coscinium* sp. (see photos in Annex 7). These factories are mostly run by Lao PDR companies, as well as foreign companies from China and Vietnam. These factories can buy materials from local villagers at a price of around 500 to 1,000 Kip per kilogram for raw *Coscinium* sp., or US$10-20 per kilogram, depending on the quality, and export a large quantity into China (TMRC 2007). The demand for berberine is increasing year by year, with the demand for medicinal plants estimated at around US$14 billion a year, with a projected rise to US$5 trillion by the year 2050 (MoIC & ITC 2006). At present, China is one of the biggest trading partners of ASEAN countries. Plans and negotiations are underway between China and Lao PDR for the China-ASEAN FTA that will take effect in 2015 (CPI & UNDP 2006). It is expected that demand for medicinal plants and spices will further increase as a result of ASEAN.

With increased demand for produce also comes increased pressure on the environment as a result of over-harvesting. Species such as *linana* are collected from the forest by local villagers. Sometimes villagers collect not only the liana, but the roots as well (TMRC 2007). This method of collection can be very destructive, dramatically impacting on the biodiversity of the forest as well as threatening the survival of the species. With an increased demand in plant products, care needs to be taken in the way in which this material is harvested in order to meet the demand.

Cultivation: the distillation of essential oil from aquilaria wood (agarwood)

Activities dealing with the distillation of agarwood (*Aquilaria* sp.) have been implemented in many provinces throughout Lao PDR, including a factory in Pak Ka Ding District of Bolikhamxay province which has been used by the TMRC as a case study. A summary of the case study has been provided below (TMRC 2007):

- So far, the raw material for distillation has been collected from the wild. The factory pays 2,000 Kip per kilogram of agarwood.
- At present, the factory has 30 distillation units. In the future, the plan is to extend the capacity of the factory to up to 100 distillation units.
- For each batch of distillation, about 60-70 kilograms of the coarse and dried powder of agarwood are used. The distillation lasts for seven to nine days before collecting the essential oil from the

surface of the distillate by hand. Annex 8 shows the photos of the distillation unit and the essential oil from agarwood.

- If the quality of the wood is good, it is possible to extract 360 ml of essential oil from 30 units.
- The price of the oil depends on its quality. The solid oil is worth US$1,200-1,350 per 360 ml, while liquid oil is worth US$2,970-3,200 per 360 ml.

Besides the factory in Bolikhamxay, there are also other factories in other provinces. The need for raw material will increase as the demand for this kind of oil increases. According to the owner of the Bolikhamxay factory, the main buyers are from Arabic countries, who will come to the factory when the oil in stock is at about 1-1.5 litres, and there is currently increased demand for overseas, and factories are expanding in response to this demand (TMRC 2007). Agarwood is not only used for domestic processing, but also for export (Sundara 2006). From 2009, two Lao companies Lao Asian Ecology Public Co. Ltd. and Khamphay Sana Agriculture Co. Ltd., expect to export at least 2,000 tons of raw agarwood to Brunei per year under an agreement with the Brunei Kyarikat Khasana Permamta Hijua Company in February 2006 (IUCN & TRAFFIC 2006).

Fortunately, many companies and individuals have made efforts in recent years to maintain a sustainable supply of agarwood for domestic processing and for exportation, such as through:

- Propagation and *ex situ* conservation of *Aquilaria* sp. by plant tissue culture.
- Propagation and *ex situ* conservation of *Aquilaria* sp. by seeds.

The trade of this species is a good example for the sustainable production of natural forest products, however there are some concerns regarding the agarwood business that should also be noted:

- Plantations should be located on unused land to avoid negative environmental impacts on the landscape. Trees should not be cut down and the land cleared for the cultivation of agarwood.
- The GoL should be closely involved in this business in order to have regular and sustainable market supply.

A note on certification, environmentally-friendly cultivation and sustainable harvesting

In recognition of the negative impacts of the unsustainable supply of raw material from the wild, the GoL promotes the cultivation of medicinal plants for export. Cultivation of medicinal plants will not only help to conserve natural resources, but can also contribute to the socio-economic development of the country. Many foreign companies started to invest in cultivation, such as the plantation of *Styrax tonkinensis* P., *Orthosiphon stamineus benth*, *Dendrobium* sp., *Aquilaria* sp., *Amomum* sp., and Eucalyptus sp. These activities are still at the primary stage and more efforts should be put into this sector.

While the cultivation of medicinal plants can help provide a sustainable resource for the medicinal plants and spices sector, various issues such as deforestation, loss of biodiversity (monocropping) and land/water pollution (use of chemicals to cultivate) should be noted. Similarly, harvesting of medicinal plants from the wild should not be considered negatively if the resource is properly understood and management for sustainable harvesting is robust.

One option to ensure the sustainability of medicinal plant resources, in addition to government policy and regulation, is certification (Schippmann, Leaman & Cunningham 2002). As seen in Table 1, Foreign Direct Investment (FDI) has the potential to bring better technology (the technology effect) and methods of production from abroad. In terms of medicinal plants, this could mean the introduction of organic (and environmentally) certified cultivation techniques or certified sustainable harvesting.

One example of certification is coming out of Nepal where the Nepali Non-Timber Forest Product Promotion Alliance made up of corporations, government and non-profits have secured Forest Stewardship Council certification from the Rainforest Alliance/Smart Wood for a number of medicinal

plants. This is now being used as a means of protecting the wild resources and also enabling the group to tap into high-value niche markets abroad (Subedi 2006).

Section 3:

Conclusions and strategic policy recommendations for the medicinal plants and spices sector

3.1 Conclusions

The GoL has set the goal to graduate from the status of a least-developed country by 2020, which will require efforts by the public and private sectors. The non-timber forest products and medicinal plants and spices as a subsector contribute greatly to reaching this goal. For instance, in 2003 the export value of Gum (*Styrax tonkinensis*) alone was US$1.2 million (MoIC & ITC 2006).

To address the threats listed in Section 2.1 is a significant challenge for the country as a whole and will require a better understanding of how to manage socio-economic development activities and to minimize the environmental impacts that might occur. Many factors might threaten the sector's ability to contribute to poverty alleviation while ensuring environmental sustainability:

- Bad management of the sector;
- Risk of over-reliance on medicinal plants and spices as a source of income for rural people;
- Slow development in remote areas;
- Weakness in laws and regulations enforcement; and
- Low participation of local communities.

In the coming years, trade in medicinal plants will continue to play an important role as part of the measures for poverty eradication in rural areas. Many local people, particularly in remote areas, earn money only from selling these products and also rely on them as their only affordable source of medicine. Wildlife trade involves a large domestic trade for food and medicine and a substantial international trade for different purposes, including traditional medicine, food and trophies. At the same time, the activities dealing with harvesting of these medicinal and herbal NTFPs represents another threat to our environment. As development proceeds, roads are constructed, forests are converted to other land uses and natural habitats are more extensively exploited. Therefore, those rural people will be facing a shortage of natural resources if there are no appropriate measures to fight against these environmental threats. With the national population estimated to reach 8.3 million in 2020 (MAF 2005), effective and efficient sustainable management of resources, and of the sector as a whole, must be the goal of the GoL in the process of development.

3.2 Strategic policy recommendations

The goal of the GoL is to ensure the sustainable growth of the medicinal plants and spices sector through cultivation, sustainable harvesting, and value adding in processing and marketing (MoIC & ITC 2006). Recommendations have been made below for the improved sustainable use of medicinal plant resources in Lao PDR:

- Collaborate with neighbouring countries on the conservation of bordering protected areas and control of illegal trade in wildlife and prohibited plant species. This not only helps to protect rare and endangered species, but contributes to the implementation of Convention on International Trade in Endangered Species (CITES) principles as well. Activities could include: pilot projects in collection sites on sustainable harvesting and fair market access in accordance with CITES regulations; and improved customs processes (through trainings on enforcement of legislation) at the border.

- Work towards more scientific and community-orientated management of forest resources inorder to generate timber and non-timber forest products at sustainable levels. This could be done by pilot work at the district level with local communities, and co-management agreements in and around protected areas that provide access for sustainable NTFP collection.

- Improve statistics on resource harvesting and exporting to guide future policy in the sector. The first step in the process should be to gather responsible agencies, increase collaboration and define roles and responsibilities.

- Develop and enforce laws and regulations related to the forestry sector as a whole, and especially to non-timber forest products. For example, the MAF has outlined harvesting quotas for specific medicinal plants, yet they are not properly adhered to. Ensuring the implementation and enforcement of such policy and laws would benefit the sustainable growth of the sector.

- Identify appropriate measures for improving awareness on environmental impacts for rural communities. This could be done by increased scientific research about collection methods and education for local communities on the importance of conservation and methods of conserving resources. The TMRC could be supported to continue work on medicinal plant reserves that provide better information on local resources, and opportunities for learning and raising awareness about these resources.

- Improve the quantity and quality of the exported medicinal plants and spices to meet the demands of foreign markets, through:
  - strengthening infrastructure, especially the construction of laboratories for quality control of exported raw and processed materials;
  - enhancing research and development, marketing and certification;
  - training personnel in taxonomy and photochemistry;
  - drafting new laws and regulations, especially for the protection of property rights and traditional knowledge of the country. Particular attention should be paid to legislation to enforce the Convention on Biological Diversity. This would include access and benefit sharing under the Bonn Guidelines, so that communities and the country can benefit from any potential commercialization of traditional medicinal plants (CBD 2007).

- Encourage the private sector to consider the environmental impacts of unsustainable harvesting and unplanned cultivation, and their responsibility for gaining permission from the country to bio-prospect, with assurance of access and benefit sharing of any commercialized products from traditional medicines and herbs, including the possibility of:
  - working with the GoL and civil society to explore the option of certification. An initial scoping study could be completed on the opportunities and current status of certification in the medicinal plants and spices sector in Lao PDR and abroad.

- Gain the full support of the private sector in addressing environmental concerns by establishing incentives including the possibility of:
  - lowering taxes for a period of time for the plantation of medicinal plants and spices dedicated to export in an effort to reduce the unsustainable harvesting of wild plants;
  - lowering the cost of the unused land that could be used for plantations;
  - ensuring market access for natural Lao products in export markets; and
  - reducing bureaucratic barriers to doing business in the sector.

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Annex 1: Commonly traded wild medicinal plants of Lao PDR

Source: Data from Traditional Medicine Research Centre

Number	Lao name	Scientific name
1	Chan Dai	*Dracaena cambodiana* P
2	Dok pheuang	*Dendrobium* spp
3	Duk Deua	*Amorphophalus* spp
4	Hao Pao Pet, Hao Tom Ngeun	*Stephania* sp
5	Het Pek	
6	Hoa Sam Sib	*Stemona tuberosa* Lour.
7	Ka Xao Phi Mod	
8	Kan Nam Man I Tou Ton	Distillation of *Cinnamomum camphora* oil
9	Kan Nam Man Pek	Distillation of *Pinus* oil
10	Ket Sa Na	*Aquilaria* spp
11	Kheua Hem	*Coscinium* spp
12	Kheua Tib Ti	
13	Khing Pha	*Polygonatum* sp
14	Kout Tin Houng	*Helmintostachus zeylanica* (L.) Hook.
15	Mak Chong Ban	*Sterculia lychnophora* Hance
16	Mak Kha	*Alpinia galangal* L.
17	Mak Kham Pom	*Phyllanthus emblica* Linn.
18	Mak Neng	*Amomum* spp
19	Mak Nhor Ban	*Morinda citrifolia* L.
20	Mak Nho Pa	*Morinda tinctoria* Roxb.
21	Mak Seng Beua	*Strychnos nux-vomica* L.
22	Man Kha Kai	*Codonopsis* sp.
23	Man On Ling	*Polygonum multiflorum* Thunb.
24	Nam Man I Tou Ton	*Cinnamomum camphora* oil
25	Nhan	*Styrax tonkinensis* P.
26	Pit Pi Khao	*Plumbago zeylanica* L.
27	Tin Pet	*Alstonia scholaris*
28	Teu Khang, Xeum Khang	
29	Toum Ka Deng	*Strychnos nux-vomica* L.
29	Van Bai Lay	*Anoectochilus* spp
30	Xeum pha	
31	Ya Hoa	*Smilax glabra* Roxb.

Annex 2: Commonly used medicinal and aromatic plants

Source: Data from Traditional Medicine Research Centre

Number	Lao names	Scientific name
1	Chan Dai	*Dracaena cambodiana* P.
2	Chong Ban	*Sterculia lychnophora* Hance
3	Chi Nay Kom	*Adenosma capitatum* Benth.
4	Dok Feung	*Dendrobium* spp
5	Fang Deng	*Caesalpinia sappan* Linn.
6	Fek Hom	*Vetiveria zizanoides* (L.)Nash.
7	Hat Mi	*Artocarpus lakoocha* Roxb.
8	Hoa Sam Sib	*Stemona tuberose* Lour
9	Iane Done	*Osbeckia chinensis* L.
10	Khe	*Cinnamomum* spp
11	Kheua Hem	*Coscinium* spp
12	Khing Kheng Pa Kang	*Homalomena aromatica* Schott
13	Khing Pha	*Polygonatum* spp
14	Kong Sa Den	*Croton* sp.
15	Khom La Van Chor	*Evodia lepta* (Spreng) Merr.
16	Kout Tin Houng	*Helmintostachus zeylanica* (L.) Hook.
17	Mak Neng	*Amomum* spp
18	Mak Nhor Ban	*Terminalia citrifolia* L.
19	Mak Nhor Pa	*Morinda tinctoria* Roxb.
20	Man Kha Kai	*Codonopsis* sp.
21	Man On Ling	*Polygonum multiflorum* Thumb.
22	Seng Kham Ton	*Terminalia nigrovenulosa* P.
23	Si Khai Ton	*Litsea cubeba* (Lour.) Pers.
24	Som Mor	*Terminalia chebula* Retz.
25	Song Fa	*Clausena harmandiana* P.
26	Tin Pet	*Alstonia scholaris* L.
27	Tom	*Stephania* spp
28	Ya Hoa	*Smilax glabra* Roxb.
29	Yik Bo Thong	*Eurycoma longifolia* Jack.

Annex 3: Essential oil distilled at the Traditional Medicine Research Centre

Source: Data from Traditional Medicine Research Centre

Lao name	Scientific name	Essential oil yield (%)
Khar	*Alpinia galangal* (L.) Willd.	0.10
Khe hom	*Cinnamomum cassia* Bl.	0.05
Khi hoot (fruit)	*Citrus hystrix* DC.	0.40
Khi hoot (leaf)	*Citrus hystrix* DC.	0.78
Khi Min	*Curcuma longa* L.	0.32
Khing	*Zingiber officinale* Rosc.	0.10
Long leng (wood)	*Cunningghamia sinensis* R.Br.	0.60
Mak Khen	*Zanthoxylum nitidum* (Roxb.) DC.	1.90
Nad Hom Bay Noy	*Artemisia annua* L.	0.05
Nam Man Khieo	*Eucalyptus globules* Labill.	0.92
Phak See	*Foeniculum dulce* Mill.	0.60
Pek	*Pinus kesiya Royle* ex Gordon	2.50
Sab Heng	*Hyptis suaveolens* Pour.	1.00
Sa La Nat	*Mentha arvensis* L.	0.35

Sa Phao Lom Khao	*Ocimum bacilicum* L.	1.00
Si Khai Kheuang	*Cymbopogon citrates* (DC.) Stapf	0.75
Si Khai	*Cymbopogon nardus* (L.) Rendle	0.62

Annex 4: Quotas of wild medicinal plants for the year 2004-2005

Source: MoIC & ITC 2006

No.	Scientific name	Product	Quotas (tons)
1	*Amomum ovoideum* P.	Dried seeds	1,015
2	*Styrax tonkinense* P.	Dried resin	55
3	*Coscinium usitatum* Pierre	Dried liana	3,040
4	*Dracaena cambodiana* Pierre ex Gagnep.	Dried Red lignified core	15
5	*Sterculia lychnophora* Hance	Dried fruit	450

Annex 5: Some cultivated medicinal plants

Source: Data from Traditional Medicine Research Centre

No.	Lao name	Scientific name
1	Khing	*Zingiber officinale* Roscoe.
2	Khi Min Kheun	*Curcuma longa* L
3	Ket Sa Na	*Aquilaria crassna* Pierre
4	Mak Deuy	*Coix lachrymal-jobi* L.
5	Mone	*Morus alba* L.
6	Nat Hom Bay Noy	*Artemisia annua* L.
7	Nha Nouat Meo	*Orthosiphon stamineus* Benth.
8	Nhane	*Styrax tonkinensis* P.
9	Phak Nok	*Centella asiatica* Urban
10	Phak Boua Leuat	*Eleutherine subaphylla* Gagnep.
11	Ra Sa Bi, Sam Phan Bi	*Andrographis paniculata* (Burm.f.) Wall. Ex Nees
12	Van Hang Khe	*Aloe vera* L.
13	Van Hoa Deo	*Curcuma xanthorrhiza* Roxb.
14	Van Phai	*Zingiber cassumunar* Roxb.
15	Kao Bok	*Catharanthus roseus* G.Don

Annex 6: Trade and environmental effect

The *Trade and Environment Handbook* outlines four categories of physical and economic impacts on environment and development resulting from trade flows and trade liberalization (IISD & UNEP 2005):

Scale effects - Trade leading to expanded levels of economic activity can have positive impacts in terms of the wealth it creates - the ability of people to acquire new and more environmentally-friendly technology or raised level of environmental concern of people with fewer basic livelihood concerns; or negative impacts in terms of increased scale of production without appropriate control, increasing use of natural resources, and in turn increasing impacts such as the unsustainable use of resources and pollution.

Structural effects - Trade can lead to changes in the composition of an economy, causing it to produce more of the goods it makes well or has in abundance and less of those it does not. An economy may change so that less polluting sectors dominate, labour-intensive industries may provide employment and wealth (see scale effect) and the demand for green goods may result in the composition of certain sectors being geared solely towards these markets. On the other hand, if the goods a country produces are more resource-intensive, polluting, and contribute less to development objectives, trade, if guided poorly can have significant adverse impacts on the environment.

Product effects (also known as technology effects) - Traded products themselves can have an impact on the environment. Positive effects may include investment in newer, more efficient and cleaner technology, or the rapid adoption of goods that have less environmental impact that those being used. Conversely, the product effect can be negative, such as foreign investment in cheaper but polluting technology and the transfer of poor management practices to the country.

Direct effects - Direct effects are those environmental impacts caused by the very fact that trade is occurring, for example pollution caused by the transportation of goods.

Annex 7: Extraction of berberine from *Coscinium spp*

Raw material (Coscinium *spp*)

Grinding of raw material

Maceration of raw material

Drying of crude berberine

Annex 8: Local method for the distillation of Agarwood oil in Pak Ka Ding district

Maceration of agarwood

Distillation apparatus

Solid form of oil

Liquid form of oil

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Environmental Impacts of Trade Liberalization in the Biodiesel Sector, Lao PDR

by Phaychith Sengmany*

Introduction

The Lao People's Democratic Republic (Lao PDR) is a landlocked country in Southeast Asia that borders with China, Myanmar, Vietnam, Thailand and Cambodia. Lao PDR is one of the 42 least developed countries in the world. With limited natural mineral and oil resources, Lao PDR relies on imports of fuel for transport and industry. The recent rise in crude oil prices and the rapidly growing demand for oil in China have highlighted the importance of developing an efficient energy policy, including alternative energy sources. Given that Lao PDR is landlocked, it is particularly vulnerable to dependence on external energy sources. In this context, the need to explore new and environmentally-friendly alternatives to external energy sources has become even more important.

The production of biodiesel in developed and developing countries has been increasing in recent years and is likely to continue expanding at a rapid rate through the end of this decade as planned capacity comes on stream (Steenblik 2006). A recent Organization for Economic Cooperation and Development (OECD) analysis of biofuels notes that "in many cases the choice of feedstock, particularly oils from tropical plants, available to developing countries means that they can produce biodiesel at lower cost than the fuel can be produced elsewhere" (Steenblik 2006). The OECD analysis outlines that domestic government policies are necessary to contribute to a faster rate of substitution of a relatively clean-burning fuel for petroleum diesel and ensure that environmental safeguards are in place.

Trade and environment are intrinsically linked and no less in Lao PDR where trade is highly dependent upon the country's wealth in natural resources. Lao PDR has recently joined the Association of Southeast Asian Nations (ASEAN) and consequently has taken on commitments to liberalize its economy through the ASEAN Free Trade Area (AFTA). The Government of Lao PDR (GoL) is also preparing for accession to the World Trade Organization (WTO), which includes myriad requirements to increase economic efficiency and open up the economy to competition as the country integrates into the multilateral trading system.

This paper provides an overview of the biodiesel sector in Lao PDR in light of increasing trade liberalization with its key trade partners. It seeks to explore the potential positive and negative environmental effects of trade liberalization in this sector, with the aim of flagging key environmental impacts that should be considered in trade negotiations. It should be noted from the outset that one of the primary purposes of switching to locally-produced biofuel sources in Lao PDR is to reduce dependence on imports of oil. For example, as tariffs on fuel imports are reduced through trade liberalization, the domestic biofuel sector will have to be increasingly efficient in order to compete with cheaper fuel imports.

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Section 1:

Overview of the biodiesel sector

1.1 What is biodiesel?

Biodiesel is defined by the World Customs Organization (WCO) as “a mixture of mono-alky esters of long-chain (C16-18) fatty acids derived from vegetable oils or animals fats, which is a domestic renewable fuel for diesel engines.” The GoL plans to designate approximately two million hectares of land for the development of biofuel feedstock plantations in an effort to produce sufficient biofuels by 2020 to replace the contribution of imports to the country’s total fuel consumption (GoL 2004). There are many types of plants that can be used to produce biofuels, for example the original diesel engine was operated on peanut oil. A number of crops are grown in Lao PDR that would be suitable as a potential source for biodiesel, including jatropha, soybean, palm and coconut. Corn, rice and coffee are also used for ethanol biodiesel production. Each of these raw materials has advantages and disadvantages in being used as a source of biodiesel, some of these are discussed below:

- **Coconut** - Coconuts grow well in Lao PDR and have a high yield of 2,400 litres per hectare. The problem is that in plantations, coconut trees are at high risk of yellowing, a disease that kills trees with no known prevention or treatment. Thus, growing coconuts in large quantities is a high-risk endeavour with longer-term guarantee of supply difficult to ensure.

- **Jatropha Curcus** (physic nut) - Jatropha is easy to grow and is commonly used as a shrub by farmers. Depending on the cost of buying jatropha from the local farmers, this crop represents the most viable potential as biodiesel in Lao PDR at present. However, if Lao PDR were to produce jatropha, it would be as a “single use” oil, which is not suitable for human consumption or animal feed. Jatropha projects are currently being developed in Khammuan province to provide a projected yield of 2,100 to 2,800 litres of oil per hectare.

- **Soybean** - Soybean is being grown with great success as a short-term crop with a variety of uses, such as in food, medicines, soaps, detergents, skincare creams and biofuel. The residual material from processing can be used for soymilk or animal feed. The waste materials can also be used as a flour substitute for celiac sufferers, or as a milk substitute for lactose-intolerant people. Soybean produces 500 litres of oil per hectare with little waste material.

- **Palm** - Palm nuts produce large volumes of oil per acre but the oil tends to solidify at a high temperature. Biodiesel made from palm oil also tends to cloud or gel at a higher temperature than oil from other sources. For example, palm kernel oil is difficult to handle below 30°C (86°F) and palm oil would be difficult to handle below 40°C (104°F). This should not inhibit their use but producers must be prepared to put significant energy into maintaining the temperature at a high enough degree to keep it liquid. Palm nuts produce 5,950 litres of oil per hectare.

- **Corn** - Corn is presently grown for animal feed in and around Vientiane. The quality varies. Corn is generally used for ethanol production; the main disadvantage of corn for biodiesel is its low yield of oil. It produces only 70 litres per hectare, the lowest yield of the crops examined in this paper.

- **Rice** - Rice is a significant crop in Lao PDR, with a higher yield of oil than corn, at 335 litres per hectare. Pilot projects to test the viability of this crop as a fuel source have been undertaken in recent years. There are concerns that allocating rice for fuel will impact on rice availability for local consumption. However, pilot projects are overcoming this issue by concentrating on using inedible rice for this process, which also produces higher-quality ethanol (Vientiane Times 2006a).

- **Coffee** - Coffee is increasingly being cultivated in Lao PDR, with rising sales for domestic consumption and export. Coffee produces 186 litres per hectare. The main problem with coffee is the independent crop value far outweighs the cost of refining this expensive crop for biodiesel. It is

not an economical use of the crop, particularly considering the gains in the world coffee price over the last few years.

While a formal policy on biodiesel has yet to be developed (see Section 1.3) the overall policy of the GoL is to promote the commercial production of appropriate crops and to substitute imports to strengthen Lao PDR's trade position (GoL 2004). As a result, these policies are directly linked to the promotion of biodiesel. Therefore, the GoL has proposed to support Lao businesses by cultivating crops of jatropha, soybean and coconut to process raw vegetable oil through the process of "transesterification" into biodiesel. In the initial phases, demand for biodiesel is likely to be driven by government policies. Demand for renewable energy sources has been shown to be significantly impacted by tax incentives, regulations on the share of biofuels in transport fuel, and government procurement policies (Steenblik 2006). Lao PDR is not alone in the region in its recent drive to stimulate biofuel production. For example, Thailand has recently put in place a three percent target share for biodiesel by 2011. Biodiesel production from jatropha is being studied, given that this large, fast-growing, drought-resistant perennial shrub yields seeds that produce 2,700 kilograms of raw oil per hectare (Steenblik 2006). Moreover, biofuel production generally does not require complicated proprietary technologies.

1.2 Environmental concerns in the sector

By using vegetable rather than mineral-based oil, there is approximately 80 percent less net release of carbon dioxide and a dramatic reduction in sulphur dioxide. There is an increase of nitrogen oxides of between 10-15 percent if pure biodiesel is used. Biodiesel is considered safe to handle and transport because it is as biodegradable as sugar. It is ten times less toxic than table salt and has a high flashpoint of about 300°F compared to petroleum diesel, which has a flashpoint of 125°F.

The rational for the GoL's plans to increase the production and use of biofuels is based on the premise of potential positive environmental and social impacts, notably the mitigation of climate change through greenhouse gas abatement, conservation of fossil fuels, security of energy supply and maintaining employment in the agricultural sector. The environmental impacts of diverting land to biodiesel crops depend on several factors, including yield, water consumption, chemical inputs, watershed and soil management, and biodiversity conservation.

There are real concerns about the environmental and social impacts associated with some feed stocks. In broad terms, the main environmental impacts are as follows:

- Conversion of natural forests to mono-crop plantations;
- Conversion of land for food crop production for biofuels;
- Expansion of biodiesel crop cultivation into areas with rich biodiversity and endangered species;
- Use of land clearing techniques such as slash and burn to establish new biofuel crop plantations;
- Soil erosion and increased sedimentation;
- Water pollution from the use of fertilisers and pesticides;
- Pollution from oil mill effluents;
- Potential use of genetically-modified crop varieties to increase yields; and
- Use of land targeted for alternative purposes, such as nature conservation.

1.3 Policy and regulatory framework for the biofuels sector

At present, Lao PDR does not have specific decrees or regulations to manage the broadly defined policy to increase production and use of biofuels. Recently, the Lao National Council of Sciences was requested by the Prime Minister to draft a biofuels policy for the consideration of the GoL.

Given the linkages of biofuel production to a range of other areas, such as agriculture, forestry, water

and waste management, and environmental protection, the following policies and regulations are relevant to this sector:

- Notice of the Prime Minister's Office No. 09/PM dated 25/05/2006 to save on imported fuels due to price increases.
- Environmental Protection Law No. 02/NA dated 03/04/1999.
- Decree on the Implementation of the Environmental Protection Law No. 102/PM dated 04/06/2001.
- National Science and Technology Policy to 2010 No. 09/PM dated 27/11/2003.
- National Strategy on Environment Education and Awareness to 2020 and Action Plan for 2006-2010 No. 01101/STEA-PMO dated 05/06/2004.
- Forestry Law No. 01/NA dated 11/10/1996.
- Land Law No. 01/NA dated 12/04/1997.
- Agricultural Law No. 01/NA dated 10/10/1998.
- Water and Water Resources Law No. 02/NA dated 11/10/1996.
- Industrial Processing Law No. 01/NA dated 03/04/1999.
- Business Law No. 03/NA dated 18/07/1994.

Currently, government research as well as foreign direct investment (e.g., from Thailand and Korea) are focused on the potential of jatropha as a biofuel in Lao PDR. Jatropha has been identified as the plant with the most biodiesel potential in Lao PDR because the jatropha fruit yields seeds with high oil content. Jatropha oil can be extracted and used as fuel for operating internal combustion engines. There are more than five associations that have partnered with private companies to carry out research and pilot projects for jatropha, including the Sustainable Tree Plantation and Livestock Promotion Association; Lao Promotion Biological Products Association; Lao Agricultural and Artisanal Promotion Association; Community and Environment Development Association; and Lao Organic Farmers Association. To date, it is estimated that more than 50,000 hectares of jatropha have been planted in Lao PDR (Sunlabob 2007).

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sector

The GoL is making an effort to reduce its dependency on petroleum imports and to address a prolonged trade deficit through promoting trade-led growth and attracting foreign investment. Initiatives are being put in place that will increase production to meet the needs of the domestic market and boost exports, especially in key sectors such as agriculture, construction materials and light manufacturing industries. Increasing production and exports will require a solid energy policy to underpin economic growth and ensure that it goes hand-in-hand with sustainable development in Lao PDR.

2.1 Analysis of the impacts of increased trade in the biofuels sector

There have been many studies carried out at the international level on the environmental impacts of substituting biofuels for fossil energy sources (Steenblik 2006). There are many compelling reasons for promoting the production of biofuels, as well as important constraints. The National Environment Performance Assessment (EPA) undertaken by STEA sets out several environment indicators of relevance to the development of biofuels: forest resources; water resources; threat to biodiversity; land degradation; and climate change (STEA & UNEP 2006). Given the GoL's commitment to a forest policy to protect existing forests, the EPA states that "shifting cultivation and inappropriate farming practices in the uplands" have contributed to a dramatic decline in forest cover in the past three decades (STEA &

UNEP 2006:12).

Thus, it is vital to note that the agriculture sector is by far the largest consumer of water resources, at 82 percent of total freshwater withdrawals in 2000, compared with 10 percent for industry and 8 percent for domestic use (STEA & UNEP 2006). As a direct result, the extent to which biodiesel development impacts on forests, water, biodiversity and land policies will have to be taken into consideration. The EPA highlights that there was a marked decrease in the 1990s with respect to land degradation through slash and burn farming due to the GoL's policies. Notably, agriculture ranks as the largest contributor to greenhouse gas emissions, accounting for 86 percent of methane emissions and 81 percent of CH4 emissions mainly through slash and burn practices (STEA & UNEP 2006). This percentage does not take into account the loss of absorption capacity of forests that have been destroyed to make way for agriculture. Potential benefits of using biodiesel and possible associated environmental impacts are summarized below; importantly, the extent of these impacts will be shaped by the policy and regulatory framework put in place by the GoL.

Positive impacts of biodiesel

- Empowerment of a slowly-developing country by reducing its dependence on external sources of mineral oil products, thereby reducing the current trade deficit;
- Contribution to environmental protection on a large scale through a potential reduction in greenhouse gases resulting from a switch from fossil fuels to alternative biofuels;
- Contribution to environmental protection on a smaller scale by using renewable resources for biofuels produced by domestic labour.
- Economic benefits to the macro and micro economy of the country by using domestic labour and resources in the production and distribution of energy;
- Use of land that would otherwise not be suitable for cultivation of other crops; and
- Efficient use of biodegradable outputs from industry, agriculture, forestry and households, such as straw, timber, manure, rice husks, sewage, and biodegradable waste.

Negative impacts of biodiesel

- Unsustainable land use changes as a result of a shift from, for example, rice paddies to plantations for biodiesel production;
- Loss of natural forests to mono-crop plantations for biofuels;
- Food security concerns resulting from a shift from food crops to production for biofuels, as well as rising prices for stable crops for food;
- Loss of biodiversity and endangered species;
- Land-clearing fires to establish new biofuel plantations; and
- Water pollution (ground water and watershed areas) from the use of chemical fertilizers and pesticides.

With the developing interest in biodiesel as a sustainable alternative to fossil fuels in Lao PDR, it is important to recognize that the potential benefits may be undermined if forests are cleared for biodiesel crops, for example. This is likely to be less the case for jatropha, which can grow on marginal land, but potentially the case for other crops, such as palm and soybean. Given that Lao PDR has a significant forest cover - with approximately 40 percent of the country covered in forests (STEA & UNEP 2006) - the temptation may be to cut prime forested areas for biofuel cultivation. As a direct result, the environmental benefits of biodiesel as a non-CO_2 emitting alternative to fossil fuels may be undercut by the loss of forests for carbon absorption. These inter-linkages will have to be further studied to allow for a complete assessment, on a case-by-case basis, of the impacts of biodiesel development in Lao PDR.

2.2 Case study of Jatropha: an integrated approach to rural development

There is significant interest in the production of biofuels from the fruit of the jatropha tree, with jatropha cultivation and resulting biodiesel production increasingly being established in Lao PDR (Vientiane Times 2006b). This industry may prove economically viable due to the country's low population density and large areas of available land suitable for jatropha cultivation. Positive impacts of developing the jatropha biodiesel sector include:

- Jatropha does not require large quantities of water to grow and can grow in areas where land is poor and degraded.
- Jatropha is suitable for use as a revegetation and erosion prevention species as the plant's roots grow close to the ground's surface, anchoring the soil and effectively reducing surface run-off during heavy downpours, thus causing more water to penetrate the soil. The jatropha tree has been used to create shrub fences around the Nam Theun 2 dam to reduce wind erosion and help to control soil erosion.
- Jatropha is commonly used for hedges, for example around cotton plantations or to fence-in livestock, while also improving soil fertility.
- The processing of jatropha results in a "press cake" after oil extraction, which has proved to be effective organic manure.
- Jatropha hedges are used in cotton production and rotation to ensure improved fallow, whereby jatropha hedges keep out cattle when the cotton fields are sown with legumes to improve soil fertility protect cotton fields.

It is important to keep in mind that if pesticides are used in the production process for jatropha, there is an increased potential for pesticides to run-off into the local hydrology system.

The Lao PDR Ministry of Agriculture and Forestry has been working with farmers in Saythany district and Vientiane municipality to cultivate 2.5 million trees on approximately 1,000 hectares of land, where trees can reach maturity within two to three years and have the capacity to produce up to 5 million litres of biodiesel per year (GoL 2004). In addition to local initiatives, there has been Thai investment in jatropha plantations in Vientiane and Savannaket provinces, and Malaysian investors have applied to the GoL for concession areas for jatropha and palm oil plantations.

There has been considerable attention given to the potential of jatropha as a biodiesel in Lao PDR to provide energy sufficiency and to build an integrated approach to rural development. Various research and development projects have been defined by the GoL as well as the private sector to establish and encourage biofuel programs.

Non-government organizations have also been attracted to this sector. For example, a Lao company, Sunlabob, in cooperation with the Lao Organic Farmers Association, is exploring the viability of jatropha oil through participating in research and development projects for propagation, village level decentralized production and processing of oil, and the use of oil for fuel in rural areas for machinery such as tractors, trucks, pumps and generators (Sunlabob 2007). Sunlabob is developing jatropha to generate electricity for remote villages that are not connected to the main electricity grid. Biofuel-operated motors for electricity generation have the potential to provide rural villages with an efficient energy source. Providing rural communities with electricity has obvious development benefits, such as enhancing productive capacity for grain mills, sawmills, carpentry, food processing and packaging, distillation of essential oils, and enhancing communication. The intention is also to stimulate village income and make agricultural processes less energy intensive and more energy efficient.

Section 3:

Conclusions and strategic policy recommendations for the biofuels sector

3.1 Conclusions

- The GoL will continue to focus on the development of biofuels to replace imports and to contribute to meeting the country's total fuel consumption needs. Increased production of biodiesel as a reliable domestic energy source can contribute to meeting the needs of the domestic market and to underpinning trade-led economic growth in Lao PDR. Lao PDR has significant land on which to cultivate plantations of jatropha and soybean, which are the plants with the most biodiesel potential.
- While many government policies and regulations indirectly govern the biodiesel sector, a cohesive national policy on biofuels does not exist at present and will require coordination between government ministries and provincial authorities.
- Biodiesel has many environmental benefits and should be promoted; however, the production of this fuel source also raises the environmental concerns outlined above. There are also social issues such as the labour involved in biodiesel crop cultivation and production and the impacts of transferring productive food crops to fuel crops.
- There are a growing number of examples of private/public partnerships, such as the Sunlabob/Lao Organic Farmers Association, which are promoting the production and use of biodiesel and directly contributing to the GoL goals of growth and poverty reduction.
- There is a shortage of experts and technicians to help to monitor the quality of biodiesel produced and make sure the equipment operates efficiently and with the best available technologies. There is a lack of training in rural areas to ensure efficient crop cultivation, processing and use of biofuels.
- There is a lack of in-country materials, research and expertise in biofuels in Lao PDR.

3.2 Strategic policy recommendations

The objective of the GoL is to increase the domestic supply of energy to provide an alternative to high-cost petroleum imports. To do this in a sustainable manner will require integrated planning, assessment of potential impacts with a strategy for mitigating negative impacts, and a forward-looking national energy strategy that realistically includes biofuels within the overall energy context of national development. In formulating a national biodiesel policy, it is recommended that the GoL consider:

- **Mainstreaming environmental considerations into biodiesel policy and regulation development processes, through:**
  - including a strategic environmental assessment (SEA) of the national biofuel policy in coordination with the ministries and provincial authorities concerned, which clearly outlines environmental and social policies and is integrated with, and included in a national energy production and management plan;
  - conducting environmental impact assessments of jatropha as well as other biofuels in order to promote environmentally sustainable and integrated rural development as part of developing a national policy;
  - drafting the government's "Master Plan" for the utilization of land, encouraging biodiesel plantations to integrate crop rotation with other crops, such as rubber and rice, and to incorporate natural resource-use considerations;
  - establishing a centralized institution to address current gaps in knowledge, skills, equipment and capital to carry out integrated planning and management of a standard biodiesel program. One possibility would be to develop a training program on the environment and social aspects of the

industry. This training curriculum could then be expanded to include other educational institutions, such as the National University of Laos; and

- establishing a government-supported system to check the quality of biofuels produced and to ensure the equipment is operated efficiently during production and delivery.

- **Encouraging the private sector to adopt best practices, through:**
  - strengthening the strategic environmental assessment process to ensure the private sector addresses environmental and social issues of their operations in Lao PDR;
  - providing incentives to attract investment from both domestic and foreign sources to develop suitable biodiesel crops in line with SEA findings; and
  - providing incentives for, and investor preferences to those investors with a proven environmental and social track record.

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Environmental Impacts of Trade Liberalization in the Hydropower, Mining and Construction Materials Sectors, Lao PDR

by Tom Callander*

Introduction

Trade, foreign investment and, in turn, increased growth have the potential to radically alter a country's economy, people and environment. Done without concern for all three of these elements, growth can be perverse and often destructive. When carefully considered, planned and implemented, this same growth has the potential to benefit society and the power to ensure environmental conservation. Whether this change is positive or negative is ultimately the responsibility of key decision makers within government, business and society at large.

The Government of Lao PDR (GoL) is committed to promoting trade-related growth through economic liberalization and providing greater access to foreign investors. This is an important aspect of meeting Lao PDR's overall goal of sustainable development, economic growth, poverty reduction and environmental conservation, as outlined in the government's *National Growth and Poverty Eradication Strategy* (2004a) and as a result, the country is moving quickly to integrate its burgeoning market in the global economy. In 1992, Lao PDR joined the Greater Mekong Subregion (GMS) – an Asian Development Bank led initiative - with its five neighbouring countries – Cambodia, China, Myanmar, Thailand and Vietnam. In 1997, the GoL joined the Association of Southeast Asian Nations (ASEAN), and as a result became party to the ASEAN Free Trade Area (AFTA) and the ASEAN-China Free Trade Area (ACFTA). In recent years, trade ties have also been strengthened through bilateral trade agreements such as the resumption of Normal Trade Relations with the United States, signed in 2004, and the Cua Lo Agreement expanding trade between Lao PDR and Vietnam in 2005. Currently, the GoL is looking beyond the region, concentrating efforts on accession to the World Trade Organization by 2010.

Increasing trade relations have played an important role in the dramatic rise of foreign direct investment (FDI) in Lao PDR. The GMS, through its programme of infrastructure development and promotion of the freer flow of goods and services has emerged as a significant regional forum for cooperation across a variety of themes including trade, investment, energy and the environment.

In terms of ASEAN, one of the most important impacts of Lao PDR's membership was the signal given to investors that the country's transition to a market economy would be more certain and rapid (Menon 1998), with a commitment to reform and simplify national investment procedures in line with ASEAN requirements. With membership in AFTA, Lao PDR has also adopted the ASEAN Agreement on the Promotion and Protection of Investment 1994 through its Individual Action Plan, and is working with its neighbours on improving the investment climate through the ASEAN Investment Area, to which it will be fully committed in 2010 (GoL 2000).

Due in part to the improved national investment policy climate, investment has been booming in the industrial sectors of mining, hydropower and construction materials. With actual investment more than doubling between 2004 and 2006 (see Figures 1.1 & 1.2), this trend is expected to continue well into the next decade (World Bank 2007). The new investment law (GoL 2004a) promotes, first, activities for export such as electricity generated from hydropower and minerals from mining (Article 16.1), and many of the areas where these activities take place are in priority low economic infrastructure zones (Article 17). In addition, security of investments is particularly important for large-scale investors in politically and environmentally sensitive areas such hydropower, mining and construction materials (Menon 1998),

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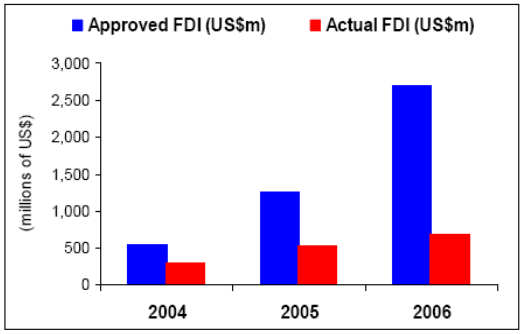
and the impact of increased investor confidence resulting from integration through ASEAN should not be underestimated.

Foreign Direct Investment into Lao PDR

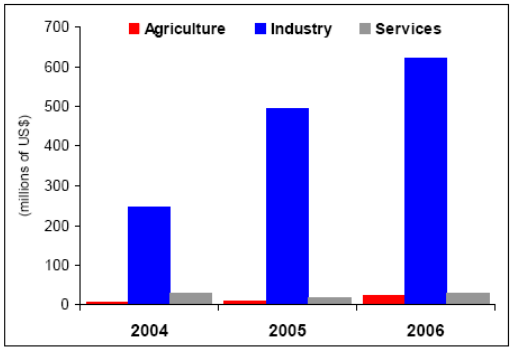
(Source: World Bank 2006)

Figure 1.1 FDI in Lao PDR



Source: Lao authorities (CPI) and WB staff estimates and projections (2006)

Figure 1.2 Actual FDI per Sector in Lao PDR



Source: WB staffs estimates and projections (2006)

This record growth in FDI may also be the result of external factors such as the increasing demand for energy in Lao PDR's neighbour countries, and their desire to ensure future energy security, high gold prices and strong demand for metals and minerals globally. While this may be the case, regional and international trade agreements now and in the future will become key to securing these resources, and investment security will remain important to ensuring large-scale investments.

The development and growth that this investment spawns is set to have a significant impact on Lao PDR. Understanding the linkages between trade and the environment, and ultimately, integrating environmental considerations into the trading system will be vital factors if sustainable development is to be achieved. Key decision-makers in the Government have an opportunity now to better understand these linkages, and by doing so, help steer Lao PDR's development by identifying unique sustainable growth opportunities and avoiding adverse environmental impacts before they arise. The present situation, one in which investors are lining up to enter the country, should be viewed with the understanding that Lao PDR is comparatively small in the regional trade context, and decisions about how the country's resources are committed will shape Lao PDR's trading position now and well into the future.

The purpose of this paper is to identify key environmental concerns in three priority sectors - hydropower, mining and construction materials - and to examine both positive and negative environmental impacts of trade liberalization. It is not intended to be a comprehensive analysis, but rather a 'discussion starter' that will help guide both environment and trade decision-makers as well as future work to strengthen the sound economic, social and environmental development of Lao PDR.

Section 1:

Overview of the hydropower, mining and construction materials sectors

1.1 Hydropower

Assumption: Increased trade ties will strengthen the flow of foreign investment in the hydropower sector and in turn provide Lao PDR with substantial exports in renewable energy.

Hydropower is a key sector for Lao PDR. The country is estimated to hold around 80 percent of the total hydropower potential in the lower Mekong basin and high investment and development priority has been placed on harnessing this resource.

This sector is not a new one. Energy from water has been produced in Lao PDR for decades and the first large-scale dam and hydro facility, Nam Ngum 1, was completed in the 1970s. However, it was not until recently that long-term plans for the substantial development of the sector began to be implemented. There are presently more than 40 hydropower projects in Lao PDR (CPI & UNDP 2006) with further feasibility studies underway.

Fact box: Hydropower

- In 2004, exports of electricity of over US$100 million accounted for 18 percent of Lao exports.
- All past exports have gone to Thailand but new agreements and the development of the GMS grid will see electricity exports to Vietnam, China and other GMS countries.
- Upon completion of the Nam Theun 2 Dam in 2010, exports are expected to increase to US$354 million, with total government revenue from electricity exports of approximately US$100 million per annum.
- The total capacity of the country is estimated at 23,000 mega watts – 81 percent of all hydropower potential in the Mekong basin south of China.

(source: CPI & UNDP 2006)

Growth in foreign direct investment in this sector is being spurred by increasing demand for energy globally, and the active energy security policies of countries like China, Thailand and Vietnam, all of which are concerned with how they will continue to power the growth of their economies in the future. Hydropower is also seen by many as a clean energy source in a world which is currently grappling with the realities of climate change, and demand for this type of energy production is expected to keep rising.

1.2 Mining

Assumption: Liberalization commitments undertaken regionally and internationally will ensure a steady flow of foreign direct investment into the Lao PDR mining sector and substantial increases in exports of metals and minerals.

Fact box: Mining

- In 2004, total exports of minerals reached US$64.7 million, accounting for 11 percent of Lao exports.
- Lang Xang Minerals, the subsidiary of Australian company Oxiana commenced gold and copper mining operations in 2003, and is by far the largest single investor (US$375 million) and source of mineral exports.
- At the beginning of 2006, there were 121 mining concessions; 35 foreign investors held 50 of these concessions, with the majority Chinese (24), Vietnamese (11) and Thai (6).
- Only 30 percent of the country has been surveyed, but results indicate strong deposits of gold, copper, zinc, gypsum, coal and lignite.

(source: CPI & UNDP 2006; World Bank 2006)

Mining is singled out in the GoL's *National Growth and Poverty Eradication Strategy* (NGPES) (2004a) as a priority sector for investment, due to its potential for stimulating economic growth and increasing government revenue – which in turn can help to reduce poverty. The sector consists of five key groups: 1) metal minerals; 2) industrial minerals; 3) construction materials and dimension stones; 4) gems; and 5) fossil fuels (UNIDO & MoIH 2003). Until the late 1990s, only small mines and artesian mining operations could be found, and the industry represented just 0.56 percent of the national GDP. However, recent successes of the Sepon gold and copper mine developed by the Australian-owned company Lang Xang Minerals (Oxiana Limited) have led to a flurry of foreign interest in the country's mineral assets. Private investment in the sector has grown by almost 34 percent over the last five years; in 2006, the sector was expected to represent nearly 10 percent of the national GDP (World Bank 2006).

Demand for metals and minerals is being fuelled by strong construction sectors in countries such as China and India. Metal prices are at their highest levels for some time. Despite constraints of high transport costs, skills shortages and persisting ambiguities in the mining law and regulations, the *National Human Development Report* (NHDR) (CPI & UNDP 2006) notes that foreign investors are 'lining up' for the opportunity to operate in Lao PDR. With increased regional and international

cooperation through agreements such as AFTA and ACFTA, coupled with growing world-wide demand, investment in the mining sector in Lao PDR will continue to grow rapidly.

1.3 Construction Materials

Assumption: Trade liberalization and the subsequent lowering of trade barriers will lead to increased foreign competition and rising imports, and domestic production will be forced to increase efficiency and find high-value niche markets. Increased foreign direct investment in infrastructure in Lao PDR will also stimulate the growth of the construction sector.

Fact box: Construction Materials Sector

- In 2001, consumption of construction materials in Lao PDR amounted to US$56 million (US$36 million domestic and US$25 million imported materials).
- Domestic materials consist mainly of plastic tubes, pipes and hoses (US$7 million), cement (US$6 million), and iron bars (US$5 million).
- Cement manufacturing operates at a loss (mainly due to the small scale of operations) and enjoys protection from cheaper international products in the form of quantitative import restrictions, which will not be possible under AFTA post-2008.
- Thailand and Vietnam are major exporters of construction materials to Lao PDR.

(Source: Lao PDR Industrial Development Strategy, 2003)

The Lao PDR construction materials sector, another priority growth sector cited in the NGPES (GoL 2004b) consists mainly of plastic tubes, pipes, hoses, cement, corrugated roofing and iron bars (excluding wood products produced for building purposes and micro-scale village brick production).

In terms of FDI, the cement industry has recorded significant investment in recent years and there are three cement facilities operating in Lao PDR, all either partly or wholly funded by Chinese foreign investment. In 1994, production began at Lao PDR's first cement plant, Wanrong Cement Plant 1 – a US$13.9 million joint Lao-Chinese investment in Vang Vieng district, 160 km north of Vientiane. Construction of the second plant, Wanrong 2, with a total joint Lao-Chinese investment of US$37 million, was completed in 2001. The country's third Chinese-funded cement plant was recently constructed in the province of Saravan. This new cement factory is 100 percent owned by Chinese investors who invested about US$30 million to build the plant. The total cement production capacity of the country is now estimated at 473,000 tons per year (World Bank 2006), mainly for domestic consumption.

According to the Lao PDR *Medium-Term Strategy and Action Plan for Industrial Development* (UNIDO & MoIH 2003), some industries, such as the cement industry, operate at substantial losses due mainly to inadequate economies of scale, but enjoy government protection in the form of quantity restrictions on imports of cement. It has been predicted that when AFTA commitments are implemented in 2008, quantitative restrictions in most of these sectors will need to be abolished and as a result, significant impact from foreign competition may be felt in the cement and roof panel sectors (CPI & UNDP 2006). These sectors will need to become more competitive. Various policy options include promoting larger sized production facilities; adopting standards, regulations and quality control for building materials to ensure eligibility on international markets; investing in research and development to find niche products; investing in infrastructure development for transit services to allow cheaper in-country transit of domestically-produced cement; and domestic industry-friendly government procurement policies (UNIDO & MoIH 2003).

1.4 An outline of environmental concerns in the hydropower, mining and construction materials sectors

The hydropower, mining and construction materials sectors can all be viewed as large 'ecological footprint' sectors – that is, they all have substantial impacts on the natural environment because of their use and reliance upon natural resources. The Lao PDR National Environmental Performance Assessment (EPA) Report (STEA & UNEP 2006) provides a base for identifying key environmental concerns in these three sectors in the context of the current state of the country's natural resources, and developing indicators of increasing pressures, the basic assumption being that with increased trade

and growth in these sectors, environmental impacts will also increase. The extent of the impact will be determined by the policy and regulatory framework in which increased trade takes place, in order to accentuate the opportunities and mitigate potential negative environmental impacts.

The table shown in Annex 1 was developed using the National EPA report, and highlights the following key concerns, which will be analyzed in more detail in Section 3 of this paper:

- Impacts on the forest resources of Lao PDR include the flooding of large forested areas for hydropower dams, clearing for mining operations and clearing of forests for access and essential infrastructure improvements to support the development of these industries.
- Impacts on water resources, in particular the hydropower effects on natural flows and the potential of mining operations to pollute clean water systems with hazardous waste (e.g., cyanide), waste-water or sediment.
- Impacts on biodiversity including fisheries resources, which can be impacted severely by hydropower and mining operations through the destruction of habitats and pollution of water supplies.
- The effects of climate change which will be an increasing concern in the future. All three sectors have the ability to minimize their impact. Hydropower and the construction material sectors are seen to possibly contribute towards stabilizing the issue in the years to come.

1.5 An outline of the policy and regulatory framework relevant for the hydropower, mining and construction materials sectors

The above concerns can be mitigated and even avoided through the development and successful implementation of constructive policy and regulations. It is therefore important that trade decision-makers are aware of which frameworks exist, how effective they are in addressing key environmental concerns, and more importantly, how they will fare in an open and growing economy, presumably with a much greater potential for environmental impact.

The NGPES (GoL 2004b) is the GoL's umbrella policy document which identifies all future growth and poverty eradication programmes that will be developed and implemented (2004b). The Strategy articulates the following key points in relation to this paper:

- The underlying goal of sustainable growth, coupled with continuous social progress and equity;
- Priority investment and growth sectors including hydropower, mining and construction materials; and
- The vital importance of environmental conservation in achieving long-term sustainable economic growth and poverty eradication.

Through the NGPES, the GoL has recognized that "solutions for environmental conservation have to be founded in the broader context of national development, wherein each sector integrates environmental principles in its policies, programmes and projects" (2004b). However, at this point in time, the GoL is still in the process of crafting a broad environmental policy and assigning a specific institution tasked with ensuring this integration. Currently, there exists an array of complex and fragmented institutional relationships and interrelating polices and regulations. A brief outline is provided in Annex 2, and certain policies and regulations will be discussed in more detail in Sections 2 and 3.

Section 2:

Trade-related environmental impacts and national experiences in improving environmental sustainability in the sectors

As noted in the introduction of this paper, trade and investment can have positive and negative impacts on the natural environment, and in many cases these effects can occur simultaneously. The relationship is complex and the 'final' result for any given country will depend on myriad factors, including the

characteristics of the national economy, policy and regulatory frameworks, the strength of institutions and perhaps most importantly the commitment of key decision-makers (Cosbey 2004).

FDI in Lao PDR has been increasing rapidly in recent years, led by growth in priority sectors such as mining, hydropower and construction materials. These sectors, although vital for national economic development, can lead to serious and irreversible environmental problems if developed poorly. At the same time, the GoL is seen to be committed to the integration of environmental principles in its policies and regulations to ensure sustainable development; however, capacity for implementation is still lacking.

2.1 Analysis of the impacts of trade in the hydropower, mining and construction materials sectors on the natural environment

The *Trade and Environment Handbook* (IISD & UNEP 2000) outlines four categories of physical and economic impacts on the environment and development resulting from trade flows and trade liberalization:

1. **Scale effects** - Trade leading to expanded levels of economic activity can have positive impacts in terms of the wealth it creates – increasing the ability to acquire new and more environmentally-friendly technology or increasing environmental concern; and negative impacts in terms of increased scale of production without appropriate control, increased use of natural resources and in turn increased impacts such as the unsustainable use of resources and increased pollution.
2. **Structural effects** - Trade can lead to changes in the composition of an economy, causing it to produce more of the goods it makes well or has in abundance and fewer of the goods it does not. An economy may change so that fewer polluting sectors dominate, labour-intensive industries may provide employment and wealth (see Scale Effect as discussed previously) and the demand for green goods may result in the composition of certain sectors being geared solely towards these markets. On the other hand, if the goods a country produces are more resource-intensive and polluting, and contribute less to development objectives, trade, if guided poorly can have significant adverse impacts on the environment and thereafter on the foundation for sustained economic growth and poverty alleviation.
3. **Product effects** (also known as technology effects) - Traded products themselves can have an effect on the environment. Positive effects may include investment in newer, more efficient and cleaner technology; or the rapid adoption of goods that have less environmental impacts than those being used. Conversely, the product effect can be negative such as sourcing foreign investment that utilizes cheaper but more polluting technology, and facilitates the transfer of poor management practices to the country.
4. **Direct effects** - Direct effects are those environmental impacts caused by the very fact that trade is occurring, for example pollution caused by the transportation of goods.

The above categories, combined with key environmental concerns sourced from the GoL's EPA report (STEA & UNEP 2006) and listed in Annex 1, provide a useful platform for the analysis of potential impacts of increased liberalization of trade and investment. Using these two frameworks, this Section seeks to analyze some of the more pressing issues and present some examples of where the GoL and the private sector are or could be capturing the environmental potential of foreign direct investment and increased trade.[1]

2.1.1 Forests and biodiversity (including fish resources) – the scale effect in the hydropower sector

Lao PDR's forest and biodiversity resources are the centrepiece of the country's development. STEA & UNEP's EPA (2006) reports that the quantity and quality of natural resources in Lao PDR are on the decline, and that since the 1960s, it is estimated that forest cover has been reduced from around 70 percent to 40 percent of the country's total land surface. Directly correlated to this loss of habitat is the loss of species. The IUCN Red List in 2005 recorded 48 species as vulnerable, 21 as endangered and

[1] While 'direct effects' including impacts associated with transportation do span across these three sectors it was decided that they were of low priority and that this analysis should concentrate on the three remaining categories – scale, structural and product.

12 critically endangered (IUCN 2007). In an attempt to try stabilize this downward trend, the GoL has established a comprehensive network of National Protected Areas (NPAs). Poor management of these NPAs, however, coupled with intensifying pressures on their natural resources, continue to threaten the integrity of ecosystems and the stability of the livelihoods throughout the country (IUCN 2007).

As outlined in Annex 1, the hydropower, mining and construction materials sectors can all have significant impacts on forests and biodiversity, and any increase in scale in these sectors will most likely lead to the increased scale of this impact. New investment in the hydropower sector will significantly increase as plans for the construction of over 40 hydroelectric power facilities by 2020 continue. The environmental impacts of this sector have been well documented in Lao PDR and include the logging of entire valleys, the flooding of areas of high biodiversity and changes to water flows and the impact this can have on resources downstream, such as fish resources and water quality.

A critical point to note is that there are different levels of investor responsibility in this sector. The NHDR (CPI & UNDP 2006) notes that dam projects funded by the World Bank or the Asian Development Bank tend to have more stringent standards for resettlement and mitigation of environmental impacts (see World Commission on Dams at <http://www.dams.org>), while those funded by individual countries or private companies, which make up the majority of projects in the sector, are generally lacking the same standards.

The Nam Thuen 2 hydropower project (NT2) is the first attempt in Lao PDR to build mechanisms into the hydropower development process that take into account environment and social considerations. NT2, a World Bank-supported project, will use the Xe Ban Fai, Nam Phit and Nam Katang rivers, and flood 450 square kilometres of the biologically diverse Nakai-Nam Theun NPA. It is estimated that in addition to the almost 13,000 people who will be displaced by the development, a further 790,000 people could be affected by changes in flows and water quality (CPI & UNDP 2006). Clearly, the environmental and social costs of this project are high, but the GoL has made the decision in this case, that the economic potential and high government revenues of USUS$30 million per annum for the first 10 years and USUS$110 million per annum between 2020-2034 (World Bank 2007) make it vital that this development goes ahead. At the same time, commitment has been made by the GoL and developers to mitigate and offset these negative impacts.[2]

One important policy to arise from this project has been the GoL's *National Policy: Environmental and Social Sustainability of the Hydropower Sector in Lao PDR* (2005). The aim of this policy is to help ensure that the principles of social and ecological sustainability are integrated into all large hydropower developments. Another is the establishment of the first Watershed Management Protection Authority in Lao PDR. Yet even this multi-million-dollar project, with years of stakeholder engagement and strong commitments to mitigate serious environmental social issues, is seen by many as falling short of meeting some of its key promises. A February 2007 report prepared by the International Environmental and Social Panel of Experts reveals that not all Government, Nam Theun 2 Power Company personnel and contractors share the same conservation goals for NPAs, nor do they share an understanding of the importance of watershed protection (Mcdowell, Scudder & Talbot 2007). This difference in opinions has led to issues such as delays in resettlement activities, uncertainty surrounding allocated village forests reserves, and environmental degradation caused by poor construction practices. In addition, it has been reported that livelihood restoration programs have yet to effectively begin and face significant time and budget constraints (IR 2007).

The above example highlights two important points for consideration in the event of a substantial increase of hydropower development in Lao PDR in the coming years:

- Further efforts will have to be made to ensure that dams are supported by bilateral or private investment, and have undergone rigorous cost-benefit and environmental and social impact assessments. If approved, dam projects must have appropriate environmental and social safeguards in place. In addition, appropriate documents and strategies need to be disclosed to the public.

[2] Numerous assessments and reports detailing lessons learned have been produced by NGOs and others. Many can be found on the website of the International Rivers Network (www.irn.org).

- Once environmental and social commitments have been made, capacity and commitment at all levels must be continuously monitored in order to ensure implementation.

2.1.2 Water pollution and land contamination (water pollution and hazardous waste) – the structural and product (or technology) effects

New investment from abroad can bring new skills, knowledge, methods and technologies, which in turn can have positive influences on developing countries, for example foreign investment may bring with it "state-of-the-art" pollution control management systems. FDI, if not managed appropriately, can also have a negative impact on the country, whereby foreign companies move to countries with less stringent environmental standards and in turn exploit the industry, for example by utilizing cheap, outdated polluting technologies and practices.

Lao PDR has abundant and high quality water resources that have been highlighted as key to the country's development. However, as investment in water dependant sectors grows, so too will competing interests and pressures on these resources. A key risk to water quality in the mining sector is the use and management of cyanide, the disposal of slag and the tertiary treatment of water. The NHDR (CPI & UNDP 2006) reported that in 2005, a mining company mishandled and spilled cyanide, which contaminated a water stream, killing fish and affecting the health of some villagers, and that Oxiana, operator of the Sepon gold and copper mine, reported an increase in level 2 and 3 incidents[3] in 2005 (Oxiana 2006). While these incidents are a concern, it is encouraging that the second example was reported in the public domain, a practice common now in developed countries but less so in developing economies. With the mining sector set to grow rapidly over the next few years, it is of the utmost importance that the best technology and management practices be encouraged and/or regulated to minimize these incidents from the outset.

> ***"Corporate Social Responsibility is the continuing commitment by business to contribute to economic development while improving the quality of life of the workforce and their families as well as of the community and society at large"***
> (Source: WBCSD 1998)

Oxiana Limited views itself as a leader in the mining sector. It has portrayed a commitment to Corporate Social Responsibility (CSR). The company believes that to achieve its corporate growth targets, it needs to operate according to the principles of sustainable development; its guiding principle is to develop mineral deposits in a manner that is financially sound, while being environmentally and socially responsible. To ensure it lives up to this principle, the company runs programs designed to maximize benefits and minimize impacts, including the $500,000 Sepon Community Trust Fund to share the benefits of its operations with the community, and environmental monitoring and rehabilitation seeking to go beyond compliance at its site. In addition, Oxiana openly reports on its performance (using the Global Reporting Initiative framework - see <http://www.globalreporting.org>) not only in the traditional financial sense, but also on its economic contribution to the province and country in which it is operating, its environmental impact and management performance, and its commitment to its stakeholders, including employees and communities.

It should be noted that there many critics of CSR who believe that a great deal of CSR to date has been little more than 'green-wash' – a term used to describe companies that publicize their commitment to the environment, but make minimal effort to address these issues. It is therefore important that care be taken to seek out clear assessments on the true performance of CSR companies. Nevertheless, companies that publicly commit to environmental and social best practices are more likely to address concerns in these areas. Analysis of CSR performance and appropriate incentives to attract committed companies may have the potential to provide investment decision makers with an additional tool in ensuring investment in Lao PDR that meets the countries overall socio-economic development goals.

In addition to encouraging companies to raise the bar in environment and social performance, clear investment laws, procedures and coordination mechanisms specifically related to Environmental Impact

[3] Oxiana's sustainability report has an environmental incidents category system, level 2, a localized impact confined within the exploration lease boundary with minimal damage to the environment and level 3, a moderate impact that may extend beyond the exploration lease boundary.

Assessment (EIA) are required to ensure best practice. Over recent years, the integration of EIA requirements across the GoL has been improved through laws such as the *Regulation on Environmental Assessment 2000* (see Annex 3), and has contributed to the capacity building of government institutions to carry out their responsibilities. EIAs are now being completed for most major projects and STEA is working on ways to incorporate these processes into sector policies through Strategic Environment Assessments. There remains however, a missing link in the EIA chain between the approval of an EIA regarding whether it meets the requirements, and the final decision-making process of the project. The mechanism for coordinating a response to such assessments is insufficient, and necessary action needs to be taken to ensure that EIA recommendations are considered, acted upon (either through mitigation measures or disallowing the project altogether) and incorporated into the final decision-making process.

Issues also arise regarding the law on the *Promotion of Foreign Investment 2004*, which although it incorporates many provisions regarding the environment (see Annex 4), there is no specific reference to EIAs. In addition, while STEA has been assigned responsibility for final approval of an EIA (confirmation that an EIA meets the requirements) (see Annex 3), it is not clear if a specific mandate on EIAs has been given to the Committee for Promotion and Management of Investment, which has been assigned overall responsibility for final decisions regarding foreign investment (GoL 2004a). One possible factor stifling progress in this area may be the belief by some that international standards will deter investment, where others would argue that enforcing high standards would mean that only socially and environmentally responsible investment would be attracted to the country and would then contribute to the alleviation of poverty and meet sustainable development priorities (CPI & UNDP 2006). The case study above demonstrates the type of company that can be attracted, even with stringent standards. In fact, companies and industry associations are often interested in playing leading roles in the development of such standards (Johnson 2006).

The latter understanding has been emerging in Lao PDR government policy in recent years. In February 2007, the Committee for Planning and Investment announced an official ‘slow down’ in mining concession/investment approvals to enable the GoL to build capacity for assessing the credentials of foreign applicants (Pansivongsay 2007). More recently, the Lao PDR Prime Minister announced a moratorium on large land concessions until a more comprehensive strategy could be developed (*Vientiane Times* 2007). In addition, a Ministry of Energy and Mines was established in 2005, which has brought attention to current gaps in the governance of mining investment and development, and is currently drafting a national mining policy with some of the following key recommendations for the development of the mining sector:

- Revisiting investment procedures and EIA processes, including ensuring mechanisms for coordinating a response to EIA recommendations and taking action - either modification or cancellation - as required.
- Increasing efforts to ensure mining laws and laws relating to the environment are applied to all investors, domestic and foreign, in line with international norms (World Bank 2006).
- Strengthening the penalty system to regulate illegal mining activities.
- Building capacity to manage the social and environmental impacts of mining operations, for example STEA has just commenced a project titled Independent Environmental Monitoring and Assessment of Technologies in the Mining Sector in Lao PDR (DISM & STEA 2007).

2.1.3 Climate change: the product (technology) effect

The final environmental impact to be discussed in this paper is climate change. Midway through 2007, the International Panel on Climate Change, prepared a 4th Assessment report summary (IPCC 2007) that highlighted the level of consensus that increased man-made greenhouse gases does in fact contribute to climate change, and warned of its disastrous consequences. Climate change has the potential to severely impact Lao PDR, environmentally, economy and socially. A climate impact study conducted in the southern province of Attapeu revealed that climate change has the potential to bring about floods with greater severity and increased frequency, which in turn has the potential to impact on local communities, including loss of paddy fields, rice stocks, livestock and equipment, as well as disease and housing damage (MWBP 2006). Climate change is an increasingly important regional and

global issue with which the Lao PDR must engage. In recognition of this, the GoL has signed the UN *Framework Convention on Climate Change* and ratified the *Kyoto Protocol*.

Lao PDR has been addressing the issue of climate change through the development of hydropower energy. FDI is contributing to the development of renewable energy technology in the country by helping to facilitate trade liberalization in the energy sector and assist Lao PDRs position as a net exporter of this 'clean' energy in the region. While hydropower has the potential to contribute positively to mitigating climate change, in actual fact it can have the opposite effect if large tracts of forest are cleared for the building of dams, thereby removing carbon sinks. In addition, there are associated carbon emissions from the development of hydropower infrastructure, such as roads and buildings. There is also debate as to whether rotting organic matter in large dam reservoirs will contribute to greenhouse gas emissions (see Annex 1 for further discussion on the impacts of hydropower on the environment).

Lao PDR has the potential to develop and supply regional trading partners with energy-efficient construction materials. The construction materials sector has an impact on climate change in terms of the energy consumed in the production process, and in terms of the energy efficiency of the product itself. Despite encouraging the adoption of international management standards, such as ISO 9000/14000 for certain facilities to ensure better energy efficiency, there is little evidence that FDI is facilitating the wide-scale transfer of technology that allows the production of energy-efficient construction materials (DISM & STEA 2007). Lao PDR could however follow China's lead in the adoption of energy-efficient technologies. The Chinese government considers the adoption of energy-efficient technologies in buildings to be a promising path to ease the expanding energy crisis, with the nation spending up to 45 percent of its total energy on manufacturing and transporting building materials, constructing homes and offices, and heating and cooling structures (Li 2007). The country's latest five-year plan (2006–10) calls for energy savings of 50 percent for new buildings nationwide and up to 65 percent for buildings in four large municipalities (Beijing, Shanghai, Tianjin & Chongqing). In early 2006, the Government issued a design standard for energy conservation to encourage contractors to use energy-efficient materials and adopt energy-saving technologies for heating, cooling, ventilating, and lighting public buildings (Li 2007). With support, Lao PDR could move further into the energy efficient industry.

The Lao PDR *Medium-term Strategy and Action Plan for Industrial Development* (UNIDO & MoIH 2003) outlines the overall need to improve competitiveness of the sector in the wake of regional competition resulting from post-2008 AFTA implementation. It recommends exploring niche opportunities through research and development, using donor direct investment and adopting norms and standards for specific building materials. As explained above, demand for energy-efficient materials in China is on the rise. If trade liberalization pushes Lao PDR to improve the competitiveness of the construction materials industry, one example of an emerging niche is the demand for green building materials from an energy-conscious China. By encouraging the eco-efficiency of its resources and helping others to do the same, Lao PDR has the potential to expand its economy, and at the same time conserve its natural resource base.

Section 3:

Conclusions and strategic policy recommendations for the hydropower, mining and construction materials sectors

3.1 Conclusions

To ensure that environmental concerns are best addressed and that opportunities for environmental conservation are realized in the hydropower, mining and construction materials sectors, the following key conclusions can be drawn from this paper:

- The GoL is making a concerted effort to review its FDI policies and practices to ensure that the country benefits economically, socially and environmentally from this investment. However, it also reveals that it is difficult for policy-makers to keep pace with the scale of investment and economic growth in Lao PDR.
- The scale and growth of FDI in Lao PDR should also be viewed within the international context of the increasing demand for resources. Global demand for energy, minerals and construction materials is high, and Lao PDR, being well-endowed with these resources, is in a strong position to accept only the most economic, environmentally and socially beneficial investments for the country.
- A sufficient policy and investment framework needs to be put in place to guide the recent and significant inflows of FDI, which are concentrated in mining and hydropower.
- There has been significant analysis of the development potential for Lao PDR in certain key sectors, such as electricity, mining and construction materials. These sectors are highlighted as models for providing “long-term security and prosperity” for Lao PDR. From a sustainable development perspective, however, the type of large infrastructure development that characterizes these dynamic sectors also brings with it potentially significant environmental concerns. Concerns include:
    - Depletion of forest resources through the flooding of large forested areas for hydropower dams, clearing for mining operations (including limestone excavation), as well as clearing forest areas for the development of access points and infrastructure to support these industries.
    - Hydropower operations alter the natural hydrology of an area, particularly by inhibiting natural flows downstream of the dam.
    - Mining operations have the potential to pollute water systems with hazardous waste (e.g., cyanide), waste-water or sediment.
    - Mining and hydropower operations can destroy aquatic habitats and pollute water supplies, impacting severely on fish stock preservation and the fishing industry.

3.2 Strategic policy recommendations

Regional approaches to common environmental issues in the hydropower, mining and construction material sectors are vitally important, specifically with respect to the management of Mekong River resources. This paper makes four key recommendations for the hydropower, mining and construction materials sectors to ensure environmental concerns are best addressed, and that opportunities for growth-led environmental conservation are realized:

- **Improve environmental governance at the same pace as current trends of FDI in Lao PDR.**

  Improving environmental governance includes developing the commitment of the Government and the private sector to address environmental concerns; strengthen institutional capacity, especially at the provincial and district levels to implement government policies; and ensure better coordination/collaboration between all levels of Lao society.

  It is clear that the current governance structures are under pressure from the increase in investment and growth over recent years. Substantial time and resources need to be allocated to strengthening governance to assist in sustainable development, not only in the government but across Lao PDR society.

  The critical importance of integrating policy and strategy commitments has been recognised at the highest levels; this recognition needs to continue to be translated into real action on the ground. Of utmost importance is the government’s commitment to ensuring that policies and regulations – and as early as possible, international best practices – are respected by foreign investors, including through improved EIA/SIA. While much effort has been made to integrate these requirements across government and build institutional capacity, there is insufficient clarity and direction on the mechanisms for coordinating a response to the recommendations of such assessments and on the need to ensure that foreign investors are accountable for adhering to appropriate standards.

Government commitment is essential in ensuring that only foreign investors that implement best practices are attracted to Lao PDR. This could include:

- improving environmental governance in the EIA/SIA and investment process;
- undertaking further research and analysis on the link between the investment and EIA processes, including an analysis of gaps and current weaknesses;
- strengthening the process of responding and taking necessary action on EIA recommendations, and clarifying the roles and responsibilities and capacity of relevant government agencies in key policies and laws. One possibility would be to amend the *Law on the Promotion of Foreign Investment* 2004 to better reflect the roles and responsibilities of the CPMI and investor obligations concerning EIA/SIAs; and
- Further developing leadership within key government agencies in order to increase the awareness of the importance of EIA's/SIAs at all levels.

- **Build closer regional cooperation on investment to ensure environmental concerns across the region are addressed.**

Continuing to strengthen regional agreements concerning the environmental requirements of foreign direct investment, both from outside and within Asia, is important to ensure sustainable development in the region. To this end, it is recommended that:

- Lao PDR continue to engage in regional processes through the GMS and ASEAN mechanisms, such as the ASEAN Investment Area Council, the ASEAN Coordinating Committee on Investment, the GMS business forum and various environmental institutional structures, such as the ASEAN Ministerial Meeting on the Environment or the GMS Regional Working Group on the Environment. One possibility may be to establish a regional trade and environmental research and policy network under ASEAN or the GMS consisting of representatives from each member country to further information exchange, collaborative research and strategic policy advice on the issues concerning trade and the environment.
- The GoL seek further regional cooperation on issues related to trade and the environment through bilateral relationships and continue to incorporate these aspects into bilateral trade agreements.

- **Facilitate a domestic business environment that attracts responsible business and international best practice.**

Improving implementation of polices and enforcement of regulations creates an environment of certainty which is conducive to attracting investment. While the government plays a lead role in the enforcement of these decisions, the private sector is responsible for adhering to them, and in many instances can raise – or even go beyond - national standards. Attracting those companies that have a proven track record of good practice elsewhere during the initial investment stages can ease the burden on government agencies that are tasked with ensuring the implementation of environment-related policies and regulations. In this light, it is recommended that the government:

- encourage and, in time, require that companies adopt international best practice codes of conduct and guidelines;
- provide investment incentives to private companies that are committed to implementing new approaches to managing environmental issues, such as Corporate Social Responsibility that go beyond national standards; and
- encourage and facilitate more input from the private sector on the development of laws and policy by increasing engagement with associations, such as the Lao Chamber of Commerce and Industry and the Lao Business Forum.

- **Realize growth-led environmental conservation: green market opportunities.**

Recognizing the environmental opportunities that will result from trade liberalization is vital for the sustainable development of industry in Lao PDR. Identifying these opportunities should be a priority

for government decision-makers, trade negotiators and industry representatives. Green market opportunities should be integrated into current development policies, such as research and development in the construction material sector and niche market creation.

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Annex 1: The state of Lao PDR's natural resources, environmental concerns and pressures caused by the industrial sector

Environmental concerns	State (source: Lao EPA report 2006 and Lao SOE report 2001)	Pressure		
		Hydropower Sector	**Mining Sector**	**Construction Materials Sector**
Forest Resources	Currently, forest cover stands at 40 percent, down from 70 percent in the 1940s. While this forest cover remains the highest in the region, the rate of deforestation is rapid and the country currently contains large areas of low-density forest.	Flooding of forested areas.	Clearing of forested areas for mining operations.	Sourcing of timber and clearing for sourcing materials such as limestone; inputs for cement.
Water Resources	Abundant and high-quality water resources coming under increasing pressure from competing interests.	Changes to natural environmental flow; decreased downstream water quality; changes to fisheries resources for food, biodiversity and livelihoods.	Use of water in mining operations; acid mine drainage from mining operations and waste tailings results in pollution of water resources; impact on water sheds; biodiversity.	Use of water in cutting materials and construction production processes.
Fisheries Resources	Fisheries resources are still relatively sound, but captured fisheries have stagnated in recent years.	Hydropower dams change habitats and block migration of certain fish species; changes in flows impact on downstream fisheries.	Water pollution impacts on downstream fisheries; potential reduction of stream flow as water is diverted into mining operations with potential impact to aquatic life.	
Biodiversity	High biodiversity exists and protected areas have been set up, but the loss of biodiversity is increasing.	Flooding of key biodiversity areas; access roads opening up PAs; change in hydrological flow regimes impacts species diversity and richness.	Clearing of biodiversity areas for mining operations; access roads opening up PAs.	Sourcing input materials for construction.

Land	Large areas of the country's cropland, grassland, woodland and forests are now seriously degraded.	Deforestation, erosion of alluvial plains; landscape change.	Open-cut mining degrades land; pollutants from mining degrade land.	Use of land inputs for construction materials.
Solid Waste Management	Solid waste management is improving (in major centres), however on the whole the management of solid wastes continues to be poor.	Disposal needs of mine tailings and overburden wastes.	Solid waste from mining operations deposed of in surrounding environment.	Increase in construction materials lead to increase waste (off-cuts etc).
Hazardous Waste Management	Hazardous wastes is increasing and limited management facilities exist (only in Vientiane and four secondary towns). In other areas, hazardous waste is deposed of with non-hazardous waste.		Hazardous waste generated by mining operations (e.g., arsenic used in gold mining).	Oil-based solvents, paints and lacquers used in construction present hazards when remainders and unused portions are mixed with solid waste streams; asbestos-based insulation presents human health threat.
Climate Change	Climate change is a global issue, and the state of this problem is outlined in the most recent Intergovernmental Panel on Climate Change, in which the level of concern has been raised significantly.	Deforestation; carbon-free energy production.	Carbon intensive industry – mining operations, transport etc.	Ability to produce energy-efficient construction materials that reduce carbon if energy is sourced from fossil fuels.

Annex 2: Key Institutions, policies and regulations in relation to the environment governing the hydropower, mining and construction material sectors in Lao PDR

	Key National Institutions	Key National Policies and Regulations
Overarching	Ministry of Foreign Affairs	National Growth and Poverty Eradication Strategy 2004
Environment, Natural Resources	Science Technology and Environment Agency Ministry of Agriculture and Forestry Land Management Authority National Environment Committee Environment Protection Fund	National Environmental Strategy 2010-2020 National Biodiversity Strategy and Action Plan to 2020 Forestry Strategy 2020 Power Sector Environment Policy Water Sector Strategy and Action Plan 1999-2004 Environment Protection Law 1999 Regulation on Environment Assessment 2000 Forestry Law 1996 Prime Minister's Decree 164 (1993) establishing national protected areas
Trade, Commerce and Investment	Ministry of Industry and Commerce National Committee for Planning and Investment	Law on the Promotion of Foreign Investment in Lao PDR 2004 Enterprise Law 2005
Hydropower	Ministry of Energy and Mines Lao National Committee on Energy	National Policy – Environmental and Social Sustainability of the Hydropower Sector in Lao PDR (No.561/CPI)
Mining	Ministry of Energy and Mines Director General of Mines (DGM)	Mining policy under development (inputs to this policy supplied by World Bank report 2006) Mining Law 1997 (article 31 of the mining law – EIA) Draft Implementing Rules and Regulations of the Lao PDR Mining Law 1997 (in preparation)
Construction Materials	Ministry of Industry and Commerce	Lao PDR: Medium-Term Strategy and Action Plan for Industrial Development (2003)

Annex 3: Responsibilities for carrying out the Environmental Assessment Law (2000)

Organisation or Entity	Responsibility
Project owners or their consultants	- prepares project descriptions (Article 7) - prepares IEE (Article 9) with EMP (Articles 9 and 14) or for ToR for scoping of an EIA (Article 11) - implements the EPMs (Article 14) - monitor and evaluates the project environment (Article 15)
DPRA (Office for Foreign or Domestic Investment Management)	Delegates rights and duties with respect to the mandate and tasks according to paragraph 5, Article 3 of this Regulation including project environment screening and IEE review and approval to the Environmental Management and Monitoring Unit (EMMU) of the concerned ministry. The EMMU retains responsibility for ensuring that the EA process is completed in accordance with this Regulation.
DPRA (Ministries responsible for development projects)	- preparing project descriptions for its own project (Article 7) - screens project descriptions for all projects in its sector area of responsibility (Article 8) - prepares or retains a consultant to prepare an IEE for its own projects (Article 9) - reviews and recommends approval of IEE of projects in its sector area of responsibility (Article 10) - prepares and reviews ToR for EIA for its own projects and reviews ToR for other projects in its sector area of responsibility (Article 11) - prepares or retains a consultant to prepare an EIA with an EMP, for its own projects (Article 12) - reviews and approves EMPs for all projects in its sector area of responsibility (Article 10) - monitors and evaluates the project environment for its own projects (Article 15) - Monitors and evaluates the project environment for all projects in its sector area of responsibility (Article 15)
Science, Technology and Environment Agency	- finally approves IEE reports (Article 10) - finally approves ToR for EIA (Article 11) - reviews and approves EIA reports and EMPs (Article 13) - coordinates with line agencies for monitoring and evaluation (Article 15) - issues environmental compliance certificates for projects that have satisfactorily completed the EA process (Articles 8, 10 and 13)

Annex 4: Environmental considerations contained within the Law on the Promotion of Foreign Investment (2004)

Article 3 of the Investment law states that foreign investors may invest in all business sectors in the Lao PDR, except in business activities which are detrimental to national security or cause a negative impact on the environment in the present or long term, or are detrimental to health or national traditions.

Article 13(7) obliges foreign investors to protect the environment.

Article 16 (3) of the law promotes those activities that protect the country's environment and biodiversity.