

Juth Pakai



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New Thought

Issue 3



Perspectives
on Lao development

**Economics policy, education,
elephants, and erosion**

Juth Pakai

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Sharing Information to Stimulate Development

The Editorial Board of *Juth Pakai* firmly believes that the objectives of alleviating poverty and stimulating development in the Lao PDR will be better pursued if information and innovative thinking are shared. The articles presented here challenge our current way of thinking and/or contain information that has not yet been published. We sincerely hope that *Juth Pakai* will stimulate an active development debate and will contribute to a better understanding of the development challenges in the Lao PDR.

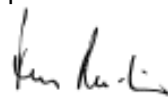
Editorial

Selecting the articles for *Juth Pakai* is becoming more challenging with each issue, as more papers are being submitted every month. Hopefully this is a sign of growing interest from foreign experts, development practitioners and academia. However, we are not yet completely satisfied with the number of papers we are receiving, particularly from Lao authors. The journal is, after all, for Lao people and while our translators work hard to try to get the ideas of foreigners conveyed in the Lao language, I know they would be much happier translating Lao ideas into English!

The editorial board has selected four varied pieces for the current issue and there are some exciting prospects still in hand for forthcoming editions. The first paper comes from Dr. Chi Do Pham, a former IMF representative in Laos and someone with expert knowledge of economic policy in developing countries. Richard Noonan's contribution on the economics of minority language education has made a belated appearance and expands nicely on the subject raised by Suksavang Simana in the previous issue.

Arlyne Johnson and her co-authors give a fascinating account of the issues surrounding the future of Lao elephants. These noble animals have an important role in Lao culture and history, and may even provide a future resource for tourism development. The last article, from Vincent Chaplot, returns to the familiar theme of slash-and-burn agriculture and its environmental effects. M. Chaplot's scientific evidence that swidden farming may actually be a way of preserving soils in the uplands provides food for thought to rural development planners.

The opinions presented in these articles are divergent and sometimes controversial, but the exchange of ideas, opinions and research is essential for the achievement of sustainable human development and poverty reduction. Once more I invite you to read them with an open mind and to remember that if you disagree and can provide good evidence for a different way of looking at a subject, then *Juth Pakai* is your forum for publication.



Finn Reske-Nielsen
UN Resident Co-ordinator

Letters

Translation

Colleagues,

I have read both of issues of *Juth Pakai* and while, I understand the UNCT is working hard on this, I think the quality of translation into Lao is quite poor. I hardly understand some of papers and find others confusing (e.g. How Firms Learn and The Mekong in the last issue). I have to compare with the English version in order to fully understand. The other thing is that the book is too technical - I don't think the context is useful for most Lao people. Some articles, frankly, are boring and long. From discussion with colleagues and friends, we would prefer something short but informative and well concluded.

Submitted by e-mail

Editor: Thank you for being frank! Admittedly there are problems translating such technical articles into Lao, but it is interesting that one of the articles the reader could not understand was actually written in Lao and then translated into English. One of the motives behind publishing *Juth Pakai* is that reading skills are very low in Laos – a natural consequence of there being very little material published. We will continue to put out technical and development-related material in both Lao and English, and appeal to our readers to supply interesting papers.

Upland Paddy Rice

Colleagues,

Pandey, S. et al. gave a good overview of the potential for expanding rice paddy area within the northern mountains (Issue 2). I would like though to comment that:

- The article relates to a study that presents the relation between the amount of paddy land and the level of food security/wealth. It implies ('direct correlations') that those who have larger paddy area are better off and concludes that paddy expansion results in greater wealth and more food security. The conclusion that farmers who adopt project innovations are now wealthier is very commonly used all over the world. However, this is not always true: very often the 'innovating' farmers were those who already had higher status and a more secure livelihood, and as such have had the possibility to expand their economic activities.
- The article states that further expansion of paddy fields is currently limited due to the lack of suitable land and the lack of water. Having lived and worked for five years in Nepal, I can note that the technical scope for expanding paddy area in the highlands of Laos is still huge. Most irrigation in Laos consists of a dam across a stream, followed by a short canal. In mountain areas, an inlet

running nearly parallel to the source and followed by a longer canal has more potential. Limitations to expanding paddy area in the mountains of Laos are a lack of technical skills, followed by the maintenance factor (small number of farmers in relation to the amount of irrigated paddy) and financial resources. Additionally, land holding size in Asia is often related to the ability of the owner to plough the area. In Laos ploughing has been largely mechanised, but in the mountains mechanisation is limited due to the terrain. Expansion could well be limited by the ability to plough the land.

In the presented cost-benefit analysis, the major cost in creating new paddy land is the construction of terraces, a weir and the irrigation canal. It states the amount to be US\$300 per hectare, derived from the Troesch survey. This seems to be underestimated. Either the farmers have not stated their full inputs (not only financially, but labour paid 'in kind') or the expansion area was relatively easy to transform. The breakeven point for this investment is given as four years. The estimate is either incorrect or the financial aspect is becoming more and more important. It would be interesting to find out the price at which terracing becomes uneconomical. If we assumed US\$500 more investment is required to install irrigation, (totalling US\$800), this would still result in an internal rate of return of 20% and a breakeven point of ten years. US\$1,000 more investment (totalling US\$1,300) would near the discount rate of 10%, though the breakeven point would be achieved only after 25 years. Should the discount rate unavoidably increase to 25%, even then there is a net present value of over US\$200.

However, I stress that these comments do not take away from the importance of the main focus of the article: investment in small-scale irrigation schemes can greatly contribute to improving the living conditions of people in mountain areas.

Rick Dubbeldam
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The United Nations in the Lao PDR is supporting the production of *Juth Pakai, Perspectives on Lao Development* with the aim of stimulating dialogue on all issues related to development in the country. The Editorial Board has reviewed the articles presented in this issue. The views expressed in this publication are those of the author(s) and do not necessarily represent those of the United Nations in the Lao PDR.

Economic Reforms in a Transition Country - The Recurring Experience of Laos

by **Chi Do Pham**

This paper charts the transition of economic policy in the Lao PDR from the mid 1980s, examining some of the successes and problems encountered in the bid to set up a market-oriented economy. The author contends that State Enterprises and non-performing loans continue to hinder the national economy and concludes that a fresh and radical policy is once more needed if the country is to catch up with the economies of neighbouring countries.

Background to Economic Reform and Initial Conditions

After the 1975 communist revolution the Lao PDR set up a centrally-planned economy in which the dominant sector, agriculture, remained characterised by small private holdings. Prices of agricultural produce were strictly regulated by the state, trade between provinces was restricted, and a large proportion of public sector wages were paid in coupons usable only in state shops. Domestic price control, as well as an overvalued exchange rate, led to parallel markets for goods and foreign exchange (Ljunggren 1993; Bourdet 1995).

The industrial sector, comprising only a small part of GDP and concentrated mainly on light manufacturing, was largely controlled by the state planning system. State enterprises accounted for some 80% of industrial output and these companies were obliged to transfer targeted amounts to the budget, regardless of their financial performance. They therefore had to borrow heavily from the banking system to finance operations. The resulting monetary policy required to finance the credit demand of State Owned Enterprises (SOEs), as well as the annual budget deficits of the government, fuelled inflationary pressures.

Price and Trade Liberalisation Policies

In 1986, the government embarked on the New Economic Mechanism (NEM), an ambitious agenda to change pricing and trade policies. Public enterprises were given operating autonomy to determine their own production levels, output mix, investment, employment and wages. Agriculture procurement prices were freed: farmers began to receive payment in cash for their produce; and the state monopoly over the procurement and distribution of rice ended.

Moreover, retail prices, except for certain public utilities and domestic air transport, were liberalised. The private sector was authorised to participate fully in the production and distribution of most goods and services. A decree was issued to establish the autonomy of private firms and to enable their retention of after-tax profits; and the scope of private and mixed enterprises in international trade was expanded.

The exchange system was simplified with multiple official exchange rates being unified at levels close to the parallel market rate.

Stabilisation Policies

In the early years of reform, the continued lack of a 'hard budget constraint' on both the government and public enterprises led to 'money printing' and unrestricted access to credit from the banking system, and hence to high rates of inflation. Up to 1989, the government continued to rely heavily on bank financing to cover its annual budget deficits. In addition, the banking system still accommodated credit demands by public enterprises, despite their newly granted financial autonomy and early restructuring efforts. Inflation surged to an annual rate of over 100% by mid-1989, mainly due to deficit financing associated with a large wage increase in the public sector to replace food coupon payments, and partly because of the effects of a severe drought in 1987-88.

*monetary control helped restore confidence
in the Lao currency and the nascent
commercial banking system*

This prompted the government to take decisive stabilisation measures in late 1989, in the context of a comprehensive structural adjustment programme strongly supported by multilateral and bilateral organisations. Besides substantial financial contributions, these donors also provided generous technical assistance and policy advice to support the development of a strong package of government fiscal and monetary policies designed to reduce the budget deficit and sharply curtail the liquidity expansion in the economy. On the fiscal side, there were two major tax reforms in 1988 and 1989, which substantially raised government revenue from direct and indirect taxes. These efforts to centralise revenue collection were highly successful, due to the strong political support they received. The revenue/GDP ratio rose from 8.2% in 1989 to 12% in 1993. At the same time current expenditure was virtually stabilised as a share of GDP, so the overall budget deficit declined from 12.5% of GDP in 1989 to 4.4% in 1993. The deficit was also fully financed by external assistance, without recourse to bank financing.

The most powerful instrument used to control inflation was an effective monetary policy package consisting of: (i) containment of bank credit to the government; (ii) drastic reduction of bank credit to state enterprises and (iii) use of three-month Treasury certificates and one-year bank deposits with very high nominal interest rates to absorb excess liquidity and encourage financial savings. Following these measures, domestic liquidity expansion was sharply curtailed from 89% in 1989 to 16% in 1991.

The result of the battle against inflation was dramatic: the year-on-year rate of inflation was brought down from 76% at the end of 1989 to 10% at the end of 1991; it was further reduced to 7% by 1993. This successful monetary control also explained the relative stability of the kip exchange rate from mid-1989 to the end of 1993, and hence the continued success of inflation control. The monetary control helped restore confidence

in the Lao currency and the nascent commercial banking system (Chi Do Pham 1994 and 1996).

Structural Measures

These stabilisation policies were also accompanied by bold structural policies.

Reform of Public Enterprises and the Privatisation Programme

The government initially decided to embark on an ambitious programme to privatise all state-owned enterprises, except seven considered 'strategic' companies, which were retained in the public sector and were to be restructured. This was carried out with two major caveats: (i) only small SOEs were completely privatised - larger enterprises were restructured but still retained in the public sector or only partly divested; and in addition (ii) most of these cases involved leases or workers' contract agreements rather than outright sales to the private sector. The government's preference for such agreements reflected: (a) the lack of technical expertise to evaluate the assets and liabilities of these enterprises; but mostly (b) the desire to retain flexibility in the privatisation process. This gradual reform of SOEs has turned out to be a major cause of structural problems in subsequent years. SOEs were later responsible once again for the growth of non-performing loans (NPLs) incurred by the banking sector, thereby slowing development of the private sector as an engine for fast and sustained economic growth, and hampering financial sector reform.

Reform of the Financial Sector

Laos initially made considerable progress in creating a two-tier banking system, a structural reform which was instrumental to the early monetary policy success in curtailing inflation. The international financial institutions supported this banking reform through a generous recapitalisation programme in 1993-95, helping state-owned commercial banks get rid of sizable NPLs. However, the lack of internal management improvement in these banks, and their continued policy to lend under government pressures rather than lend commercially based on profitability, rendered this effort futile. The result is that today, the banking sector is facing the same mounting problems as in 1993-94, with NPLs once more comprising half of the total loan portfolio.

Institution Building and System Reform

Major progress in the institutional area led to successful economic reforms from 1990-94:

- Adoption of the new constitution in late 1991 and other important legislative work.
- Setting up of an inter-ministerial working group, with effective coordination and strong backing from high-level authorities, to monitor macroeconomic management.
- Establishment of the Foreign Investment Management Committee and initiation of dynamic efforts to promote direct foreign investment.
- Centralisation of external aid management, public investment programming, and execution of public capital outlays.

Recurring Financial Turmoil, 1998-2000

After a period of macroeconomic stability between 1990 and 1994, the Lao economy ran into serious financial disequilibrium in the second half of the nineties, notably after the exacerbating effects of the Asian financial crisis in 1998. As a result the external current account deficit enlarged; the government was often unable to make salary payments to civil servants for several months and incurred sizable arrears with the private sector, causing a liquidity crunch for its activities. The banking sector became insolvent due to mounting NPLs, and there was a total loss of confidence in the Kip.

The credit policy was relaxed at the start of 1995, and fiscal discipline was abandoned in the following years. Heavy annual budget deficits recurred after 1997 and prompted deficit financing by the banking sector, leading to renewed rapid liquidity expansion in the economy and fuelling rampant inflation, which once again reached the three-digit level by 1999 – an all too familiar experience for many Lao people. Most notably, an ill-conceived devaluation of the Kip has been adopted since 1995 without the required support of the strict monetary and fiscal policies that were successfully implemented during a similar scheme from 1988-90. This has caused continuous waves of depreciation of the national currency under the intricate nexus of the ‘budget deficit-bank financing-excess liquidity-inflation-depreciation’ cycle. The value of the Kip now stands at 10,800 Kip/USD compared with the rate of about 720 Kip/USD a decade ago. The reasons for this recurrent experience in economic destabilisation were both weak macroeconomic policy and a slowdown in structural reforms, as we will discuss below.

The Root of the Problem: Lack of Fiscal Discipline

Weak revenue administration is a serious recurrent problem in the Lao economy, despite considerable technical assistance in this area from international financial institutions. The ratio of revenue/GDP amounted to some 11.2% during 1998-2000, stagnating at about the same level as 1992-93. Meanwhile, total government expenditure rose to around 21.9% of GDP, compared with 19.4% in 1992-93. The stop-and-go reform did not help the transitional process, especially with regard to fiscal decentralisation, which weakened central government revenue collection and prevented budget transfer from surplus provinces to deficit provinces. This, together with the slow reform of the state enterprise sector, continued to exert strong pressure on monetary policy through the constant need for public sector deficit financing. Notably, the financial weaknesses of SOEs and their subsequent NPLs has placed serious constraints on state-owned commercial banks.

Enduring Problems of the Banking Sector

The problems of the Lao banking sector have originated from three main sources:

- The large size of NPLs, which has been caused mainly by the ‘policy lending’ obligation of the government.
- The heavy exposure to foreign exchange losses, due mainly to the Asian financial crisis period of 1997-99, combined with macroeconomic instability in the Lao PDR.
- The high cost structure of the Lao banking sector, due mainly to inefficiencies in organisation and management.

The Emerging ODA Problem and the Nature and Scope of ‘Capacity Weakness’ in Laos

The Lao PDR is heavily dependent on ODA. 70% of public investment is funded by donors, which among transitional economies is perhaps a situation unique to Laos. In recent years, two emerging issues encountered during the ODA process have been the spread of aid management among all line ministries and low absorptive capacity.

There is an urgent need for the government to improve its internal aid management and coordination with donors, in order to get better control over the holistic picture of both national revenue and ODA. This would improve public investment coordination, as well as recurrent expenditures. With regard to ‘absorptive capacity’, there is a difference between donors and the government in perception of the nature and scope of the human resource issue facing Laos. While both parties acknowledge the serious human resource shortage, there is no mutual understanding as to the magnitude and urgency of the deficiency. Donors see it as a mainly qualitative shortage, while the government on the other hand continues to see the human resource issue merely as a routine perennial task of assigning ‘deserving’ personnel to authoritative positions without due concern for relevance of qualification.

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The Need for a Revived Strategy for Private Sector Development and Return of Foreign Direct Investment (FDI)

The country has experienced stagnation in private investment, especially new FDI, with the FDI/GDP ratio declining from 5% in 1994-95 to 2% in 2003. There is a need for the government to take a fresh look at this area: private businesses complain enormously about the red tape and corruption required both to get licenses and to operate profitably.

This points to the need to create a new enabling business environment for private sector development. Among these issues is the creation of a new ‘Enterprise Law’, following the recent successful experience of Vietnam in this area, which will regulate the establishment and operation of commercial enterprises, simplify existing registration procedures and encourage rapid formation of private domestic companies and quick return of FDI. Notably, private sector development may help promote the participation of domestic and foreign investors in contributing towards Lao national growth and poverty reduction through generation of employment opportunities.

Accelerating Trade Liberalisation

In the above context, liberalising further foreign trade by eliminating the remaining impediments to trade will prepare the Lao economy for regional and global integration in the next decade. Laos has just opened up to the world economy. In recent years, although the government has made significant progress towards trade liberalisation, the country's trade regime is still characterised by non-transparency, high levels of import protection, and a highly dispersed tariff structure. To address the above challenges of integration, Laos must adopt a new trade policy aimed essentially at instilling a neutral and uniform tariff regime and removing non-tariff barriers (NTBs). Three forms of NTBs persist even after the two decades of economic reform under NEM: quantitative restrictions; the system of special arrangements between government and private business agents concerning fiscal payments, and the transportation monopoly governing transit trade through Thailand.

The Partial Recovery Period 2001-2003: Where do we go from here?

After the financial turmoil of 1998-2000, caused partly by the Asian crisis and partly by the lack of adequate stabilisation policies, the Lao government adopted an economic recovery five-year plan, covering 2001-2005 and aimed at three major objectives: (i) strong and sustainable economic growth at 7% annually; (ii) substantial structural transformation of the Lao economy; and (iii) strengthening economic and social infrastructure.

The country's trade regime is still characterised by non-transparency, high levels of import protection, and a highly dispersed tariff structure

In the event, average economic growth reached 5.9% annually during the first three years, below target by about 1.1%, but achieving about the same growth record of the preceding five years. There was a favourable structural transformation of the economy as desired, with the respective GDP shares of the manufacturing and services sectors rising from 24.2% and 20.2% in 2000, to 26.5% and 23.3% in 2003; meanwhile, the agricultural sector declined from 55.6% of GDP in 2000 to 50.2% in 2003. In addition, the government succeeded in significantly improving the infrastructure of the economy, notably with sizable investment in the national road network. Inflation was also brought down from the three-digit level in 1999 but still remained at double-digit level and above the target level in 2002-2003. Financial policies, particularly fiscal policy, were still vulnerable to a stop-and-go pattern and proved inadequate.

The Need to Restore Macroeconomic Stability

Learning from its own past success story during 1989-1994, it seems that the government would need to re-establish conditions for a stable macroeconomic environment to pursue the national development

agenda of sustainable growth path and poverty reduction. In particular, a Senior Economic Policy Steering Committee is urgently required at the highest level to establish the national economic agenda and monitor its monthly implementation:

- A key success indicator would be the restoration of the confidence in the Kip in the next one to two years.
- An absolute *must* in improving financial conditions of the country is restoring fiscal discipline in the public sector, by reducing the budget deficit through revenue raising and containing expenditure measures.
- ‘Budget constraint’ needs to be restored in SOE operations, and bank credit to loss-making enterprises has to be strictly restrained. There is an inherent need to accelerate SOE reform and privatisation.
- To solve banking sector problems, the key policy is to restore financial discipline in the public sector as mentioned above, and to restructure the state-owned commercial banks. There is an urgent need to free these banks from policy lending and allow them to follow strict commercial bank orientation. In this task, it is most essential that the government firmly pursues SOE reform in order to enhance the banking sector reform, notably in reducing non-performing loans. As pre-requisites to any new recapitalisation effort, the banks need to restore their credit discipline and improve their own management to prevent any new loss-making activity.

The National Growth and Poverty Eradication Strategy (NGPES)

The NGPES is the country’s dual-objective policy framework for a sustainable growth path and poverty reduction. This reflects Laos’s long-term national development goals over the last two decades, which are:

- To move from a centralised to a market-based economy to attain economic efficiency;
- To achieve sustained and equitable economic growth and social development; and
- To improve the material well-being of the whole society while enhancing the spiritual and cultural life and unity of the Lao multi-ethnic population.

The NGPES includes several specific national programmes. The following section will discuss briefly some key elements of that agenda for the period ahead (IMF 2003; UNDP 2003).

Reforming Public Administration for Better Governance

This will be the key element of future reforms. For some time, governance problems have been well recognised by the Lao government, especially the issues of corruption and excessive red tape. Improved governance is an integral part of the government’s policy framework since limited public resources must be used efficiently in order to not compromise the potential help for the poor.

In the past decade, the authorities have undertaken wide-ranging public administration reforms aimed

at improving the system of decision-making in the transition to a market-based economy. However, public administration still suffers from duplication of mandates, insufficient coordination, inadequate management rules and procedures, and very low salaries. The latter greatly weakens the ability of the public service to operate effectively.

The key lesson learned in Laos is the question of sequencing decentralisation. The rush towards decentralisation had a harmful effect on the central government's ability to manage the process, particularly the fiscal side, and undertake national development plans and reforms. The poor revenue collection of both domestic taxes and customs duties is the most typical example of poor governance. In addition, fiscal decentralisation carried out in recent years is the second fundamental reason for weak revenue because provincial officials could challenge the central authorities' control by concealing important tax revenues. Fiscal decentralisation needs to be reviewed and addressed urgently.

Improving Implementation of ODA

With regard to the need for aid management and control, it is essential to review the on-going institutional reforms: the roles of relevant ministries (Planning, Finance, and Ministry of Foreign Affairs responsible for ODA) need to be defined and coordinated. In addition, it would be critical to address the issues of transparency and accountability of aid as there is sign of 'donor fatigue' due to the country's continuous dependency on ODA.

The private sector in Laos could and should be a major contributor to GDP for sustained growth

The need to find innovative ways to accelerate the implementation of ODA is an issue of highest urgency for the country and the donor community. Likewise, the donor community must be prepared to re-examine their approach to technical assistance and set in motion integrated efforts to achieve real and verifiable transfer of skills and know-how to local counterparts.

Revived Strategy for Private Sector Development

While China and Vietnam have achieved very impressive results in their respective efforts to accelerate private sector development as an engine for growth in the last few years, the private sector has rather stagnated in Laos. With the exception of few SOEs (which enjoyed government subsidies or exclusive privileges), tourist companies and urban-based food service and recreation business establishments, many privately owned businesses have experienced declining business, insolvency, and failure. As a result, FDI in several sectors has dried up all together.

To reverse this situation, the experiences of China and Vietnam offer valuable lessons for Laos. The private sector in Laos could and should be a major contributor to GDP for sustained growth. As the

sector comprises predominantly of small and medium enterprises, there is a pressing need for the government to boost the growth of these SMEs. This will ensure a much-needed level playing field for SOEs and private companies, including those financed by FDI.

Trade Liberalisation

Liberalising trade will establish it as the cornerstone of the national poverty reduction programme because it will promote private sector development, encourage both domestic and foreign direct investment, and open up the country to competitive market forces. Trade has the potential to create employment opportunities in both urban and rural sectors, and eradicate poverty. Thus, further economic integration will help accelerate Laos's transition to a market economy. In preparation for Laos to integrate regionally (ASEAN and AFTA) and globally (WTO and Normal Trade Relations in the context of the eventual bilateral trade agreement with the United States), it is important to remove existing impediments to export and import activities. It is also important to examine the social and cultural impact of integration on society.

Developing a Resource-Based Economy: Using Comparative Advantage

The Lao economy is heavily dependent on the country's natural resource base, namely forestry, water, land and mineral resources. While its forest resources have already been significantly exploited, water, land and mineral resources have remained largely untouched. Although it is understandable that the authorities wish to maintain the country's social and political stability as well as its traditional and cultural values, the absolute poverty of a large part of the nation's population poses a serious question for policy agenda in the next decade.

Conclusion

Since 1986 Laos has implemented various reforms under the NEM, in the areas of public administration, budget, banking, SOEs and the legal system. Within this general 'open door' policy, major economic and social improvements have surely become visible. After nearly two decades of implementation however, the NEM is clearly showing signs of exhaustion and needs to be followed by another overall development strategy which would help Laos to join the global economy.

Furthermore, the speed of systemic improvement in Laos lags behind the speed at which the outside world is changing. As a consequence, Laos continues to stay in a disadvantaged position in the context of Asian dynamism on the eve of globalisation. A new mechanism, of similar grandeur to the NEM, is needed to meet the challenge of integration, an objective that will not be accomplished through stopgap measures and half-hearted attempts at coordination.

About the Author

Chi Do Pham was the IMF representative in Vientiane in the early 1990s, and advised senior government leaders on economic policy. He currently works as a consultant.

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References

Bourdet, Yves. "Macroeconomic Stabilisation Under Transition in Laos". *Communist Economies and Economic Transformation*, Vol. 4, No. 4.

International Monetary Fund (IMF). *Staff Reports and Recent Economic Developments in the Lao PDR*, 2003.

Ljunggren, B. "Market Economies Under Communist Regimes – Reform in Vietnam, Laos and Cambodia." in Ljunggren, B. (ed). *The Challenge of Reform in Indochina*. Harvard Institute for International Development, Harvard University Press, 1993.

Pham, Chi Do (ed). *Economic Development in the Lao PDR: Horizon 2000*. Bank of the Lao PDR. Vientiane, 1994.

Pham, Chi Do and Ichiro Otani (eds). *The Lao P.D.R. Systemic Transformation and Adjustment*, IMF Occasional Paper No. 137, Washington DC, 1996.

GOL. *The National Growth and Poverty Eradication Strategy (NGPES)*. Vientiane, 2004.

Language of Instruction: Economic Analysis of the Use of Minority Languages for Early Education

by **Richard Noonan**

The Lao PDR is a multi-ethnic nation, with nearly 50 officially recognised ethno-linguistic groups. Collectively, the majority Lao language group represents 64% of the population. The government is committed to achieving quality basic education for all (EFA), but to achieve high enrollment rates with low wastage, primary schooling must be provided in languages children understand. Experience in many countries suggests that the most cost-effective way for minority children to learn basic concepts and become literate in Lao is by receiving initial instruction in a language they already know, and then using that as a base for learning Lao. This economic analysis focuses mainly on the costs of using minority languages for instruction but also touches on the benefits and financing.

Equity, quality, and efficiency are pillars of Lao education policy. The ability of young children to understand and benefit from instruction is an important aspect of quality that must be taken into account if the Education for All (EFA) goal is to be achieved. Laos has a rich ethno-linguistic diversity, and more than 30% of children have a mother tongue other than the national language, Lao. This presents a complex challenge to the education authorities, whose duty is to ensure that all children, regardless of the language used in the home, can benefit from primary school instruction.

Research in other countries with ethno-linguistic minority communities shows that children learn basic concepts and become literate most cost-effectively if initial instruction (the first three grades) is in their own language (UNESCO 2003; Stroud, 2002). The aim of this paper is to analyse the costs involved in providing instruction in ethnic minority languages in grades 1-3 in regular local schools and communities. The main determinants of costs are: (a) The numerical and spatial distributions of the ethno-linguistic groups; (b) The extent of mutual intelligibility of the various language groups, languages, dialects, and variants; (c) The use and distribution of trade languages or lingua franca; and (d) The extent to which school-age children understand these multiple-community languages. The paper also briefly discusses the economic benefits (in terms of efficiency, equity and socio-economic development) of using minority languages for instruction, and possible sources of financing to cover development costs.

Distribution of Ethno-Linguistic Groups

Laos is a multi-ethnic nation, a fact explicitly recognised by the Constitution. The 1995 population census identified 47 ethno-linguistic groups. Linguists and anthropologists have identified up to 230 ethno-linguistic groups and sub-groups.

Numerical Distribution

<i>Population by Ethno-Linguistic Group</i>	
<i>Group</i>	<i>%</i>
Lao Tai	64
Mon-Khmer	22
Hmong-Mien	7
Tibeto-Burman	2
Others	5
Total	100

Source: Census 1995

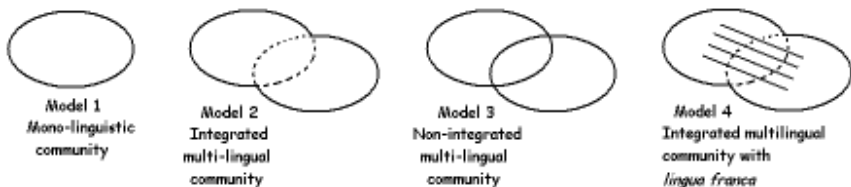
The Lao language group itself (Lao-Tai) comprises four variants, which collectively represent 64% of the population according to the 1995 census. Other major language groups include the Mon-Khmer languages, representing 22% of the population, the Hmong-Mien (Hmong-Yao), representing approximately 7%, and the Tibeto-Burman, representing some 2%. Each of these language groups comprises several more or less mutually intelligible *variants*, but the different language *groups* themselves are not mutually intelligible (Chamberlain and Phomsombath 2002). To complicate the picture, many people speak more than one of these languages, and according to the location, different variants serve as a trade language or *lingua franca*.

The Mon-Khmer family is numerically dominated by the Kmhmuic group, in which there is great diversity, although the eight major groups have high mutual intelligibility. The Hmong-Yao family is numerically dominated by the Hmong group and mutual intelligibility is high. The Tibeto-Burman family is made up of diverse and mutually unintelligible groups. The largest group, the Kor (Akha), comprises widely diverse sub-groups and mutual intelligibility is not well researched. The second largest group, the Phounoy, comprises three distinct groups, of which the largest serves as a *lingua franca*. The “Others” category comprises a large number of highly diverse small ethno-linguistic groups.

Spatial Distribution

The Lao-Tai tend to live in low-land and riverine areas. Kmhmu’ communities tend to be distributed over large areas in the northern provinces and Hmong communities widely dispersed in the northern and central provinces. Many of the smaller ethno-linguistic communities tend to be widely scattered in small isolated villages spread over many parts of the country. According to the 1995 census, the ethnic minority population was in the majority in 60 of the 133 districts in the country at that time. The ethnic minority population of these districts alone is estimated to total some 1.4 million in 2004, or nearly a quarter of the total population and two-thirds of the minority population. These general tendencies hide substantial variation in the spatial distribution of villages and families.

Figure 1: Models of Spatial Distribution of Ethno-Linguistic Groups



A language map for Laos, based on careful ethnographic and linguistic research, displays great spatial variation in distribution of ethno-linguistic groups (SIL International). A more detailed map of the spatial distribution of ethno-linguistic groups, soon to be published, will show a highly variegated pattern, with large amorphous patches representing one group, long amorphous strips representing a second, and small scattered islands representing a third. Spatial and numerical distribution, mutual intelligibility of language variants, and stakeholder choice are important determinants of both efficiency and equity in the provision of quality schooling for all, regardless of ethno-linguistic group.

Mutual Intelligibility and Choice

Despite the great linguistic diversity in Laos, there has been little ethno-linguistic mapping or research into the mutual intelligibility of various language variants or the use and distribution of lingua franca (Chamberlain and Phomsombath 2002; Chamberlain 2002). If two language variants (say A and B) have high mutual intelligibility, then it might be possible for the respective linguistic communities to agree on a common variant (say either A or B, or some 'blend' AB, or a common lingua franca C) for use in instruction in the early years of primary schooling. As will be seen below, mutual intelligibility and the use and distribution of *lingua franca* represent two important determinants of the costs of achieving universal basic education. Equitable solutions to the educational needs of the country's diverse ethno-linguistic groups have to be cost-effective and based on the specific objective and conditions in the different communities. Stakeholder choices need to be taken into account, and these choices will vary from one community to another, often in ways that are difficult to predict. Stakeholders need to be aware of their right to choose, what the choices are, and their consequences. In some cases, the choices will be clear; in other cases a socio-linguistic survey will be needed to clarify the situation and support informed choice.

*Stakeholders need to be aware of their right to choose,
what the choices are, and their consequences*

Some typical patterns in the complex spatial distribution are displayed in Figure 1 above. In the simplest case (see Model 1, Figure 1), a community shares a language with a larger group in a wider spatial area. In such a case, the community might prefer children in early grades to receive instruction in the shared minority language. Even in such a simple case, however, agreement is not assured. The community stakeholders may prefer their children to receive instruction in Lao from grade 1, especially if there is significant interaction with the Lao-speaking community. In a more complex case, stakeholders in a small minority community existing within a different but wider minority area might prefer to use either the local language, the language of the wider surrounding group or the national language.

In Model 2, two language communities are economically and socially integrated. A high level of integration in the community may make it easier to reach agreement on the language of instruction. If the integration is high, many people may be bilingual, so community stakeholders might prefer one

of the languages (the most 'useful' or 'higher status' language) to be used for instruction in the early grades. In Model 3, two language communities (say A and B) are not integrated. Lack of integration might make it difficult for the stakeholders from the respective communities to reach agreement on a single language, A or B, for instruction in the early grades. If one of the languages is perceived by both groups to have higher utility or status, it might be possible to reach an agreement to use that language. Alternatively, they might agree to use Lao. In Model 4 in Figure 1, two language communities, A and B, are integrated through lingua franca C. Stakeholders might select either A or B as the medium of instruction, or C if it is spoken by school-aged children and is suitable for instruction, or Lao.

The Costs

An economic analysis of the costs of instruction in multiple languages must be based on a comprehensive coverage of the costs involved in schooling. Costs are steered by selection of inputs (students, teachers, materials and equipment, facilities, operation and maintenance) and processes (curriculum and teaching/learning processes). In this analysis, the two main cost factors are teacher salaries, and materials and equipment. It is assumed that a single national curriculum is used, but translation costs are subsumed under the cost of materials.

*Instruction in minority languages can be provided
cost-effectively without increasing the total
number of teachers*

Costs to Students and their Families

The costs to students and their families are mainly opportunity cost (loss of income when children go to school instead of working at home or in the fields; this cost is low for children in lower primary grades), combined with costs for transportation, uniforms, books and other instructional materials. It is assumed here that additional costs to students' families for having initial instruction in an ethnic minority language are generally nil. The mere fact that instruction is in a language they understand does not in itself add to their costs. There could be some exceptions. First, in some cases (for example see Figure 1, Model 3), students might have to travel a little further to attend the school offering instruction in the language of their choice. *A little* further is emphasised because the objective is to bring instruction in ethnic minority languages into regular local schools. Use of ethnic minority boarding schools is rejected as inappropriate for young children. The additional cost of instructional materials in minority languages is discussed below, because a distinction needs to be made between the cost and who bears the cost. To make minority language instruction a realistic alternative, it must be assumed that minority children do not have to pay more for their instructional materials than ethnic Lao children do. The additional cost must be covered either through supply support to the publisher or demand support to the students or schools - ideally through demand support.

Costs for Facilities

One objective of this paper is to show how instruction in minority languages can be provided through redeployment of teachers, and flexibility in the use of existing physical facilities, as discussed below. It is therefore assumed that using ethnic minority languages for instruction in the early primary grades creates no additional facility costs.

Teacher Salaries

Another objective of this paper is to show how instruction in ethnic minority languages can be provided cost-effectively without increasing the total number of teachers. Redeployment of teachers will be required though, as will the continuation of the current trend of training more ethnic minority teachers. Teacher salaries (including base salaries and all supplements) typically account for some 80% of recurrent expenditure, although the level and pattern of expenditure can vary considerably between levels of schooling, location (province, district, school), and over time (Noonan 2001). Current evidence for the Lao PDR as a whole indicates that for primary level, 92% of the recurrent budget is allocated to teacher salaries (Gannicott; Noonan 2003a). There are three major categories of teachers as defined by employment conditions:

- Civil servants, or 'quota teachers'
- Contract teachers, usually employed by the provincial governments but sometimes by central government
- Community or volunteer teachers, typically employed by the local community.

Salaries of quota teachers are regulated by the civil service salary scale. Contract teacher salaries are regulated by a recommendation to follow the civil service salary scale, but contract teachers do not receive the health care benefits or pensions of civil servants. Salaries of community teachers are established by negotiated agreement between the community and the teacher. Anecdotal evidence suggests that in practice, salary levels of contract teachers vary in accordance with supply and demand, and could be either higher or lower than for quota teachers. Salaries of community teachers are not regulated and vary according to local supply and demand conditions. Anecdotal evidence suggests that the salaries of community teachers are often substantially lower than those of quota teachers.

Teacher Deployment

Teacher pay comprises a base salary, determined mainly by level of qualification and years of experience, and a series of supplements. There are no supplements related specifically to teaching in ethnic minority communities or languages. Indeed, anecdotal evidence suggests that ethnic minority teachers often teach in the minority language in early grades

<i>Supplements for Remote Areas</i>	
Remote & isolated areas	15% of net
Remote & mountainous areas	20% of net
Especially difficult areas	25% of net
<i>Supplements for Multi-grade Teaching</i>	
Two-grade classes	25% of base
Three-grade classes	50% of base

at no additional cost! Some of the supplements are determined by the personal situation of the teacher and others by teaching conditions. Two particular salary supplements are of relevance for meeting the needs of ethnic minority communities, namely the supplement for teaching in isolated, mountainous, and difficult areas, and the supplement for teaching two- or three-grade (multi-grade) classes in schools with too few classrooms or teachers.

Would expenditure on teachers increase if ethnic minority languages were used as the language of instruction? There are several factors to consider. To be realistic, use of minority languages will generally require the use of teachers from the respective ethno-linguistic communities. Unless teachers from other linguistic communities learn the local language (not likely on any substantial scale, especially considering the isolation, cultural differences, and the lack of salary incentive), instruction in the local language will be impossible. In recent years the number of ethnic minority teachers has increased at an even higher rate than the number of ethnic minority students has (Noonan 2003b). In the usual 'one-class, one-teacher' context of ethnic minority communities, there would be no additional cost for teacher salaries if teachers from the community were employed. In multi-ethnic communities, if the number of children in each grade is sufficient (say large enough for at least two classes at each grade level) and the proportion of minority teachers and minority pupils is nearly the same, then use of minority language for instruction might be achieved by simply deploying minority teachers to teach minority students. In that case, no additional teacher salary cost would be associated with minority language instruction. In many rural and mountainous communities, especially small ethnic minority communities, schools are incomplete (offering fewer than five grades). One measure taken to support access to five grades is the supplement for multi-grade teaching.

Figure 2: Models of Efficiency and Equity in Minority Teacher Deployment

Multi-lingual classes, low equity 5 teachers, 0 ethnic minority	L + M Grade 1	L + M Grade 2	L + M Grade 3	L + M Grade 4	L + M Grade 5
Mono-lingual classes, high equity 5 teachers, 1 ethnic minority	M Grades 1 - 3	L Grades 1 + 2	L Grades 2 + 3	L + M Grade 4	L + M Grade 5
Multigrade supplement:	50%	25%	25%		
Mono-lingual classes, high equity 5 teachers, 2 ethnic minority	M Grades 1 + 2	L Grades 1 + 2	M Grades 3 + 4	L Grades 3 + 4	L + M Grade 5
Multigrade supplement:	25%	25%	25%	25%	
	L = Lao students		M = Minority students		

In communities able to support at most one class at each grade, different models of teacher deployment can yield different degrees of efficiency and equity, as illustrated in Figure 2. If there is at least one teacher from the local language community, multi-grade deployment can enable the use of the local language for instruction in the early grades. Such deployment, unless made specifically for minority language instruction incurs no extra cost. Even if there is only one minority teacher (out of five), multi-grade teaching can allow use of a minority language in grades 1-3. In order to retain some balance in class size, majority students would also be assigned to multi-grade classes (1 and 2) and (2 and 3), as

illustrated in Figure 2 (middle row). This would incur an additional cost of one supplement for teaching three grades (50% of base salary) plus two supplements for teaching two grades (25% of base salary). The total additional cost would be $50\% + 2 \times 25\% = 100\%$ of the base salary of a teacher, or approximately 65-70% of the total salary cost of one primary school teacher (Noonan 2003a). If there are two minority teachers, four two-grade classes could be formed, with minority language instruction in grades 1 - 4. This would come at a cost of four two-grade supplements of 25% each, for a total of $4 \times 25\% = 100\%$ of the base salary of a teacher, or approximately 65 - 70% of the total cost of one primary school teacher.

Teacher Training

Although ethnic minority languages are reportedly in widespread use where students have difficulties with the national language, minority teachers lack training for teaching basic concepts and reading in their own language, then helping pupils pass from the minority language to the national language in later grades. It is unreasonable to require minority teacher trainees to have more than the standard amount of training simply in order to teach in their own language. In order to provide such training within the framework of standard pre-service or in-service teacher training, investment would be required to develop suitable curricula and for the production and distribution of instructional materials for use in teacher training colleges.

Materials and Equipment

Information regarding expenditure on materials and equipment for primary schools is scant. Rural primary schools are usually completely lacking in instructional equipment other than blackboards. In practice, the major expenditure on instructional materials and equipment at primary level is for textbooks. The costs of instructional materials are complex and need to be seen in the context of educational materials publishing (Bgoya and Noonan et al 1996). Publishing covers the full range of activities from concept to distribution. Publishing costs can be divided into fixed and variable costs. Fixed costs are all those incurred prior to printing (writing, illustrating, camera work, assembling, plate making). Variable costs are functions of numbers of copies. The unit cost is calculated by dividing the total cost by the number of copies produced.

Production Costs and Economies of Scale

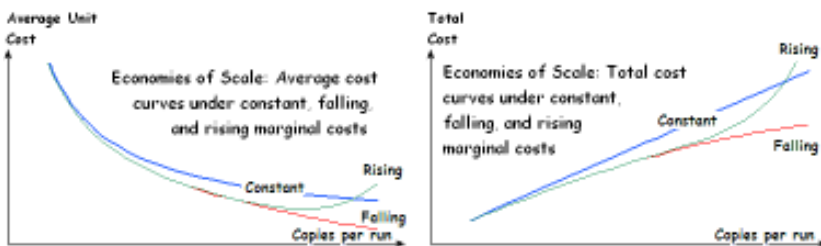
Economies of scale generally apply to production and distribution costs. The more copies produced, the lower the unit cost. The largest single cost is production, which typically represents about one-third of the retail price. If instructional materials are published in multiple languages, each language represents one production run of a

<i>Retail Price</i>	<i>%</i>
Production (raw materials, printing)	32
Discount to booksellers	23
Publishing overheads (personnel, management, finance, profit)	16
Payment to authors (royalties)	11
Marketing (promotion, selling)	9
Distribution	9

(Source: Bgoya and Noonan et al.)

given title. The added cost of using multiple languages includes both translation and production. The translation cost for a given language is fixed, and the production cost is variable. If materials are produced centrally, the cost of distribution to the ethnic minority communities could increase at least marginally, depending on organisation. If materials are produced locally, distribution costs could be reduced. Local small-scale production, using desktop publishing software, can probably be done at printing houses in at least a dozen towns around the country.

Figure 3: Scale Economies



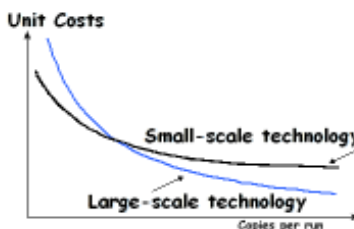
Production Costs: Appropriate Technology and Distributed Production

There are limits to scale economies derived from centralised production. Average unit cost curves can rise, as the limits of capacity (in both production and distribution) are reached, as shown in Figure 4. If materials are printed centrally in hundreds of thousands of copies, large-scale production apparatus is needed, limiting the number of printing firms that can compete and thereby reducing the opportunities for competitive pricing. Moreover, large-scale centralised production requires bonded warehouse facilities and a major distribution apparatus, with substantial risk for theft. All this adds to the unit cost of production and distribution. If printing work is distributed, and materials are printed in smaller runs for more limited geographic distribution, smaller and simpler technologies can be used, and the number of competing producers can be larger. If appropriate technologies are used, the shape of the total cost curves can be substantially different, and unit costs can be lower over the relevant range. For example, if small-scale simple reproduction equipment (such as photo-offset copiers) is used, the set-up costs can be quite low when compared with traditional large-scale printing presses. The long-run costs can be higher, but if the production volume needed for a given set of instructional materials is small, unit costs can be relatively low.

Figure 4: Cost Curves

Development Costs

If minority languages are to be used for instruction, then suitable materials need to be developed. In many cases, minimal revision would be required to make the materials suitable. For some materials, for example basic readers, more extensive revision might be required to adapt the text to each culture.



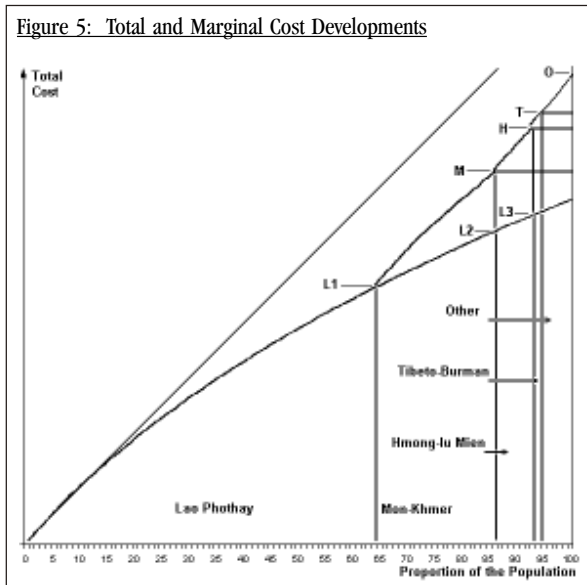
Moving towards Efficiency and Equity

Use of minority languages for instruction would be associated with both development costs and costs of production and distribution. These costs would apply to textbooks, teachers' guides, teaching aids, and supplementary materials. Production of teaching materials need not be a costly process, and indeed more flexibility is achieved by using low-tech methods for textbook production at the provincial or district level, where materials can be easily modified or amended. This can be a better strategy, especially where smaller groups are concerned. The groups for which unit costs will be highest are those for which production runs are smallest: using minority languages will incur high unit costs due to the size of print runs. A strategy is required to move successively closer towards improved efficiency and equity in the provision of educational services with quality and relevance, beginning with the lowest cost cases (the largest ethno-linguistic groups, for which Lao-based scripts are already established and in use), and then moving towards smaller language groups as resources become available.

Given the numerical distribution of ethno-linguistic groups, substantial gains in equity and efficiency could be made by beginning instruction in the Mon-Khmer group of languages, especially Kmhmu', as suggested in Figure 5. Of course, not all variants in the Mon-Khmer group could be used as languages of instruction. Assessment of exactly which variant(s) can serve the widest communities needs to be supported by socio-linguistic research and decided by the communities themselves through 'linguistic negotiation'. If Kmhmu' were

a language of instruction, some 70-80% of all children in Laos would be instructed in languages they understood. If Hmong were used, a further 6-7% of children would receive instruction in a language they understood. That is, using only three variants of instructional media, nearly 90% of children could receive early instruction in a language they understood. The cost would be marginal compared to the improvements in participation rates and student learning.

The costs of these 'cost increments' are illustrated in Figure 5. The total cost of providing ethnic Lao children with instructional materials is represented by L1. The additional cost of admitting Mon-Khmer is not the total height of the curve at L2 but the difference between M and L2. The cost of adding



Hmong is the difference between H and L3. These amounts represent the difference between the total cost of the minority-language materials and the cost that would be incurred if the minority students were provided with Lao materials. In other words, they represent the marginal cost of admitting another language for instruction. The differences along the vertical axis between L1, L2, and L3 represent the added cost of increased participation rates as universal basic education is approached.

The Benefits

Human Development and Human Resource Development

The government is committed to achieving quality basic education for all. In this age of open global market economies, human development requires that all people learn at least a minimum of general concepts and have the ability to read, write, and calculate. In order to participate in national, regional and global society, all people need to be able to inform themselves, to make judgments, and to express themselves. Illiteracy and lack of basic education is an effective barrier to participation in the economy beyond the confines of the household and local community. Economic integration requires common concepts, literacy and numeracy. No nation today can afford to limit its economic potential by failing to meet the basic education needs of ethno-linguistic minorities. Communities that are not economically integrated can contribute to neither their own nor the nation's economic growth and development.

Use of minority languages in early grades would significantly increase participation and contribute to the integration of minorities in the Lao nation.

Poverty Reduction Strategy

Of the 47 poorest districts identified by the National Growth and Poverty Eradication Strategy (NGPES, previously referred to as NPEP), 31 had predominantly ethnic minority populations according to the 1995 census. Language of instruction is a persistent problem in ethnic minority villages. Many minority villages do not participate in the education system because their children do not understand Lao (NSC 2002). Use of minority languages for instruction in the early grades, by teaching basic concepts, literacy and numeracy before moving on to Lao, would significantly increase participation and contribute to the economic, social, cultural and political integration of minority communities in the broader, multi-ethnic Lao nation.

From Land-locked to Land-linked

An important part of the national development strategy is taking advantage of the geographic position of Laos, 'the country in between', by transforming the country from land-locked to 'land-linked'

through heavy investment in road construction. Economic integration, through opening Laos to regional and global markets, could provide a platform for healthy economic growth and development. If the human resource base remains weak, the country may witness exhaustion of its natural resources, worsening terms of trade with its neighbours, and ultimately the impoverishment of the nation, as Laos continues to export unskilled labour and import skilled labour, export raw materials and low-value-added goods and import finished, high-value-added goods. Laos needs to change its priorities and invest more in education and training, including in rural and remote areas, and where needed, to provide early primary school instruction in ethnic minority languages.

Financing

The costs of providing early primary school instruction in ethnic minority languages need to be shared. If a clear policy and programme were presented and discussed with the donor community, development costs and even the added recurrent cost for instructional materials could at first be partially financed externally. Ultimately, the added recurrent cost must be borne by government, because it would be inequitable to require ethnic minority communities to pay more for meaningful basic education than the majority population pays. Some of the cost of socio-linguistic negotiations needs to be covered by the ethnic minority communities themselves.

Conclusions

The cost of achieving efficiency and equity in the distribution of quality primary school services among ethno-linguistic groups is subject to economic analysis. Investment cost includes the translation and adaptation of existing instructional materials for classroom use and the development of curricula and instructional materials for use in teacher training programmes. The largest recurrent cost is for teacher salaries. In some circumstances, the use of minority languages can lead to higher teacher salary costs, but rational allocation of minority teachers can minimise these costs, in some cases to zero. The second largest recurrent cost is the added cost for production and distribution of instructional materials in small runs. Production costs represent approximately one-third of sale price, and it is primarily the size of production runs that determines the average unit cost and economies of scale. Centralised production and distribution of instructional materials in multiple languages could be very costly, but distributed production using appropriate small-scale technology can minimise the added cost of production and distribution. With rational analysis, enlightened stakeholder choice, and rational planning of production and distribution, high levels of efficiency and equity can be achieved without massive cost increases.

The benefits of using ethnic minority languages for instruction where needed are improved human development and human resource development. Economic integration will contribute to economic growth and development only if the human resource based is improved across the whole population. Laos cannot afford to ignore the basic education needs of its ethnic minority population.

About the Author

Richard Noonan, an education economist, is Senior Advisor for Sector Investment at the Ministry of Education. An earlier draft of this paper was presented at the UNICEF “Informal Consultation on Ethnic Minority Language Issues and Challenges”, Vientiane, October 31, 2003. The author is indebted to James R. Chamberlain and Pamela Sue Wright for generously sharing their knowledge and understanding of the linguistic dimension of the teaching and learning problems faced by ethnic minority children, and to Laetitia van Haren for valuable comments on the “Consultations” draft.

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References

Bgoya and Noonan et al. *The Economics of Publishing Educational Materials in Africa*. See especially Chapter 7, ‘Patterns in Purchasing and Funding’. Association for the Development of Education in Africa. London, 1996.

Chamberlain, J.R. and Phomsombath, P. *Poverty Alleviation for All: Potential and Options for People in the Uplands*. pp. 54-65. Swedish Embassy. Vientiane, September 1, 2002.

Chamberlain, J.R. *Assessment of Economic Potentials and Comparative Advantages of the Ethnic Minority Groups of Lao PDR*. pp. 14-28. ADB. Vientiane, September 15, 2002.

Gannicott, K. *Educational Financing in Lao PDR: Worthwhile Achievements, Daunting Challenges*. Table B.2. Draft Report. MOE/DTT. Vientiane, 2003.

Noonan, R. *Education Financing in Lao PDR: Part I. Patterns of Expenditure in a Turbulent Decade of Transition (1990 – 2000)*. Sida/World Bank. Stockholm, 2001.

Noonan, R. *Teacher Salaries in 2001/2002: An Analysis of the Teacher Salary Scale, Salary Supplements, and Income Tax Scale, with Special Reference to Primary Teachers*. MOE/DPC. Vientiane, 2003a.

Noonan, R. *Recent Trends in the Supply of Primary and Secondary School Teachers in Lao PDR: Progress and Problems in the Period 1999/2000 – 2001/2002*. MOE/DPC. Vientiane, 2003b.

NSC. *Recent Participatory Research on Poverty Assessment*. National Statistics Centre. Vientiane, 2002.

SIL International. *Ethnologue* website at: <http://www.ethnologue.com/>, and especially http://www.ethnologue.com/show_map.asp?name=Laos, 2004.

Stroud, Christopher. ‘Towards a Policy for Bilingual Education in Developing Countries’. *New Education Division Documents No. 10*. Sida. Stockholm, 2002.

UNESCO. *Education in a Multilingual World. Education Position Paper*. Paris, 2003.

Getting Along with the Neighbours

Human-Elephant Conflict and the Potential for Resolution

by Arlyne Johnson, Khamkhoun Khounboline, Thibault Ledecq and Roland Eve

Incidents of conflict between humans and elephants, including crop raiding, attacks on humans, and sometimes death of elephants or humans, are on the increase in the Lao PDR. This is of immediate concern to those engaged in rural poverty alleviation and wildlife management. This preliminary study estimates the extent and severity of conflict in Nakai District, Khammouane and compares results from Nakai with reports from across the country. The recommendations in this paper are also embodied in the proposed National Programme for Integrating Elephant Management and Sustainable Livelihoods, which, it is hoped, will be adopted as government policy.

Historically described as *Lan Xang*, the ‘Land of a Million Elephants’, the Lao PDR continues to enjoy a culture and tradition in which the Asian elephant (*Elephas maximus*) plays a prominent role (ElefantAsia 2003). Laos is also one of the fastest growing tourism destinations in the world, with wildlife viewing (including elephants) at the top of the list for international visitors (WTO 2002). However, elephant numbers are much reduced from historic levels and the species is globally recognised as “endangered”, meaning that it faces a high risk of extinction in the wild in the near future (IUCN 2004).

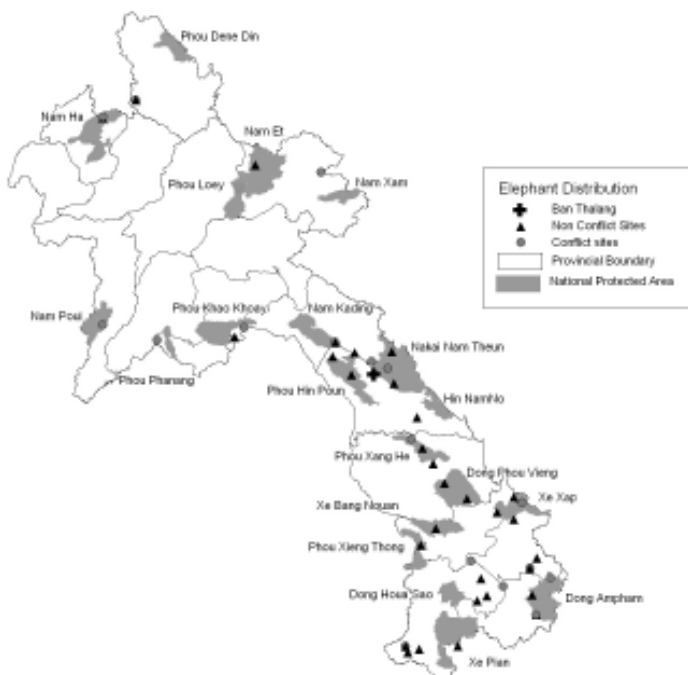
Wild elephants are still widely distributed across Laos and remain relatively abundant in some areas (Duckworth et al. 1999). However, incidents of conflict between humans and elephants, including crop raiding, attacks on humans, and sometimes death of humans or elephants, are on the increase (FAO 2002). This growing conflict is of immediate concern to agencies engaged in rural poverty alleviation, as well as those responsible for managing endangered species. The immense cultural, economic and ecological values of the elephant in the Lao PDR merit the search for solutions to the conflict.

Overall, very little quantitative information is available on elephant numbers, distribution, origins of human/elephant conflicts, the real costs of these conflicts, or economic impacts at local, district, provincial and national levels (FAO 2002). The lack of information makes it difficult to formulate government policies or other guidelines to systematically deal with conflict situations and associated socio-economic impacts. The importance of developing these guidelines is consistent with the *thammasat* (nature based) way of development recommended by the National Growth and Poverty Eradication Strategy (NGPES), in which three pillars – economic growth, social/cultural development and ecologi-

cally sound resource management – mutually reinforce each other in a balanced approach to poverty reduction (GoL 2004).

To address the need for quantitative information on human elephant conflict (HEC) to guide government policy, this preliminary study present results estimating the extent and severity of HEC conflict and its consequences for both humans and elephants in Nakai District, Khammouane Province. The paper compares results from the Nakai case with reports of HEC from across the country and presents recommendations, embodied in the proposed National Programme for Integrating Elephant Management and Sustainable Livelihoods in Lao PDR (FAO 2003), which aim to: 1) improve the living conditions and socio-economic development of local people who coexist with elephant populations; 2) enhance the conservation and sustainable management of forests and all other biodiversity resources in landscapes used by elephants; and, 3) ensure the proactive management of viable populations of Asian elephants throughout their current range in the country.

Figure 1. Known distribution of Asian elephant populations in the Lao PDR (source: FAO 2002)



Elephant populations (triangles) and sites of reported human elephant conflict (dots) are shown relative to the location of National Protected Areas (shaded areas). The Thalang village study area is located in the Nam Theun Corridor between Nakai Nam Theun and Phou Hin Poun NPAs (crosses)

The Asian elephant is unique, being the only species of wild animal that, after a few months of teaching by man, behaves toward him with patience and understanding. It participates in man's religious, cultural, and social activities, lending dignity and grace as each occasion demands, as though it had learnt all about it in the jungle. The folklore and cultures of Asian countries are rich in tales and anecdotes, which confer on elephants a kind of superior intellect enabling them to live with people and yet not succumb to complete domestication.

This touching relationship between man and elephant in Asia from time immemorial sends strong conservation impulses through governments, decision-makers, and the general public. They would not consciously jeopardise the future of a much-loved animal, so it is up to conservationists to translate this sentiment into a commitment from politicians and planners to safeguard that future. The best laid plans for conservation in general will come to nothing if there is no political will to implement them... such commitment can be expected if we provide politicians with attractive alternatives, supported by quantifiable data and, where appropriate, strengthened by tested practical solutions which they can use without seriously compromising national plans for economic development.

From the introduction of the Asian Elephant Action Plan (Santiapillai and Jackson 1990).

Study Area and Methods

The study was conducted around the village of Thalang from February 2001 to April 2002 (Khounboline 2002). Thalang village is located within the Nam Theun Corridor protected area (738 km²), linking the Nakai-Nam Theun and Phou Hin Poun National Protected Areas (NPAs). The area contains one of the two largest elephant populations in the country (Duckworth et al. 1999). Thalang village is made up of 68 households, with a human population of 310 individuals that are predominantly of the Meuy ethnic group. Shifting agricultural fields (of approximately one hectare per household) are dispersed among the bamboo/secondary forest surrounding the village and used for one or two years before new fields need to be cleared. Farmers burn and clean rice fields in March, plant in April, and harvest in October or November. Recent increases in human population on the Plateau have resulted in annual food shortages and more extensive exploitation of forested areas (NTEC 2002). Nakai district is identified as one of the priority poor districts in the country (NGPES 2004).

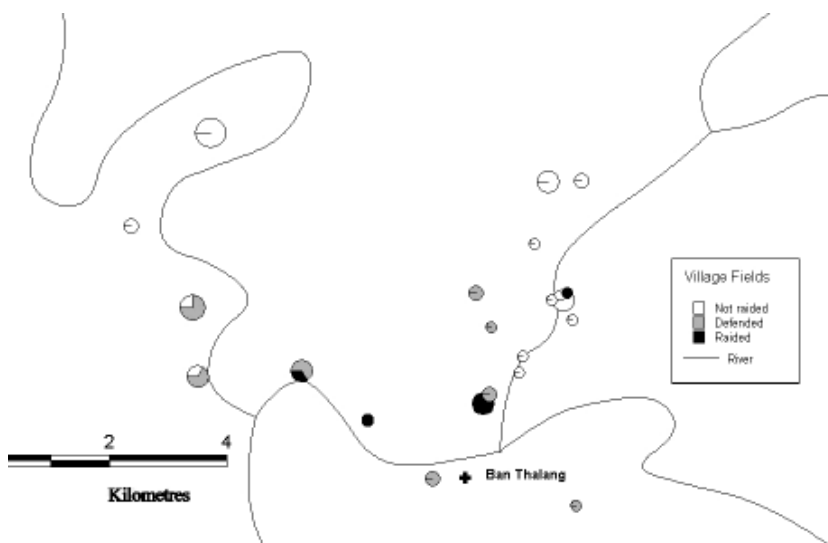
To determine the extent and type of agricultural fields in the study area, each field was visited to record location, type of crop, and the name of the farmers using the field. Farmers were asked to report any attempted or successful crop raiding by elephants so that a damage assessment could be conducted. When a field was raided, a standardised crop damage assessment protocol (adapted from O'Brien et al. 2000) was used to map the damage and estimate the extent and monetary value of the loss to the farmer.

The value of rice crop loss was calculated based on upland rice production statistics for Khammouane province (Lao-IRRI 2002).

Village reports of aggressive behaviour by elephants towards humans or of human killing of elephants in or near the boundaries of the study area were also recorded, with a visit made to the attack site to verify and collect details. Measurements of crop loss from elephant raiding, attacks on humans, and killing of elephants in Thalang were compared to farmer reports from previous years in that village, in surrounding villages, and at other sites of HEC in Laos.

Figure 2. Location of agricultural fields and elephant crop raiding in Thalang village in 2001
(source: Khounboline 2002)

Map shows field locations relative to village (black cross) and major rivers. Field sizes are not to map scale. Fields depicted in white were not raided. Those in grey were raided but successfully defended by farmers. Fields in black were raided and crop loss sustained.



Results

A total of 43 households had fields in 21 locations around Thalang village during the study period. 49% of the households reported that elephants attempted to raid crops. This included all the locations with banana groves ($n=2$) and 47% of the rice field locations ($n=19$).

Crop Raiding

Of the households who experienced attempted crop raiding ($n=21$), the majority (71%) successfully defended their fields by staying in their fields at night and scaring away elephants with stationary fires and noisemakers. Six households, with fields in four locations (three rice fields and one banana grove), reported crop damage as a result of elephant raiding.

Measurements of the three rice fields that were raided found that the area damaged by elephants varied from 4% to 22% of total field area, with estimated losses ranging from 40–215 kg of unmilled rice per household (Table 1). Given that rice production in Nakai District is frequently insufficient to meet the annual needs of the population (NTEC 2002), it is likely that any crop lost due to raiding further contributes to rice deficiencies. The monetary value of the rice lost ranged from 31,000 to 167,000 Kip (3–17 USD) per household. Relative to an average annual household cash income of only 149 USD (range 0–468 USD) in Thalang village (NTEC 2002), this degree of loss could still be considerable for some families. The total amount of rice lost to elephants in the village in 2001 (419 kg) was greater than farmer estimates of losses in 2000 (244 kg) (Khounboline 2002). Farmers reported only having problems with elephant crop raiding since 1998 but felt that elephants were increasingly less afraid of humans each year.

Table 1. Extent and value of crop loss in Thalang village in 2001

Field / crop	Banana	Rice	Rice	Rice
Number of families using the field	3	1	1	1
Month raided	April	June	August	August
Total field area (hectares)	0.59	0.62	0.60	0.62
Proportion of the field that was damaged	100%	16%	22%	4%
Estimated rice loss ^[1] (kg)	-	165	215	40
Estimated value (USD) of rice loss per family ^[2]	-	13	17	3

[1] Yield of 1.65 tons of upland (unmilled) rice per hectare in Khammouane province in 2000 (Lao IRRRI 2002)

[2] Conversion of unmilled rice to milled rice is 65% (Lao IRRRI). 1 kg of milled rice @ 1,200 Kip / kg; 9,650 Kip = 1 USD, average exchange rate FY 2001–2002 (Pholsena 2002).

The banana field owned by three households sustained 100% damage during the Lao New Year when the field was left unguarded. The number of households reporting crop raiding in banana fields in 2001 (n=5) was less than reported in 2000 (n=15) but this was largely because fewer farmers planted bananas in 2001 and none chose to plant sugar cane, cassava or papaya. Despite several of these being popular cash crops, farmers said they had stopped planting these crops because the fields have been repeatedly raided by elephants in recent years.

At least five other neighbouring villages (Nakai Nua, Nakai Tai, Sopen, Kengnyao, and Nong Bouakham) have also reported elephant crop raiding problems to the District Governor's office (FAO 2002). As in Thalang, approximately half of the 48 families in Nong Bouakham reported crop raiding losses ranging from 20% to 100% of individual fields between 1998 and 2001, especially in cases where fields were far away from the village and not well guarded.

Elephant Attacks and Killings

During the study period, both humans and elephants suffered fatalities in the Thalang area. Elephants attacked three people and three elephants were killed by poachers. A village resident was killed by a single male elephant while walking on the road from his field to the village on April 14, 2001. One year later,

a couple from the village was attacked by a single male elephant while collecting firewood. The woman was killed and her husband seriously injured. As a result of these incidents, villagers reported being increasingly afraid of going to the forest or their fields and asked for government permission to move or to kill the problem elephant. Three elephants were killed by poachers for their ivory, two in March 2001 and one in September 2001. Prior to the study period, another man was killed by an elephant while checking his snare lines in 2000. The families of the people killed by elephants in the last three years have received compensations of 150,000-200,000 kip (US\$ 15-20), but no payments have been made for crop losses.

Before 1995 crop raiding by elephants was rarely reported in Nakai District, even though surveys recorded evidence of elephants across the area and estimated that a population of approximately 100-150 animals occurred there (WCS 1995; Timmins and Evans 1996). Several factors have been identified as possibly contributing to the increasing human-elephant conflict in the Thalang area (FAO 2002):

Human Population Increase and Habitat Loss

Thalang village has doubled in size in the last ten years, thus expanding human activity in elephant habitat and resulting in conversion of forest to crop fields and secondary vegetation. Studies elsewhere indicate that elephants have a tendency to become crop raiders when they experience a loss of habitat that causes a change in their movements (Duckworth and Hedges 1998).

Field Locations

As new fields are established further and further away from villages, it has become more difficult for farmers to effectively protect them against elephant crop raiding. It has also resulted in a mosaic of fields within the forest and maturing secondary vegetation that is the elephants' principal habitat. Studies elsewhere have shown that fields near forest in elephant habitat are more susceptible to raiding (Naughton-Treves 1998).

Poaching

Poaching of elephants for ivory has been a problem in the Thalang area since 1990 (FAO 2002). This is known to disrupt elephant social organisation and can result in wounded or harassed animals becoming aggressive towards humans (Sukumar 1989).

Discussion

As illustrated in the case study, the root causes of human-elephant conflict are numerous and complex. Human-elephant conflict in Laos is centred upon human land use expanding into elephant habitat. This leads to crop depredation by elephants that leave forested habitat to feed in adjacent cropland areas. The impacts are direct damage to subsistence and cash crops, constraints on expanding cash crop areas for fear of elephant depredation, and the death of both humans and elephants. Although human-elephant conflict is widespread and probably increasing in Laos, it is important to bear in mind that its frequency and extent is still very low compared to in other countries. Moreover, much of the conflict that

does occur could be avoided through better land use planning (FAO 2002). With this in mind, management of human-elephant conflict and management of elephant populations should be approached at three different levels:

Provincial, District and Village Level

The first dimension should focus on improving the conditions of local people who coexist with elephant populations, ensuring that farmers are able to protect their crops and reduce the potential of elephant attacks. Currently, farmers are left entirely to their own devices when faced with conflict situations. Likewise, government officers lack experience in dealing with conflict situations. Expertise, guidelines for action, training for rapid response teams, systematic reporting and record-keeping and funding are lacking. A recent review of available mitigation measures used to discourage elephant crop raiding in Asia and Africa indicated that many are potentially applicable to conditions in Laos and would not require a large investment (FAO 2002).

*Alarm systems can alert farmers to elephant crop raiding,
and noise-makers, fire and lights, repellents and irritants
such as chillies can ward off problem elephants*

The first recommended measure is to maintain remaining elephant habitat and engage in land use planning to avoid creation of conflict situations. The second is to work with farmers to develop a range of management solutions to both detect and deter elephants from crop raiding in sites where conflict already occurs. Alarm systems can alert farmers to elephant crop raiding, and noise-makers, fire and lights, repellents and irritants such as chillies can ward off problem elephants. Although compensation, insurance and credit schemes could also be investigated, studies elsewhere have clearly shown that it is critical for farmers take responsibility for crop protection and that solutions cannot be unsustainably expensive or reliant on external donors and agencies (Osborne and Parker 2003). Farmer-managed mitigation measures should be included in the implementation of agriculture projects in existing elephant areas. It is important to have standardised response procedures and the ability to implement them quickly, in order to prevent villagers from resolving conflict situations by injuring or killing elephants.

Wild elephants living near village areas could become a source of alternative income through nature-based tourism activities. This is being tested by the National Tourism Authority and the German Development Service in Phou Khao Khouay NPA near Vientiane, where a project is working with one village to train village guides and build an elephant-viewing platform.

National Level

National management of landscapes used by elephants can ensure that viable populations survive throughout their current distribution while also minimising human-elephant conflict. Surveys have documented elephant populations in at least 18 of the 20 NPAs, with additional populations included in conservation areas, as well as outside the protected area system (Duckworth and Hedges 1998). This situation requires a broadly based approach to elephant habitat and population management that includes formally established protected areas, maintenance of suitable contiguous forest cover across migration corridors, and establishment of cross-border management areas and Managed Elephant Ranges (FAO 2002). The latter is a landscape-level approach that gives priority to habitat requirements of elephants but also incorporates compatible human activities. The proposed National Programme for Integrating Elephant Management and Rural Livelihood Improvement, drawn up by a partnership of the Ministry of Agriculture and Forestry, UNDP, FAO, WCS, WWF and IUCN, advocates this landscape approach to land use planning and is consistent with several government policies and strategies for sustainable management of natural and cultural resources (FAO 2003).

*National management can ensure that
viable elephant populations survive while
also minimising human-elephant conflict*

Government initiatives related to management of shifting cultivation, development of land classification systems, and land suitability assessment and land allocation are particularly relevant to elephant habitat management. Both the NGPES and the Government's Strategic Vision for the Agricultural Sector and National Environment Strategy 2003–2020 (GoL 2003) emphasise the need to sustainably utilise natural resources to ensure the sustainable development of the country, with attention to food security and poverty alleviation. The National Ecotourism Strategy and Action Plan 2004–2010 promotes nature-based tourism in rural areas to support the sustainable use and management of natural resources (NTA 2004).

Yet beyond these initiatives, there are no formal government policies or other guidelines on how to systematically deal with human-elephant conflict situations and associated socio-economic impacts. In this context, there is a need for a comprehensive review of all current and planned government policies that touch on land use and socio-economic development, and the inclusion of provisions that prevent human-elephant conflict through proactive land use planning while managing and maintaining elephant populations and habitat.

Although elephants are generally perceived positively by the general public, a much more in-depth, widespread appreciation of elephant management issues is needed to provide support for government decision-makers who are responsible for the management of elephant populations. Proactive and widely implemented public awareness activities would help to educate the general public and increase

understanding of elephant behaviour, habitat use and spatial needs in areas where elephants and people coexist, and would show people the socio-economic benefits of elephant conservation. A mechanism is also needed for the routine sharing of information among technical agencies working on elephant conservation and related land use management issues.

International Level

The final dimension is cooperation and exchange of information at the international level to resolve common problems. The IUCN Asian Elephant Specialist Group includes representatives from all Asian elephant range countries and is designed to encourage regional coordination and exchange of information, knowledge and expertise. In Africa, human-elephant conflict is also the result of human population increase, habitat loss, and poaching. There has been considerable research on methods of managing and mitigating conflict, and several projects are being tested to increase capacity and responsibility for crop protection among farmers (Osborne and Parker 2004). In a letter to UN Secretary-General Kofi Annan following the international Symposium on Human-Elephant Relationships and Conflicts, delegates from the elephant range states requested the intervention of the relevant UN agencies to assist range states in developing and implementing integrated government policies on elephants and their habitats (IEF and BECT 2003). This was considered necessary in light of the critical need for governments to increase their capacity to implement effective action and take into account the ecological requirements of elephants in their national land-use policies, in order to minimise human-elephant conflict and the resulting loss of lives and resources.

Conclusion

As exemplified in Thalang village, human-elephant conflict is at an early stage of development in Laos when compared with neighbouring countries. There is still excellent potential for minimising conflict through proactive land use planning, and for effectively mitigating existing conflicts using known or modified methods from other conflict areas. The clear lesson learned from all other countries where human-elephant conflict occurs is that problems should be identified and resolved before they reach unmanageable proportions. This requires timely implementation of elephant management activities in coordination with socio-economic development activities, including policy, programming and personnel commitments from all levels of government, as well as advisory and material support from external sources. There is a need both for rapid action to mitigate human-elephant conflict that is now occurring, and for longer-term planning and policy development to minimise the future occurrence of conflict situations. Appropriate interventions regarding management of the Lao elephant population should not only be undertaken by wildlife management agencies but should also be embedded in development activities to avoid more conflicts and to provide an integrated approach to local communities regarding food security and poverty alleviation.

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World Wildlife Fund – Lao Country Program, Box 7871, Vientiane

References

Duckworth, J.W. and Hedges, S. *A review of the status of tiger, Asian elephant, gaur and banteng in Vietnam, Laos, Cambodia and Yunnan (China) with recommendations for future conservation action*. WWF Indochina Programme. Hanoi, 1998.

Duckworth, J.W., Salter, R.E. and Khounboline, K. *Wildlife in Lao PDR. 1999 status report*. IUCN-The World Conservation Union, Wildlife Conservation Society and Centre for Protected Areas and Watershed Management. Vientiane, 1999.

Elefantasia. *La caravane des elephants: 1300 km au Laos pour sauver l'éléphant d'Asie*. Actes Sud. France, 2003.

FAO. *Technical report of the FAO/GoL mission on human/elephant conflict resolution in Lao PDR*. Food and Agriculture Organisation of the United Nations. Vientiane, 2002.

FAO. *National Programme for Integrating Elephant Management and Sustainable Rural Development and Livelihoods in Lao PDR*. Government of Lao People's Democratic Republic. UNDP, FAO, WCS, WWF and IUCN. Vientiane, 2003.

Government of the Lao PDR. *National Growth and Poverty Eradication Strategy (NGPES)*. Prime Minister's Office. Vientiane, 2004.

International Elephant Foundation (IEF) and the Biodiversity and Elephant Conservation Trust (BECT). Letter to UN Secretary General Kofi Annan from delegates who attended the *Symposium on Human-Elephant Relationships and Conflicts*. 19-21 September, 2003. IEF and BECT. Colombo, Sri Lanka, 2003.

IUCN. *Red list of threatened species*. IUCN, Gland. Switzerland, 2004.

- Khounboline, K. *Ecology, behaviour, and conservation of Asian elephant on the Nakai Plateau, Khammouane Province, Lao PDR*. M.Sc. thesis. Kunming Institute of Zoology, 2002.
- Lao-IRRI. *The Lao-IRRI Annual Technical Report 2000-2001*. NAFRI and Lao-IRRI. Vientiane, 2002.
- National Tourism Authority of Lao PDR. *National Ecotourism Strategy and Action Plan 2004-2010 – Summary Draft for Final Consultation*. National Tourism Authority. Vientiane, 2004.
- Naughton-Treves, L. Predicting patterns of crop damage by wildlife around Kibale National Park, Uganda. *Conservation Biology*. X:156-168. 1998.
- NTEC. *Nam Theun 2 Hydroelectric Project Social Development Plan: Resettlement Action Plan*. Volume 3. September 2002. Vientiane, 2002.
- O'Brien T.G., Kinnaird, M. and Sitompul, K. *Sumatran Elephant Crop Damage Protocol*. WCS-IP Sumatran Elephant Program. Bogor, Indonesia, 2000.
- Osborn, F.V. and Parker, G.E. Towards an integrated approach for reducing the conflict between elephants and people: a review of current research. *Oryx*. 37(1):80-84. 2003.
- Salter, R.E. (compiler). *Wildlife in Lao PDR. A status report*. IUCN. Vientiane, 1993.
- Santiapillai, C. and Jackson, P. *The Asian elephant: an action plan for its conservation*. IUCN. Gland. Switzerland, 1990.
- Sukumar, R. *The Asian Elephant*. Cambridge University Press, 1989.
- Timmins, R.J. and Evans, T.D. *A Wildlife and Habitat Survey of Nakai-Nam Theun National Biodiversity Conservation Area, Khammouane and Bolikhamxai Provinces, Lao PDR*. Wildlife Conservation Society. Vientiane, 1996.
- World Tourism Organisation. *Tourism Market Trends 2002 - World Overview and Tourism Topics*. WTO. Madrid, 2002.
- Wildlife Conservation Society. *Result of a Survey of Terrestrial Wildlife in the Area to be Affected by the Proposed Nam Theun 2 Hydroelectricity Project*. WCS. Vientiane, 1995.

How Shifting Cultivation Limits Runoff, Sediment and Carbon Losses on Sloping Land

by Vincent Chaplot

Due to increasing land pressure in northern Laos, the duration of the traditional fallow period in shifting cultivation is being dramatically shortened. This reduction is environmentally damaging in terms of water erosion and soil degradation. The main objective of this study was to evaluate the effect of different fallow periods on the runoff, sediment and carbon losses within a small sloping catchment. A second objective was to assess the mechanisms involved in the erosion of clayed soils. Longer fallow periods decreased not only overall soil erosion but also carbon erosion, due to a greater resistance to the mechanical breakdown caused by raindrops. These results demonstrate the importance of the fallow period in the limitation of soil water erosion: if shifting cultivation in the uplands is replaced by continuous agriculture, environmental damage will increase.

The effect of rapid changes in land use on water and soil resources in the tropics caused by demographic, economic, political and/or cultural shifts is well documented. In sloping lands in the tropics, the main traditional agricultural practice consists of shifting cultivation, with successive periods of crop and fallow. This non-intensive practice is presumed to preserve soil fertility in the long term (Sanchez and Hailu 1996), for instance due to the improvement of nutrient cycling as shown in northern Vietnam by Fagerstrom et al. (2002). Nowadays, in many tropical sloping lands, the shifting cultivation cycle (i.e. the time period between two successive clearings/croppings on the same site) is being shortened to three to five years, whereas ecological sustainability may require a minimum fallow period of at least ten years (Sanchez and Hailu 1996). Such dramatic reduction or suppression of fallows may have direct consequences upon water erosion at the catchment level.

The direct impacts of fallow on the reduction of soil water erosion over catchments are well documented. Among available studies, Gafur et al. (2003) indicated that in Bangladesh the sediment loss from a catchment under fallow was about six times smaller than under cultivation. The reasons for lower erosion under fallow than under cultivation may be due to the decrease in detachment rate (reaching 64% - Mamo and Bubenzer 2001) and the increase in infiltration (Husain et al. 2002).

However, there is still a need for quantitative data on the impact of the reduction of fallow duration on soil and carbon losses during the cropping period of the shifting cultivation cycle. The main objective of this study was to evaluate the effect of different fallow periods on the runoff, sediment and carbon losses within a small sloping catchment. A second objective was to assess the mechanisms involved in soil erosion variations of clayed soils by testing the structural stability of aggregates (e.g. Le Bissonnais and Arrouays 1996; Barthès and Roose 2002).

The study was conducted in mountainous areas of northern Laos where shifting cultivation covers one-third of agricultural land (Dufumier and Weigel 1996). It involved simultaneous evaluations of water, sediment and carbon erosion on 1m² microplots with a short-range variability of environmental factors, and at the outlet of a 0.6 ha catchment. Measurements of field erosion were performed on microplots under cultivation following a four-year fallow period (F4) and under continuous cultivation (F0). In addition, soil aggregate stability was evaluated at the laboratory.

The results are expected to increase knowledge on controlling processes and factors of water erosion, and to assist decisions on land management and land use planning. Furthermore, these results will allow the calibration of the vegetation factor in predictive models of water erosion such as the USLE or USLE-M (Wishmeier and Smith 1978; Kinnell 2001).

Materials and Methods

The study site, a 0.6 ha catchment, is located in Luang Prabang province. The average annual rainfall over the last thirty years was 1,403 mm. The mean annual temperature was 25°C. Two distinct seasons characterise the study site: a wet season from April to October and a dry season from November to March. Altitudes over the catchment, estimated from a 5 m digital elevation model (DEM) generated using a theodolite, ranged from 514 to 588 m. A permanent central gully stretches out from the catchment outlet to the first third of the hillslope.

*Dramatic reduction or suppression of fallows may
have direct consequences upon water erosion at
the catchment level*

The catchment is representative of the slash-and-burn without inputs systems of southeast Asia. In particular it shows the effect of the gradual reduction of the fallow period from ten to fifteen years in the 1970s to five to two years now, as well as the gradual encroachment of continuous cultivation on the whole catchment area. Land use is predominantly rotating land (80%) supporting shifting cultivation. Forest is less than 20% of the whole catchment area. Upland rice (*oryza*) and Job's tears (*Coix lacryma Jobi*) are the most common crops. On hillslopes, crops are generally located at backslope and midslope positions whereas the slope summits are under forest and the bottomlands under tree plantations.

Site Description

Runoff, sediment and carbon losses were measured during the 2002 rainy season at the catchment outlet and on 1m² plots under a three-year continuous monoculture and under cultivation following a four-year fallow (F0 and F4 respectively).

Field measurements were carried out from May 15th, 2002 to November 3rd, 2002. After June 5th, measurements were considered to occur under conditions of steady-state soil loss because no significant soil cracking and rills were observed within the plots. At the catchment outlet, a weir was constructed for the estimation of runoff. Automatic samplers were installed for sediment collection and thus for the estimation of sediment and carbon losses. It was possible to minimise variations in environmental factors (e.g. soil types, geology, topography) by selecting a single catchment where two contrasting fallow durations existed. Thus, runoff, soil, and carbon losses were monitored using three bounded 1 m² microplots per land-use history. Microplots were located downslope of the catchment on Alfisols. Their mean slope gradient was 45%. Two metres separated each microplot. The F4 treatment was clear cut on March 10th. Metal borders bounding the microplots were inserted in the soil to a depth of 0.1 m, just after the burning operation of March 22nd. Sowing occurred on May 15th. Each plot was weeded at the same time on June 19th, August 1st and 27th. For weeding, plots were shallow tilled by the farmers. Soil surface features and roughness were quantified visually and using a laser at each plot according to a 5 cm regular grid.

For each rainfall event, characteristics such as rainfall amount, maximum or average rainfall intensity were estimated using an automatic raingauge with a 6-min step. After each rainfall event, the total runoff from each microplot replicate was measured and an aliquot was collected and oven dried to estimate sediment concentration and sediment discharge. A total of 210 samples were collected from 35 rainstorms.

In order to estimate carbon erosion at the catchment outlet and from the plots, additional determination of organic carbon (OC) content of sediments was performed for the main rainfall event of 2002 and an additional set of four events randomly selected over the range of 35 events. Measurement was performed following the wet oxidation techniques of Heanes (1984).

Evaluation of Soil Structural Stability

Evaluation of the soil structural stability of F0 and F4 treatments used soil aggregates collected before the rainy season in the vicinity of the microplots. Tests were performed in the laboratory following Le Bissonnais (1996). Soil samples were first collected in the field on May 5th, just after the burning of the crop or fallow residues. A large quantity of soil (around 5 kg) was collected from the 0-5 cm layer and aggregates 3-5 mm in size were obtained by sieving and then oven-dried at 40°C for 24 hours. The carbon content of the soil samples was evaluated using the Heanes method.

In addition to this and after the harvest of the rice, a soil profile was described for each treatment. The following parameters were measured: (i) the number, type (Soil Survey Staff, 1999) and thickness (including thickness of loose saprolite) of horizons; (ii) the moist Munsell chroma and value; (iii) the structure and main features. Additional measurements of texture, bulk densities and OC were performed for each plot from samples collected in the 0-5 cm layer at the onset of the study at a systematic location over the plot boundary. The bulk densities were estimated by the volumetric method using 250 ml volume cylinders (Anderson and Ingram 1993).

Runoff, Sediment and Carbon Losses

The 2002 rainy season, from May 25th to October 25th, produced a total rainfall amount of 1,651 mm. During this period runoff occurred at 35 events, with a total rainfall amount of 1,023 mm. Minimum and maximum rainfall amounts were 4.5 and 162 mm respectively, with a median of 17 mm. At the catchment level, the mean runoff coefficient (R) was 0.5% with values ranging from 0 to 5.7%. During the five first events, the runoff coefficient was very low and only a slight increase of the cumulative amount occurred. No sediment and carbon erosion occurred during this period. Then runoff and sediment erosion greatly increased up to event number 30 with the exception of event number 23. At the end of the rainy season, the cumulative runoff was 17 l m⁻² and the cumulative sediment losses were 0.431 kg m⁻².

Sediment and carbon losses were significantly greater under continuous cultivation than on cultivation following a four-year fallow

On the microplots, the mean runoff coefficient was 25% and sediment and carbon losses were 0.045 kg m⁻² and 34 g m⁻² respectively. Runoff varied only slightly between the two studied fallow periods but sediment and carbon losses were significantly greater under continuous cultivation (F0) than on cultivation following a four-year fallow (F4). Fallow prior to cultivation reduced the total sediment erosion by 54%, the total carbon losses by 52%, and the mean sediment concentration and runoff by 34% and 14% respectively. The average sediment loss was more than double on F0 than on F4. The eroded sediments showed significantly higher OC content than the initial soil material. In 2002 the computed yearly eroded carbon was 46 g m⁻² under F0 and 22 g m⁻² under F4. These amounts represented 4.3% for F0 and 2.1% for F4 among the 0-5 cm soil layer stocks.

At the very onset of the rainy season (from May 25th to June 6th) and under conditions of bare soil and with low sized events, few differences existed between the two treatments. Differences became perceptible from the tenth event. Most of the erosion produced in 2002 occurred in the middle of the rainy season, especially during the most extreme event of July 20th. This event accounted for 65% and 37% of the total annual soil losses on F0 and F4 respectively. In addition, during this major event greater soil erosion was observed on F0 than on F4.

Soil Stability

For each microplot replicate, the MWD and its standard deviation were computed from three laboratory replicates. The MWD for all replicates varied from 2.36 to 3.19 mm. This, according to Le Bissonnais and Arrouays (1996) working in Mediterranean and temperate areas, is considered relatively high. Mean values were slightly higher for F4 (3.13 mm) than for F0 (2.94 mm). Greater and significant differences between treatments were observed for mechanical break-down in which greater disaggregation occurred for F0. In addition and surprisingly, F4 produced a significantly greater proportion of particles with diameter <2 mm whereas F0 generated >2 mm aggregates. These results demonstrated

that there was a lower disaggregation susceptibility after four years of fallow than after continuous cultivation. Furthermore, they showed that this was due to the aggregate protection from raindrop impact provided by four years of fallow. However, fallow provided few benefits in these Alfisols in terms of the aggregate slaking caused by increased air compression or the breakdown due to swelling tensions or physico-chemical dispersion.

Discussion

The study's main objective was to evaluate soil water erosion within a small agricultural catchment of northern Laos showing different durations of the fallow period. Results at the catchment level revealed very low runoff coefficient (<1%) and moderate soil losses (0.4 kg m^{-2}) if compared with studies performed at similar scales and/or comparable environmental conditions. Gafur et al (2003) indicated that runoff from 1 ha catchments was about 20% in Bangladesh. Sediment losses in catchments under cultivation were about $1.8 \text{ kg m}^{-2} \text{ y}^{-1}$. In Cameroon, soil losses at the small catchment scale were of 10.9 kg m^{-2} under cultivation (Ambassa-Kiki et al. 1999). The lower water erosion in northern Laos may be explained by the high infiltration possibilities in Alfisols. These infiltration possibilities may occur along slopes in local depressions or as a result of biological features such as tree stumps, root networks and macropores etc. In addition, a high infiltration level may occur within the central gully as observed by Bryan and Poesen (1989). Such a high infiltration may reduce the transport of sediment by limiting the efficiency of detachment and transport processes as proposed by Kinnel (2000) or Chaplot and Le Bissonnais (2003). Carbon losses of 11 g m^{-2} were slightly lower than those evaluated by Gregorich et al. (1998), at 13 to 49 g m^{-2} .

*A fallow period limits soil detachment due
to raindrop impact and by enhancing
infiltration possibilities*

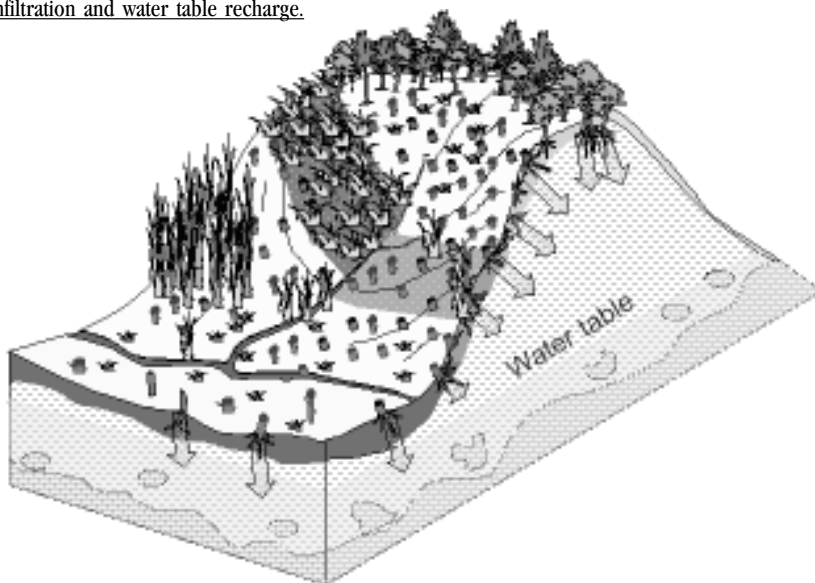
At the microplot level, runoff and erosion were much higher, confirming greater infiltration and sedimentation possibilities at the catchment level as shown by Le Bissonnais et al (1998). The runoff was on average fifty times greater and the sediment and carbon loads were seven and three times greater on the microplots than at the catchment level. Within the catchment, a comparison between water erosion on plots differing only in the duration of the fallow periods revealed a greater erosion under continuous cultivation than under cultivation following a fallow period. Such a better soil protection from mechanical break-down after a long fallow period could not be directly explained by differences in the soil structure, the clay and soil carbon content of aggregates (Le Bissonnais and Singer 1993). Additional results on the stability of aggregates confirmed the overall high resistance to disaggregation of the study Alfisols. Although the two treatments with or without fallow prior to cultivation showed very stable aggregates (MWD = 2.94 and 3.13 mm, respectively), the soil aggregates from the long

fallow period exhibited a greater resistance to mechanical break-down. However, although the soil aggregates were classified as very stable, soil losses were high in comparison with existing studies under temperate conditions (0.1 to 0.20 kg m⁻² for total sediments, Chaplot and Le Bissonnais 2003) or under similar tropical conditions (0.6 to 3.3 kg m⁻², Janeau et al. 2003).

Conclusion

This study allowed the identification of some of the processes involved in inter-rill erosion by using a combination of laboratory and field surveys. The major conclusion is that a fallow period within a shifting cultivation cycle affords protection from soil erosion, locally, at the microplot level, by limiting the soil detachment due to raindrop impact, and at the catchment level by enhancing infiltration possibilities.

Figure 1. Modelled hydrologic functioning of a sloping-land catchment under shifting cultivation. Contribution of biological features such as roots, stumps remaining after slash-and-burn to water infiltration and water table recharge.



At the small catchment level, soil erosion was relatively low due to the high infiltration capabilities limiting the transport of sediments. At this level, erosion was transport-limited. Although soil detachment and runoff production were high at the microplot level, they were not apparent at the catchment outlet, demonstrating the existence of high infiltration at punctual locations: gullies and biological features such as roots and stumps remaining after slash-and-burn (Figure 1). Furthermore, these biological features provide habitats and nutrients for a range of living organisms, so creating infiltration pathways. Thus, fallow periods reduce soil erosion by both limiting the detachment capacity and increasing infiltration at punctual locations. The fallow period not only limits the overall soil water erosion but also increases soil fertility in the long term (Sanchez and Hailu 1996) due to, for instance, the improvement of nutrient recycling as shown in Northern Vietnam by Fagerstrom et al. (2002).

When farming sloping land, shifting cultivation is thus much more sustainable than continuous cultivation. This fact questions the logic of eliminating shifting cultivation on the basis limiting environmental damage. If shifting cultivation in the uplands is permanently replaced by continuous agriculture, environmental damage will rapidly and greatly increase since punctual features with high infiltration possibilities, such as roots, stumps and associated biological activity remaining after slash-and-burn, will all disappear. Runoff, instead of infiltrating soils, will flow down and off the hillslopes, producing more and more erosion and flooding. Finally, it is apparent that further investigations are necessary in order to establish an optimal duration of the fallow period, for instance as a function of the soil conditions. Such improved understanding will allow better soil erosion modelling, and help with taking more appropriate decisions on the management of clayey tropical soils on sloping land.

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References

- Ambassa-Kiki, R. and Nill, D. "Effects of different land management techniques on selected topsoil properties of a forest Ferralsol". *Soil & tillage research* 52 (3-4): 259-264. 1999.
- Anderson, J.M., and J.S. Ingram. *Tropical soil biology and fertility: a handbook of methods*. CABI, Wallingford, 1993.
- Barthès, B., and E. Roose. Aggregate stability as an indicator of soil susceptibility to runoff and erosion; validation at several levels. *Catena* 47: 133-149. 2002.
- Bryan, R.B., and J. Poesen. "Laboratory experiments on the influence of slope length on runoff, percolation, and rill development". *Earth Surface Processes and Landforms* 4: 211-231. 1989.
- Chaplot, V. and Le Bissonnais. "Runoff features for interrill erosion at different rainfall intensities, slope lengths and gradients in an agricultural loessial hillslope". *Soil Sci. Soc.*

Am. J. 67: 844-851. 2003.

Dufumier, M., and J.Y. Weigel. "Minorités ethniques et agriculture d'abattis-brûlis au Laos". *Cahiers des Sciences Humaines* 32:195-208. 1996.

Fagerstrom, M., Nilsson, S. van-Noordwijk, M. T. Phien, M. Olsson, A. Hansson, and C. Svensson. "Does *Tephrosia candida* as fallow species, hedgerow or mulch improve nutrient cycling and prevent nutrient losses by erosion on slopes in northern Viet Nam?" *Agriculture, Ecosystems and Environment* 90: 291-304. 2002.

Gafur, A., Jensen, J.R., Borggaard, O.K. and Petersen, L. "Runoff and losses of soil and nutrients from small watersheds under shifting cultivation (*Jhum*) in the Chittagong Hill Tracts of Bangladesh". *J. of Hydrology* 279: 292-309. 2003.

Gregorich, E.G., Geer, K.J., Anderson, D.W. and Liang, B.C. "Carbon distribution and losses : erosion and deposition effects". *Soil and tillage Research* 47: 291-302. 1998.

Heanes, D.L. "Determination of total organic-C in soils by an improved chromic acid digestion and spectrophotometric procedure". *Communications in Soil Science and Plant Analysis* 15: 1191-1213. 1984.

Husain, J., Gerke, H.H. and Huttl, R.F. "Infiltration measurements for determining effects of land use change on soil hydraulic properties in Indonesia". *Sustainable Land Management Environmental Protection* 35: 229-236. 2002.

Janeau, J.L., Bricquet, J.P., Planchon, O. and Valentin, C. "Soil crusting and infiltration on very steep slopes in northern Thailand". *European J. of Soil Sci.* 5: 543-553. 2003.

Kinnell, P.I.A. "Slope length factor for applying the USLE-M to erosion in grid cells". *Soil Tillage Res.* 58:11-17. 2001.

Le Bissonnais, Y. and Singer, M.J. "Seal formation, runoff and interrill erosion from seventeen California soils". *Soil Sci. Soc. of Am. J.* 57: 244-249. 1993.

Le Bissonnais, Y. Aggregate stability and assessment of soil crustability and erodibility: I. Theory and methodology. *European J. of Soil Sci.* 47: 425-437. 1996.

Le Bissonnais, Y. and Arrouays, D. "Aggregate stability and assessment of soil crustability and erodibility II". *European J. of Soil Sci.* 48: 39-48. 1996.

Le Bissonnais, Y., Benkhadra, H, Chaplot, V., Fox, D., King, D. and Daroussin, J. "Crusting and sheet erosion on silty loamy soils at various scales from m² to small catchments". *Soil Technology* 46: 69-80. 1998.

Mamo, M. and Bubenzer. "Detachment rate, soil erodibility and soil strength as influenced by living plant roots part I: Laboratory study". *Transactions of the ASAE.* 44: 1167-1174. 2001.

Sanchez, P.A., Hailu, M. (Eds.) "Alternatives to slash-and-burn agriculture". *Agriculture, Ecosystems and Environment*, 1996.

Soil Survey Staff. Soil Taxonomy. A Basic System of Soil Classification for Making and Interpreting Soil Surveys. 2nd ed. USDA, Washington D.C, 1999.

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