Greater Mekong Subregion

Environment Operations Center

Strategic Environmental Assessment of the North South Economic Corridor Strategy and Action Plan

Scoping Report

November 2008

Note on the Scoping Report

The SEA scoping phase defines the coverage and framework of the assessment. It is based on (i) a program of in-country meetings in Thailand, Lao PDR and Yunnan Province of China, (ii) field missions to the NSEC route in each country and (iii) a regional scoping workshop in Kunming which involved local and national government representatives from each country.

Substantial inputs to the scoping phase were based upon the comprehensive collection and analysis of baseline information - by the national and international SEA team members. 48 baseline templates covering the key issues identified at the regional workshop were completed. They were analysed and synthesised to provide the main substantive foundation on which the next SEA stage – the assessment – will be conducted.

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Acronyms

ADB	Asian Development Bank
ASEAN	Association of Southeast Asian Nations
BADC	Border Area Development Committees
BCI	Biodiversity Conservation Corridors Initiative
BF	Business Forum (GMS)
CBTA	Cross-Border Transport Agreement (GMS)
CEP	Core Environment Programme
CLUE	Conversion of Land Use and its Effects (model)
CADC	Cooperation Area Directing Committee (GMS)
CPI	Committee for Planning and Investment (Lao)
DAFO	District Agriculture and Forestry Office (Lao)
DFID	Department for International Development (UK)
DOA	Department of Agriculture (Lao)
DOAE	Department of Agricultural Extension
DOE	Department of Environment (Lao PDR)
DoE	Department of Education (Lao)
DOF	Department of Forestry (Lao)
DOFCOM	Department of Commerce (China)
DOI	Department of Irrigation (Lao)
DOP	Department of Personnel (Lao)
DOT	Department of Transportation (Lao)
DPI	Department of Planning and Investment (China)
DPSIR	Driver, Pressure, State, Impact, Response
DRC	Development Reform Commission
EAD	Environmental Assessment Department
EC	European Commission
ECF	Economic Corridors Forum (GMS)
ECP	Economic Cooperation Programme (GMS)
ED	Electricity Department
EIA	Environmental Impact Assessment
EMM	Environment Ministers' Meeting (GMS)
EMP	Environmental Management Plan
EPA	Environmental Performance Assessment
EOC	Environment Operations Centre
EPB	Environmental Protection Bureau (China)
EPL	Environmental Protection Law (Lao)
ERC	Expert Review Committee (involved in EIA in Thailand)
ERI	Environmental Research Institute (Lao)
ESD	Environmental and Social Division (Lao)
ESPO	Convention on EIA in a Transboundary Context (Espoo, 1991)
EU	European Union
EWEC	East-West Economic Corridor (GMS)
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GHG	Green House Gas
GIS	Geographic Information System
GLOBIO	Global biodiversity (Calculation of mean species abundance – model)
GMS	Greater Mekong Sub-region

GNI	Gross National Income
GPS	Global Positioning System
ICEM	International Centre for Environmental Management
IEE	Initial Environmental Examination
ITC	International Institute for Geo-Information Science and Earth Observation
IUCN	International Union for Conservation of Nature
IWMU	Integrated Water Management Unit (Lao)
IWRM	Integrated Water Resources Management (Lao)
LAO PDR	Lao People's Democratic Republic
LNTA	Lao National Tourism Administration
LTEC	Lao Transport Engineering Consultancy
LUP	Land Use Planning
LUPLA	Land Use Planning and Land Allocation
MCE	Multi Criteria Evaluation
MCTPC	Ministry of Communications, Transport, Posts and Construction (Lao)
MIC	Ministry of Information and Culture (Lao)
MM	Ministerial Meeting
MOE	Ministry of Education (Lao)
MOF	Ministry of Finance Forestry???(Lao)
MOIC	Ministry of Industry and Commerce (Lao)
MONRE	Ministry of Natural Resources and Environment (Thailand)
MOU	Memorandum Of Understanding (for ECF, 31 March 2008)
MPI	Ministry of Planning and Investment (Lao)
MRC	Mekong River Commission
MSA	Mean species abundance (output GLOBIO model)
MTCO	Mekong Tourism Coordination Office
NA	National Assembly
NAFES	National Agriculture and Forestry Extension Service
NAFRI	National Agriculture and Forestry Research Institute (Lao)
NBCA	National Biodiversity and Conservation Area
NEB	National Environment Board (Thailand)
NEQMP	National Environmental Quality Monitoring Programme (Lao)
NESDB	National Economic and Social Development Board (Thailand)
NGPES	National Growth and Poverty Eradication Strategy (Lao)
NPEP	National Poverty Eradication Programme (Lao)
NSEC	North South Economic Corridor (GMS)
NTFP	Non-Tiber Forest Product
OA	Office of Agriculture (Lao)
OF	Office of Forestry (Lao)
ONEP (Thailand)	Office of Natural Resources and Environmental Policy and Planning
PAVO	Provincial Agriculture and Forestry Office (Lao)
PBL	The Netherlands Environmental Assessment Agency (MNP)
PMO	Prime Minister's Office (Lao)
PPSC	Provincial Project Steering Committee (Lao)
PPWT	Provincial Public Works and Transport (Lao)
PRC	People's Republic of China
PREPB	Puer Environmental Protection Bureau (China)
PWREA	Provincial Water Resources and Environmental Administration
RCSP	Regional Cooperation Strategy and Programme
RETA	Regional Technical Assistance
SAP	Strategy and Action Plan
SEA	Strategic Environmental Assessment

SEC	South Economic Corridor (GMS)
SEF	Sub-regional Energy Forum
SEI	Stockholm Environment Institute
SEZ	Special Economic Zone
SF	Strategic Framework (GMS)
SFA-TFI	Strategic Framework for Action on Trade Facilitation and Investment
SIDA	Swedish International Development Cooperation Agency
SIWG	Sub-regional Investment Working Group
STCF	Sub-regional Telecommunications Forum
SMCA	Spatial Multi Criteria Analysis
SOM	Senior Officials' Meeting (GMS)
STF	Sub-regional Transport Forum (GMS)
TAR	Trans Asian Railway
TFWG	Trade Facilitation Working Group
TWG	Tourism Working Group
UNECE	United Nations Economic Commission for Europe
UNEP WCMC Centre	United Nations Environment Programme World Conservation Monitoring
UNEP GEO	United Nations Environment Programme Global Environment Outlook
WGA	Working Group on Agriculture
WGE	Working Group on Environment
WGHRD	Working Group on Human Resource Development
WRCC	Water Resources Coordination Committee (Lao)
WREA	Water Resources and Environment Administration (Lao)
WWRC	Water Resources Co-ordination Committee (Lao)
WWTP	Waste Water Treatment Plant
YEPB	Yunnan Environmental Protection Bureau
YEPC	Yunnan Environmental Project Management Centre for Foreign Funding
YEPO	Yunnan Environmental Project Office for Foreign Funding
YESS	Yunnan
YIES	Yunnan Institute of Environmental Science
YN	Yunnan Province China
YPTA	Yunnan Provincial Tourism Bureau
XSBN	Xishuangbanna (in Yunnan Province, China)

Acknowledgement

This scoping report was prepared through an intensive consultative process involving central and local government representatives from China, Lao PDR and Thailand. This multi-stakeholder group is involved in all aspects and steps of the assessment, in field missions, small group and inter-sectoral meetings convened by the lead agencies in each country, and in regional consultative workshops. The first of those regional workshops ran over three days and focused on the scope of the SEA.

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1 Introduction

1.1 Background and Objectives

1.1.1 The GMS Economic Cooperation Program was initiated in 1992. The Program aims at enhancing cooperation, connectivity and competitiveness in the GMS region, comprising Cambodia, Lao PDR, Myanmar, Thailand, Viet Nam, the two Chinese provinces of Yunnan and Guangxi and the Zhuang Autonomous Region. The North South Economic Corridor (NSEC) is one of three priority corridors targeted for infrastructure and economic development under the Program.

1.1.2 The Environmental Operation Centre (EOC) of the Greater Mekong Sub-region (GMS) has commissioned a Strategic Environmental Assessment of part of the North South Economic Corridor – the section from Kunming in the Yunnan Province of the Peoples Republic of China (PRC) to Bangkok in Thailand.

1.1.3 The rationale behind the economic corridors is to extend benefits of improved transport links to landlocked and remote locations in the GMS, provide a spatial focus to GMS development activities, with a transport backbone, growth centres and nodal points serving as a catalyst for developing neighbouring areas and to open up opportunities for investments from within and outside the region.

1.1.4 The NSEC consists of three major routes along the north-south axis of the GMS that connect major population and economic centres in the sub-region, namely: (i) the Kunming-Chiang Rai-Bangkok route via Lao PDR and Myanmar, (ii) the Kunming-Hanoi-Haiphong route via Lao Cai, the border between Yunnan Province in PRC and Vietnam, and the Hanoi-Nanning route.

1.1.5 A Strategy and Action Plan (SAP) is being prepared for the NSEC. The purpose of the SAP is: "The formulation of a strategic framework, as well as an action plan for NSEC development". It is aimed at: "(i) operationalizing a multidimensional approach to economic corridor development; (ii) sharpening the focus, improving coordination, and ensuring effective and sustained implementation of NSEC initiatives; and (iii) assisting in mobilizing financial and technical resources from various sources, as well as in broadening the support of various stakeholders--especially at the local level--for NSEC development[1]". Prior to the first draft o the SAP a series of consultations with the NSEC countries at both local and national levels were held. Furthermore the SAP builds on the findings of a series of regional policy frameworks and studies focussed on the NSEC including:

- The GMS Transport Strategy
- Report of the North-South Economic Corridor: Progress to a fully fledged economic corridor
- Report of Logistics Development Study of the North South Economic Corridor (Development Study of NSEC Phase 1, ADB)
- The Cross Border Transport Agreement (CBTA)

[1] ADB-GMS (draft) Toward Sustainable and Balanced Development: A Strategy for the GMS North South Economic Corridor.

1.1.6 This SEA will focus on the proposals set out in the SAP in relation to the Kunming – Bangkok part of the NSEC and in particular the route via Lao PDR and the border areas on Lao PDR, PR China, Thailand and Myanmar, otherwise known as the Golden Quadrangle.

Figure 1.1: The NSEC

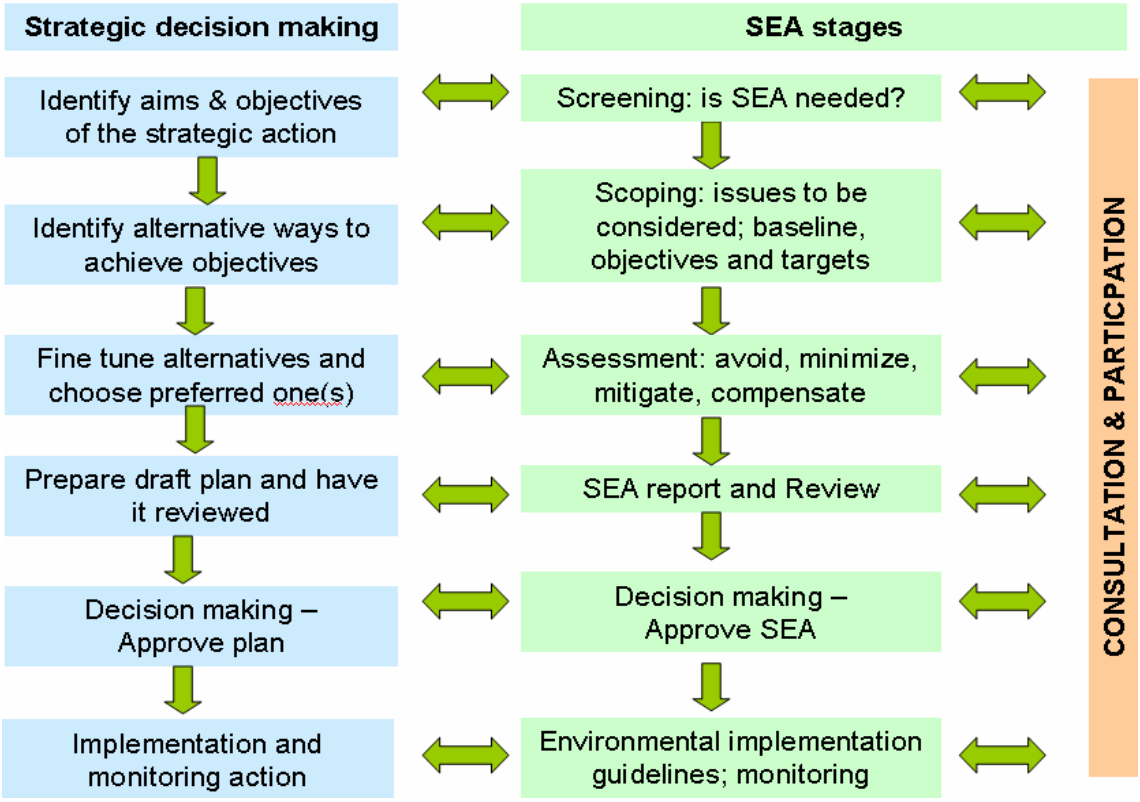
1.2 The SEA

1.2.1 Strategic Environmental Assessment (SEA) is an iterative decision-support tool that helps planners and decision-makers assess the environmental, social and economic effects of proposed policies, plans or programmes and their alternatives as early as possible in the planning process.

1.2.2 SEA promotes the integration of sustainability considerations at an early stage of public decision-making, to i) identify at a strategic level potential impacts to optimise positive effects

and avoid or reduce negative effects, ii) consider potential cumulative effects of different proposals, iii) promote accountability and transparency among stakeholders and the general public, and iv) address trans-boundary issues & contribute to broader governmental policy commitments and obligations (e.g. international treaties). Figure 1.2 sets out a typical SEA process[2].

Figure 1.2: Generic SEA Process



Regional and National SEA

1.2.3 This is a pilot SEA which is being conducted with a view to influencing the NSEC SAP as well as demonstrating the usefulness of SEA to regional (transnational) development planning. As far as possible the SEA will work within existing institutional, policy and procedural arrangements at GMS and government level so that its uptake and implementation are optimised.

1.2.4 There is no legal requirement to undertake SEA of the NSEC SAP at the regional level in the GMS. In the ADB, SEA is not yet mandatory but is recommended as a, "method and approach for conducting environmental assessment of program loans"[3]. SEA is being promoted in the

[2] There are many variations to this process but they are usually fairly similar in their main considerations. This figure is based on an SEA process emphasizing a participatory and integrative approach. EC, DG TREN, 2005.
[3] www.adb.org/Documents/Guidelines/Environmental_Assessment/Strategic_Environmental_Assessment.pd

GMS, particularly through the EOC, which has initiated three pilot assessments including the SEA of the NSEC SAP.

1.2.5 Among GMS countries, only China and Vietnam have legislated for SEA. Under the Environmental Impact Assessment Law of China, all levels of governments and their agencies are required to conduct SEAs of land use plans, plans for all regions, river basins and sea areas, as well as SEAs of plans for 10 key development sectors. A draft plan without SEA statements cannot be approved and implemented. No approvals can be given to EIA of construction projects under regional/land use plans which haven't performed SEA or for projects under the 10 sector plans which haven't fulfilled SEA requirements. Some 37 SEAs have been conducted at national level and several hundred at local government level in China.

1.2.6 Lao PDR has no legislation on SEA although there is comprehensive legislation on project level EIA which has been applied to major projects with regional and strategic significance, such as hydropower schemes and three sections of the NSEC R3 highway.

1.2.7 In 2005, the Thai National Environment Board (NEB) appointed the "Subcommittee on Strategic Environmental Assessment" to propose how best to apply SEA in preparing policies, plans and programs of the government sector and to develop a framework and guidelines for SEA. In the meantime, the SEA subcommittee can propose to the NEB development plans which must prepare SEAs. SEA is recognized and promoted as a tool for public policy formulation in the Tenth National Economic and Social Development Plan (2007-2011) and the Environmental Quality Management Plan (2007-2011). Draft SEA guidelines have been prepared but are not supported by law. Some 30 pilot SEAs have been conducted by various Thai government and non government organizations.

SEA Internationally

1.2.8 In 2001, the EU legislated for SEA with the adoption of Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (the 'SEA Directive'). In 2003 UNECE introduced a Protocol to the ESPOO Convention on Environmental Impact Assessment based on the EU directive. Once the protocol enters into force it will apply to all signatory countries.

1.2.9 The approach to this pilot SEA of the NSEC SAP is a hybrid drawing from the experience of the EU and the UNECE protocol, pilot SEAs in Yunnan (promoted by the Yunnan Provincial Government with support from SIDA and Dfid), the Thai SEA guidelines and GMS EOC pilot SEAs in Vietnam and Cambodia.

The Need for an SEA of the NSEC

1.2.10 The need for an SEA of the NSEC SAP was identified through the SAP process and its promotion of sustainability in corridor development, as well as the broader GMS cooperation framework objective of mainstreaming environment into regional sector planning processes, (for example in transport, energy and tourism)[4].

[4] This objective is outlined within the Regional Technical Assistance (RETA) 6289: Core Environment Program and Biodiversity Conservation Corridors Initiative

1.2.11 The NSEC in particular was identified as a suitable pilot for SEA in the GMS through consultation between the GMS EOC and the GMS Secretariat which is responsible for overall planning within the economic corridors, as well as for drafting of the NSEC SAP. Consultations were also held with the GMS Transport Sector Forum and more broadly through an SEA scoping workshop organized by the EOC in August 2006. The proposal to focus the pilot SEA on the NSEC SAP was later reaffirmed through the GMS Working Group on the Environment (WGE), and detailed country consultations with relevant sector agencies.

1.2.12 The growing commitment to SEA in the GMS reflects recognition of the need to strengthen spatial and land use planning practices in the region. Existing EIA of projects are not capturing many of the strategic and transboundary sustainability concerns. Most assessments are being conducted on a piecemeal basis. The areas concerned do not have comprehensive spatial plans which define zones and standards as the framework for development. Increasingly, SEA is seen as a key tool for promoting more rational plan making through its general requirements to develop options early in the plan making process; as well as its emphasis on evidence informed decision making and the communication of its conclusions in an accessible report which enhances the accountability of decision makers.

The purpose of the NSEC SEA

1.2.13 The SEA for the NSEC SAP is a pilot SEA and its main purpose is to: i) integrate sustainability considerations in the NSEC SAP, and ii) strengthen human and institutional capacity in SEA and spatial/strategic planning.

1.2.14 The general SEA aims are to:

- mainstream environmental and social concerns with the purpose and scope of the NSEC Strategy and Action Plan
- integrate environmental, social and economic concerns in regional development planning using GIS
- improve the cross-sector collaboration and coordination during the GMS planning process
- strengthen the strategic planning capacity of governmental and sector agencies
- develop training materials and a technical package of skills for effective implementation of corridor plans and initiatives.

1.2.15 Ultimately, the pilot SEA of the NSEC SAP will provide recommendations at several planning levels: (1) the Strategy and Action Plan that serves as the overarching umbrella planning framework for the corridor; (2) the Transport sector strategy and action plan coordinated by the GMS Transport Sector Forum (as the main sectoral framework feeding the corridor development process); and (3) relevant national plans within the corridor, for example, for transport, trade and tourism development.

1.3 The GMS and NSEC

GMS

1.3.1 The GMS was launched in 1992 as an informal cooperation mechanism. The ADB provides secretarial services to the GMS as an independent and non political body. The GMS aims to build on mutual trust, confidence and goodwill of the member countries to promote a pragmatic approach to development.

1.3.2 The Ten-Year Strategic Framework for the GMS Program (GMS-SF) was endorsed by the GMS Leaders at their First Summit in Phnom Penh in November 2002. The Strategic Framework includes a vision for a more "integrated, prosperous and harmonious sub region". This vision includes 4 goals on: accelerated and sustained economic growth; reduced poverty and income disparities; improved quality of life and sustainable environmental management of natural resources. The framework also includes 5 strategic thrusts

- Strengthen infrastructure linkages
- Facilitate cross border trade and investment and Tourism
- Enhance private sector participation and competitiveness
- Develop human resources & skills competencies
- Protect the environment and promote the sustainable use of shared natural resources.[5]

1.3.3 These 'thrusts" inform action plans on transport, telecommunications, energy, environment, tourism, trade. Investment, human resources, development and agriculture. Economic corridors are a major instrument for realising the vision, goal and thrusts of the GMS strategic framework.

Economic Corridors

1.3.4 The economic corridor approach was adopted at the 8th GMS ministerial meeting in 1998 to accelerate sub regional cooperation. The Joint declaration stated that:

- GMS countries will create economic corridors linking the GMS to major markets
- Economic corridors are not just transport corridors, (They deal with more than physical infrastructure and traffic flows. They include softer issues such as trade agreements and logistics, as well as human resource development to maximise economic and cultural cooperation between countries.)
- Nodal points within these corridors will serve as centres for enterprise development.[6]

1.3.5 The Economic corridor approach objectives include:

[5] The Mid Term Review of Greater Mekong Subregion Strategic Framework (2002-20012) [Online: http://www.adb.org/documents/reports/mid-term-review-gms/Midterm-Review-GMS-Final.pdf?bcsi_scan_F6892CABA15785B4=0&bcsi_scan_filename=Midterm-Review-GMS-Final.pdf]
[6] http://www.adb.org/GMS/min8_app4.asp

- Extending the benefits of improved transport links to landlocked and remote regions of the GMS
- Provide a spatial focus to GMS activities, with 'backbone' growth centres and nodal points serving as a catalyst fro developing neighbouring areas
- Open up opportunities for investment from within and outside the GMS
- Promote synergy and enhance impact through clustering of projects
- Provide a mechanism for prioritising and coordinating infrastructure investments.[7]

1.3.6 The inaugural meeting of the Economic Corridor Forum (ECF) was held in Kunming Yunnan on the 6th June 2008. The GMS leaders had previously endorsed the establishment of the ECF. The Terms of Reference were agreed on the 5th June 2008. The ToR for the ECF states that is aims to strengthen cooperation between various working groups and forums, as well as discuss strategies and implementation to address bottle necks. It also aims to increase participation of local authorities and help mobilise resources.

NSEC

1.3.7 The North South Economic Corridor connects South West China and Thailand and the wider ASEAN region. It links two of the largest and most dynamic economics in the GMS area and provides another route to the sea for land locked Yunnan. At the same time it passes through some of the more remote and poorer regions of the GMS, such as North West Lao PDR, and thus offers opportunities to take advantage of the predicted increase in transport and trade to stimulate economic development and growth **throughout** the corridor.

1.3.8 Already there has been a number of actions for accelerating the development of the NSEC including:

- The NSEC Logistics Development Study[8]
- Country assessments of logistics development
- The Cross Boarder Transport Agreement[9] and their pilot implementation
- Various national and regional workshops
- Concept paper on Institutional Arrangements for GMS Economic Corridor Development
- Assessing the remaining missing links in NSEC
- Improving cross-border facilities along the NSEC
- Conducting training for officials involved in customs-immigration-quarantine operations in boarder areas

[7] EOC presentation on the GMS NSEC (pers comm.)
[8] ADB (2007) Logistics Development Study of the Greater Mekong Sub Region North South Economic Corridor. RETA 6310
[9] CBTA has been developed under the Strategic Framework for Action on Trade Facilitation and Investment (SFA-TFI) to facilitate the movement of goods, people and vehicles along the corridor. They include: single-stop/single-window customs inspection; cross-border movement of persons (i.e., visas for persons engaged in transport operations); transit traffic regimes, including exemptions from physical customs inspection, bond deposit, escort, and agriculture and veterinary inspection requirements that road vehicles will have to meet to be eligible for cross-border traffic exchange of commercial traffic rights and infrastructure, including road and bridge design standards, road signs, and signals. More inform can be found online: [online: http://www.adb.org/GMS/Cross-Border/default.asp]

- Strengthening institutional arrangements for promoting economic corridor development

1.3.9 The NSEC will be developed in three stages:

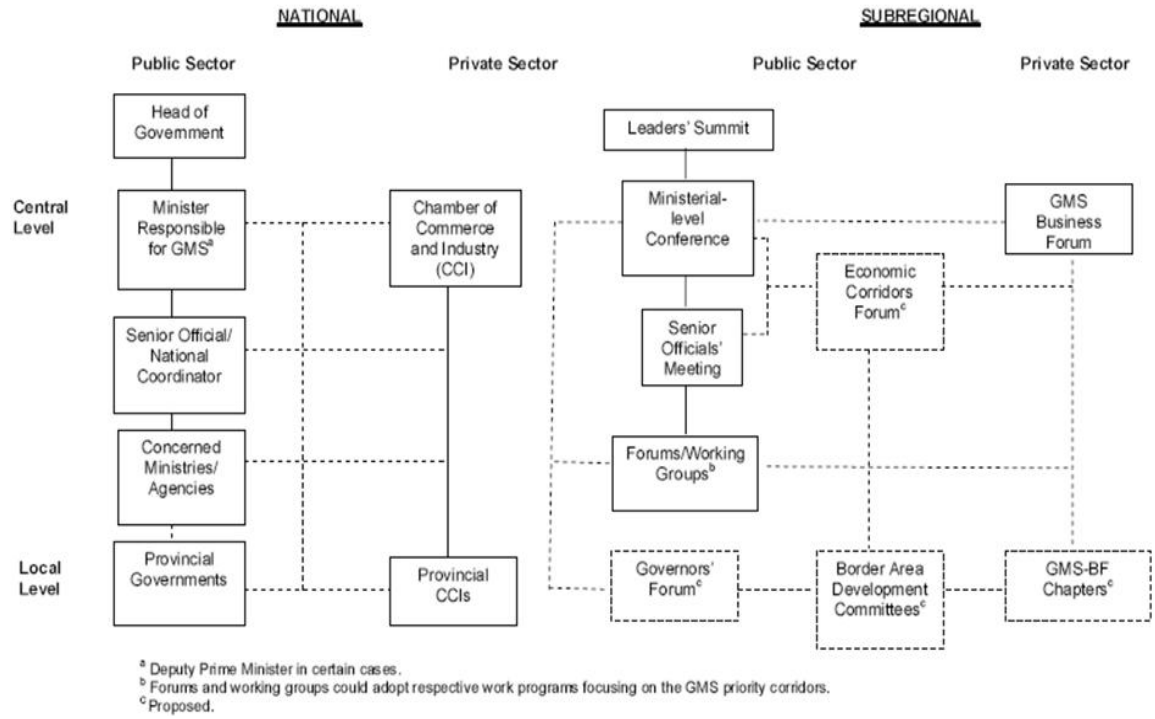
- Phase 1 – A transport corridor which includes identifying, prioritising and addressing missing links in the road network
- Phase 2 - A logistics corridor which includes facilitating the logistics infrastructure and addresses barriers to improved logistics
- Phase 3 – A fully fledged development corridor which includes the soft infrastructure to facilitate trade in goods, services and cultural exchange[10]

1.3.10 The NSEC is in phase 1 of its development. The aim is to move towards a logistics corridor by the time the ASEAN and the ASEAN / China Free Trade Agreements are signed. An integrated strategy and action plan (SAP) is being prepared for the NSEC and will be considered for adoption by the GMS countries late in 2008. It was proposed to bring together the different strands of work on the NSEC. The purpose of the SAP is to identify and prioritise the tasks and investments needed to move towards phase 2 and eventually the fully fledged Economic Corridor in phase 3.

1.3.11 There has been no specific body in the GMS that is tasked with promoting economic corridors. A review of intuitional arrangements funded by the ADB has proposed setting up an Economic Corridors Forum (ECF) which would have a broad set of stakeholders including national and local government representation, as well as representatives of the private sector. Other institutions such as Border Area Development Committees at certain crossings, and a Governors Forum and Business Forum have also been proposed. The Inaugural Meeting of the ECF took place directly after the Third GMS Leader's Summit 2008 in Vientiane. Figure 1.3 outlines the institutional set up for the GMS including the new Economic Corridors Forum.

[10] EOC Presentation on the NSEC (Pers Com)

Figure 1.3: GMS Institutional set up



1.4 The NSEC Strategy and Action Plan

1.4.1 The initial draft SAP includes the following objectives:

- Mainstream measures to deal with social and environmental concerns in NSEC development
- Strengthen physical infrastructure and facilities needed for the integration of economic activities in the corridor
- Facilitate cross border transport and trade
- Promote and facilitate investment in agriculture, agro-industry, natural resource-based industries, manufacturing, tourism and logistics and the development on a complementary basis of industrial clusters in the corridor and surrounding areas
- Address human resource constraints in the public and private sectors
- Establish and enhance institutional mechanisms for planning, coordinating and implementing NSEC initiatives, and for expanding public private partnership[11].

1.4.2 The strategic Framework for the SAP was adopted by GMS countries on the 31st March 2008 through an MOU (Towards Sustainable and Balanced Development for the Greater Mekong Sub region North South Economic Corridor and Enhanced Organisational Effectiveness for

[11] ADB (in Press) Towards Sustainable and Balanced Development A Strategy and Action Plan for the GMS North South Economic Corridor

Developing Economic Corridors". The basic thrusts of the SAP were adopted by the ECF in June 2008. Subsequently a revised version of the SAP has been circulated (August 2008) for a second round of Country Consultations. Once fully approved, (expected November 2008) the NSEC SAP will provide an umbrella development plan influencing and guiding the more detailed GMS sector plans in the corridor, major project planning and plans at national to local level relating to the corridor. The GMS Economic Corridors Forum (ECF) will stimulate economic corridor development and enhance collaboration between countries within the GMS and among GMS forums and working groups.

1.4.3 The SAP sets out the priorities and actions for transforming the NSEC into an economic corridor. It provides a framework for investments in the following activities:

- Completion of missing links in physical road infrastructure
- Modernization of cross border facilities
- Finalization of the CBTA and trade facilitation measures under the SFA-TFI at selected border crossing points through investments in the logistics and trade components of the corridor (CBTA) and enhancing general activities related to the development of logistics industries and cross-border industrial zones
- Establishing Special Economic Zones and Industry Clusters along the route
- Optimizing the supply chain networks
- Business plans for the logistics industries
- Developing important 'nodes' and border crossing points.

1.4.4 The SAP will help stimulate associated, cumulative and indirect developments particularly at the border areas. These developments will include economic growth proposals associated with industrial development, growth in tourism and growth in logistics and other services. The developments will have positive and negative, as well as cumulative impacts following the provision of the NSEC road infrastructure, which the SEA should assess in terms of its potential economic, environmental and social consequences.

1.4.5 The SAP also identifies various social and environmental 'threats and risks' associated with corridor development including: the spread of communicable diseases; trafficking of women and children; displacement of local communicates and ethnic minorities; increased land prices and accidents; deforestation, loss of biodiversity and general environmental degradation.

1.4.6 The threats and risks identified in the SAP relating to corridor development and its sequencing are likely to have significant sustainability implications which the SEA will need to identify, assess and make recommendations for addressing.

Geographic focus of the SEA

1.4.7 The SEA will focus on the section of the NSEC that runs from Kunming in the PR China to Bangkok in Thailand via Lao PDR. This section of the corridor is receiving priority attention in terms of investment flows. A comprehensive social and environmental assessment is required especially as the route crosses some of the richest and most vulnerable areas of biological and cultural diversity, as well as one of the most isolated areas economically in the GMS. To date,

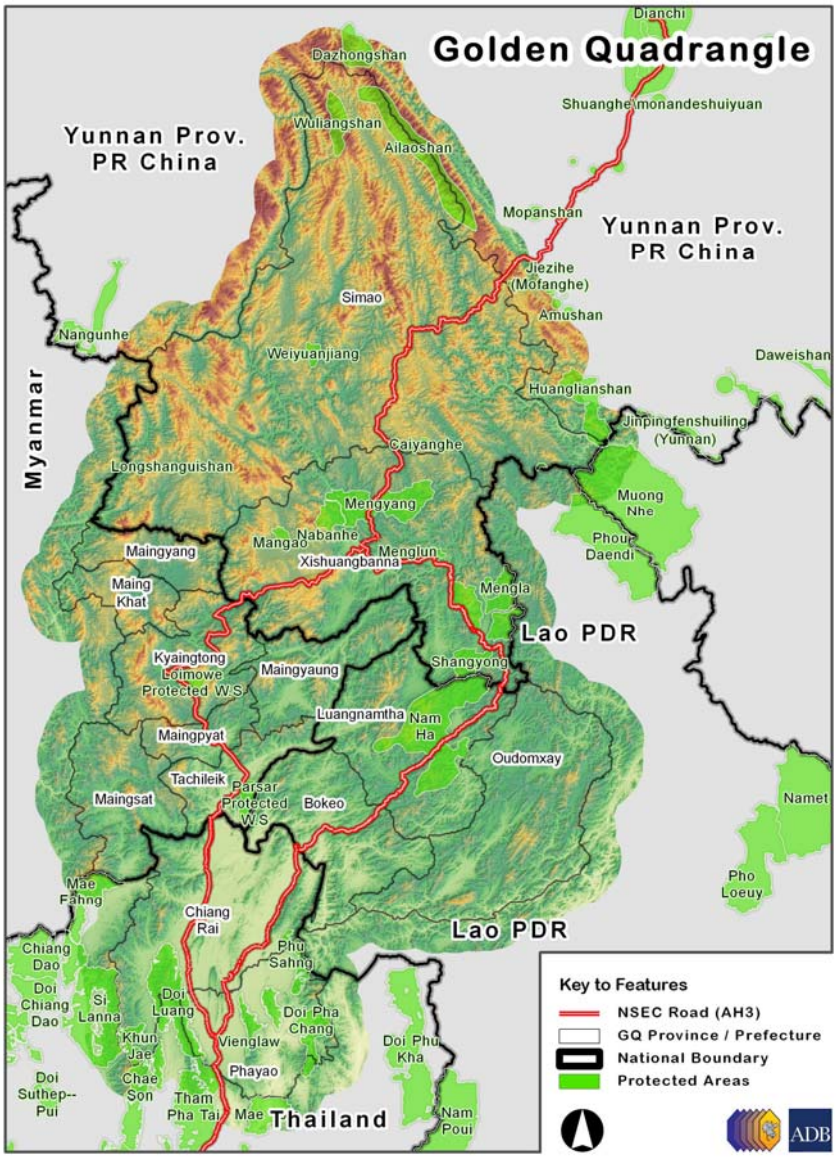
environmental assessments in this corridor section have been limited to small sections of the road and other specific development projects.

1.4.8 **The Golden Quadrangle:** Within the Kunming to Bangkok section of the corridor an especially sensitive and relatively isolated area had been identified as a focus for the SEA – it takes in North-east Lao PDR- the central East of Myanmar- North-west Thailand and Xishuangbanna in southern Yunnan Province of China. This area has adopted the name of the Golden Quadrangle [12]**(**Figure 1.4**)** and has become the focus of a collaborative tourism development initiative. In summary the golden Quadrangle has been identified for focussed assessment in the SEA because:

- It retains biodiversity of global and national importance
- It is home to a mix of cultures and ethnic groups of exceptional diversity and extreme poverty
- It is the target for intensive eco and cultural tourism initiatives
- It includes a number of important border crossings which are the target for infrastructure and industrial development, concessions and trade agreements
- It has been identified by the NSEC SAP preparatory team as an area of special importance for the successful development of the corridor but with many environmental and social risks
- It provides an opportunity to assess transboundary concerns and define solutions to them for wider application in the GMS
- Currently it is relatively isolated with poor connectivity to major areas of economic growth in the GMS.

[12] Myanmar will not be included in the SEA for the NSEC

Figure 1.4 Golden Quadrangle area



1.5 Approach to the SEA

1.5.1 The context set out here highlights a number of challenges and opportunities for the SEA including:

- There is no statutory duty to undertake the SEA; but there is a general political willingness and interest in the recommendations that an SEA might make to improve the sustainability of the NSEC proposals, and avoid or reduce some of the threats and risks already identified through the SAP process.

- This SEA is being undertaken in a transboundary context. This may help promote regional cooperation, training and mutual understanding of the difficulties faced by neighbouring countries with unplanned and unwanted side effects of NSEC development, and of the opportunities for fulfilling their own needs and priorities.
- There is a need to develop understanding and build ownership of an SEA process and recommendations which falls outside the normal statutory duties of the key stakeholders. This will encourage a participatory approach to identifying key issues and priorities and agreeing significance of impacts. This participatory process will be informed by a comprehensive evidence base and some innovative modelling and analysis of the baseline.
- The SAP is being prepared by a separate institution (the GMS Secretariat in the ADB in Manila) to the one that is facilitating the SEA (the EOC in Bangkok). However, the SEA provides an opportunity to promote cross sectoral and multi institutional working, not only within ADB related institutions but also wider intersectoral cooperation within and between countries. The participation in the SEA of GMS government officials (at both the provincial and local level), NGOs and donors will help achieve convergence of both development and sustainability goals.

1.6 Scoping report purpose and structure

1.6.1 The scoping report is organised around the following chapters. Chapter 2 of the scoping report sets out the approach and SEA framework for assessing the NSEC SAP. The framework includes definition of the SEA stages and how these will be integrated with the SAP process. The SEA sustainability objectives to be used to assess the potential impacts of the SAP and alternatives;

1.6.2 Chapter 3 includes the analysis of the baseline information collected during the scoping phase of the SEA and in particular outlines some of the key issues that will need to be addressed.

1.6.3 Chapter 4 outlines some of the methods for analysing the evidence and assessing the impacts.

1.6.4 Chapter 5 includes some interim observations and recommendations aimed at the SAP writing team).

1.6.5 Chapter 6 outlines the next steps of the SEA process.

2 The SEA Framework

2.1 Introduction

2.1.1 The SEA is based on an objectives-led approach whereby the potential impacts of the SAP are assessed against a series of objectives for sustainable development.

2.1.2 The SEA framework includes (i) identifying the SEA stages and how these will be integrated with the NSEC SAP process; (ii) defining the key strategic development issues to be addressed by the SEA; (iii) settling on the SEA objectives and criteria/questions which will be used to identify and assess the potential impacts of the SAP; (iv) determining the geographic extent of the SEA – especially important when conducting spatial and baseline analysis; (v) identifying development options for the corridor which the SEA seeks to assess and compare against the sustainability objectives, and(vi) agreement on the methods and analysis tools that will be used to analyse the evidence and assess impacts. The sections in this chapter address each of these components of the SEA framework.

2.1.3 The SEA framework was developed in a three step scoping process. Step one was a series of in-country consultations in China, Lao and Thailand conducted by the international and national SEA team members. Round table meetings and interviews were held with national line agencies in Lao and Thailand, as well as relevant provincial Governments in all three countries. The second step was a regional consultation and scoping workshop held in Kunming in Yunnan Province in April 2008. The workshop included government officials from the Yunnan Provincial Government, Lao PDR, Thailand and Chiang Rai Province in Thailand. The workshop included some NGO and donor representatives, EOC officials and the international and national SEA team experts. The workshop developed a draft set of key issues, SEA objectives and NSEC strategic development alternatives. The final step (on-going) in building the SEA framework and scope will be to review the draft key issues, objectives and alternatives against all the evidence that has been collected by local experts on the SEA team through extensive field work and analysis of existing plans and documents.

2.1.4 The scoping workshop provided an opportunity to i) inform and involve stakeholders on the scope of the planned SEA work, ii) to develop a shared vision on key issues, objectives and alternatives, and iii) to identify other relevant development plans and programs which are proposed for the NSEC and may affect the objectives of the NSEC and SAP.

2.1.5 The outputs of the workshop were:

- An SEA framework agreed by all participants including the geographic and substantive scope of the assessment
- A set of templates for collecting the evidence base
- A common understanding among SEA team members on how to collect the data and information and populate the evidence base templates

2.2 SEA stages

2.2.1 Figure 2.1 sets out the stages of the SAP and the corresponding stages of the SEA. The figure illustrates how the SEA to inform the SAP preparation process at several key points in the preparation process. This process includes

- Stage 1: The SEA team sent initial high level comments on the first draft of the SAP to the SAP writing team.
- Stage 2: The SEA scoping report will be sent to the writing team and other key stakeholders. This Scoping report will include the SEA framework (including the SEA objectives and criteria which will be used to test the performance of the measures set out in the SAP); the evidence base (including analysis of relevant policies and the baseline situation and trends according to key economic, environmental and social themes[13]), and a synthesis of the key issues based on the consultations and evidence collected, which will be used to help judge the significance of the potential impacts identified. Any comments received from stakeholders will be incorporated into the final scoping report.
- Stage 3: Assessment of the SAP preferred option and some additional strategic alternatives developed by stakeholders in the region (see chapter 2 for more details)
- Stage 4: Publication of the draft SEA report which will be sent to key stakeholders including the SAP writing team
- Stage 5: Comments on the draft SEA will be incorporated into the final SEA.

2.2.2 The first draft of the SAP was sent to the SEA team which in turn provided initial comments to the SAP writing team to consider in the next iteration of the SAP. The SEA used this initial draft SAP and SEA comments as a basis to design the scoping stage of the SEA. The outputs of the scoping stage will be sent to the SAP writing team so that pertinent comments can be incorporated into the next draft of the SAP.

2.3 Key Sustainability Issues and objectives

2.3.1 Tables 2.1-2.3 present the draft list of key policy issues and associated objectives arising from the discussions and breakout groups at the regional scoping workshop in April 2008. It was agreed that these draft issues and objectives would be ***amended*** in light of the evidence base being gathered by the national SEA team members in each country and reviewed at the regional assessment workshop. This issues and objectives framework will form the basis of the SEA for testing the environment, social and economic performance of the NSEC SAP.

[13] Baseline information according to agreed themes is being collected by local consultants using a set of templates see section 2.4 below for more details

Figure 2.1: Outline of the NSEC SEA and SAP Processes

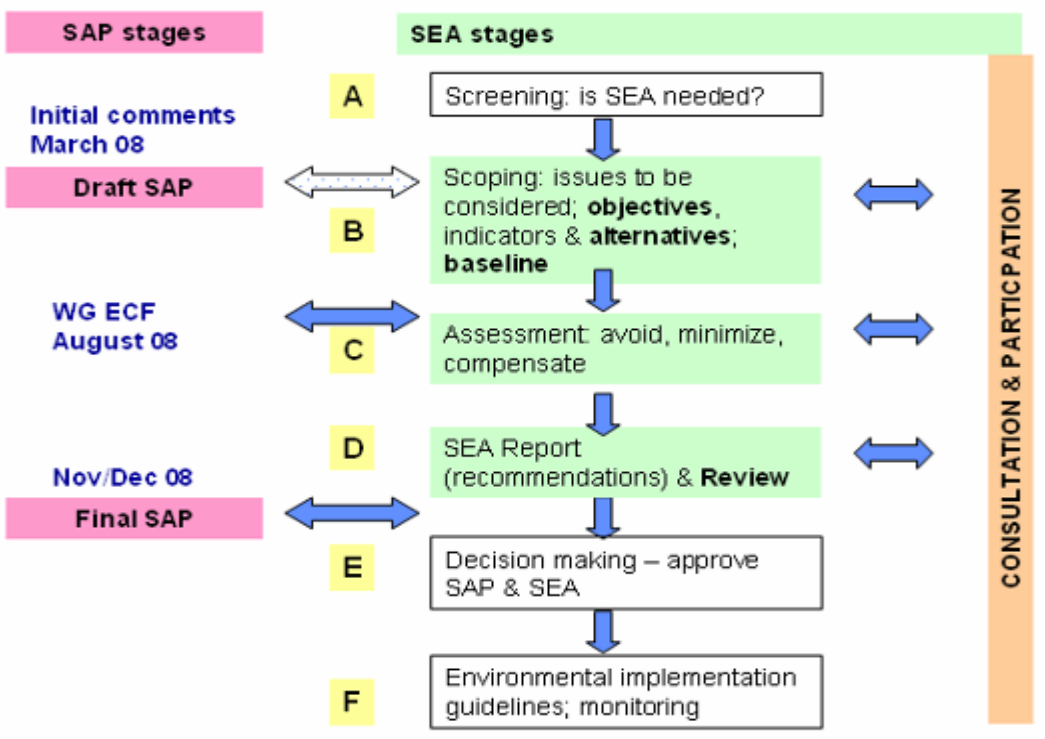


Table 2.1: Theme 1 Economic Issues

Category/ Theme	Key Policy Issues	SEA objectives
Economic	1. Need for national governments to promote sustainable national & local GDP growth	Sustainable growth of local and national GDP for the next 20 years 1. Increase Regional GDP so that all countries benefit 2. Increase GDP/capita 3. De-link environmental damage from economic growth
	2. Disparities in levels of economic development in : Agriculture, tourism, trade & industry (sector development) among GMS countries	To increase economic integration of the NSEC in trade investment in agriculture, industry and tourism based on the potential of each country • Put in place policies and a framework mechanism to encourage integration • Sustainable increase export and import • Sustainable increase in the number of tourists • Promote NSEC to becomes a common eco tourist market (destination) • Promote the free flow of people
	3. Need to attract investment through Special economic zones; Free trade zone, concessions - investment (spatial development)	To create cross border investment zones in order to create job opportunities for local people in the NSEC, promote trade and investment and to improve the infrastructure
	4. Limited and inequitable trade in goods, services, FDI and movement of people (information division, health, education, logistics, culture)	To increase the volume of FDI, trade, services, including research & development (R&D) and technology transfer along NSEC
	5. Lack of formal employment opportunities	To increase employment opportunity for local people To promote capacity of local people and entrepreneurship To increase individual income in disadvantaged communities

Table 2.2: Theme 2 Social Issues

Category/ Theme	Key Policy Issues	SEA Objectives
Social	1. Poverty reduction(improve the standard of living, local community development, ethnic minority well-being)	Decrease the poverty population, more community people including the ethnic people access to basic services (primary education, health care, so on) • Improve access to basic services of local communities including ethnic groups (e.g. safe drinking water) (*Remark: Different countries have different standards for defining poverty – e.g. absolute and relative)*
	2. Education and capacity building HRD	• Decrease illiteracy, • Increase access for local people to vocational education/skill training
	3. Quality of Life (public health, safety, noise, smell)	improve the quality of life for people in the corridor (GMS region) • To avoid negative impacts on public health including communicable Diseases • To avoid negative impacts on safety • To avoid negative impacts of smell • To avoid negative impacts of noise Improve the joint efforts in GMS countries to prevent and control the communicable diseases and establish a shared early-warning system;
	4. Migration and trafficking	To control illegal and involuntary immigration (trafficking of people)
	5. Retention of ethnic cultures and traditions (Impact to Mekong culture diversity)	Support ethnic groups in maintaining their cultural identity, traditions and heritage
	6. Empowerment of disadvantaged groups (information, participation in decision making)	To promote access to government information and encourage participation in decision making

Table 2.3: Theme 3 Environmental Issues

Category/ Theme	Key Policy Issues	SEA objectives
Environment	1. Air pollution (construction & operation); road, agricultural residual (slash & burn at a large scale) & forest fires;	To minimize air pollution from specific key sectors (agriculture, Industry, transport, domestic) (Including green house gasses)
	2. Water pollution and management;	To manage water pollution minimize water pollution from urban, agriculture, tourism and industry sources *Re-mark: Point source / non point source* • Chemicals (fertilizers, etc) • Waste water treatment plants/onsite (coverage)
	3. Unsustainable use of resources (forest, land, soil, minerals, water)	To ensure the long term conservation and sustainable use (*demand and supply*) of natural resources • Water • Forest • Land • Soil • Minerals • Energy
	4. Biodiversity and ecosystem fragmentation (loss of ecosystem services)	To minimize loss of biodiversity and protect valuable species • To improve the ecosystem connectivity • To improve the wildlife habitat • To rehabilitate damaged ecosystems To maintain ecosystem integrity and services
	5. Waste management (transport & storage of hazardous waste in China; Laos: solid waste;	To minimize waste output • (reduce, reuse and recycle) To effectively manage the collection, treatment and disposal of residual waste • To manage the transport (*inc transboundary*) and disposal of hazardous waste in an environmentally sound manner
	6. Climate change (greenhouse gas emissions)	To ensure capacity building for climate change impact • To ensure effective adaptation and mitigation measures in the future

2.4 The evidence base

2.4.1 Baseline evidence was collected according to the 16 key baseline themes identified at the workshop. National SEA team members from the three countries were tasked with collecting the data according to a set of predefined templates. Table 2.5 summarises the 16 themes agreed at the workshop for which templates were developed and guidance issued to national consultants. Annex 1 includes the completed templates

Table 2.4: Summary of evidence base templates

Theme 1: Economic issues	Theme 2: Social issues	Theme 3: Environmental issues
1. National and local GDP	7. Poverty Reduction	12. Air and water pollution
2. Transport and Trade (road water, rail and air)	8. Skills	13. Water resources
3. Tourism	9. Public health	14. Forests and land resources, (including land degradation)
4. Industry (energy, mining and others)	10. Population, migration and trafficking	15. Biodiversity (terrestrial aquatic and PAs)
5. Agriculture	11. Natural disasters (including floods and landslides)	16. Waste
6. Special economic zones		

3 Baseline analysis

3.1 Introduction

3.1.1 This chapter outlines the different sections considered in the baseline analysis (Collected by the national consultants). The sections include i) The policy framework, ii) The EIA systems and their application to NSEC development, iii) Synthesis of key issues.

3.1.2 As part of this baseline collection where possible, regulations, policies, plans and institutional arrangements relevant to the SEA for the NSEC and SAP were described. The main purpose of this is to i) determine the extent to which the NSEC proposal is in line with national environmental and sector policies, plans and programmes, ii) assess the compliance of the proposal with international commitments and initiatives, and iii) evaluate relevant institutional structures and procedural arrangements

3.1.3 Table 3.1 starts to identify relevant international, regional and national policies and commitments and to review their objectives to see if they are relevant to the NSEC SEA. This information will be used to help identify key issues and targets to help judge significance of potential impacts during the assessment stage.

3.1.4 A critical concern for the pilot SEA of the NSEC will be its influence in regional and national development planning and the definition of responsibilities for its implementation. The countries within the NSEC have different SEA and EIA systems and institutional arrangements. Those systems provide the context for implementation of the SEA at national and local level, and for past and future environmental assessment of specific projects as part of NSEC development.

3.1.5 At the scoping workshop each country was asked to present an outline of the laws and procedures for their own systems of EIA and SEA (where it exists). This has been used to inform the design of the NSEC SEA and any associated capacity building initiatives.

Table 3.1 Policy analysis

#

Plan	Key Messages	Relevant Topics
International		
Convention on Biological Diversity (1992)[14]	Set the target to achieve by 2010 a significant reduction of the current rate of biodiversity loss	Biodiversity and Open Space
The Convention on Wetlands of International Importance 1971 (Ramsar Convention)	Provides for the protection of waterfowl habitat	Biodiversity and Open space, Water, Landscape.
United Nations framework Convention on Climate Change (1992)[15]	Recognises the threat of climate change and commits states to act (UNFCCC)	Climate Change and flooding
To be completed…..	……	……

3.2 Synthesis of key baselines issues

3.2.1 This section draws together the findings from the evidence base and the workshop to distil a ***final*** set of key issues arising from the baseline. These key issues will be used to help determine the significance of the potential impacts of the SAP on the NSEC, in particular, the Golden Triangle area. This will be done in a workshop format with key stakeholders from the regions. Chapter 4 has more details. It will be important to identify geographic areas of significance in the Golden Triangle, the trends as well as current imperatives such as poverty reduction and up and coming issues like climate change and trafficking.

3.2.2 The following pages provide a summary of the key environmental, social and economic issues in the area by country (Yunnan Province, Lao PDR and Thailand) and a synthesis of the key environmental, social and economic issues in the NSEC overall. The information presented in this section draws on baseline data collected by local consultants and recorded in templates (see Annex 1), site visits and scoping workshop.

[14] For further information visit: http://www.cbd.int/default.shtml
[15] The Kyoto Protocol (1997) accessible via: http://unfccc.int/kyoto_protocol/items/2830.php

Key environmental issues in the Yunnan Province

Air pollution
• **SO2 pollution increasing:** SO_2 discharged in Yunnan increased 35.2% from 2000 to 2005 due to increasing coal consumption in the raw and processed materials and thermal power industry. Industrial sources account for 82% of the SO2 emissions.
• **Vehicle emission increasing:** Vehicles are heavy emitters of particulate matter and SO_2. Vehicles numbers are growing rapidly in the NSEC. The growing size of vehicles fleets is only part of the problem; however, low emissions standards and outdated technology also contribute to increasing levels of air pollution.
Water pollution
• **Drinking water quality is getting worse in the NSEC:** In 2006, only 33% of drinking water sources in the NSEC met environmental standards.
• **Rural non-point source pollution is increasingly serious in the NSEC**. Sources mostly are livestock and poultry farms, increasing fertilizer and pesticide use and rural domestic waste water.
• **Waste water discharged is on the increase in the NSEC:** COD discharged in Yunnan will increase 32% in volume over the three years from 2005.
Water resources
• **Water is used wastefully** by agriculture and industry with only 20% recycling by industry
• **Water pollution** limits the accessibility of water for economic and domestic uses
• **Soil erosion** reduces the life of water management infrastructure such as reservoirs and is a key cause of reduced water quality
• **Environmental flows** are not adequately considered in the development of water resources
Biodiversity
• **Forests are threatened** and fragmented by encroachment for crop cultivation, timber cutting and commercial tree plantation such as rubber, also by wood cutting for fuel and house construction.
• **Species loss**: At least 500 types of plants are threatened by habitat loss, environmental pollution, over grazing and invasive species. One third of endemic species are threatened or endangered as a result of water pollution, reservoir construction, over fishing and invasive species introduction
• **Road and reservoir construction** is a major cause of biodiversity loss.

• **Protected areas**: new sections of the NSEC corridor have dissected the Mengyang Protected Area in Xishuangbanna Prefecture, Yunnan Province.
Forests and land resources
• **Expansion of plantations:** Commercial plantations, especially rubber, are replacing areas of degraded natural forest and agricultural land.
• **Soil erosion:** One third of Yunnan suffers from soil erosion problems. Farming on sloping field especially slope exceeding 25 degree is the main inducement of soil erosion and land degradation. Average soil erosion amount per year is 0.5 billion ton, equal to 160 thousand hectare of farmlands are lost.
• **Construction of infrastructure** including roads, power and irrigation is a key cause of land degradation.
Solid waste and hazardous material
• **Industrial solid waste on the increase in the NSEC:** The volume of industrial solid waste generated in Yunnan increased 45.83% from 2000 to 2005 (chemicals industry, coal mining, metal smelting industry).
• **Rural domestic solid wastes** on the increase mostly discharged directly in the environment without treatment.
• **Land fill sites in the NSEC cannot cope** with the increasing volume of solid wastes generated
• **Hazardous waste on the increase in NSEC:** In Yunnan, main types of hazardous waste generated are organic phosphorus waste, lead, waste acids, cadmium, zinc, arsenic and chrome, account for 98% of the total volume generated in the province. It comes mainly from the expanding chemical industry and metal smelting.

Key environmental issues in Lao PDR

Air pollution
• **Smoke haze from forest fires** originating from slash and burn cultivation practices of upland farmers
• **Smoke from household cooking**: Most NSEC households use wood as the main source for cooking,
• **Dust from unsealed roads and construction sites**: A serious health problem for expanding settlements along road sides.
• **Transport emissions:** Road transport – especially heavy vehicles, expected to increase with no provisions for pollution control
Water pollution
• **Cross border river pollution:** There is evidence that surface water entering Laos from Yunnan Province has been polluted raising the need for collaborative agreements on management of shared rivers
• **Localised industrial pollution:** industrial development is picking up in the NSEC – often with international investment in concession areas and zones. No pollution controls have been put in place and there is anecdotal evidence of localized pollution
• **Increasing use of agricultural chemicals in the NSEC:** Agriculture is intensifying and chemical uses is increasing and uncontrolled.
• **Uncertain impact of hydropower and multi-purpose reservoirs on water quality:** Mekong hydropower dam development in the area and the risk of the release of anoxic bottom waters from reservoirs
Water resources
• **Watershed degradation** including forest and vegetation clearing and soil erosion due to infrastructure development, agriculture activities and settlements even within protected areas
• **Waterways and wetlands degraded** due to sedimentation, destruction of riverbanks, modification of water courses and encroachment on wetlands including within protected areas (e.g. Nam Ha NPA)
Biodiversity
• **Illegal logging** in protected areas
• **Forest and agricultural fires** encroaching on protected area core zones and reducing biodiversity throughout the NSEC

• **Hunting:** Small-scale hunting is widely practiced and has greatly reduced populations of mammals and larger birds.
• **Wildlife trade:** There is a large amount of trade in wildlife and wildlife parts throughout the region. One such market specializing in wildlife is situated near the provincial forestry office in Lampang.
• **Cutting of biodiversity corridors:** The route runs across a wildlife corridor which connects the major part of the Nam Ha NPA with the Shiang Yong Protected Area in China (Asian elephant). Also cuts corridor between northern and southern portions of Nam Ha NPA.
• **Expansion of rubber plantations:** Since 2002, rubber cultivation has reduced biodiversity due to conversion of natural and degraded forest and reduced harvests of non-timber forest products. In 2005, over 4,850 ha of degraded forest and fallow swidden fields had been cleared and replaced with small rubber plantations around the NSEC.
• **Soil erosion:** soil erosion brought about by massive land clearance on steep slopes for intensive agriculture
• **Degradation of aquatic habitat:** Aquatic biodiversity are experiencing degradation too leading to signs of reduced fisheries and loss of livelihoods, especially for aquatic products
• **Protected areas**: new sections of the NSEC corridor have dissected the Nam Ha National Park (established 1993) in Lao PDR. In addition, the mitigation and stabilisation activities seem (from an initial field based review) to have been inadequate as well as the monitoring of impacts despite special arrangements being put in place.
Forests and land resources
• **Forest loss through logging:** The commercial logging always carried out on cross border basis stemming from demand for wood in Thailand, Vietnam and China.
• **Forest fire:** Shifting cultivation and agricultural burning prevent forest rehabilitation and destroy natural forest fringes
• **Riverside development and dredging**: Road construction, settlements and land disturbance close to waterways is causing degradation of aquatic habitats and loss of biodiversity as is mainstream dredging and blasting.
• **Soil loss:** Deforested areas in the NSEC are susceptible to significant soil erosion. Heavy rains during the wet season wash away significant amounts of topsoil from cleared areas in the catchment. Deforested hillsides are quickly

eroded and areas downstream experience flash floods during July and August.
Solid waste and hazardous material
• **Hazardous wastes from mining**: hazardous wastes such as cyanide and mercury
• **Agricultural chemicals**: their use and storage
• **Transport service and maintenance areas**: Vehicle servicing,
• **Small-scale industry:** especially located in concession areas and industrial zones - food and metal processing, textiles, printing, leather tanning and tourism facilities

Key environmental issues in the Thailand

Air pollution
• **Forest fires, agricultural burning** and open cooking all contribute significantly to particulate pollution in rural areas with growing health and productivity impacts
• **Transport pollution is increasing along transport corridors and urban areas:** Motor vehicles, two-stroke motorcycles, diesel trucks and old buses are contributing significantly to the PM10 and Ozone problem in the cities
Water pollution
• **Lack of waste water treatment:** In the Northern region of the NSEC domestic wastewater discharges account for about 83 percent of water pollution but industrial pollution in increasing in urban areas, both without treatment.
• **No environmental flows during dry season:** During the dry months between May-July, when water flows are low, many rivers deteriorate to very poor water quality
• **Ground water threatened:** Groundwater quality is increasingly contaminated from agricultural run-off, pesticide residues as well as saltwater intrusion from over-extraction.
• **Industrial pollution intensifying:** Effluent discharges from commercial establishments and factories located on river banks and in urban areas is increasing chemical and hazardous pollution.
• **Waste water equipment malfunctions and failures:** Collection efficiency is constrained by the reliance on old drainage systems comprised of canals or open sewers and poorly maintained drainage pipe networks with limited connections.

Water resources
• **Watershed degradation and soil erosion:** Forest loss and farming on sloping lands has resulted in severe soil erosion and sediment transport to drainage channels and reservoirs.
• **Infrastructure development damaging catchments:** Construction of roads and establishing reservoirs inside or nearby protected watersheds has resulted in their degradation due to improved access for illegal loggers and forest conversion.
• **Slash and burn is degrading watersheds:** Slash and burn techniques cause adverse environmental impacts on upland watersheds.
• **Settlements in Class IA watersheds:** Class IA watersheds are for strict protection but occupied by a number of ethnic minority peoples. The challenge has been to enable them to continue living in these areas while also playing a role in watershed protection.
• **Upstream – downstream conflicts over occupancy in protected watersheds:** Sharing and managing the benefits between upstream and downstream users of watershed areas is an increasing problem in Northern Thailand.
• **Enforcement of water quality control*:*** The lack of integrated approaches combined with lax law enforcement, weak capacity, insufficient investment, and poor operations and maintenance systems have exacerbated the pollution problems.
• **Water management and allocation:** There are no standard criteria for water allocation during the dry season. Priority is given to power supply and urban uses. Serious shortages of water occur when environmental flows are insufficient to combat saline intrusion and pollution concentration. Effects water intakes for agriculture, domestic and industrial uses.
• **River bank and wetland protection:** Encroachment on river banks and wetlands is increasing flooding and impacting on biodiversity.
• **Deforestation:** The loss of forest cover has adversely affected hydrological regimes, increasing the intensity of runoff and flooding, and reducing biodiversity.
• **Non-native species:** Several non-native plant and animal species have been introduced to riverine environments destabilising ecosystems. The three species having the greatest impact are Water hyacinth, Giant Mimosa and the Golden Apple Snail.
• **Sand dredging:** Sand dredging has become large-scale commercial enterprise

using powerful mechanical shovels causing intense sedimentation, fish kills, changes to river hydraulic regimes and erosion of banks.
Biodiversity
• **Deforestation, habitat degradation and species loss** due to commercial logging, roads and infrastructure development, forestland conversion for agriculture.
• **Fragmentation due to Infrastructural development**: construction of roads and other infrastructure including hydroelectric and irrigation dams inside and close by protected areas
• **Illegal logging inside and close to protected areas** carried out by influential businesses in conjunction with corrupt officials and police officers.
• **Forest fires** set by farmers and hunters sweep through forests in northern regions of the NSEC region annually.
• **Illegal wildlife trade**
Forests and land resources
• Continuing forest loss through increasing accessibility and infrastructure development:
• Forest fires are continuing to reduce forest area, structure and diversity.
• Smoke haze is affecting public health, tourism and productivity in other sectors.
• Soil loss, especially on steep slopes is reducing agricultural productivity and affecting aquatic environments.
• Forest restoration and rehabilitation not focusing on environmentally sensitive areas.
Solid waste and hazardous material
• Industrial hazardous wastes are growing in quantity, complexity and diversity
• More than half of community hazardous waste is created by transport service stations – a growing source of pollution in transport corridors and urban areas.
• Tourism is a growing source of solid waste. For National Parks this problem is leading to the accumulation of waste due to poor waste collection and the existence of open dump sites in what should be a natural protected areas
• Methane emissions from landfill sites are forecasts to be 339 Gg/year by 2020. This is a challenge and opportunity.

Synthesis of key environmental issues in the NSEC

Air pollution

1. Smoke from fires
• **Forest fires, agricultural burning** (including slash and burn cultivation practices of upland farmers) and open cooking all contribute significantly to particulate pollution in rural areas with growing health and productivity impacts throughout the NSEC (in Laos most NSEC households use wood as the main source for cooking)
2. Air pollution from transport sector
• **Transport pollution is increasing along transport corridors and in urban areas:** Motor vehicles, two-stroke motorcycles, diesel trucks and old buses are contributing significantly to the PM10, SO2 and Ozone problem. Vehicles numbers are growing rapidly in the NSEC. The growing size of vehicles fleets is only part of the problem; however, low emissions standards and outdated technology also contribute to increasing levels of air pollution.
• **Dust from unsealed roads and construction sites**: A serious health problem for expanding settlements along road sides.
3. Industrial air pollution
• **SO2 pollution increasing:** SO_2 discharged in Yunnan increased 35.2% from 2000 to 2005 due to increasing coal consumption in the raw and processed materials and thermal power industry. Industrial sources account for 82% of the SO2 emissions.
4. Methane from landfill
• Methane emissions from landfill sites are forecasts to be 339 Gg/year by 2020. This is a challenge and opportunity.
Water pollution
1. Industrial waste water
• **Increasing industrial waste water volume with limited treatment:** The volume of industrial pollution is increasing rapidly in the NSEC, often without treatment. This is particularly a problem in Yunnan and in Thailand but a growing localised problem in Laos. In Thailand, collection efficiency is constrained by the reliance on old drainage systems comprised of canals or open sewers and poorly maintained drainage pipe networks with limited connections.
• **Cross border river pollution:** There is evidence that surface water entering Laos from Yunnan Province has been polluted raising the need for collaborative agreements on pollution management of shared rivers
2. Agricultural sources of water pollution
• **Organic wastes from farms**. Agriculture in the NSEC is intensifying as is pollution from this source. In Yunnan livestock and poultry farms are particularly

a problem.
• **Increasing use of agricultural chemicals in the NSEC:** Agricultural chemical uses are increasing and often uncontrolled.
• **Ground water threatened:** Groundwater quality is increasingly contaminated from agricultural run-off, pesticide residues as well as saltwater intrusion from over-extraction.
3. Reservoirs
• **Uncertain impact of hydropower and multi-purpose reservoirs on water quality:** Growing numbers of reservoirs in the NSEC create a risk of release of anoxic bottom waters
Water resources
1. Watershed degradation
• **Forest loss and soil erosion:** Forest loss and farming on sloping lands has resulted in severe soil erosion and sediment transport to drainage channels and reservoirs. The loss of forest cover has adversely affected hydrological regimes, increasing the intensity of runoff and flooding, and reducing biodiversity. Soil erosion reduces the life of water management infrastructure such as reservoirs and is a key cause of reduced water quality.
• **Slash and burn is degrading watersheds:** Slash and burn techniques cause adverse environmental impacts on upland watersheds.
• **Infrastructure development damaging catchments:** Construction of roads and establishing reservoirs inside or nearby protected watersheds has resulted in their degradation due to improved access for illegal loggers and forest conversion.
2. Wetlands and waterway degradation
• **River bank and wetland destruction:** Encroachment on river banks, modification and blocking of water courses and filling of wetlands by road development and water management infrastructure is increasing flooding, reducing water quality and impacting on biodiversity.
• **Sand dredging:** Sand dredging has become large-scale commercial enterprise using powerful mechanical shovels causing intense sedimentation, fish kills, changes to river hydraulic regimes and erosion of banks.
3. Inadequate provision for environmental flows
• **Environmental flows** are not adequately considered in the development of water resources and other infrastructure
• **No environmental flows during dry season:** During the dry months between May-July, when water flows are low, many rivers deteriorate to very poor water

quality
• **Water management and allocation:** Serious shortages of water occur when environmental flows are insufficient to combat saline intrusion and pollution concentration. Effects water intakes for agriculture, domestic and industrial uses.
Biodiversity
1. Loss of forest habitats
• **Deforestation** due to commercial logging, roads and infrastructure development, and forestland conversion for agriculture.
• **Illegal logging inside and close to protected areas** carried out by influential businesses in conjunction with corrupt officials and police officers.
• **Forest fires** set by farmers and hunters sweep through forests in northern regions of the NSEC region annually.
• **Expansion of rubber plantations:** Since 2002, rubber cultivation has reduced biodiversity due to conversion of natural and degraded forest and reduced harvests of non-timber forest products.
2. Loss of aquatic habitats
• **Riverside development and dredging**: Road construction, settlements and land disturbance close to waterways is causing degradation of aquatic habitats and loss of biodiversity as is mainstream dredging and blasting.
• **Non-native species:** Invasive exotic plant and animal species have been introduced to riverine environments destabilising ecosystems.
3. Species loss
• **Species loss** from habitat loss, environmental pollution, over grazing and invasive species. In aquatic environments, one third of endemic species are threatened or endangered as a result of water pollution, reservoir construction, over fishing and invasive species introduction
• **Hunting:** Small-scale hunting is widely practiced and has greatly reduced populations of mammals and larger birds.
• **Illegal Wildlife trade:** There is extensive trade in wildlife and wildlife parts throughout the NSEC.
4. Fragmentation of habitats
• **Fragmentation due to Infrastructural development**: Construction of roads and other infrastructure including hydroelectric and irrigation dams inside and close by protected areas are proceeding with limited attention to maintenance of connectivity.

• **Cutting of biodiversity corridors:** The NSEC route cuts across wildlife corridors – for example connecting the major part of the Nam Ha NPA with the Shiang Yong Protected Area in China (Asian elephant) and between northern and southern portions of Nam Ha NPA.
Forests and land resources
1. Forest fire
• **Forest fires** are continuing to reduce forest area, structure and diversity.
• **Shifting cultivation and agricultural burning** prevent forest rehabilitation and destroy natural forest fringes
2. Soil erosion
• **Soil loss,** especially from land clearance on steep slopes is reducing agricultural productivity and affecting aquatic environments. One third of Yunnan suffers from soil erosion problems. Farming on slopes exceeding 25 degree is the main cause of soil erosion and land degradation.
• **Deforested areas** in the NSEC are susceptible to significant soil erosion. Heavy rains during the wet season wash away significant amounts of topsoil from cleared areas in the catchment. Deforested hillsides are quickly eroded and areas downstream experience flash floods during July and August.
3. Infrastructure and plantation development
• **Construction of infrastructure** including road, power and irrigation projects is a key cause of forest loss and land degradation through poor controls during construction and enforcement of safeguards and increased accessibility and multiplier developments
• **Expansion of plantations:** Commercial plantations, especially rubber, are replacing areas of degraded natural forest and agricultural land.
4. Logging and rehabilitation
• **Forest restoration and rehabilitation** is often poorly implemented and not focusing on environmentally sensitive areas.
• **Forest loss through logging:** Commercial logging of natural forest in Laos is always carried out on cross border basis stemming from demand for wood in Thailand and China (and Vietnam).
Solid waste and hazardous material
1. Industrial waste
• **Industrial hazardous wastes are growing** in quantity, complexity and diversity in the NSEC. The volume of industrial solid waste generated in Yunnan, for example, increased 45.83% from 2000 to 2005 (mainly from chemicals industry, coal mining, metal smelting industry). Organic phosphorus waste, lead, waste

acids, cadmium, zinc, arsenic and chrome, account for 98% of the total volume generated in the province.
• **Tourism** is a growing source of solid waste. For National Parks this problem is leading to the accumulation of waste due to poor waste collection and the existence of open dump sites in what should be a natural protected areas
• **Small-scale industry:** especially located in concession areas and industrial zones - food and metal processing, textiles, printing, leather tanning and tourism facilities
• **Transport sector:** More than half of community hazardous waste in Thailand is created by transport service stations – a growing source of pollution in transport corridors and urban areas.
• **Mining**: hazardous wastes from mining such as cyanide and mercury
2. Rural waste
• **Rural domestic solid wastes** on the increase mostly discharged directly in the environment without treatment.
• **Agricultural chemicals**: their use and storage is an increasing challenge
• **Land fill sites in the NSEC cannot cope** with the increasing volume of solid wastes generated
Climate Change
• **Climate change effects** are expected to be regionally and locally different. One possible scenario is that changes in precipitation are expected to result in increased intensity and extent of flooding, drought and fire problems. This would have an impact on agriculture (food security), water (supply and quality), human settlement and infrastructure, and on biodiversity and fisheries. Another possible scenario could be that changes in precipitation might result to more equal distribution of rainfall. Understanding levels and types of changes regionally will assist in mitigating potential threats and adapting to climate change accordingly. The role of the developing NSEC in helping to exacerbate or mitigate and adapt to these potential issues is crucial to maintaining productivity and protecting livelihoods.

Key social issues in the Yunnan Province

Education and capacity
• **Training and development:** To date, there has not been any specific training programme targeting the NSEC development area. The NSEC is likely to provide an incentive for local economic development and will give rise to a need related to training in knowledge, skills and technology in relevant industries,

sanitation, etc.
• **Educational attainment:** Compared to China as whole, Yunnan has fairly low percentages of senior and middle high school capacity and enrolment rates. For instance, national enrolment rate of senior high school was 66% versus 45% in Yunnan.
• **Vocational training:** The ratio of regular high school enrolment versus vocational high school is lower than the national one (1:0.75 versus 1:0.93). The percentage of degree graduates was the lowest in China except for that of Tibet.
• **Illiteracy:** The rates of illiteracy, particularly in women, are also higher than national rates. Yunnan is also the province with the lowest percentage of over 6 years old that have attained primary education (52%).
Poverty reduction
• **Poverty:** Yunnan contains almost 12% of the total poor population of China and 18% of their population lives in poverty.
• **Ethnic diversity:** Yunnan is also ethnically diverse, with 25 ethnic minority groups with a population of more than 5,000, 15 minority groups only found in Yunnan and an additional 16 ethnic groups living transboundary between China and other countries.
• **Inequalities:** There is a great gap in terms of development and poverty levels between some ethnic minorities present in Yunnan and the NESC area and other nationalities in China.
Public health
• **Risk of increased transmission of communicable diseases:** The NSEC will bring in a substantial increase of trade, logistic, and tourist exchange between China and GMS countries but also increased the potential for transmission of communicable diseases. It will be necessary to reinforce the monitoring and inspection and reporting of communicable disease in the key towns and cities along the NSEC.
• **Infectious diseases:** Although the incidence of infectious diseases has been greatly reduced since the 1970s, risk of some serious communicable diseases is still significant including: cholera, venereal diseases, medicine-resistant tuberculosis, and viral hepatitis. Some endemic diseases have a strong prevalence, e.g. schistosomiasis, of which Yunnan province is one of the main prevalence areas in China.
• **Malaria** is still an important risk in the province particularly for under 45 year olds, farmers, labourers and transient population.
• **HIV/AIDS** was first detected in 1989 in the area with 146 cases. In 2007, the incidence of HIV/AIDS contracted cases reached 56,054 officially, however

some experts believe the figure is over 80,000 in Yunnan province.
• **Road accidents:** Traffic accidents on this international highway stand out as the major impact to public safety, which has been a key issue for local government to address by adoption of various safety measures and management.
Population, migration and trafficking
• **Population growth targets:** There is a target for Yunnan to maintain its population on 46 million by 2010. The population growth in 2007 was 6.86‰ to 45.14 million. However, population growth has decreased from 10.6‰ in 2003 due mainly to incentives for 'one child' households which have greatly reduced the birth rate.
• **Population growth rates:** The population growth rates in the NSEC area are Honghe 7.99‰, Xishuangbanna 7.50‰, Kunming 6.47‰, Pu'er 6.01‰ and Yuxi 5.50‰.
• **Migration:** Although population growth has taken a descending tendency, the in-migrant and population flow due to economic potential of Yunnan in the context of GMS and ASEAN cooperation could resulted in an increase of population in near future, particularly in the NSEC main cities.
• **Human trafficking:** Although the fight against human trafficking in the GMS countries has shown good progress and institutional arrangements are in place, the target to eliminate human trafficking in GMS is far from being achieved.
Natural disasters
• **Natural disasters and human factors**: Geological environment, climate and human interventions are the main reasons that cause meteorological disasters in Yunnan. The human factors are rapid growing of population, excessive reclamation of land, deforestation and soil erosion.
• **Environmental measures to prevent meteorological disasters:** The Yunnan's government measures include: upland and grassland reversion program, reforestation, rehabilitation of soil erosion, river basin management etc.
• **Disaster monitoring and forecast capacity** has been improved gradually in Yunnan by establishing monitoring systems, radar detecting systems, automatic weather station monitoring systems, satellite and lightening position and automatic rainfall stations. Joint working mechanisms have been set up between the related government agencies to share information and resource on disaster precaution and relief.
• **Earthquake prediction:** The Yunnan's earthquake observation station network and Kunming's earthquake intensity fast report station were built between 2000 and 2005 and laid the foundation for further establishment of the earthquake automatic detection system for important infrastructures.

- **Need for international co-operation**: Due to the location of Yunnan in terms of tectonic plates and movements and the natural linkage of Yunnan to the neighboring nations in earthquake conformation and dynamical environment, it's urgent for Yunnan to improve international cooperation capacity on earthquake detection and disaster relief.

Key social issues in Lao PDR

Education and capacity
• **The quality and relevance of primary education** is a critical development concern for the area. Legislation, regulations, standards, training, and education planning need to be improved to address this concern.
• **Institutional capacity** is not strong enough to deal with the problem (including the management, administration and coordination of programs) and resources in schools are also limited.
• **Education and ethnic minorities:** For smaller ethnic communities, the content of primary education is often not related to their lifestyle and community away from school. Students and their families lack awareness and understanding to question these shortcomings. The Government and development partners often lack the resources and well-defined strategic vision to overcome such concerns.
Poverty reduction
• **Poverty:** More than 38% of the population live below the poverty line (2002), In 2003, 73% of the population earn less than 2 USD per day and per capita and 26% less than 1 USD.
• **Drivers of poverty**: Principal drivers of poverty in Lao PDR are lack of rice sufficiency and livestock holdings, illness and lack of health services
• **Development:** The Lao PDR is one of the least-developed countries, with a GDP of 390 USD per capita in 2004 (1,420 USD per capita in average for East Asia and Pacific), the second poorest nations of ASEAN and ranked 133 in the UNDP index of human development, out of 177 States.
Public health
• **Access to medical care** is limited in the NSEC Project Area. Although there is a hospital in each of the main towns, each hospital has to cover lots of villages. Some villages are very remote and have very difficult access to health facilities. Most villages have a village health volunteer and some have a nurse. Hospitals are reputed to be understaffed, and without many essential resources.
• **Drugs affordability issues:** Impoverished villagers are sometimes unable to afford to buy medicines, even when these are available in local clinics.
• **Public health and sanitation information campaigns** are carried out by the provincial Public Health Departments, the Red Cross, the Lao Women's Union, and various area NGOs.
• **Campaigns to make affordable chemically-impregnated mosquito nets available** to people have had a significant impact in reducing malaria and dengue fever, but these diseases are still common.

• **The main communicable diseases** in the NSEC area are: malaria, diarrhea, dang fever, dysentery etc. The key concerns in relation to potential impacts of NSEC are AIDS prevention and STDs.
Population, migration and trafficking
• **Population distribution**: the provinces in the NSEC area are characterised by low population density (between 17 to 23 people/ km^2), average household sizes of 6 people per household and 78 to 86% of the population living in rural areas.
• **Development standards**: There are significant differences in terms of standard of living between urban and rural villages (much less developed) including access to piped water, electricity, health and schools.
Natural disasters
• **Main natural disasters**: Flash flooding caused torrential rainfall during the monsoon season, landslides and earthquakes are the most significant natural disasters in the area.

Key social issues in Thailand

Education and capacity
• **Secondary education attainment:** The percentage of the population that has reached secondary education as the highest level of education is fairly low in all the provinces along the NSEC (average 6%). The percentage of the population that has received vocational training averages at 3%.
• **Graduates:** Percentages of graduates and bachelors are also in the range of 1 to 2%. There are no great differences in educational achievement by gender
Poverty reduction
• **Poverty:** The percentage of population below the poverty line has decreased since the year 2000, but showed an increase in 2007 in about half of the provinces along the corridor, namely Chiang Mai, Lampang, Sukhothai, Pitsanulok, Kamphaeng Phet, Nakhon Sawan, Chai Nat, Saraburi and Bangkok. The percentage of population below the poverty line is higher than the national average of 8.5% in 7 of the 17 provinces affected.
• **Ethnic minorities** are present in ten provinces along the corridor. A series of issues affect these minorities differentially: settlements in protected areas, loss of cultural identity, low quality of life, spread of AIDS, involvement in drug related activities.
Public health
• **Main communicable diseases:** In terms of public health, there is a high incidence of African hemorrhagic fever and AIDS.

• **Road accidents** are a major cause of death in Thailand and cause considerable loss in property and medical expenses.
Population, migration and trafficking
• **Population growth:** Population numbers have been relative stable in the area with an average annual growth of 0.14% (2001-2007) which is lower than the country averages.
• **Population densities** of Bangkok and Pathum Thani at 3,644 and 588 persons per square kilometer are markedly different from the rest of the provinces. Pathum Thani as a province adjacent to Bangkok has become a residential area for people working in Bangkok.
• **Rural population:** With the exception of Saraburi, Ayutthaya, Pathum Thani and Bangkok, the rest of provinces along corridor had more than 70 percent of population living in rural areas. The percentage of people moving from rural to urban areas has increased in some of the provinces but decreased in others.
• **Income:** The average income per household per month increased in all provinces from 2002-2006 and was clearly higher for the corridor provinces in the central region than those in the northern region. Payao, Chiang Rai and Tak are the three lowest income provinces in 2006 while Bangkok, Pathum Thani and Saraburi are the three provinces with the highest income.
• **Migration:** Concerning migration, the percentage of immigration and emigration is quite balanced within the whole NSEC over the years. Bangkok, Tak and Sukhothai have a higher percentage of emigrants than immigrants, while Chiang Mai, Lamphun, Lampang, Phitsanulok, Kamphaeng Phet, Nakhon Sawan, Chai Nat and Pathum Thani.have a higher percentage of immigrants than emigrants. In Saraburi, Ayutthaya the percentage of emigrants was higher than that of immigrants in 2005 and 2006, but in 2007 the reverse took place.
• **Human trafficking:** Thailand serves in terms of human trafficking as country of origin, transit country and destination area. The reasons for human trafficking in Thailand namely poverty and lack of education. In addition, Thailand's economy is more prosperous than that of neighboring countries and there is also a demand for unskilled workers which make Thailand an obvious destination for trafficking.
Natural disasters
• **Main natural hazards:** The NESC covers areas prone to landslides and flooding and six of the 13 active fault zones in Thailand. One of the biggest concerns with regards to earthquakes is the potential collapse of Srinakarin Dam which would cause severe floods. Within the NSEC, there are 11 provinces, 70 districts and 448 villages in areas prone to landslides during the rainy season.

Synthesis of key social issues in the NSEC

Education and capacity
• Educational attainment, quality of the education and lack of vocational skills are key concerns for the area. Low percentages of the population have reached secondary school and even lower percentages have undertaken vocational training. The rates of literacy are also low.
• The lack of skilled workers and capacity in knowledge and technology will reduce the areas ability to capitalize on the opportunities that will be provided by the NSEC.
Poverty reduction
• Poverty is a key issue in the area, particularly in Lao with 38% of the population living under the poverty line and 18% in the Yunnan province. In the Thailand area, the percentage of population below the poverty line is higher than the national average of 8.5% in 7 of the 17 provinces affected.
• Particularly affected groups are ethnic minorities and rural populations. Ethnic minorities have often poor access to education, health services, etc.
• Loss of ecosystem services: Loss and degradation of natural resources will affect the livelihood and quality of life of communities depending on these resources and their services.
Public health
• Increased movement of people could increase the transmission of several communicable diseases which still have a high incidence in the area. Transmission of HIV/AIDS and STDs is a particular concern.
• Road accidents are another important public health issue, particularly in Thailand, where it accounts for a large number of deaths every year. The increase in traffic caused by the NSEC will exacerbate this problem.
• Lack of health services and unaffordability of care and drugs are key public health issues. Lack of access to health facilities is particularly serious in rural areas and for certain groups, e.g. ethnic minorities.
Population, migration and trafficking
• Most of the population in the area lives in rural villages. There are significant differences in terms of standard of living between urban and rural areas which have much lower standards of development including access to piped water, electricity, health and schools.
• Human trafficking is an issue of concern in the area. The NSEC could indirectly lead to a worsening of the situation if it increases the incentive to employ low-skilled and low-paid labour.

• The NSEC area is rich in ethnic minorities. A big issue is that these groups may lose some of their culture and traditions due to the NSEC project and the increase in traffic of people. Ethnic minority have also lower quality of life than other groups and could potentially benefit less from the NSEC and also be differentially affected by any negative impacts.
• The NSEC project could lead to migration to the area seeking to benefit from increased prosperity and jobs. Population growth is fairly stable in the area with the exception of the Yunnan provinces where despite the efforts to reduce population growth this is still in the range of 6% annually.
• Displacement of local communities: Road construction and associated developments including concession areas entail the displacement of local inhabitants. The impact on marginalized and displaced groups has to be examined and long term adjustment and support programs initiated.
Natural disasters
• The NSEC area is at high risk from natural disasters including floods, landslides and earthquakes. The frequency and effects of these have been exacerbated due to human factors such as deforestation and lack of effective forecasting and warning systems.

Key economic issues in the Yunnan Province

National and local GDP
• **Economic development:** Although the Yunnan Province experienced rapid socio-economic development during the 2000 to 2005 period, the Provincial GDP growth rate is lower than that of China (1.9% of China). Yunnan provincial per capita GDP is also much lower than that of China (65%).
• **Regional differences:** Economic development in the Yunnan province is unbalanced among the different regions. There is a big gap between the relatively developed areas and the remote poor areas. Of the 5 Municipalities/prefectures in NSEC, Kunming and Yuxi are the strongest with per capita GDP much higher than the provincial average, while Xishuangbanna and Honghe are weaker, with per-capita GDP much lower than the provincial average; Pu're is much more weaker. The corridor links the complex of the cities of Kunming, Qujing, Yuxi and Chuxiong, which are the economic growth pole and urban economic sphere of Yunnan Province. It is expected that the NSEC will bring more economic opportunities to this area.
Agriculture
• **Agricultural exports:** The proportions of Yunnan's agricultural product exports to GMS countries in relation to that of the Nation and that of total export value of Yunnan's is decreasing (in 2002 the agricultural export value to GMS countries from Yunnan accounted for 17.2% of Nation exports, and this decreased in

2003, 2004 and 2005).
• **The gap in the Kunming—Bangkok road corridor** may increase the cost of agricultural cooperation among GMS countries, restricting the cooperation between investors with producers and their competitiveness in GMS.
• **Language differences** create communication barrier to agricultural cooperation among GMS countries.
• **Rubber plantations:** Large areas of forest are being cleared for rubber plantations along the corridor in Yunnan without thorough environmental assessment.
Industry
• **The industrial economic development** of the Yunnan Province is facing problems and difficulties including: the uncertainties in world economic development, the strong competition at the later stage after China's accession to WTO, the more complicated issues as the results of accelerated development pace may impose adverse impact to the industrial economic development of Yunnan Province which has long lagged behind.
• **The total output value of the industrial sector** in Yunnan is low: the growth rate of added value of industry during 2001-2005 was 8% lower than that of the Nation.
• **The industrial structure** is still irrational because it is too heavily dependent on tobacco & cigarette and resources processing is still the dominant industrial sector, while the new high-tech industrial development is very limited with little technology and few name brands and innovative products.
• **Regional differences:** Industrial development was unbalanced between the different regions: the added value of larger sized industries in 7 prefectures/municipalities (including Kunming, Yuxi, plus Honghe in the NSEC) accounted for 90%, while the other 9 prefectures/municipalities only accounted for the remaining 10%.
• **Industrial growth**: The growth pattern of industry in Yunnan was extensive: the technical process of traditional industrial sector of metallurgy, chemical industry, building materials, machinery are subject to further improvement, except for the tobacco and cigarette sector, some of mineral resources do not have alternatives, the issue of "high input, high consumption, high emission, low efficiency" is still outstanding.
Special Economic Zones
• **Problems with designation:** Although these zones were designated in the "Programs for the Eleventh-Five Year Plan on New Industrialization Development", there was lack of official approval document from YPG. As a consequence, the industrial zone management committees find themselves in

difficulties for the approval of plans, land use, financing and attracting investment.
• **Land acquisition difficulties:** due to the very slow procedures for permitting land acquisition and reluctance of farmers to sell their land, there is a limitation in the availability of land.
• **Financing difficulties:** due to difficulties in obtaining loans from local commercial banks, decentralized use of special funds for supporting industrial development, lack of sufficient fund channels, etc.
• **Difficulties in inviting business and attracting investment:** due to some zones being less well known, smaller area of the locality of the industrial zones, insufficient necessary infrastructure, etc.
• **Lag behind of infrastructure**: due to the lack of sufficient funds input for the development of necessary infrastructure to access to or in the industrial zones.
Tourism
• **Tourism** in Yunnan Province is also growing rapidly. Overseas tourists increased from 1.001 million person-times in 2000 to 1.5028 million person-times in 2005 and tourism earnings in foreign exchange increased from 339 million USD in 2000 to 528 million USD in 2005, with average annual growth rate of 9.27%. Local governments in the Corridor are all expecting this growth in tourism to continue. For example, the vision for tourism in Puer is to build the prefecture into a world class tourism destination for recreation, trekking and eco tours.
• **Eco-tourism:** In Yunnan Province, eco villages and tourism towns have been planned outside Puer National Park. There is also a wider regional vision to create a Green Triangle as part of the Golden Triangle.
• No key significant issues identified but there is a need to manage the rapid increase in tourism, especially domestic tourism, to prevent the degradation of natural, cultural assets and ensure tourism development supports local communities.
Transport and trade
• **Transportation network:** Although transportation network has taken its initial shape, transport development in Yunnan remains unbalanced.
• **The value of import & export trade** as a percentage of the Yunnan provincial GDP is low; this was 8.23% in 2003 which is much lower than China's total (50.1% in 2003).
• **Traffic flow in the Kunming-Bangkok highway:** Although the Kunming-Bangkok highway has been opened, the traffic flow still remains low due to the different considerations on political, economic and safety issues among the

different GMS countries.
• **The pace of implementing the CBTA** is also slow.

Key economic issues in Lao PDR

National and local GDP
• **Differences between rural and urban areas:** Although the figures for the Bokeo Province show that the economy has been developing at a reasonable pace between 2000 and 2004, living standards between rural and urban villages vary significantly. With only 27% of rural villages being connected to the electricity grid and none of them being connected to a water system there are still development issues to be addressed.
• **Issues with landlocked countries:** From a statistical point of view, landlocked countries like Laos are usually less well-off than neighboring maritime countries. GDP per capita of landlocked countries is approximately 57 percent that of maritime countries, the life expectancy is on average 3.5 years lower, and educational index scores are lower by about 0.36. In addition, development rates are slower. The poorer performance of landlocked countries compared to the neighbouring maritime countries could be attributed to their reduced access to markets and opportunities, which results in higher costs for trade and transaction and which have a negative impact on investment and therefore to economic growth.
• **Road network:** The biggest challenge facing Lao PDR is the improvement of the road network within its own borders so that it can take advantage of opportunities on and outside of its borders.
Agriculture
• **Irrigation:** There is a low amount of irrigation capacity in the area
• **Community forests:** Some villages have no access to community forest.
• **Land ownership:** All villages now have a form of recognition of land ownership and the government intends to formalize this primarily to expand the tax base.
Industry
• **There is a very weak industrial base** most of it around resource extraction with some processing such as feed or mineral water bottling.
• **Lack of skills and foreign ownership**: Most of the industry is owned by international entities partly due to the lack of skills and resources in the area necessary to accelerate the process of industrialisation.
• **Tax revenues** from the industries present do not appear to benefit the local authorities as much as might be expected in fact some industries could be a

regulatory or pollution burden on the local authority.
• **Rubber plantations:** In Lao, rubber plantations are encroaching the Nam Ha NPA and based on the trend of expansion from 2000–2005, there is a real threat more rubber will be planted inside the protected area in the future. In addition to biodiversity loss, there might also be an impact on tourism. The area and particularly Namtha and Sing districts have great potential for eco-tourism.
Special Economic Zones
• **The environment damage and regulatory burden** on the local authorities.
• **Capacity building and resources** needed to allow the local communities to benefit from special economic zones.
Tourism
• **Tourism:** Tourism in Lao PDR is constantly growing. International and domestic tourists come to visit natural areas for trekking, to see ethnic cultures, cultural heritage and history. The number of visitors coming to Lao PDR has significantly increased since 1993 from 102,946 to 1,632,943 in 2007 and it is expected to increase up to 3,572,000 by 2015. The income from tourism has also significantly increased, from $6,280,000 in 1993 to $233,304,695 in 2007 and it is expected to reach $388,748,338 by 2015 (Lao NTA, 2008).
• **Managing the consequences of increased tourism:** The NSEC project is expected to ease the movement of people in the areas of Bokeo and Luang Namtha and the expectation is that this project will increase tourist arrivals. Therefore it is important to take all necessary measure to ensure that the natural areas and the heritage will be protected in order to keep attracting visitors to the area.
• **Constraints for tourism** include limited tourism services and skilled labour, inadequate catering for food requirements of international tourists, limited access routes and links to remote areas and limited guide maps/brochures.
• **There is a need for more investment and capacity building** to maximise the potential tourism activities whilst ensuring they are environmentally, socially and economically sustainable as well as fair and equitable among different groups.
• **Eco tourism:** Lao PDR has recognised the importance of tourism in development and poverty reduction and has announced (Much like Puer) a desire to become a “world class eco-tourism destination” (Lao NTA, 2003). The development of alternative tourism activities such as Community Based Tourism and Ecotourism has an important role in the national tourism strategy.
Transport and trade
• **Road based transport and trade are dominant** and may compete directly with trade on the river.

- **The transport infrastructure** is generally poor.

Key economic issues in Thailand

National and local GDP
• **Balancing growth with natural resources management and environmental conservation:** The expectation is that NSEC will offer new opportunities for further development to all provinces in the region. Some of the provinces aim at increasing their competitiveness in sectors like trade and technology and manufacturing. NSEC will provide the opportunities for having better and more access to other markets either in Thailand or abroad. These sectors are expected to profit from the development of NSEC and this will benefit those provinces aiming at reducing poverty. Tourism and ecotourism will also get benefit from NSEC. Some of these provinces are also aiming at sustainable natural resources management and environmental conservation. The development of the NSEC might have some negative impacts on these objectives in case mitigation measures are not considered by the developers.
Agriculture
• Some provinces in the corridor are still highly dependent on agriculture, although they also have factories processing agricultural products.
Industry
• **Main industries:** The area is predominantly agricultural therefore in most provinces agriculture is the major industry. However there are provinces such as Sing Buri, Lop Buri and Sarabury have heavier industry since they are located close to Bangkok, the capital, where most industrial activities are concentrated and they serve a large amount of population.
Tourism
• **Occupancy rates:** In 2007 the occupancy rate for most of the corridor provinces was less than 50% reflecting the slowing down in tourism. In 2007, the highest occupancy rate was in Pathum Thani, 76.17%, followed by Ayutthaya, 73.64%, Bangkok 67.96% and Saraburi 53.63%.
• **Average length of stay:** The statistics reveal that visitors would like to visit most of these provinces more than once a year; the average trips per person in 2007 were 2.2, while they stayed on average about two days, the average length of stay in the corridor provinces in 2007 were 2.2 days.
• **Mean expenditure:** The mean expenditure per person per day is 1276.2 Baht. In Bangkok the average expenditure in 2007 was 3,197 baht/person/day, higher than the average. In Chiang Mai the expenditure in 2007 was 2,729 and in Chiang Rai 2,516 baht/person/day.
Transport and trade
• **Transportation of commodities** in Thailand is dominated by road. In 2005 road

transportation accounted for 87% of the total transportation; the remaining 13% was via waterway, rail and air.
• **Exports versus imports:** In 2007, the total value of exports was 5,242 billion baht and the total value of imports was 4,870 billion baht, with a positive trade balance of 372 billion baht. Despite these figures, Thai international trade has been slow down from 27.67% in 2000 to 2.35% in 2007. Trade with the corridor countries has been expanding steadily. In 2007, total trade with China was 1,075 billion baht, with Laos 61 and with Myanmar 114 billion baht.

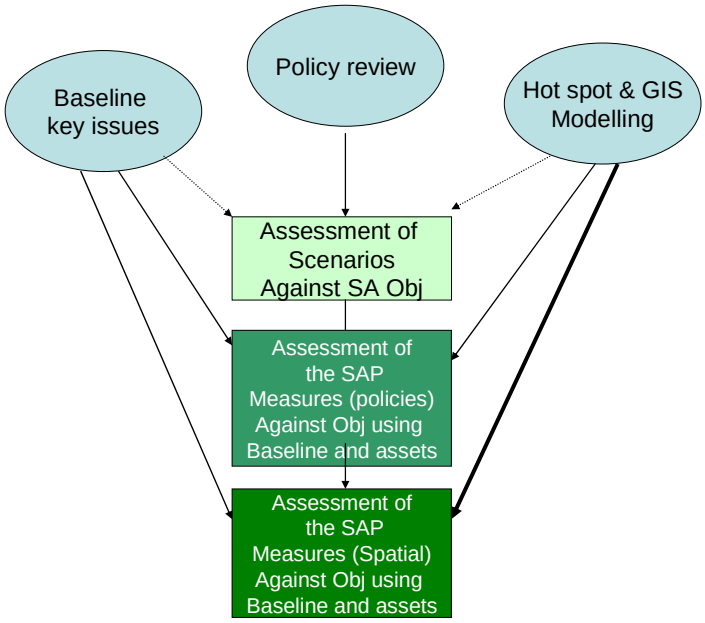
Synthesis of the key economic issues in the NSEC

National and local GDP
• Particularly in the Yunnan and Lao areas, there is a significant variation in living standards and economic development between urban and rural areas and among different regions. In Lao, there is also a weak economic base, mainly comprised of small businesses (less than 10 people). Available natural resources are being exploited by foreign firms due to a skills gap and tax revenues they generate are not contributing to local economies sufficiently.
• The key issues in the Thailand area are that most of the economic activity and heavier industry is concentrated in Bangkok and the 3 surrounding provinces. Managing urban migration and rural decline is another key issue.
Agriculture
• Most of the areas are still heavily reliant on agriculture (less so in Thailand). However, this area of activity suffers from lack of irrigation and ownership of land and access to community forests (in Lao) and decreasing export value (in Yunnan).
• Rubber plantations: Large areas of forest are being cleared for rubber plantations along the corridor in Yunnan and Laos without thorough environmental assessment. This also has implications for eco-tourism as it reduces the amenity value and attractiveness of the areas affected.
Industry
• Industry in Yunnan is growing but not realising its full potential compared with the rest of the country. Managing the environmental and cultural impacts of rapid industrialisation and economic restructuring should be a priority.
• Particular issues for Lao include high proportion of foreign ownership, lack of skills and lack of local benefits derived from tax revenues.
• In Thailand most of the industry is related to agriculture, except in the areas close to Bangkok, which concentrate most of the heavier industry.

Special Economic Zones
• Establishing, financing and acquiring land for these zones are important challenges in the Yunnan province. In Lao, these areas have been more a burden than an asset for the local areas as they have to live or remediate the environmental impact and due to lack of skills in the local communities they are not directly benefiting from them.
Tourism
• The NSEC project is likely to increase tourism in the area and it is particularly important to manage this rapid growth to prevent the degradation of natural, cultural assets and ensure tourism development supports local communities. Related to this is the need for capacity building and developing skills in the local communities so they can benefit from the increase in tourism.
• Eco tourism is being taken seriously by local governments along the corridor and the importance of tourism in development and poverty reduction is being recognised.
Transport and trade
• The transport network remains underused in the Yunnan province and it is of variable quality in the different provinces. Export and border trade have a low and decreasing value in Yunnan. International trade and the value of exports is decreasing in Thailand, however a positive balance still remains.
• Road transport is dominant in the area with low use of any alternative means.

4 Method and Approach

Figure 4.1 Methodology over view



4.1.1 Figure 4.1 above shows the methodology outline of the assessment phase. In short there are four main phases

- Phase 1 – complete modelling, policy review and baseline analysis and provide summary of impacts to be used in the assessment workshop
- Phase 2 – Assessment of scenarios. – Scenarios are based around the different infrastructure options a more environmental scenario might try to encourage growth in trade and transport by more environmentally benign modes such as rail and water. A more economically focussed one will concentrate on transport efficiencies and minimising cost. A scenario designed to maximise the social benefits of increased trade and transport arising from the development of the NSEC may concentrate on equity impact, rural feeder roads and public transport. This assessment will be carried out in a workshop format with key stakeholders form the region. Information from phase 1 will be used to make expert qualitative judgements backed up by quantitative and modelling data where appropriate.
- Phase 3 – Assessment of the SAP policies. This will also be carried out in a workshop format with key stakeholders form the region. Information from phase 1 will be used to make expert qualitative judgements backed up by quantitative and modelling data where appropriate

- Phase 4 – Assessment of the programme of infrastructure contained in the annex of the SAP again workshop using evidence from phase 1 will be used.

4.1.2 Below we outline these phases and some contextual information such as the geographic scope of the corridor in more detail.

4.2 The Geographic Extent of the NSEC SEA

4.2.1 The exact geographic area of the NSEC has not been precisely defined in the draft SAP or in past development planning for the corridor. The SEA is taking a spatial approach to the assessment including: gathering the evidence base in the NSED, using GIS analysis and in defining sustainable development zones and safeguards. For the purposes of the SEA and for effective SAP implementation, a clearer geographic and administrative definition of the corridor is required.

4.2.2 This setting of geographic and administrative boundaries is an essential part of the SEA scoping process.

4.2.3 There is no standard methodology to define the geographic extent or 'study area' of a proposed plan, programme or even project at the level of EIA. The shape of the study area for regional and national plans is usually determined by administrative and/or environmental boundaries (Antunes et al, 2001).

4.2.4 The geographic extent of the NSEC depends on a number of issues. Setting the SEA coverage is part of the scoping workshop, where the representative stakeholders determine which environmental, social and economic issues and indicators should be considered in the SEA and what the geographical or spatial limits for the assessment should be. Through discussion at the scoping workshop the working boundary for the NSEC study area was defined to be the administrative units touching or crossing the Kunming-Bangkok express way, and including those more distant from the road identified in the SAP as within the NSEC zone of influence (Figure 1.1).

4.3 Strategic Options

4.3.1 Options are alternative ways of meeting the plan objectives. Usually an SEA strengthens the Plan objectives and influences the definition of options. In this instance the SEA is developing a set of options to dovetail closely with the SAP framework of objectives and preliminary discussion of options.

4.3.2 The draft SAP includes six objectives (section 1.4) but considers only one option (or mix of measures) for addressing those objectives[16], for the existing express way from Kunming to Bangkok[17]. Consequently three scenarios[18] for this part of the NSEC were developed and

[16] Good practice suggests that a number of options for meeting plan or strategy objectives are useful at least as a sensitivity test for the preferred option. In the case of the SEA sensitivity will be around meeting the sustainable development criteria set out in the SEA framework see Chapter 2 above.
[17] Although the SAP covers several sub corridors from China to Vietnam and through Myanmar the SEA is only looking at the section from Kunming to Bangkok through Lao (see para 2.5.4)
[18] It was proposed by the SEA team that the workshop participants develop three possible future scenarios for the development of the NSEC. One was an environmentally led scenario, another one economically led and the final one was more socially led. It is important to

presented to the regional scoping workshop. One of the major differences between the scenarios and overall purpose of using them will be to explore the possible mixes of modal measures within the corridor. The low cost economic growth scenario being predominantly road based (and represents the current SAP option) and the environmental one placing some more emphasis on water and rail and the development of multimodal interchanges alongside the road measures.

4.3.3 These scenarios were used to stimulate a discussion (in breakout groups) on what measures the two additional reasonable alternatives might include, so that these options can be assessed and compared alongside the current preferred option fro the Kunming to Bangkok sub corridor already outlined in the SAP. These scenarios were:

- Scenario 1: Low cost economic growth – In this scenario the development of the NSEC is overwhelmingly driven by economic considerations and most of the measures will be road based designed to maximise economic growth and minimise the need for investment in new infrastructure.
- Scenario 2: Enhanced poverty reduction – In this scenario the development of the NSEC is overwhelmingly driven by poverty reduction considerations especially for the poorest most vulnerable and the most isolated communities. Most of the measures in this option will encourage public transport and local feeder road connections to the corridor and will be designed to maximise poverty reduction.
- Scenario 3: Environmentally enhanced options – In this scenario the development of the NSEC is driven by the need to maintain, rehabilitate and use sustainable the natural resources and systems of the area, to conserve biodiversity and to enhance environmental quality. Most of the measures in this option will be designed to minimise environmental damage, maximise biodiversity and environmental quality and reduce future growth in the carbon footprint of the corridor growth. Measures are likely to include some rail and river based solutions alongside the road and encourage the development of efficient multimodal interchanges.

4.3.4 The results of the break out groups were reported back to a plenary session. The results of the discussions on alternatives in the workshop are reproduced below. They provide a starting point for developing the alternatives that will be used to assess and compare the impacts of the SAP. As can be seen below, some of the scenarios generated more measures than others. All these options will be discussed and developed by the SEA team and will be used in the next phase of the assessment.

Low cost economic growth options

- Hardware (Physical infrastructure)

  Short-term: water-way, low-class road, airport – designate economic zones

  Middle-term: high-class road, more local flights

  Long-term: railway, expressway, local airports

note all three scenarios included measures that addressed the three pillars of sustainable development but that workshop participants were asked to develop one pillar more strongly in each case - i.e. either economic, environment or social sustainability. These scenarios will then be worked up into SEA alternatives for developing the NSEC and evaluated alongside the SAP which presents the preferred option.

- Software: (measures for implementing this option)

  Traffic management regulations

  Appropriate and comprehensive logistics services for shifting goods

  Privatize & provide system of incentives for operation/investment

  A system of tariffs and one stop services

  Strengthen local entrepreneurship

  Facilitate movement and flexibility in labour resources

  Expedite CBTA

  Overcome patent right limitation

4.3.5 Remarks: Rail and river based navigation often include significant operational and construction costs and are unviable vis-à-vis road networks and this needs to be factored into the equation.

Enhanced Environmental sustainability options

- Mode of transport – promote bus, train and then air transport modes
- Promote multimodal transport
- Emphasize rail links and facilities. Trains can be more efficient and economical with less negative impacts than the full scale highway
- A closely linked multimodal system from the outset, rather than staged with roads as the only first stage option
- The social and economic cost of environmental options (timing) need to be considered – multimodal approaches may be more suitable for dense urban areas
- Greater emphasis on safeguarding natural areas and systems through protection, rehabilitation and mitigation as part of the economic cost

Enhanced poverty reduction options

Include agriculture, education, public health development and linked infrastructure requirement in strategy - e.g.

- Eco tourism is very important for poverty reduction measure – this should be community based
- Short, medium and long term strategies needed
- Road access to tourist destinations is essential as well as trails and interpretation facilities in hot spot areas
- Need to increase the quantity and quality of the service (guides and transport) – special facilities for high income tourists.
- Programs for capacity building of human resources along the corridor is very important at three levels (local province and centre)

- Vocational and technical training is especially important
- Agro forest products processing – this provides food security ("prior to exporting food we need to feed our selves")
- Agriculture and handicraft production
- Laos is more focused on agriculture and china on industry – these differentials in strategic focus and how they are promoted and integrated need to be considered in the strategy
- Infrastructure include improved telecommunications and electricity and other main development infrastructure to more remote areas
- Ensure genuine opportunities of employment for local people
- Provide special support to ethnic cultural concerns and well being

4.4 Methods and tools

4.4.1 The SEA includes the initial steps in spatial planning of the NSEC. Spatial planning aims to achieve an optimal spatial arrangement of land uses, including future development initiatives, to balance the economic and social needs of communities with the protection of environmental values and ecosystem services. It involves understanding the spatial implications of sector policies and plans proposed in the NSEC area.

4.4.2 To facilitate the spatial planning process, the SEA will focus on integrated resource planning, cumulative assessment techniques and scenario building, including GIS and specific spatial decision support tools such as spatial multi criteria analysis, trend analysis and trade-off analysis.

4.4.3 A Geographic Information System (GIS) is a computerized system that facilitates the storing, editing, analysing, sharing, and displaying of geographically referenced information. GIS allows the user to construct and analyse multi-layered electronic maps. Once a GIS database has been prepared, additional data can be added and amended in response to the individual questions and wishes of stakeholders.

4.4.4 The main purpose of the application of spatial tools in the SEA of the NSEC is to i) provide a composite picture of the environmental, social and economic parameters of the study area (baseline), ii) identify and locate vulnerable environmental and social-cultural assets and hotspot areas, iii) locate suitable sites for potential developments, including infrastructure, iv) establish mitigation measures for conflict areas, and v) illustrate potential changes in natural resource and biodiversity assets according to different development visions. Different GIS functions and products can be used in the different stages of the SEA for the NSEC.

4.4.5 During the scoping workshop an overview was given of the different spatial models and approaches to be explored in this SEA, and the specific spatial data requirements to run these models (Table 7.1 and 7.2).

Table 4.1: Spatial tools (blue) outlined against SEA stages and the DPSIR cause-effect framework

<table>
<tr><th>NSEC - SAP</th><th colspan="2">Baseline</th><th colspan="2">Assessment / scenario development</th><th>Alternatives & Mitigation</th></tr>
<tr><td rowspan="2">National: Poverty reduction through economic development

Sub-regional: Increase economic development though improved / more efficient transport and trade links</td><td>Infrastructure already built
Map display</td><td rowspan="2">Geographic distribution of key social, economic and environmental parameters

Map display and overlay</td><td>Identification of conflict and hot spot areas

SMCA</td><td rowspan="2">Assessment of future land use pattern (CLUE model) & related biodiversity loss (adapted GLOBIO model)</td><td>Development of suitable mitigation measures
SMCA</td></tr>
<tr><td>Infrastructure in planning phase

Strategic development options
Map display</td><td>Identification of assessment criteria, weights and policy visions
SMCA</td><td>Identification of safeguard zones and sustainable development zones
SMCA</td></tr>
<tr><td>Driver</td><td>Pressure</td><td>State</td><td colspan="2">Impact</td><td>Response</td></tr>
</table>

Table 4.2: Spatial tools: inputs required by national consultants and stakeholders

Spatial Tool	A. Data Input*	B. Knowledge Input	C. Outputs
GIS - visualization of geographic data	1. Roads (by road class and planning status) 2. Railways (planning status) 3. Economic development zones 4. Urban areas / settlements 5. Land cover / land use 6. Natural habitats 7. Forest assets 8. Agricultural assets 9. Mineral assets 10. Historical / cultural / spiritual / religious sites 11. Rivers and water bodies 12. Protected areas 13. Poverty 14. Elevation 15. Slope	None	• Maps of social, environmental and economic key parameters in the study area
Spatial Multi-Criteria Analysis (SMCA)		1. Criterion Tree (identification of parameters, respective criteria, and weighting values)	• Maps showing conflict areas and hotspots • Maps of alternative routings, safeguard and development zones
Assessment of Future Land Use Pattern (CLUE model)		2. Tables - Future Land Demand (hectares, for each country and different scenarios); 3. Matrices - Land Use Specific Conversion Settings (Conversion, Flexibility – for each country)	• Maps of future land use pattern • Maps of areas of land use change
Assessment of Biodiversity Loss (Adaptation of GLOBIO framework)		4. Matrix - Biodiversity Loss from Pristine Ecosystem to Current Land Use (for each country); 5. Definition - Zones and intensity of road impact; 6. Definition - Impact by fragmentation (habitat size vs. biodiversity correlation)	• Maps of geographic hotspots of biodiversity loss

*All 3 model approaches are using a selection or all of these datasets, or derive information from them.

Baseline Collection and Assessment

4.4.6 The evidence base for the SEA includes the baseline information (spatial and non-spatial) and a policy review. Section 2.4 mentioned the themes and templates that are being used to collect the non-spatial base line information and information required for the policy review and Chapter 3 contains the key issues that emerge from the analysis of these templates. The key issues will be used to help determine the significance of impacts during the assessment phase of the SEA for the NSEC.

4.4.7 The GIS data collected by the consultants will be processed and integrated in a GIS database for the SEA of the NSEC. Sources for the spatial data were identified during the scoping workshop in a data needs assessment exercise, which has been taken as a guideline for the national consultants to collect the datasets.

4.4.8 As a first step a set of maps and map overlays have been prepared illustrating the current distribution of key environmental, social and economic assets. These maps will be used by the team to familiarize themselves with the spatial distribution of these assets and draw initial visual conclusions on potential challenges and conflicts arising from them.

Identification and location of hotspot areas

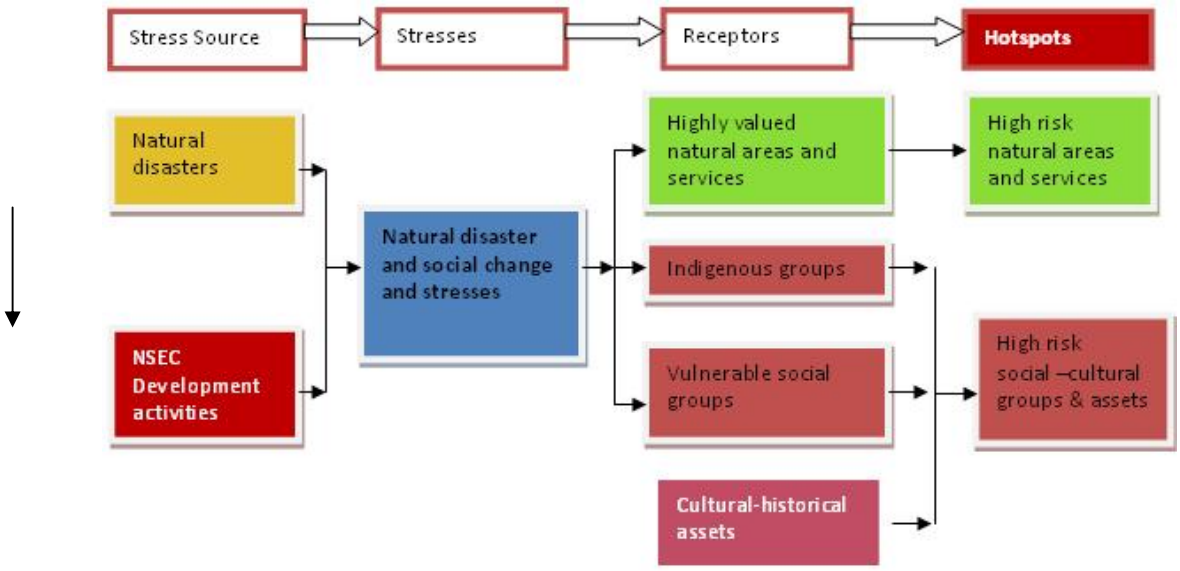
4.4.9 The first step in the hotspot analysis is the identification of valuable natural, social and cultural assets within the corridor, along with its economic potentials. The next step involves identifying areas of potential conflict between competing uses where valuable assets may be at risk. This process points to “hotspots” where special safeguards and management are required to maintain those values which the countries of the NSEC wish to keep in place (Figure 2.7.1).Hotspots are highly vulnerable natural areas, communities and cultural-historical assets at risk of degradation or reduced well-being.

4.4.10 The SEA will take the following steps in proposing a framework of safeguards for hotspots:

(i) Identify NSEC natural and social-cultural assets including:
   a. natural assets
   b. social-cultural assets
   c. areas used by vulnerable communities
(ii) Identify key NSEC development areas and their zone of influence
(iii) Identify and locate natural disasters
(iv) Identify natural and social-cultural assets at risk (hotspots)
(v) Define safeguards and management approaches to areas at risk

4.4.11 The approach will rely on overlaying and analysing GIS datasets and confirmation and clarification through national consultations and field missions within the constraints of the SEA resources

Figure 4.2 Identification of NSEC environmental and social assets at high risk[19]



Spatial Multi Criteria Analysis (SMCA)

4.4.12 To support and enhance the spatial planning process in the SEA for the NSEC SMCA will be applied for ongoing and proposed transport, trade and tourism developments, interactively and in collaboration with local stakeholders (Figure 2.7.2)..

4.4.13 The SMCA application assists and guides a user in undertaking Multi-Criteria Analysis (MCA) in a spatial way. ITC, the Netherlands, has developed a Spatial Multi-Criteria Evaluation (SMCE) module in their free source ILWIS 3.4 software[20]. The input for the SMCE application is a set of biophysical, social and economic criteria and corresponding maps, and a criteria tree that contains the way criteria are grouped, standardised and weighted. The output is one or more 'composite index' or suitability maps, representing a specific development goal.

4.4.14 SMCA is particularly cost- and time-effective for decision making on a strategic, higher level of planning on (geographically) large-scale investment schemes. It is a practical tool in SEA to assess cumulative impacts and to identify and evaluate sites suitable for a particular development, for example tourism, industry, or infrastructure. In this way, the environmental, social and economic qualities of the area determine potentially suitable routes or the best sites for developments. SMCA can also be used to identify areas of conflict (low suitability) of, e.g. infrastructure, and therefore may give an indication for targeting specific mitigation measures[21].

[19] Adapted from GMS Environment Strategy, 2002, ADB SEI
[20] http://www.itc.nl/ilwis/default.asp

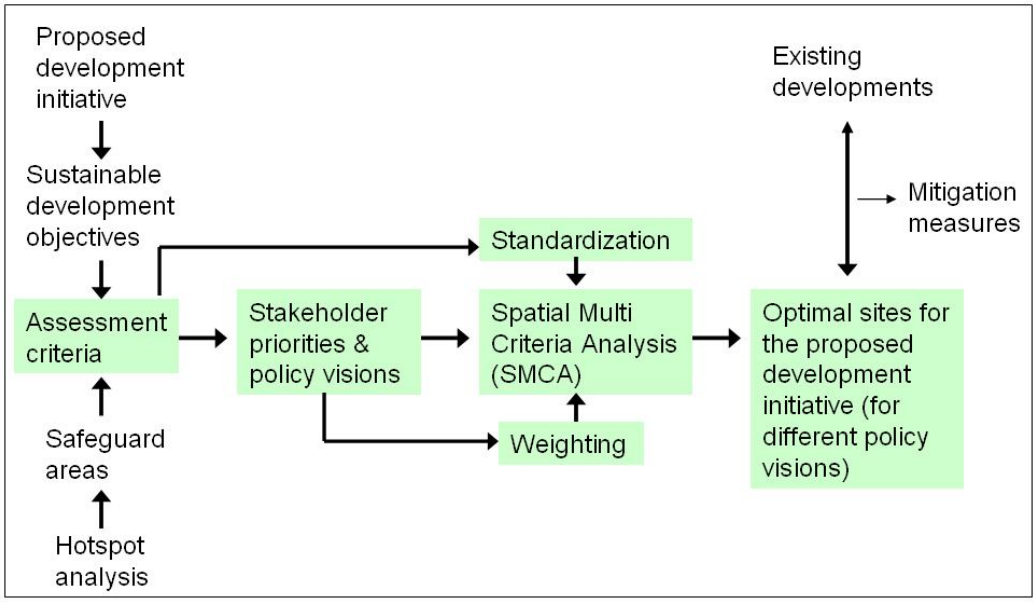
[21] The tool, linked to network analysis, was used to formulate and assess optimal routings for the Via Baltica corridor in Poland, which is part of the Trans-European Transport Network. Keshkamat, S.S., Looijen, J.M. and Zuidgeest, M.H.P., 2008. The formulation and evaluation of transport route planning alternatives: a spatial decision support system for the Via Baltica project, Poland. J. Transp. Geogr. (2008), doi:10.1016/j.jtrangeo.2008.04.010.

4.4.15 Using SMCA highly vulnerable and risky areas can be avoided and the beneficial aspects of the proposed development enhanced. The highly vulnerable natural and social-cultural areas to be considered for safeguarding in the hotspot analysis can be made 'constraint' areas, not to be regarded for development.

4.4.16 A positive effect of the SMCA process is that stakeholders can actively be involved in the planning and decision-making process. Within a couple of minutes valuation criteria and weights can be changed and a new suitability map produced. This makes the whole assessment process more transparent and easy to visually illustrate the implications of spatial decisions.

4.4.17 This methodology will give insight in the trade-offs between the economic potential and social and environmental impacts. This will not only serve to identify the most appropriate and least damaging options, but it will also give maximum involvement of the stakeholders.

Figure 4.3 General SMCE process



Trend Analysis

4.4.18 Trend analysis refers to the concept of collecting information and attempting to spot a pattern, or trend, in the information. Accurate trend analysis is an important aspect of any strategic assessment. Trend analysis facilitates presentation of the main linkages between environmental pressures and corresponding (sometime delayed) changes in the state of the environment. As such, it can assist predictions of future impacts.

4.4.19 Trends can be linear, exponential or cyclical and they should, where possible, be analyzed over a correct temporal scale. There are numerous computer programs that facilitate trend analysis. In this SEA the CLUE and GLOBIO model will be applied.

Conversion of Land Use and its Effects (CLUE-s model)

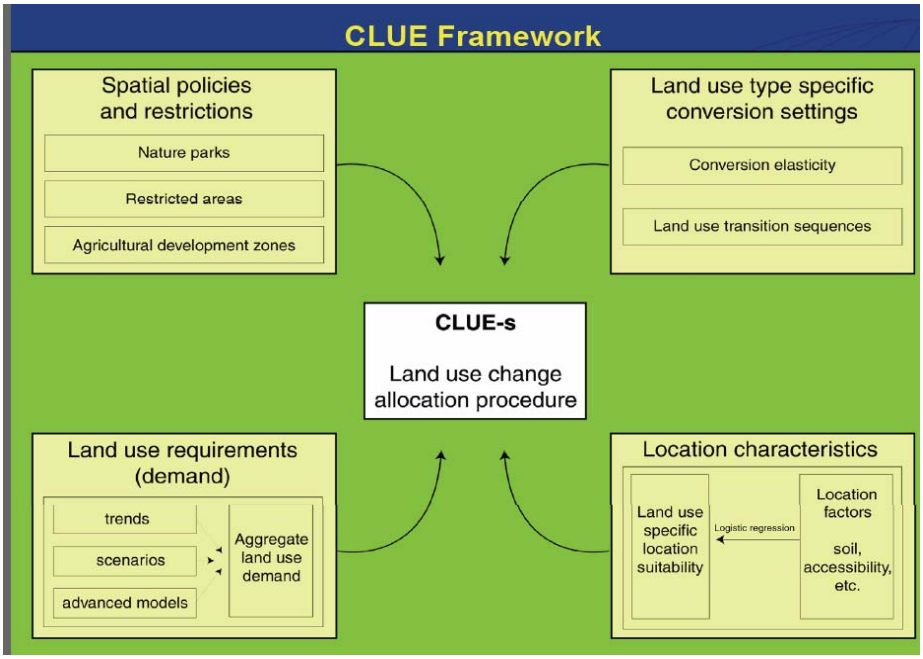
4.4.20 The CLUE model[22] is a stand-alone, free software that reads and processes a range of spatial and non-spatial data to provide estimates of possible near-future land use change.

4.4.21 To achieve this, the model consists of four input components (Figure 2.1):

- Land use requirements (demand),
- Definition of possible land cover conversions,
- Spatial policies and restrictions, and
- Underlying location characteristics that explain current distribution of land use.

4.4.22 While the first two are non-spatial, "qualitative" components broadly defining the development trends and routines in the target region, the last two are location specific components that provide the "quantitative" dimension of the model and derive critical suitability criteria from it. In the final step, the land use change allocation procedure statistically tests these inputs against each other and provides maps that tell us which areas will undergo what type of (land use) change according to the different development scenarios defined in the SEA.

Figure 4.4 The CLUE model framework



[22] http://www.cluemodel.nl/clue.html

Calculation of mean species abundance (GLOBIO model)

4.4.23 As part of the UNEP GEO reporting, The Netherlands Environmental Assessment Agency (PBL)[23], in cooperation with UNEP Arendal and UNEP WCMC, has developed a global-scale spatial model of the impacts of a range of pressure factors on the decline of species diversity. This GLOBIO model calculates the relative loss in biodiversity by deducting land use change, impacts from infrastructure and fragmentation, nitrogen deposition and climate change from a potential pristine condition in the selected area. The main indicator produced is the mean abundance of the original species belonging to an ecosystem (Mean Species Abundance, or MSA), that is, the abundance of native wildlife. In the NSEC SEA an adapted version of the model will be used to identify hot spots of high biodiversity loss at present and in the future (inputs from CLUE) and analyse the potential conflict arising from this for different development visions (e.g. eco-tourism).

Trade-Off Analysis

4.4.24 The valuation of impacts is important as it helps ensure that some of the key environmental and social sustainability issues, such as climate change, are fully integrated with the economic components of sustainable development. Trade-off Analysis is based on the selection of quantifiable sustainability indicators including economic performance (annual net returns, present discounted value of returns, distribution of returns, risk, etc.), environmental performance (indicators of air quality, forest and soil quality , soil erosion, chemical leaching), impacts on human health, and the distribution of impacts across different groups.

4.4.25 Measuring tradeoffs in these dimensions requires site-specific data and the trade-offs of specific developments and strategic options will be investigated, which can be based on the suitability analysis conducted within the SMCA.

4.4.26 While specific methodologies will be delineated, the SEA will aim to provide values for specific ecosystem services, forest, wetland, provisioning (such as clean water) and Biodiversity loss, CO2 impacts of the corridor, and other environmental and social components of increased road travel such as accidents and deaths.

[23] http://www.mnp.nl/en/publications/2008/CostofPolicyInactiononBiodiversity.html

4.5 Indicators and targets

4.5.1 Once the SEA objectives have been defined, simple, measurable indicators will be defined to facilitate comparisons between alternatives. An indicator is a measurable (and foreseeable) quantity, used to directly or indirectly measure the achievement of the sustainability objectives. For example, if the objective is to prevent greenhouse emissions, a direct indicator is the 'emission of greenhouse gases, an indirect indicator could be 'vehicle kilometres. A target is the value that an indicator should take, for example, a reduction of emissions of carbon dioxide by 20%. Targets are often politically determined.

4.5.2 Table 4.2 sets out an initial set of indicators or questions against each SEA sustainability objective developed through the regional scooping workshop. The final set will be used to tests the degree to which the measures and policies outlined in the SAP are consistent with sustainable development. They will help draw out the strengths and weaknesses of the SAP and lead to targeted recommendations on how it could be improved.

Table 4.3: SEA assessment criteria and questions

SEA Objective	Indicators/Questions
Promote the sustainable Growth of Local and national GDP for the next 20 years	• Does the SAP help to increase regional GDP? • Will the SAP help increase GDP per capita? • Will the SAP delink environmental damage from economic growth[24]?
To increase economic integration of the NSEC in trade investment in agriculture, industry and tourism based on the potential of each country	• Does the SAP put in place the policies and framework mechanism for integration • Will the SAP Increase exports and imports • Will the SAP help increase tourist numbers • Will the SAP promote NSEC as a common tourist market (destination) • Promote free flow of people
To create cross border investment zones in order to create job opportunities for local people in the NSEC, promote trade and investment and to improve the infrastructure	
To increase the volume of FDI, trade, services, including research & development (R&D)	

[24]. The region should work towards greater efficiency in resources use and reduced damage per unit of GDP growth and environmental damage not allowed to carry on growing in an extrapolation of current economic trends.

SEA Objective	Indicators/Questions
and technology transfer along NSEC	
To increase employment opportunity for local people	• Does the SAP encourage capacity building of local people and entrepreneurship • Does the SAP increase individual income in disadvantaged communities
Decrease the poverty population, (primary education, health care, etc)	• Does the SAP improve access to basic services of local communities including ethnic groups (e.g. safe drinking water)? • Remark: Different countries have different standards for defining poverty – e.g. absolute and relative
Decrease illiteracy,	• Does the SAP increase access for local people to vocational education/skill training?
To improve the quality of life for people in the corridor (GMS region)	• Does the SAP help avoid negative impacts on public health including communicable Diseases • Does the SAP help avoid negative impacts on safety • Does the SAP help avoid negative impacts of smell • Does the SAP help negative impacts of noise • Does the SAP improve the joint efforts in GMS countries to prevent and control the communicable diseases and establish a shared early-warning system
To control illegal and involuntary immigration trafficking of people	
To support ethnic groups in maintaining their cultural identity, traditions and heritage	
To promote access to government information and encourage participation in decision making	
To minimize air pollution from specific key sectors (agriculture, Industry, transport, domestic) (Including green house gasses)	
To manage water pollution minimize water pollution from urban, agriculture, tourism and industry sources	• Does the SAP include measures to reduce the use of chemicals (fertilizers, etc) • Does the SAP include measures that recognise the importance and encourage the provision of waste water treatment plants with induced and associated industrial and other developments?

SEA Objective	Indicators/Questions
To ensure the long term conservation and sustainable use (demand and supply) of natural resources	• Water conservation and sustainable use • Forest conservation and sustainable use • Land conservation and sustainable use • Soil conservation • Minerals wise use • Energy conservation and sustainable development
To minimize loss of biodiversity and protect valuable species	• To improve ecosystem connectivity • To improve wildlife habitat • To rehabilitate damaged ecosystems • To maintain ecosystem integrity and services
To minimize waste output (reduce, reuse and recycle)	• Does the SAP encourage the effective management, collection, treatment and disposal of residual waste • To manage the transport (inc transboundary) and disposal of hazardous waste in an environmentally sound manner
To ensure effective adaptation and mitigation measures in the future	• Does the SAP encourage capacity building for addressing climate change impacts

4.6 Trend analysis

4.6.1 As part of the baseline analysis trends and drivers of trends are assembled to assist predictions of future impacts. These trends will also be used in the spatial modelling process, when different development scenarios are considered.

5 Interim Conclusions and Recommendations

5.1.1 On the basis of the SEA scoping process conducted between April to June 2008 and involving in-country meetings, a regional scoping workshop and field visits, the SEA can draw the following initial findings and recommendations. These findings and recommendations will be explored further during the assessment phase of the SEA in October. This should increase our understanding of the issues outlined below and allow us to make more specific recommendations when we publish the full SEA report before the end of the year.

5.1.2 Please note in the final scoping report this chapter will be amended once chapter 4 is completed.

5.2 Findings and key issues of concern

5.2.1 The interim findings and conclusions are grouped according to "the need for the SEA' and environmental, social and economic issues.

The need for the SEA

1. The NSEC is based around a series of major road developments which aim to strengthen the infrastructure linking the Greater Mekong Sub-region (GMS) members including Laos, China, Myanmar, Vietnam, and Thailand. Importantly this infrastructure is to act as a catalyst for many forms of transboundary development plans, including, concession areas, industrial zones, to facilitate trade and investment, tourism promotion and contribute to the overall development of the region.
2. In the context of point one above it would be useful for the SAP to provide some context and framework for mid to long-term transport options (road, rail and water-ways) related to projected transport and trade flows and associated environmental impacts along the corridor.
4. The environmental management innovations associated with the NSEC main road in Yunnan Province provide important lessons and demonstration for how to conduct EIA in the corridor and how to implement and monitor environmental management provisions. Yet, even in Yunnan, the EIA work has been site specific and has not taken into account potential strategic and cross border effects of the corridor development embracing issues such as the secondary, synergistic and cumulative impacts of increased trade on the ecosystems of other countries or the carbon impacts for increased traffic flows.
5. Within Lao PDR, EIA work related to the corridor has also been broken down into project or sub-project parcels. The R3 road, for example, was subject to three EIAs resulting in three sets of environmental standards with differing resources going to oversight and follow up. In the best case – the central section of the R3 supported by ADB – the EIA has been extensive, but environmental management interventions and monitoring has been inadequate. An SEA would have helped look at the strategic and cumulative impacts of the individual projects for the whole corridor and allow alternative routes

which minimised adverse environment impacts to be considered fully alongside economic costs and benefits for the whole corridor. This particular area of Lao PDR is in what we have described above as the 'Golden Quadrangle', a particularly sensitive environmental area with significant ecotourism potential. This reemphasises the need to carefully consider and reconcile all the strategic environmental, economic and social issues in a structured and formal process before a fixed route and a subsequent series of investments are agreed.

6. In particular, cumulative and multiplier impacts of the NSEC road and its associated developments are not being effectively captured through the EIA process with potential far reaching and irreversible impacts on the regions biodiversity, natural systems and ecosystem services, cultural systems and economic activities. Furthermore, time-series data on trends in environmental quality is also limited.

Environmental Issues

7. New sections of the main NSEC corridor road have dissected at least two biodiversity areas of regional and global importance – the Nam Ha National Park (established 1993) in Loa PDR and the Mengyang Protected Area in Xishuangbanna Prefecture, Yunnan Province (Figure 5.1).

8. In both cases it appears from an initial analysis of map data by the SEA team that reasonable alternative routes may have been available which could have avoided the significant fragmentation effects of the road on biodiversity and habitats. So far we have neither found evidence that alternatives were considered or a justification of the chosen route on the grounds of overriding economic and social benefits.

9. Mitigation management related to the Simao – Xiaomengyang Expressway affecting Mengyang Protected Area is impressive and may provide useful models and pilots for application elsewhere in the corridor.

10. Eco-expressway: There are important lessons from Puer and Jinghong on how to optimise biodiversity maintenance in road development throughout the corridor with respect to:

    (i) Stakeholder involvement - At the beginning the construction was controversial. The design was revised three times, through many stakeholder workshops.

    (ii) Wildlife and habitat corridors – There are many high bridges and tunnels and passages specifically for wildlife, including the elephant.

    (iii) Shared cooperative responsibility for management: The Puer county only covers 25 km the rest is Jinghong's responsibility. Wildlife is mostly within XB prefecture.

    (iv) Extensive rehabilitation and stabilization - The engineering has helped stabilise the slopes effectively. Indigenous species for eco highway planting were used.

    (v) Sensitive siting - In the Simao section the highway was diverted away from the reserve

11. In the case of the Nam Ha National Park, the mitigation and stabilisation activities seem (from an initial field based review) to have been inadequate as well as the monitoring of impacts despite special arrangements being put in place.

12. Expansion of existing protected areas: Sections of the NSEC road dissect existing protected areas or disconnect others from potential landscape wide biodiversity corridors, particularly in Thailand (Figure 3.1). It would be very useful to update the biodiversity baseline along the corridor and at key development nodes. More strategic consideration on the potential effects of the NSEC on the regional network of protected areas and biodiversity corridors would also be very useful with a view to making recommendations to extending and strengthening protected areas system in the region and enhancing natural system connectivity. A robust and resilient set of natural ecosystems in the area will help ensure that they continue to provide the vital sets of 'ecosystem services' such as carbon capture and storage, flood mitigation, clean drinking water and supplementary livelihood strategies for the poorest to mention a few.

13. Intensive monitoring of post construction impacts and following up mitigation: A one year ecological monitoring program of the eco-highway between Simao and Xiao Mengyang was conducted – it is a useful model for mitigation monitoring throughout the corridor. In the case of Mengyang, monitoring suggests that elephants have not yet adapted to the man-made passages. Further remediation measures and monitoring is needed.

14. Wildlife trade: There continues to be illegal wildlife trade on the Lao-Myanmar-Chinese borders. The Yunnan authorities have introduced strict controls. However enforcement of those controls might be difficult since it will require sufficient resource being prioritised and mutual effort from all three countries for the control of this illegal trade.

15. Forest burning: The government of Lao PDR has made slash and burn by local communities illegal except in specified zones but this has proved ineffective. Violations are widespread and increasing in the corridor area because the people have no livelihood options and no money to pay fines, so enforcement is not practical. The level of haze has regional health and climate change implications. Causes are a complex mixture of smallholders' activities, rubber/teak plantation, and legal/illegal logging. Respiratory illnesses are a problem in the region, in particular affecting children.

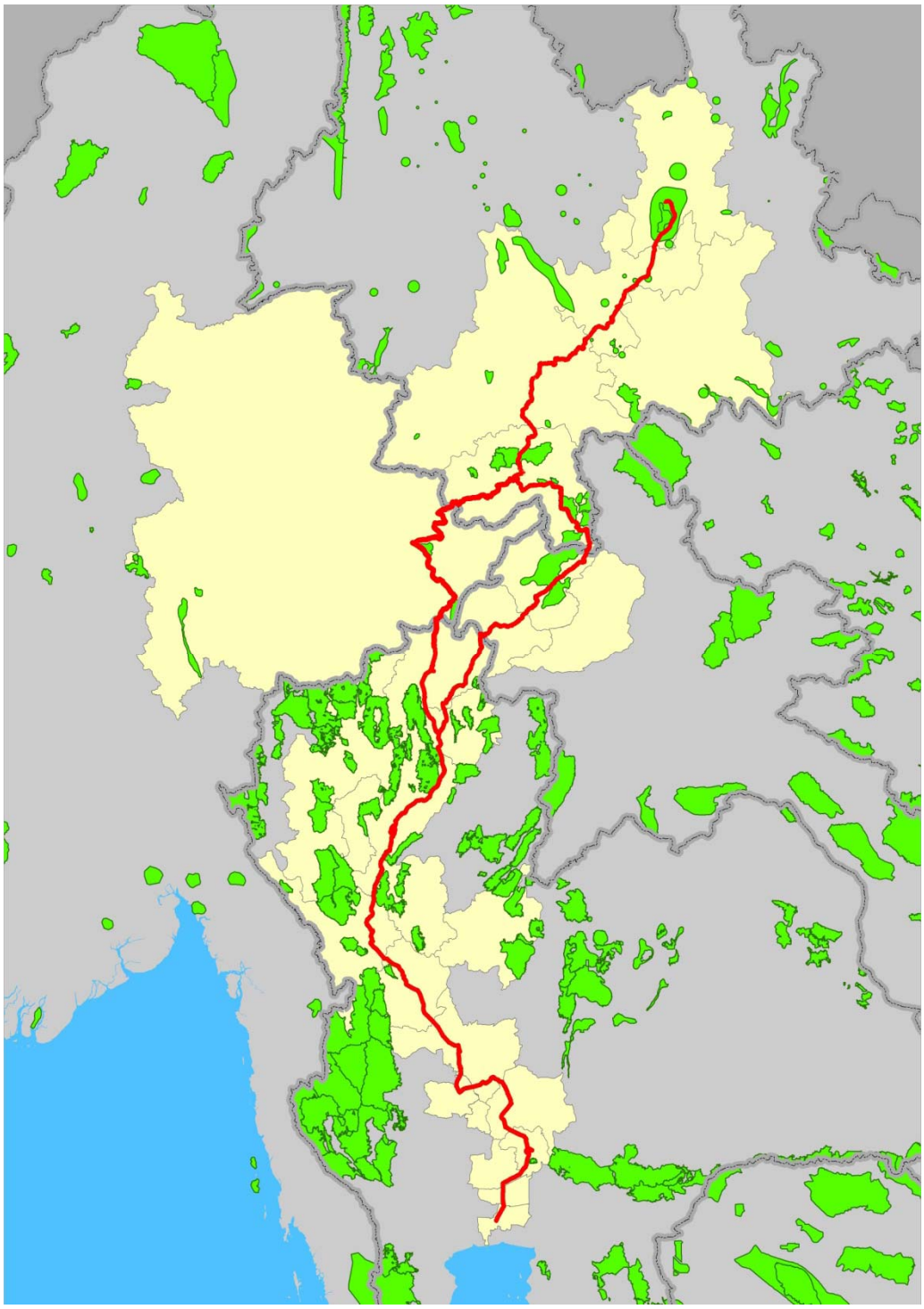
16. Water pollution and shortage: The Increase in agricultural, industrial and tourism development will have an impact on water supply and quality. This in turn will lead to an increase in production costs for water treatment and access (with economic impacts).

17. Waste: There are several free trade zones planned in Yunnan Province and in Chiang Rai, Thailand. These export processing areas can have significant cumulative impacts in terms of resource use, cross-border trade and regional waste flows. Increased production of hazardous and non-hazardous waste as a consequence of the estimated sector developments associated with the NSEC has to be assessed.

18. Climate change: Climate change effects are expected to be regionally and locally different. One possible scenario is that changes in precipitation are expected to result in increased intensity and extent of flooding, drought and fire problems. This would have an impact on agriculture (food security), water (supply and quality), human settlement and infrastructure, and on biodiversity and fisheries. Another possible scenario could be that

changes in precipitation might result to more equal distribution of rainfall. Understanding levels and types of changes regionally will assist in mitigating potential threats and adapting to climate change accordingly. The role of the developing NSEC in helping to exacerbate or mitigate and adapt to these potential issues is crucial to maintaining productivity and protecting livelihoods.

Figure 5.1 Protected areas (green) within the NSEC. The red line represents the NSEC road



Social Issues

19. Participatory mechanisms: The SAP points out that there are many ethnic minorities in the corridor area who are likely to be affected as well as vulnerable groups such as women and children with special needs to be considered. Participatory planning and decision making structures and processes are needed to ensure the views of those disadvantaged groups are represented at an appropriate level in the NSEC development. This concern was highlighted at the regional scoping workshop as a key issue for the SEA to address.

20. Equity: Lao PDR and possibly Myanmar, may shoulder the main negative environmental and social impacts stemming from corridor development. The Corridor passes through the more remote areas of these countries which, although rich in natural resources, are characterised by: little existing infrastructure, minimal economic development, low population and a paucity of the necessary skills in the local population to ensure that the potential benefits of the corridor are maximised. Special provision and international support could be required in order to minimise this impact, promote equity in economic benefits and ensure that they would not become “transit” countries (highlighted as a concern in the NSEC SAP). They are rich in natural resources but as mentioned above they are poor in skills and under populated. They have natural and social assets of global importance which need to be identified as very high priority in “corridor development” for safeguarding and enhancement and sensitive “development”.

21. Displacement of local communities: Road construction and associated developments including concession areas entail the displacement of local inhabitants. The impact on marginalized and displaced groups has to be examined and long term adjustment and support programs initiated.

22. Immigration and population growth: Concessions, tourism, trade and small scale agricultural is leading to migration and a population increase in the NSEC area of Lao PDR. Increased mobility of people could increase the spread of communicable diseases like HIVAIDS. Migrant workers, ribbon development along roads and relocated villages moving to the bigger towns will all likely need careful planning and management.

23. Land speculation: Land prices around the NSEC road is likely to rise due to speculation and increase in demand. Already early investors, including politicians, purchased land from local owners to set up business or wait until they can sell the land again for much higher prices. The impact of this trend on the poor and disadvantaged needs to be assessed and safeguards put in place.

24. Loss of ecosystem services: Loss and degradation of natural resources will affect the livelihood and quality of life of communities depending on these resources and their services.

25. Skills development opportunities (General education and vocational training): Economic benefits should be captured locally as much as possible. Increased access to more remote areas opens up the possibility of government led programmes on skills development to meet the increased economic opportunities. Although it is a explicit

objective of the SAP, there is little evidence of more concrete and specific measures, or proposals of how this objective may best be realised.

26. Out migration: the NSEC corridor may encourage increased rural urban migration of the working age population. Whilst this could increase the flow of remittances it may cause social and local economic problems; such as the lack of labour remaining in rural areas or the rapid expansion of urban areas with already over stretched infrastructure, which Governments and Donors may need to consider in associated programme development.

27. Trafficking: This subject is more difficult for certain countries to acknowledge as a potential problem than others. NGOs working with women and children in the area could be encouraged and given resources to increase awareness locally.

Economic concerns

28. Concessions are proving a planning and management challenge for Lao PDR: The Lao government granted a concession of 1460 ha on the Lao-China border to a private Chinese Casino company for 30 years with a possible 30 year extension. Two minority villages had to be relocated. A Lao timber mill in the concession area will have to be moved or sold to the Chinese company. The provincial government knows little about the concession conditions but is required to manage and enforce provincial regulations for environment, customs, tourism, policing and other sectors. This has proved difficult – because mandates and authority unclear and capacity limited. The benefit to Laos and the province are not clear to the provincial authorities. The national government has placed a ban on future concessions over 100 ha.

29. Rubber plantations: Large areas of forest are being cleared for rubber plantations along the corridor in Yunnan and Laos without thorough environmental assessment. In Lao, rubber plantations are encroaching the Nam Ha NPA and based on the trend of expansion from 2000–2005, there is a real threat more rubber will be planted inside the protected area in the future. In addition to biodiversity loss, there might also be an impact on tourism. The area and particularly Namtha and Sing districts have great potential for eco-tourism. Anecdotal evidence from the field visits in Luang Namtha shows that once a natural forest is cleared and converted into rubber plantations, it loses its attractiveness to eco-tourists.

30. Tourism: Tourism in Lao PDR is constantly growing. International and domestic tourists come to visit natural areas for trekking, to see ethnic cultures, cultural heritage and history. The number of visitors coming to Lao PDR has significantly increased since 1993 from 102,946 to 1,632,943 in 2007 and it is expected to increase up to 3,572,000 by 2015. The income from tourism has also significantly increased, from $6,280,000 in 1993 to $233,304,695 in 2007 and it is expected to reach $388,748,338 by 2015 (Lao NTA, 2008). Since the number of international and domestic tourists is increasing, more companies are needed in the area to help manage tourism. Constraints for tourism include limited tourism services and skilled labour, inadequate catering for food requirements of international tourists, limited access routes and links to remote areas and limited guide maps/brochures.

Tourism in Yunnan Province is also growing rapidly. Overseas tourists increased from 1.001 million person-times in 2000 to 1.5028 million person-times in 2005 and tourism earnings in foreign exchange increased from 339 million USD in 2000 to 528 million USD in 2005, with average annual growth rate of 9.27%. Local governments in the Corridor are all expecting this growth in tourism to continue. For example, the vision for tourism in Puer is to build the prefecture into a world class tourism destination for recreation, trekking and eco tours.

Eco tourism is being taken seriously by local governments along the corridor. Lao PDR has recognised the importance of tourism in development and poverty reduction and has announced (Much like Puer) a desire to become a "world class eco-tourism destination" (Lao NTA, 2003). The development of alternative tourism activities such as Community Based Tourism and Ecotourism has an important role in the national tourism strategy. In Yunnan Province, eco villages and tourism towns have been planned outside Puer National Park. There is also a wider regional vision to create a Green Triangle as part of the Golden Triangle.

31. Industrial parks development in Yunnan: There are important lessons to learn from the approach to planning and management of industrial parks in the Yunnan section of the NSEC. The Puer city master plan has recently been updated and covers 10 counties and districts. Industrial parks are planned in the North, South and West to build up food and medicine, logistics, construction, and chemicals sectors. Four parks 7km, 9 km, 15 and 20 km away from the centre will facilitate restructuring of existing industrial parks which are now mixed with residential areas. Collective environmental protection in the parks will also be facilitated.

    In Xishuangbanna Prefecture, three industrial parks are planned on the principles of green and low polluting industrial sector development. The feasibility studies of this program are being developed and will be followed by planning and environmental assessment.

32. Mining and logging: There have been problems in management of mines (e.g. a tailings dam burst in a Chinese owned mine). Roads are a key part of mine feasibility projects and the corridor will facilitate mining and logging development.

33. Local economic development: Some of the provincial and national administration lack the resources to ensure that the maximum possible economic benefits accrue to the local areas. The Chinese concession in Lao is a good example where there was little evidence of employment opportunities for locals.

5.3 The sustainability objectives for the NSEC SAP and SEA

5.3.1 The SEA is based on an objectives-led approach, whereby the potential impacts of the SAP and strategic options will be assessed against a series of objectives for sustainable development.

5.3.2 The scoping process has defined a set of sustainability objectives which should influence and shape development in the corridor. They are linked to each of the key issues and relate to the

three pillars of sustainability – economy, social and environment (Tables 2.1-2.3). This set of sustainability objectives will be refined in the light of analysis of the baseline information.

5.4 Interim recommendations from the scoping phase

5.4.1 The recommendations arising from the scoping phase (with the baseline assessment still to come) focus on the NSEC SAP and the SEA itself – what they should focus on over the remaining planning and assessment process.

Recommendations relating to the NSEC SAP and SEA coverage

5.4.2 The SEA focus and approach will cover the linkage/inter-relationship with the SAP, the consideration and assessment of risks, opportunities and strategic options, a spatial planning approach, safeguarding of environmental and social assets and institutional strengthening and capacity building.

The SAP and its relation to SEA

1. The preparation of a Strategic Action Plan for the NSEC is an essential foundation and guide for sustainable development of the corridor. It is welcomed that the SAP will be reviewed and revised regularly. It would be useful to include in this review an appraisal against the sustainability objectives from the SEA and learning from the experience of implementation.
2. The SAP needs to adopt and promote a set of sustainability principles which should shape all development and the way planning decisions are made in the NSEC. While environmental concerns are given prominent attention as part of the overall concerns addressed by the SAP, when it comes to the operational detail, these factors should be internalized in the economic planning framework with attention given to the sustainability and environmental management of the corridor.
3. The NSEC is described as an “economic” corridor with many assets within it that need to be part of a considered development strategy. This development needs to recognise that the protection of the environment goes beyond it intrinsic value and must capture the economic and social value of the natural resources in the areas (for example tourism resources). Identifying the most appropriate economic development path which builds on the natural, physical and human capital of the area is a key role of the SAP. The NSEC is a development corridor in which each of the countries has very different but equally valuable assets which need to be sustainably managed and incorporated into all economic development plans in the corridor. The strategy and action plan should define a development plan with clear time scales and with reference to subsequent development phases and their priorities.
4. Defining and managing the pace, scale and staging of development in the corridor is critical to sustainability and the maintenance of environmental quality. Staging accompanied by intensive monitoring and reporting on implementation experience allows

for feedback and adjustments to be made at each cycle of NSEP SAP review and revision.

5. The SEA needs to be an integral part of the SAP process. Its influence and evidence must be clearly defined in the SAP. Ideally, the final version of the SAP should be delayed until the full SEA findings and recommendations can be made available. Alternatively, the final SAP should spell out how the SEA report will be considered and implemented as part of the on-going planning and development of the NSEC through the hierarchy of plans shaping the corridor and subsequent iterations of the NSEC SAP.

6. For its part, the SEA will need to define its relationship with the NSEC SAP and the NSEC development planning process. For example, the SEA will make recommendations on:

   i) The GMS sector plans and planning processes within the North South Economic Corridor;

   ii) Procedural options for reviewing and implementing the SEA at GMS and national levels in each country

   iii) Institutional mechanisms for monitoring and reporting on SEA implementation

   iv) The role of SEA in future review and revision of the NSEC SAP and the corridor development process

   v) Potential capacity building opportunities aimed at institutionalising SEA into planning systems and processes at an early stage

7. In the meantime, collaborative approaches to conducting EIAs on the schemes outlined in the NSEC SAP, especially on the subregional and/or transboundary projects should be promoted. The larger plans and programs (such as large business parks proposed at national boarders within the NSEC corridor) should be subject to SEAs. The SEA will make recommendations on SEAs and EIAs which are required as part of NSEC SAP implementation and to help ensure that local environmental and social issues are fully integrated and mitigated where appropriate.

Strategic options

8. The SAP focuses on the NSEC road and not on other transport options, like rail and/or water transport. It is not an integrated and comprehensive development strategy and plan. The SAP needs to put in place the framework for that broad integrated perspective of the corridor and then a clear staging and process for filling out the detail defined for future iterations of the SAP every three years or so.

9. The NSEC is a development corridor - not only a road corridor. Although the SAP clearly states that the NSEC should be an economic corridor and includes pertinent objectives, the SEA team remain concerned that it does not appear to include sufficient measures for investment to realise this goal. Although a list of projects is contained in an annex to the SAP, it is our opinion that the SAP could provide more guidance on how precisely

these investments relate to the overall goal of the corridor and additional guidance on the wider measures and investments required, such as modal interchanges and alternatives, skills development, enforcement of social and environmental safeguards and the sustainable use of the regions natural resources, to underpin economic development. However, it is also important to recognise the limits of resources and what can realistically be achieved by the SAP. Nevertheless, the strategy part of the SAP should be more multi-modal and multi-dimensional. At a minimum different transport modes and corridor options need to be considered in terms of their strengths and weakness so future reviews will be forced to reconsider the multimodal and multidimensional issues in light of up dated priorities. It is good practice to set out alternatives ways of realising the vision. No options have been considered in the SAP or a staging process identified for their development. This makes assessment of environmental effects and efficiencies difficult, especially those related to climate change. The SEA will assist by defining three broad scenarios which explore different strategic development options for the corridor.

Spatial planning

10. High priority needs to be given to spatial planning in the NSEC – initially to define the overall zoning framework for development consistent with national objectives, to develop social-cultural and environmental safeguards for each zone, and to support more intensive and detailed spatial planning of hotspots such as the trans-boundary crossing points. The SEA will provide an initial spatial framework of development zones, hotspots and safeguards, using GIS and specific spatial decision support tools.
11. The trans-border areas of the corridor require special collaborative spatial planning and strong financial support to zoning, definition of standards and environmental management to minimise adverse and cumulative development impacts and promote greater equity between and within corridor countries.
12. The NSEC SAP should include an analysis of how it will help deliver or conflict with other key policies strategies and plans in the region such as proposed developments in tourism, infrastructure, industry, trade, agriculture and other sectors are assessed to determine compatibility and sustainability.
13. Spatial multi criteria evaluation (SMCE) will be applied for ongoing and proposed development initiatives, like transport, tourism and industry, to establish optimal sites for those developments and to identify areas of conflict. The latter may give an indication for targeting specific mitigation measures.
13. To provide estimates of possible near future land use change based on development trends and policies defined in the SEA, the CLUE model is used. By comparing future with present land use, potential hotspots of future land use change can be identified and targeted for mitigation measures. The CLUE-s outputs of future land use maps will additionally be used as input into the spatial estimation of biodiversity loss in the future compared to the pristine or present state.
14. Setting up and using spatial planning systems require investment in resources, that is human, hardware and data, which involves costs. More funds should be made available

for training, equipment, capacity building and to establish a regional database management system for the GMS countries.

15. A huge problem is data availability and data sharing. Data are scattered over different institutes or agencies within the three countries. Data are not available, very old or can only be purchased at a very high cost, or are not made available. Without proper spatial data it will be very difficult to apply spatial planning tools and models and therefore enhance the spatial planning process. It is crucial to establish a mechanism for (spatial) information sharing. An obvious way to ascertain such a data sharing mechanism is to link it to existing GMS agreements, like the Free Trade Agreement (FTA).

Safeguarding the interest of Lao and Myanmar

16. The NSEC SAP and SEA will need to provide more detail on potential measures to safeguard the interests of Lao PDR and Myanmar, and their local populations. As mentioned above the NSEC passes through remote regions of these countries which are under populated, lack sufficient infrastructure and skilled human capital. This will make it much more difficult for them to maximise the benefits that a single mode economic corridor may bring to the region. One way a country such as Laos may improve its potential to benefit from the corridor is if it connects with Vientiane – therefore the issues of additional transport connections and their priority needs to be considered. Lao and Myanmar should be given the highest priority for off-set and compensatory investment and development support. More “green development” nodes and multimodal interchanges should be identified along with special principles and approaches to their sections of the corridor.

Safeguarding biodiversity and interconnectivity

17. A set of development principles, standards and implementation safeguards are needed to ensure that further road and other development within the corridor does not unnecessarily degrade biodiversity assets in any country.

18. The road planning, EIA and implementation experience to date requires thorough review and the definition of lessons so that (i) unnecessary fragmentation and degradation of biodiversity and natural systems assets does not occur and (ii) remedial actions and additional environmental management investment can be applied in the case of Nam Ha National Park and other degraded biodiversity areas and corridors which have been damaged.

19. The SAP should encourage a more detailed survey of the biodiversity and ecosystem services provided by the natural areas in the corridor with a view for developing mitigation and compensation plans, investigating innovative economic development opportunities such as the possibility of biodiversity banking in the area and how the network of regionally protected areas can be strengthened (e.g. greater support of the biodiversity corridors initiative)

Safeguarding Social Issues

20 NGOs working with women and children in the area could be encouraged and given resources to increase awareness in the area.

21. Options to provide social support systems for communities without many of their working age population should be investigated

Safeguarding Economic issues

22. Resources should be earmarked for local skills development to meet the needs and economic development opportunities arising from the NSEC

23. Compensation and biodiversity offsetting (appropriateness of tradeable certificates might also be looked into) should be considered for the loss of natural resources and ecosystem services in some of the remoter and more vulnerable areas.

6 Next Steps

6.1.1 An indicative time table for the completion of the NSEC SEA is summarized below:

- July 18th – Interim Scoping report issued to SAP writing team only
- Mid August – Draft Scoping report issued to regional stakeholders for a 4 week consultation period
- September finalise scoping report incorporating stakeholder comments and issue as final scoping report
- Early October Assessment workshops with regional stakeholders
- November – first draft of full SEA for review to stakeholders
- December comments on SEA received and amendments made

6.1.2 The overall SEA phasing is scheduled as follows:

Steps to April 2008

Timing	SEA activity/step
January	Inception phase involving discussion with governments leading to: • definition of methods • work plan and • team formation
April	Scoping phase involving: • National consultation meetings and site visits • A regional scoping workshop in Kunming, China, for defining the SEA framework (key issues and objectives) to be addressed by the SEA

Next steps

May to July	- SEA national teams collate the evidence base (completion of evidence base work sheets): • Baseline information • Institutional and policy framework information - GIS digital data information completed
July	- Draft interim scoping report issued to the SAP writing report - Synthesis of baseline information

	- Spatial/land use modelling of the corridor tested
August - November	- Draft scoping report issued to the regional stakeholders (Mid August) - Review of draft scoping report by regional stakeholders (1 month) - Final scoping report including comments by regional stakeholders -Prepare for the assessment phase in October
November	- Assessment workshop • National consultation and briefing meetings • Wider SEA team regional workshop (location to be decided) - Spatial zoning and environmental safeguards defined • Avoidance and mitigation measures defined • Spatial/land use modelling of the corridor completed
November - December	- Draft SEA report - Distribution of draft SEA report for review and comment by regional stakeholders (1 month) - Final SEA/SAP team consultations (?) to consider the draft and refine avoidance and mitigation measures
December 2008 - January 2009	- Finalisation and submission of SEA report involving • EOC submission to GMS Working Group on Environment and GMS Transport Working Group • Consideration of submission to special meetings of Transport/Environment Ministers • Submission to Economic Corridor Forum - Regional SEA workshop?

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