

STRATEGIC ENVIRONMENTAL ASSESSMENT AS A TOOL TO IMPROVE CLIMATE CHANGE ADAPTATION IN THE GREATER MEKONG SUBREGION



The Greater Mekong Subregion (GMS) countries of China, Vietnam, Thailand and Cambodia receive special mention in the IPCC reports as most vulnerable to climate change effects. A recent assessment in Vietnam, for example, found that, for a one metre sea level rise, more than 60% of the nation's 64 provinces and six of its eight economic regions will be vulnerable. Similar potential impacts are foreseen in the neighbouring countries which are struggling to find approaches to systematically assess and plan for climate change.

The use of SEA as part of the development planning process provides an important opportunity to promote mitigation and adaptation measures in spatial and sector plans. China and Vietnam have introduced SEA legislation and are preparing operational guidelines. Thailand is also reviewing draft SEA guidelines. Cambodia is testing SEA in national tourism planning.

Notwithstanding SEA progress, none of the SEA systems reviewed have detailed climate change provisions. Regional donors such as Asian Development Bank and non-regional organisations such as OECD are rapidly developing guidance, policies, and experience that can be used to apply SEA as a climate change adaptation tool in GMS. This paper assesses lessons learned from current SEAs in GMS and concludes with seven measures for action by GMS governments and the international community: (i) Develop tools to assess risks and impacts of climate change, (ii) Promote SEA application upstream of individual 'mega-projects', (iii) Introduce SEA through piloting, (iv) Ensure top decision makers are engaged in pilot SEA experiences, (v) Learn from disaster management, (vi) Use SEAs to build a foundation of capacity in spatial planning, and (vii) Capitalise on the participatory nature of SEA

INTRODUCTION

Climate change has become a major issue shaping the agenda of sustainable development and environmental management among Greater Mekong Subregion (GMS) countries (Map 1).¹² Crop failures and livestock diseases are being linked to global warming, imposing high economic losses and undermining food and water security in several areas of the region. Impacts on natural systems are being observed, with suspected shifts in species' distributions and pole-ward altitudinal migrations in species' ranges. Phenological changes (for example, earlier flowering of trees, emergence of insects and onset of breeding seasons) are occurring (Murray, 2006). Recent modeling studies of the impact of climate change on the Mekong River predict that the timing and distribution of precipitation will lead to longer dry seasons and shorter, more intense wet seasons which will impact on agriculture, fisheries and flood severity. By the century's end, temperature increases of 3 to 4°C and precipitation increases by up to 10% are expected, with significant impacts on the Mekong River water regime and the biophysical environment (Guttman, 2006).

These observations and modeling studies are consistent with the Intergovernmental Panel on Climate Change (IPCC) which has identified the Mekong region as one most at risk from human-induced climate change (IPCC, 2007). IPCC mid-range climate scenarios for 2050 include: (i) a general reduction in crop yields; (ii) decreased water availability in water-scarce regions; (iii) a widespread increase in the risk of flooding; and (iv) increased exposure to vector-borne and water-borne diseases (Murray, 2006). In the GMS climate change impacts will cross international borders. The principal emerging threats from climate change in the region can be categorised as follows:

Hydrology and fresh water resources – changes in water quality, availability

The maximum monthly flow of the Mekong is estimated to increase by c. 40% in the basin by the end of the century. In contrast, the minimum monthly flows are estimated to decline by nearly 25% (Hoanh

et al., 2004), suggesting that there could be increased risks of flooding during wet season and an increased possibility of water shortage in dry season. Flooding could increase the habitat of brackish water fisheries but could also seriously affect the aquaculture industry and infrastructure, particularly in heavily-populated Mekong Delta (IPCC, 2007). Expansion of areas under severe water stress will be one of the most pressing environmental problems. It is estimated between 120 million to 1.2 billion people will experience increased water stress by the 2020's in South East Asia overall (Arnell, 2004). The decline in annual flow of the Red River by nearly 20% and that of Mekong River by nearly 25% by the end of 21st century will exacerbate this problem (ADB, 1994).

Changes in sea level – coastal erosion and inundation of coastal lowland.

Cities like Bangkok and Ho Chi Minh are located on deltas formed during Holocene sea-level changes (Hara *et al.*, 2005). These cities, with large populations and intensifying socio-economic activities are especially vulnerable to sea-level rise and extreme climate events. For a 1 m sea-level rise, over 40% of Ho Chi Minh City could be at risk (Carew-Reid, 2007). In coastal provinces of China, Cambodia, Myanmar, Thailand and Vietnam, populations concentrated on low lying plains, deltas and estuarine areas are at risk. For the 1 m sea level rise scenario, 500,000 ha of Red River Delta and up to 20,000 km² of Mekong River Delta could be flooded (Carew-Reid, 2007). In addition, 2,500 km² of mangrove (a natural storm defense barrier) could be inundated, while approximately 1,000 km² of agricultural and aquaculture farmland could be subject to severe saline intrusion (Tran *et al.*, 2005). More than 1 million people are expected to be directly affected by sea-level rise in the Mekong Delta by 2050 (Ericson *et al.*, 2005).

Increased vulnerability of the poor – inability to adapt to climate change impacts

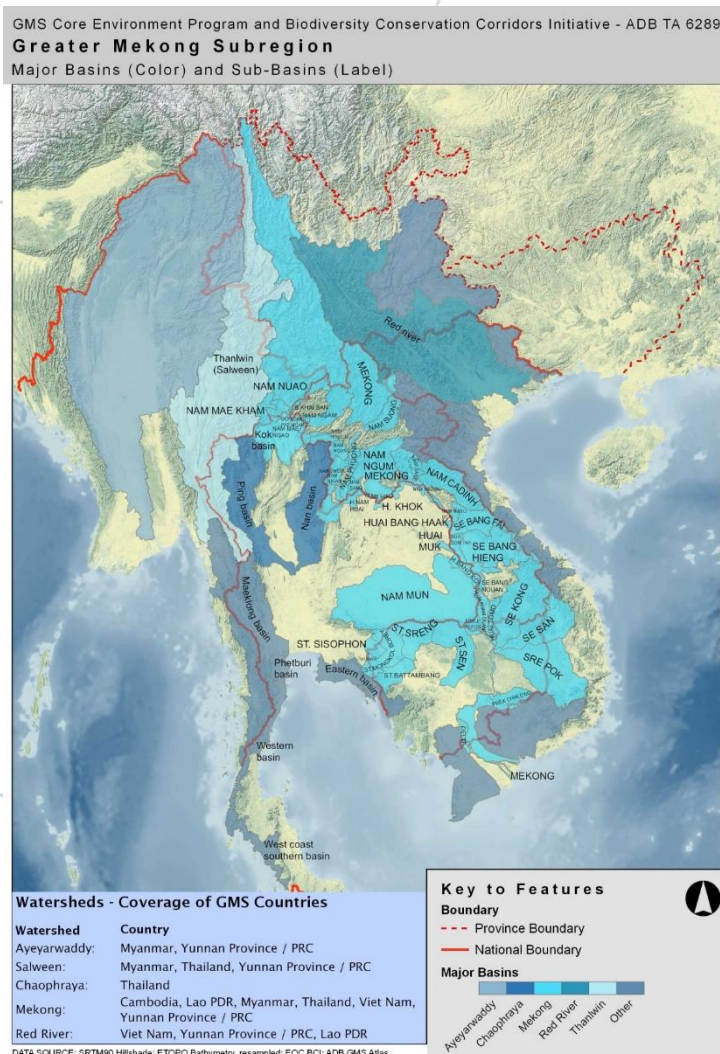
Both urban and rural poor of the GMS are highly vulnerable to climate change because of their limited access to profitable livelihood opportunities and limited access to areas that are fit for safe and healthy

¹ Information is drawn from a keynote address by U.S. Malik, Director of Agriculture, Environment and Natural Resources, Southeast Asia Department, ADB. First Joint Session of the GMS Working Groups on Agriculture and Environment & GMS Agriculture National Coordinators' Meeting, Greater Mekong Subregion (GMS) Economic Cooperation Program. 11-12 December 2007, Bangkok.

<http://www.adb.org/Documents/Speeches/2007/sp2007070.asp>

² The GMS is defined by natural systems—principally the Mekong River, which winds its way for 4,350 km from the Tibetan plateau to the river's delta in Vietnam, together with four other major drainages: the Irrawaddy, Salween, Chao Phraya, Red and Pearl rivers.

Map 1: The Greater Mekong Subregion



given high priority by most GMS governments. However, the methodologies, procedures and capacities for integrating the issue in government policy making and development planning in a systematic way are not in place. Strategic Environmental Assessment (SEA) is one tool that could help fill the gap.

GMS countries are launching climate change plans and programs which set out the issues and needed responses. For example, China's National Climate Change Program (CNCCP), June 2007³ sets out a wide range of adaptation and mitigation principles and targets for 2010. Adaption targets involve extensive ecological restoration, the expansion of protected area systems and the wise use of water resources (Box 1).

The CNCCP requires government ministries and departments to strengthen co-ordination and co-operation, so as to achieve integration in addressing climate change. Local governments at different levels are required to enhance responses to climate by preparing and implementing local climate change program as a matter of priority. The key issue which has not been addressed directly is what tools and procedures will be used to achieve this integration across government and within sectoral and provincial development plans.

habitation should they have to migrate. The poor are settling in areas exposed to more risks from floods and other climate-related hazards (Adger, 2003). Rural poor who live in the lower Mekong countries and are dependent on fisheries as their major livelihood, together with those living in coastal areas are likely to suffer heavy losses without appropriate protection (MRC, 2003).

The studies and analysis of climate change effects on the GMS are recent. All reach dramatic conclusions on its potential implications for natural systems, communities and economies in the region. Consequently, climate change has now been

Vietnam's National Target Program for Climate Change 2008⁴ is similar to the Chinese model – but gives greater emphasis to “Mainstreaming the NTP in Strategies, Plans, Socio-economic Development Planning and other Sectoral/Local Development Plans”.⁵ Once again, the mechanism for achieving that integration is not specified – and, as in China, there is an opportunity for SEA to play a significant and systematic role.

³ Downloadable at <http://en.ndrc.gov.cn/newsrelease/P020070604561191006823.pdf>

⁴ MONRE, 2008, National Target Program to respond to Climate Change (*Implementing the Government's*

Resolution No. 60/2007/NQ-CP dated 3rd December 2007). As of August 2008, the second draft of the NTP prepared by MONRE was before Government for approval.

⁵ Draft 1 of the NTP, May 2008, section 4.8.

Box 1: Adaptation strategies in China's CNCCP TO ENHANCE CHINA'S CAPACITY TO ADAPT TO CLIMATE CHANGE

To increase the improved grassland by 24 million hectares, restore the grassland suffering from degradation, desertification, and salinity by 52 million hectares, and to strive to increase the efficient use of agricultural irrigation water to 0.5 by 2010 through the strengthening of farmland infrastructure, the adjustment of cropping systems, the selection and breeding of stress-resistant varieties and the development of bio-technologies and other adaptive countermeasures.

By 2010, 90% of native forest ecosystems and wildlife will be effectively protected and the nature reserve area will account for 16% of China's total territory, and 22 million hectares of desertified lands will be under control through the strengthening of natural forest conservation and nature reserve management and the continuous implementation of key ecological restoration programs, and the establishment of key ecological protection areas and the enhancement of natural ecological restoration.

By 2010, the vulnerability of water resources to climate change will have been reduced through a range of effective measures, including rational exploitation and optimized allocation of water resources, the development of new mechanisms for infrastructure construction and increased public awareness of the need for water-saving. By that time, the anti-flood engineering systems in large rivers and the high standard for drought relief of farmland will be completed.

By 2010, the construction and expansion of mangroves will be finished, the capability to resist marine disasters will be raised markedly, and the social damages and economic losses caused by sea level rise will be as far as possible reduced through scientific monitoring of sea level change and regulation of the ecosystem in marine and coastal zone areas and through the rational exploitation of coastlines and coastal wetlands and construction of a coastal shelter system.

STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA) EXPERIENCES IN THE GMS

SEA is in early stages of testing in the GMS, with systems most advanced in China and Vietnam (ICEM, 2007).⁶ In these two countries, policy commitments to SEA are included within legislative and administrative frameworks introduced over the past three to four years. The focus is on SEA of government development plans. It does not extend specifically to SEA of policies but higher level national, sector and provincial development plans are effectively policy frameworks so in practice the requirements are quite comprehensive. The legal frameworks and implementation guidance for SEA in each country is generally consistent with the OECD guidance on SEA (OECD, 2006). Yet, there are no detailed provisions for how to take climate change into account in SEA of development plans.

China has gone well beyond other countries worldwide in its SEA legal provisions. The EIA Law 2003 requires SEA to be applied to Land Use Plans and Plans for Regions, River Basins and Sea Areas (Article 7 on SEA of regional plans). Plans prepared by the ten main development sectors are subject to SEA and SEA statements before being submitted to the environmental review authorities. The sectors covered are industry, agriculture, animal husbandry, forestry, energy, water, conservation, transportation, urban construction, tourism and natural resources development (Article 8 on SEA of Sector Plans). Most significant, the law states that a draft plan without an SEA chapter or statement cannot be approved and implemented.⁷

Vietnam has similar legal provisions for SEA of regional and sector plans relating to all levels of government.⁸ Article 14 of the Law on Environmental Protection (LEP) of 12 December 2005 requires SEA for 6 categories of strategies and action plans relating to national socio-economic development, sector development (i.e. plans of each central government agency), provincial and city development, inter-provincial (regional) plans – e.g. for land use, forest protection and development, natural resource development, economic regions and river basin

⁶ See Appendix 1 for a list of selected SEAs in the GMS.

⁷ Key elements of the regulatory framework for SEA in China are the Environmental Impact Assessment Law (2003); General Principles of the Technical Guidelines for EIA (2003); Technical Guidelines for SEA (on trial) (2003);

and the Public Participation Provisional Regulation in EIA (2006).

⁸ Key elements of the SEA regulatory framework in Vietnam are the Law on Environmental Protection (LEP) dated December 12, 2005; Government's Decree on

development. The Law gives responsibility for SEA preparation to plan “owners” and emphasizes the involvement of all relevant central and local government agencies. It promotes integrated planning and management for geographic areas. Most significantly, it requires that SEAs cover environmental, social and economic impacts. The provisions do not yet address potential risks and impacts of climate change but they do provide a sound potential framework of sector and spatial development planning assessment for this purpose. Vietnam is drafting guidelines for general SEA application, in addition to specific guidelines for hydropower, land use planning and socio-economic planning. Current drafts of the general SEA guidelines (SEMLA, 2007) do consider climate change impacts and risks in three main areas of the SEA procedure: (i) setting objectives during scoping, (ii) analysing anticipated impacts of a plan against a business-as-usual scenario and (iii) during review of environmental mitigation and enhancement measures. However, at each of these stages in the SEA, the guidelines present climate change only in terms of adaptation (neglecting mitigation) and as a criterion in lists of general ‘practical tips’, for example – ‘Do not forget objectives related to adaptation to climate change’ (SEMLA, 2007).

China and Vietnam are at similar stages SEA application. Both are taking a piloting approach and allowing sector and local governments to gradually build capacity and understanding of how best to integrated the results into development planning.

- In China, 37 SEAs have been conducted at national level and more than 100 at local government level. SEAs have been prepared in the transport sector, ranging from railway planning, road network plans, and urban transport planning. SEA was applied in a detailed overview of the performance of a regional development plan (Great Western Development Strategy–GWDS) since its launch in 1999.⁹ The Chinese pilots also include SEAs of the National Hazardous Chemicals Regulations, Shangxi Coal and Electricity Development Strategy, the Chinese

Automobile Industry Policy, Economic Structural Adjustment in Jiangsu Province and the Chinese Energy Strategy. In 2008, the Hebei Provincial Chairman instructed all counties within the province to conduct SEAs as part of their development planning. This would result in an additional 200 SEAs if all counties comply. Yunnan Province is focusing the preparation of SEAs on plans for Industrial Parks, Eco-tech Development Zones, High-tech Development Zones, Tourism Recreation Areas and Regional Hydro-power Development. Land use planning SEAs in China have not considered climate change implications. Climate change has been identified as a critical gap in the scope of Chinese SEA regulations (Tao Tang et al., 2005).

- Vietnam’s experience in SEA is accumulating rapidly, with over a dozen plans subjected to SEAs in 2007 alone relating to national and provincial socio-economic development plans, land use plans and SEAs in the hydropower, agriculture and industry sectors. These SEAs are being applied across a range of administrative levels and spatial scales, for example:¹⁰

National sector plans – National Hydropower Development Plan (within the 6th Power Development Plan for 2006-2025);

Sub-national sector plans - Quang Nam Province Hydropower Plan for the Vu Gia-Thu Bon River Basin as part of the Quang Nam Power Development Plan until 2020; Socio-Economic Development Plan for the Northern Economic Focal Region until 2020;

Provincial socio-economic development and land use plans - e.g. Ha Tay Province Socio-Economic Development Plan 2006-2020; Ba Ria Vung Tau Land Use Plan until 2010; and

Sub-provincial area-specific development plans – Dai Tu District Social and Economic Development Plan (SEDP) 2007-2020 in Thai Nguyen Province; Social and Economic Development Plan until 2020 for Con Dao District.

implementation of some Articles in the LEP (No. 80/2006/ND-CP); MONRE Circular on SEA, EIA and Environment protection commitment (No. 08/2006/TT-BTNMT) and the MONRE General technical guidelines for SEA (drafted, November 2006 and now under trial).

⁹ This SEA supported by the World Bank also included a review of the SEA process in China, “highlighting existing strengths (e.g. political will, legal mandate, administrative framework, technical know-how) and weaknesses (e.g.

implementation, public participation, and SEA methodologies / procedures)” -

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/EXTAPREGTOPENVIRONMENT/0,contentMDK:20515211~menuPK:502915~pagePK:34004173~piPK:34003707~theSitePK:502886,00.html>.

¹⁰ A recent evaluation of pilot land use and economic development planning SEAs found that climate change had not be addressed in these Pilot SEAs (SEMLA, 2008)

Legal frameworks for SEA have yet to be developed within the remaining GMS countries – Cambodia, Lao PDR, Myanmar and Thailand – and practical experience of SEA in most of these countries is more limited.

In 2005, the Thai National Environment Board (NEB) appointed a Subcommittee on Strategic Environmental Assessment to consider, test and recommend approaches to SEA. In the same year, the Office of Natural Resources and Environmental Policy and Planning developed interim guidance on piloting SEAs. Since then, there have been no official pilot SEAs but some Universities have been experimenting with SEA methodologies and conducting SEA training courses.¹¹ The main context for testing of SEA approaches under other names has been regional and spatial planning in which Thailand has advanced frameworks and wide experience. Thailand has adopted a number of regional frameworks for integrated planning, the most important relating to the decentralization of industries and the development of regional growth centers.¹² One of the earliest planning/SEA projects was conducted in 1987 for an economic region in Thailand – the Songkhla Lake Basin – a major area of southern Thailand that was facing acute problems of environmental degradation, urban expansion and low incomes particularly in rural areas.¹³ Since then experimentation with hybrid spatial regional planning cum SEA methods has continued. Currently, ADB is supporting the National Economic and Social Development Board (NESDB) in preparing a strategic development plan for Southern Thailand. That planning process includes elements associated with SEAs as reflected in the summary staging for the project activities (Table 1).¹⁴

Table 1: Southern Thailand development planning process including SEA components

Stage 1: Defining Needs, Opportunities, and Constraints

1. Situational Analysis

- Review existing plans and policies.
- Review current planning responsibilities.
- Review existing economic incentive tools.
- Profile key economic sectors (existing and proposed).
- Identify new potential industrial sectors.
- Profile existing and planned infrastructure.
- Profile environment, land use, and social composition.
- Profile links with neighboring countries.

2. Assessment of Needs, Opportunities, and Constraints

- Determine development trends.
- Assess demand, by sector.
- Determine physical infrastructure needs.
- Determine soft infrastructure needs.
- Determine potential industrial clusters.
- Establish carrying capacities and location criteria.

Stage 2: Building Scenarios and Consulting Stakeholders

3. Definition of Development Scenarios through Stakeholder Consultations

- 3.1 Define two scenarios (trend-based and balanced-growth).
- 3.2 Disseminate international experience in industrial planning.
- 3.3 Hold workshops in the development zones.
- 3.4 Prepare concept plans for the different development zones.
- 3.5 Define and articulate a regional vision for development.

Stage 3: Preparing a Preliminary Regional Structure Plan

Stage 4: Developing a Road Map for Implementing a Regional Plan

¹¹ For example, in 2006, ICEM supported NEB and Mahindol University conduct a “SEA Training of Trainers Course”, Bangkok, Thailand, 22-26 January 2006

¹² See

http://www.ide.go.jp/English/Publish/Dp/pdf/032_tsunei_shi.pdf for a discussion of the regionalization process in Thailand and its implications for neighboring countries.

¹³ Siripongse, V and Sinclair A.B. 1987. Comprehensive Regional Planning in Southern Thailand – A cooperative economic cum environment development plan, In:

Engineering Conference Darwin: Developing Remote Areas: Printed Papers: pages: 113-119. Barton, ACT: Institute of Engineers, Australia. National Conference Publication, no 87/1

¹⁴ Asian Development Bank, 2007, Kingdom of Thailand: Planning for the Sustainable Development of Southern Thailand Technical Assistance Report Project Number: 40549 December 2007 - <http://www.adb.org/Documents/TARs/THA/40549-THA-TAR.pdf>

SEA methods are also being tried as part of development planning for Thailand's 25 river basins and 19 forest complexes. The Western Forest Complex and its ecosystem based approach to planning and management used many of the steps and methods which are part of the SEA tool box.¹⁵ The process followed there shows how spatial planning, zoning and environmental safeguards need to be key elements of SEA when comprehensive spatial plans are lacking – which is the case in most countries of the Mekong region. The preparation of river basin plans was launched in 2001 with the aim of involving stakeholders in the preparation process which, once again includes elements of SEA. Stakeholders including the grassroots are supported in assessing current development plans, identifying problems and needs and in formulating plans and projects which consider potential available water resources and other related resources such as land and forests, towards sustaining the ecosystems of the basins.¹⁶

To date, none of these experiments in spatial planning with SEA components have considered climate change or followed the draft SEA guidelines which also do not address the issue.

Within Cambodia and Laos, human and institutional capacity for SEA is very limited, with capacity building efforts focused mainly on strengthening existing EIA systems. One significant pilot SEA has been undertaken in each of these two countries, although climate change has not featured significantly in either: an SEA of the national tourism strategy in Cambodia¹⁷ (supported by the GMS CEP – ADB, 2008); and of the national hydropower plan in Lao PDR, with a focus on the Nam Thuen II Hydropower Project (supported by the World Bank, 2004).¹⁸ The Nam Thuen II experience is instructive because the project EIA was a cumulative, area-wide assessment on a regional scale but could not address many of the wider strategic concerns associated with the project. An overarching SEA proved necessary.

Environmental assessment procedures are least developed in Myanmar, where there are no legal requirements for EIA or SEA. A policy commitment in 1997 to developing an EIA system has yet to be fully realised, with EIA undertaken on an *ad hoc* basis. Human and institutional capacity for SEA is therefore severely limited.

In summary, despite obvious capacity limitations (in terms of structures, procedures and skills), the more developed nations of the GMS are embracing SEA as a tool, through a piloting approach, to address cumulative environmental impacts of government development plans at various levels and in different sectors. Climate change has not been considered in the piloting and demonstration activity and is only addressed in a rudimentary way in the SEA legal and administrative frameworks.

Most countries have developed, or are in the process of preparing national climate change plans spelling out priorities and targets. Therefore the policy frameworks are being put in place both for climate change and for SEA – but the functional linkages between them have yet to be defined. With China, Thailand, and Vietnam all drafting SEA guidelines, there is an immediate opportunity build in comprehensive provision for climate change in the assessment process.

OPPORTUNITIES TO INTEGRATE CLIMATE CHANGE INTO EXISTING SEA FRAMEWORKS IN THE GMS

Regional commitment to climate change assessments and adaptation

At regional level, GMS governments have recognised the importance of improving environmental management performance and preparedness for addressing the emerging challenges of climate change. In January 2008, the Second GMS Environment Ministers' Meeting issued a Joint Ministerial Statement recognising the

“environmental risks and vulnerability from climate

¹⁵ See <http://www.sampaa.org/PDF/ch1/1.6.pdf> for an overview of the Western Forest Complex planning experience.

¹⁶ ADB has been monitoring the river basin planning processes and supporting the establishment of River Basin Organisations -

<http://www.adb.org/water/Actions/THA/integrated-watershed.asp>

¹⁷ Other SEAs have been initiated in Cambodia eg an SEA of the Canadian International Development Agency's

Cambodia Land Administration and Management Project, <http://www.acdi-cida.gc.ca/CIDAWEB/acdicida.nsf/En/FRA-42495232-JAD>. The trend for internal SEAs including climate proofing components is evident – c.f. CARE and OXFAM UK in Vietnam.

¹⁸

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/LAOPRDEXTN/0,,contentMDK:20296229~pagePK:141137~piPK:141127~theSitePK:293684,0.html>

*change to biodiversity, livelihoods and economic competitiveness of the sub-region’ and calling on ADB, UNEP and other development partners to ‘mobilise additional financial and technical resources to enable the GMS countries to undertake assessment of risks to investments and local livelihoods’.*¹⁹

This ministerial statement presents ADB and other regional development partners with a critical opportunity to consolidate regional lessons and assist governments in building effective SEA systems with linked climate change adaptation policies. Systematic application of the tool to integrated climate change concerns in development plans in turn, would have a cascade effect of influencing programmatic and project specific EIAs. This umbrella strategic approach is important for environment and development challenges which cross international borders and when projects are promoted within internationally agreed frameworks such as the GMS economic corridors.

International guidance in using SEA to climate-proof development

International organisations are planning or already providing support to GMS countries on climate change and, increasingly, to SEAs. Unlike other development assistance interventions, climate change is so new that those organisations are on their own steep learning curve – especially in applying SEA for climate-

proofing sectoral and spatial plans at regional, national and local levels. For example, only two industrialised nations - United Kingdom (Levett-Therivel *et al.*, 2007) and Canada (CEAA, 2004) - have prepared guidelines for incorporating climate change into strategic environmental assessments. Most donors active in GMS do not have their own internal climate change policies and guidelines, let alone guidance on the more focused issue of how to incorporate climate change into SEAs. Even so, international organisations are rapidly gaining valuable experience²⁰ that can be applied to GMS - two examples considered here are the Organisation for Economic Cooperation and Development (OECD) and the ADB.

OECD initiatives

The OECD’s Development Assistance Committee’s (DAC) network on environment and development co-operation (ENVIRONET) is compiling advisory notes on SEA and climate change for development professionals (OECD, in prep.). These guidelines present a series of generic questions and checklists of specific entry points for considering climate change at each stage of the SEA process. This framework could be adapted and developed further to fit with the evolving SEA experience and systems in GMS countries. Draft entry point examples are shown in Box 2.

Box 2: Examples of climate-change questions for the four main stages of SEA

1. CONTEXT

1.1 Screening

For specific sectors, what are the main risks from climate change? (*e.g. loss of coastal systems for tourism, reduced runoff & recharge for water, increased rainfall variability for agriculture, expansion of disease vector ranges for health*)

1.2 Setting Objectives

Have more specific objectives been set considering a long-time horizon and/or focusing on specific risks related to climate change? (*Climate change is likely to reduce the availability of fresh water in many parts of the world, and may adversely energy production via impacts on hydro-power, forcing greater dependence on fossil fuels in the absence of adaptation.*)

1.3 Identifying Stakeholders

Which groups will be most affected by adaptation or mitigation measures? (*e.g. poor by water pricing, coastal communities by managed realignment*)

2. IMPLEMENTATION

2.1 Scoping

Do existing studies based on extrapolation of current climate change projections identify specific likely or plausible impacts on development? If so, through which mechanisms? (*e.g. future loss of productive land or salinisation of groundwater due to accelerating coastal erosion and sea-level rise*)

2.2. Collecting baseline data

¹⁹ The Second GMS Environment Ministers’ Meeting Joint Ministerial Statement. Greater Mekong Subregion Economic Cooperation Program. 29 January 2008, Vientiane, Lao PDR.

²⁰ C.f., World Bank, 2007: Multilateral Development Banks and the Climate Change Agenda <http://www.adb.org/Environment/MDBs-and-the-Climate-Change-Agenda.pdf>

What strategies are employed to address climate risks and hazards? (e.g. agricultural diversification and spatial heterogeneity in planting to cope with unpredictable rainfall ; energy rationing ; storm and flood early warning systems, etc.)

2.3 Identifying alternatives

Where existing plans will fail to deliver developmental goals due to climate change impacts, what alternative strategies and measures will ensure that developmental goals can be achieved? (e.g. where reduced rainfall affects viability of hydropower generation, substitute with micro-generation including biogas, solar, etc; where investment in water-intensive commercial agriculture on a large scale will be lost due to decreased water availability, pilot drought-resistant crops, etc.).

2.4 Identifying how to enhance opportunities and mitigate impacts

What risk management options could be incorporated to facilitate both adaptation and mitigation? (e.g. changes in land-management and cropping practices to promote soil, water and biomass conservation may aid adaptation to reduced rainfall amounts and increased rainfall variability, as well as delivering benefits in terms of carbon sequestration and earning credits under the Clean Development Mechanism or other global carbon trading/accounting systems)

3. INFORMING AND INFLUENCING DECISION-MAKERS

3.1 Making recommendations

What key policy changes are required to promote adaptation and mitigation? (e.g. are existing policy trends and reforms, such as restructuring of agricultural sectors, promoting or inhibiting adaptation and mitigation, e.g. through the ability of farmers to innovate, experiment and invest?)

4. MONITORING AND EVALUATION

4.1 Monitoring decisions

What tools and indicators should be used to ensure effectiveness of climate change integration in terms of development outcomes? Indicators can be used for example for monitoring how the success of water management activities in the country are driving changes in crop selection by farmers, for assessing whether those changes are sustainable in light of changes in water availability, and if not, for identifying how to adjust the management regime.

4.2 Monitoring implementation

Did the plan contribute to verifiable progress on climate change specific development issues? (e.g. agricultural production and food security, health, water quality and availability)

4.3 Evaluation of both SEA and plans

Did SEA provide useful information on climate change risks/opportunities of the plan and on mitigation and adaptation measures that could be adopted?

Source: Adapted from OECD (2008 in prep.)

The OECD draft advisory note is useful for the GMS in a number of ways. It reflects the latest thinking and experience worldwide on use of SEA to address climate change when assessing development plans and it comes at a time when SEA is being tested intensively in the region but has not considered climate change even though a high shared priority of the GMS governments. To make the OECD guidelines more relevant for GMS, the following could be undertaken:

- One or more international organisations active in the GMS could support development of a GMS specific advisory note based on the OECD draft, as part of a capacity building program on climate change adaptation and tools for its integration in development plans – particularly SEA.
- Individual governments which are preparing SEA guidelines (ie China, Thailand and Vietnam) could

draw on the note to build in climate change provisions.

- International organisations active in the GMS could use the advisory note as a guide in preparing internal procedures as part of their frameworks of environmental safeguards and advice on use of SEA
- The program of SEA pilots supported by international organisations and focusing on development sectors and economic corridors at the GMS level should be extended to cover other economic sectors and corridors as a way of testing SEA climate change provisions.

ADB initiatives

ADB is integrating climate change into its key policies and strategies, including the draft Long Term Strategic Framework (LTSF)²¹ and the consultation draft

²¹ ADB, 2007. Strategy 2020: The Long-Term Strategic Framework of the Asian Development Bank 2008–2020.

<http://www.adb.org/Documents/Policies/Strategy2020/Strategy2020.pdf>

Safeguard Policy Update (SPU).²² Following completion of the SPU, ADB will integrate climate change into its Environmental Assessment Guidelines, including revising the text on strategic environmental assessment to incorporate climate change assessment, mitigation, and adaptation. To operationalise these changes, ADB has drafted a climate change adaptation program, to be financed through internal and external sources, including ADB's new \$40 million Climate Change Fund.²³ The program includes the following key elements and SEA (which incorporates climate change concerns) has a critical role in their implementation:

Incorporating vulnerability risks into Country Partnership Strategies. As future Country Partnership Strategies (CPSs) are developed, climate change impacts and adaptation needs should be considered and incorporated. Current practices for country environmental analysis and disaster risk assessment should be adjusted to include the analysis of climate change vulnerabilities. Efforts are also underway to strengthen and mainstream the links between planning for climate change adaptation planning and disaster preparedness and response under ADB's ongoing *Disaster and Emergency Assistance Policy Update*. SEA methodologies provide a useful framework for guiding the review and reform process either as an assessment of current CPSs or in preparing the next round of strategies.

Adjusting sector strategies to climate change impact realities. Sector roadmaps at the country level will need to incorporate climate change considerations. The sectors of greatest vulnerability include (i) agriculture and natural resources, (ii) water supply and drainage infrastructure, (iii) transport – including coastal roads and ports, and (iv) energy – especially hydropower. ADB developing member countries will need help to develop the necessary policy, institutional, and investment responses for each of these sectors. Once again, SEAs can be used as a tool in the integration process.

Portfolio risk analysis within ADB. ADB needs to adopt effective screening tools for the analysis of climate change risks affecting future ADB projects. ADB has initiated an assessment of climate change vulnerabilities facing its current portfolios of projects.

The Bank estimates that the increased incremental cost of “climate proofing” these projects could be 10-20% higher than current costs. Climate proofing may therefore require significant incremental financing. Ongoing portfolio risk analysis will test and refine screening tools, and ADB procedures, including application of SEA, will need to be adjusted to ensure that climate change impacts are considered in all portfolio and future project designs. Screening procedures may be incorporated into safeguard measures or other steps in the project cycle as well as sector guidelines.

Support for SEA-climate change demonstration pilots: In parallel with development of policies, strategies, and programs, ADB is supporting several on-going pilots for strategic environmental assessment in the GMS. Three are being conducted as part of the GMS Core Environment Program and one was carried out as part of ADB's infrastructure development program in Vietnam. Each is making initial attempts to recognise climate change impacts. The pilots are summarised in the next section.

ADB pilot SEAs which have considered climate change

ADB is supporting two kinds of SEA pilots and encouraging each to explore ways of addressing climate change: (i) through the framework of the GMS Core Environment Program and linked to regional development strategies and plans and (ii) as an element of country specific investment programs.

Cambodia: SEA of the National Tourism Plan (which dovetails with the GMS tourism sector strategy). Climate change did not feature significantly in this SEA other than noting that sea level rise is likely to have an impact on plans to develop beach resorts and offshore islands. The key strategic concerns identified in the SEA include “excessively rapid urban growth without adequate infrastructure or attention to climate change impacts”. Many of the mitigation measures proposed are linked to climate change adaptation. For example:

- protecting forest cover with a “no tree removal” regulation;
- banning clearing of mangroves for shrimp ponds or other uses;

²² ADB, 2007: Consultation Draft of the Safeguard Policy Update.
<http://www.adb.org/Documents/Policies/Safeguards/Consultation-Draft.pdf>

²³ <http://www.adb.org/Media/Articles/2008/12474-asian-climates-changes/default.asp>

- replanting mangroves and watersheds in suitable areas;
- providing protected area status for the most valuable mangrove areas;
- imposing strict building codes for islands where permanent residences or hotels are permitted; and
- preventing linear development by preparing town development plans for all beach areas.

Vietnam: SEA of the National Power Development Plan 6 with a focus on hydropower, and which is being undertaken in the context of the GMS energy sector strategy. This SEA is addressing climate change especially through estimating the impacts of different energy production scenarios on green house gases. Under the scenarios, a reduction in the number of hydropower projects is offset by an equivalent increase in thermal power output by expanding existing plants. The increase in green house gases was found to be very significant as more power capacity was picked up by thermal coal fired facilities – methane from coal mining and CO₂ from the power plants. The economic costs associated with this added air pollution load were valued as a way of comparing strategic power production options.

Vietnam: SEA of the Quang Nam Province hydropower plan covering the Vu Gia-Thu Bon River Basin. This is first SEA in the GMS to address climate change as part of a river basin SEA. The assessment identified a range of important climate change impacts on the hydrology of the basin for example:

Increased flooding - Continuing watershed degradation combined with climate change are expected to exacerbate severity of flooding in downstream areas. Increases in size of extreme flood flows are associated with predicted (likely) increases in intense tropical cyclone activity. Substantial increases in annual average river flows in wet tropical locations are forecast by IPCC (2007).

- **Sea level rise** worldwide predicted by climate change models during the next half century will be in the range 0.1 to 0.25 m (IPCC 2007). This will affect flooding in the seaward parts of the Delta, for example, the tourist destination and UNESCO World Heritage Site, Hoi An.
- **Increase in rainfall** - Heavy precipitation events and intense tropical cyclone activity are likely to increase in frequency by mid-century in Vietnam

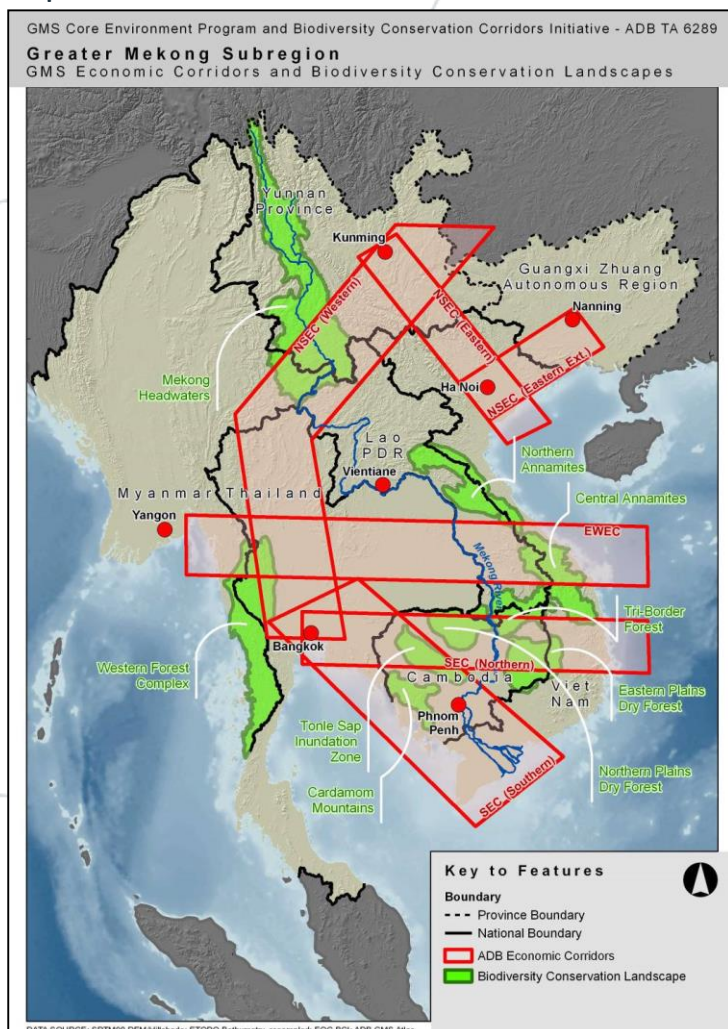
(IPCC, 2007). Increases in annual rainfall by year 2050 for the region are predicted to be up to 10%.

- **Dry season minimal flows and effect on salinity intrusion** - Global increases in temperature will increase evapotranspiration, leading to decreased flows during the dry season. For Da Nang, an increase in 3.2% in annual evapotranspiration is forecast to arise from an average increase in temperature of 1°C.
- **Sediment transport and sand excavation** - Trends towards larger extreme flood flows associated with climate change will cause much larger extreme sediment transport events, because of enhanced erosion and enhanced fluvial transport capability of the river system. Long-term average sediment transport events will also increase. Flooding associated with temporary and permanent deposition of fluvial sand will worsen.
- **Water supply affected by the Hydro-power Plan** - Future climate change is expected to create changes to the timing of flows, and to the extremity of drought and floods. This is not presently quantifiable and the change in climate will be permanent.

The SEA carried over the climate change risks into one of the principles guiding mitigation and enhancement – “the safe operations principle: emergency preparedness - prevention and planning for preparedness in case of catastrophic failure situations, including incorporation of climate change parameters in design and management”. Also, they were picked up through a wide variety of mitigation recommendations including those relating to the rehabilitation and maintenance of terrestrial and wetland ecosystems (ICEM, 2008).

SEA of the GMS North-South Economic Corridor Development Strategy and Action Plan scheduled for completion in December 2008. This SEA is important for a number of reasons – it is focusing on the GMS North South Economic Corridor running from Kunming in Yunnan Province of China to Bangkok, through Myanmar, Lao PDR and Thailand (Map 2). It is the first transboundary SEA undertaken in Asia (one of the first worldwide) that will address climate change. The GMS economic corridors had their origin as transport – or more specifically, road – corridors. Now their function has expanded as a focus for a wide range of investments in infrastructure, industry and servicing facilities. The main partner countries in this SEA – China (Yunnan Province), Lao PDR and Thailand met in Kunming in May 2008 to conduct a scoping

Map 2: GMS Economic Corridors



International Cooperation (JBIC) Institute are collaborating to carry out an assessment on the impacts of climate change on four major coastal cities in Asia – Karachi, Bangkok, Manila and Ho Chi Minh City (HCMC). A separate study is being conducted for each coastal city with synthesis reports to evaluate similarities and differences, and to identify common approaches to adaptation. Each study will address three questions (i) what environmental, social and economic effects are expected due to climate change, and what is the projected magnitude of these impacts; (ii) what adaptation measures could each city employ to address the threats and related impacts; and (iii) what are the key policy priorities for decision-makers to deal with the threats. The HCMC study is emphasizing the integration of adaptation measures into sector development plans, especially transport, water resources and agriculture, and into the City land use plan. The study will provide the foundation of methods and mitigation suggestions for a series of SEAs linked to development planning in the City and surrounding provinces as an important part of climate change adaptation.

exercise. They identified air pollution as a key strategic issue “including road/transport, agricultural residues, slash & burn at a large scale & forest fires and greenhouse gasses”. The strategic objective linked to the issue was defined as “To minimise air pollution from specific key sectors (eg agriculture, Industry, transport, domestic) including greenhouse gasses.” There was less awareness and concern regarding the ecosystems impacts of climate change and the effects on agriculture, fisheries and forestry (ADB, 2008).

CLIMATE CHANGE STUDIES USING SEA METHODS

A number of climate change studies in the GMS have implications for testing and development of SEA/climate change assessment methods and building of capacities in their use. Two are summarised here.

Ho Chi Minh climate change study: ADB, the World Bank (WB) and the Japanese Bank for

Mekong Delta climate change impact and adaptation study: This study is being planned by the Vietnam MONRE and international partners as a priority under the National Target Program. It is unusual because it aims to address five levels of linked development and climate change adaptation planning from a site specific assessment through to Mekong Basin wide concerns as follows:

Biosphere reserve in Kien Giang	▪ Detailed site specific climate change assessment and adaptation planning
Kien Giang Province	▪ Detailed provincial climate change assessment and adaptation planning – sectors, areas and communities
Mekong Delta region	▪ Detailed climate change assessment including modeling, natural system and socio-economic assessment

	<ul style="list-style-type: none"> Regional exchange of experience and lessons among provinces and projects
National	<ul style="list-style-type: none"> Briefing workshops on approach and lessons, NTP committee meetings on progress and next steps Planning for replication in other regions Involvement of National Mekong Committee
Mekong River Basin	<ul style="list-style-type: none"> Basin wide modeling inputs Integration of Delta study with MRC climate change program

The study will adopt an SEA methodology with the following assessment stages:

- Baseline assessment (including natural systems survey)
- Climate change threat analysis
- Impact assessment on (a) natural systems, (b) social systems and (c) development sectors
- Adaptation options for most vulnerable areas and sectors
- Socio-economic assessment and valuation of costs of threats and adaptation options
- Definition of priorities for action

CAPACITIES NEEDED IN SEA TO INTEGRATE CLIMATE CHANGE

In a positive sense, the early stage of SEA development and of climate change policies within the GMS means that governments are not constrained by entrenched practices or outmoded legislative frameworks. Climate change can be incorporated from the first steps of SEA legislation and implementation. The GMS is in a position to benefit from and contribute to the development of international best practice in this domain.

Experience in using SEA within the GMS demonstrates three main constraints in adapting the tool for climate change mainstreaming: (i) weak or non-existent institutional and administrative frameworks, (ii) significant human capacity limitations at all levels of government for implementing SEA and (iii) budget allocation within sectors and local government for conducting SEAs on a regular basis. Investment is needed to strengthen the basic policy and institutional arrangements promoting SEA as a tool for ensuring sustainable development in a changing climate regime. In addition to practical considerations of

technical competence in local practitioners of SEA, there exist a number of other areas of capacity deficit than require strengthening before SEA can deliver climate-proofed plans for sustainable development, including: methodologies and tools for threats analysis and assessment of impacts, and interpretation of results in practical development planning terms.

LESSONS FOR BEST PRACTICE

The GMS experience in SEA and climate change provides lessons which can inform future development of best practice in systematic application of SEA as a tool to mainstream climate change into development planning. Lessons discussed in the paper lead to a number of suggestions for continuing to promote innovation and practice.

SEA procedures and climate change adaptation governance

Beyond addressing the substantive environmental and development concerns of climate change impacts and risks, SEA can serve to strengthen governance capacities across the GMS needed for climate change adaptation. SEA's contributions to improved governance include the systematic, analytical and participatory process of the spatial and sectoral issues of climate change. SEA processes can (i) strengthen strategic and integrated development planning in GMS at regional and national levels in ways which build in climate change concerns; and (ii) serve as a vehicle to enhanced levels of stakeholder participation in development planning processes so that groups and sectors vulnerable to climate change are well represented.

Important governance, procedural and substantive lessons stemming from the first wave of ADB SEA pilots need to be addressed if the tool is to contribute effectively to climate change adaptation. Those lessons include the following:

- SEA has been demanding in terms of budgetary, staffing and skills resources. As practices and procedures for applying the tool become more systematic, those resource demands can reduce (as has been the experience with EIA over the past 15 years in the GMS).
- In most situations, SEA is stepping into a spatial planning vacuum which can make the process more demanding and difficult. SEA is substituting and, in some cases providing the spatial planning framework of safeguards against which development can proceed. As GMS countries

establish more effective spatial planning systems, SEA will become a more routine process for checking that development has complied with standards and safeguards, including those for climate change.

- SEA teams in the GMS have found the consideration of development planning options especially difficult. Most often the development plan under focus has not adequately considered options. The role of SEAs as a substitute in the process of generating and assessing development options is not well understood.
- Public involvement in the SEA process proved challenging – who to involve, when and to what extent has not been easy for GMS planners to resolve. There are many constraining factors in the region – especially in strategic level planning – and the nature of participation in SEAs differs from EIA.
- Differences in SEA jargon and staging has created problems – because the tool is so new world wide, there are many terms for the same or similar processes and uncertainty about the steps. A set of GMS guidelines is needed, tailored to local conditions and needs.
- The SEA pilots have shown how useful the tool can be in addressing equity issues, for example, between regions, provinces or groups. Often EIA of projects has not been able to address those more strategic concerns.
- SEA has proved especially useful in dealing with options for the pace and scale of development and consideration of staging (i.e. the timing and intensity of development). These strategic matters have not been well considered in the first round of development plans targeted for pilot SEAs in the GMS countries.
- SEA appears to be especially useful in promoting the sustainable use of resources and in exploring the tradeoffs involved in different uses. Many environmental quality issues can be addressed at the project level through EIA – but balancing resource use is most often a strategic planning process.

Suggestions for improving SEA practice

Initial steps which need to be taken at GMS and national level to learn from recent experience and improve SEA performance in climate change adaptation include:

Develop tools to assess risks and impacts of climate change – Practical tools for assessing the threats and impacts of climate change and for defining

adaptation and mitigation measures are not in place in the region. This has been a barrier for GMS countries wishing to incorporate climate change parameters into SEA.

Require SEA application upstream of individual ‘mega-projects’ – EIAs for major infrastructure projects (for example, transport and hydropower) confront strategic issues relating to climate change that cannot be addressed at the project level. The wide application of the Chinese approach requiring SEA of all plans prior to approval would allow for the integration of climate change concerns upstream of project specific planning.

Introduce SEA through piloting to enhance capacity – Some GMS countries are struggling to build capacity (in terms of procedures, structures and skills) for implementation of EIAs. SEA of plans can be expected to be more challenging. Hence appropriate piloting and testing approaches are needed and the gradual application of SEA in keeping with local capacities. In China and Vietnam, national regulations require all plan owners to apply SEA. Strict enforcement of this regulation could result in a large volume of poor quality, ineffectual assessments. The step-wise piloting approach to introduction of SEA at the GMS level and nationally appears to be a pragmatic and appropriate one.

Ensure top decision makers are engaged in pilot SEA experiences – Many SEAs conducted in the GMS to date have addressed plans that have already been approved, so recommendations for mitigation and enhancement have often met with resistance. The SEA of the Quang Nam Province Hydropower Plan for the Vu Gia-Thu Bon River Basin targeted senior decision makers at all stages and kept them closely engaged in the process. This brought high level consideration of climate change and other strategic issues and a commitment to implement SEA avoidance and enhancement recommendations.

Use SEA to build a foundation of capacity in spatial planning – SEAs with a spatial focus have received the most enthusiastic response from government planners and decision makers. Clearly defined spatial parameters facilitate tangible appreciation and comprehension of environmental issues (including climate change), competing resources uses, the trade-offs and potential solutions as elucidated through the participatory SEA process. Therefore, spatial planning provides fertile ground for further piloting of SEA and building of requisite capacity, before elevating

experience to tackle more intangible over-arching sector plans, and possibly highest level policies, such as energy and transport modalities.

Learn from natural disaster management – In relation to climate change impacts, GMS governments and donors alike share one particular area of relevant and extensive existing experience to draw upon when employing SEA - disaster management and preparedness. Comprehensive policy and action programs are in place in this field, and receiving significant budget allocation (state and ODA). At the local level, authorities, donor agencies and local communities have experience in the technical aspects of climatic impacts, such as typhoons and floods. SEAs need to draw on existing capacity and approaches in disaster management when exploring options in adaptation planning. There are differences between the experience and practice with disaster management and the needs of climate change adaptation. Disaster management is typically reactionary, with short-term, site specific and specific emergency responses by a designated agency; climate change, on the other hand, demands longer term proactive strategic thinking beyond the horizons of most planning cycles and action by all levels and arms of government. SEA can inject this crucial strategic and integrated thinking across spatial, sectoral and temporal boundaries.

Capitalise on the participatory nature of SEA – Perhaps the most beneficial aspect of the pilot SEA experiences in the GMS has been the consultative process (although it has proved challenging), which has resulted in raising awareness of environmental issues, and of climate-change in particular, as government authorities from different sectors have come together to define and debate shared concerns for the first time. One of the important benefits of integrating sectors through SEA of spatial planning is the strengthening of ownership, on the part of the

various stakeholders, of the plan and responsibility for its potential impacts.

SEA reforms and initial steps for climate change adaptation are proving to be a fortunate congruence of priorities in the GMS. SEA provides an important tool and process for integrating climate change concerns in development planning – and climate change analysis allows SEAs to explore many of the strategic development-environment relationships which to date have proved elusive in spatial and development planning and in EIA in GMS countries. Continuing innovations of the kind suggested in this paper are needed at GMS and national levels and within development agencies to take full advantage of SEA as an influential planning tool in climate change adaptation.

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