Policy Brief

Reducing Risks: Adaptation to Climate Change among Local Communities in People's Republic of China, Kingdom of Thailand and Socialist Republic of Viet Nam

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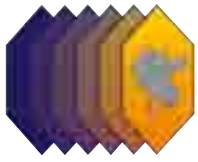

Cover photos and photo credits: Stephen Griffiths, ADB; GMS-EOC

Design and layout: Keen Media (Thailand) Co., Ltd.

GMS Environment Operations Center

The Offices at Central World, 23rd Floor
999/9 Rama I Road, Pathumwan
Bangkok 10330, Thailand

Tel: +66 2 207 4444
Fax: +66 2 207 4400

E-mail: info@gms-eoc.org
Web: http://www.gms-eoc.org

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Summary of Key Messages

Climate change risks and vulnerability in the Greater Mekong Subregion (GMS)

Recent studies show that climate change and air pollution pose serious social, economic and environmental challenges to future development in the GMS.

The GMS is especially vulnerable because its rural economy is dependent on sensitive natural resources including crops and livestock, forests, water resources and biodiversity which provide invaluable services to the region. Currently, the region is poorly equipped to cope with the impacts of climate change.

These vulnerabilities will particularly affect the livelihoods of subsistence agrarian communities and will impede programs for poverty reduction.

Building climate resilience in the GMS starts with including future climate risks into development decisions

While some countries have adopted several adaptation strategies, decisions on a wide range of major developments from the planning of highways and hydroelectric facilities to irrigation infrastructure need to routinely take future climate risks into account. Currently, this rarely occurs in the GMS.

A way forward

Several major tasks will be necessary over the next decade or two for the region to adapt to climate change and mitigate air pollution. Key priorities are:

1. Capacity to carry out climate impact assessments should be strengthened.
2. Awareness of climate change impacts and adaptation within governments and donor agencies should be increased.
3. Tools to build climate change adaptation into national development activities need to be provided.
4. The ability of local communities to cope with uncertainty and learn from experience needs to be strengthened. This can be achieved by training relevant departments, enabling better coordination between stakeholders and effective financing of required initiatives.
5. Disaster preparedness needs to be developed, for example, by the development of early warning systems.
6. Appropriate climate resilient infrastructure needs to be planned and developed (e.g. water storage systems and efficient irrigation systems).
7. Planning for disaster risk management needs to be improved.
8. Policies for climate change and air pollution should be integrated, starting with policies and programs which are already in place.
9. The benefits from a global carbon market (including REDD/REDD+) and benefit sharing mechanisms at local, national and sub-regional levels should be closely investigated.
10. Regional cooperation within the GMS should be strengthened. This may vary, for example, from the sharing of critical information and lessons within the GMS through to joint infrastructure projects.

1 Increasing CO_2 and air pollutant emissions in the GMS

The rapid economic growth in the Greater Mekong Sub-region (GMS) in the last two decades has led to substantial growth in emissions of greenhouse gases and air pollutants to the atmosphere. Asia's share of global energy-related carbon dioxide emissions grew from 8.7% in 1973 to 30% in 2006. Emissions of most air pollutants in the GMS region have also increased by similar percentages. If current global energy consumption patterns continue, carbon dioxide concentrations in the atmosphere are expected to exceed 700ppm and global average temperatures will rise by between 1.8 and 4.0°C by 2100.

Recent research has shown that climate change and air pollution are two sides of the same coin. A remarkable finding is that nearly 50% of the emissions causing global warming are from air pollutants other than carbon dioxide including black carbon, methane and ground level ozone. The sources of emissions are very similar, and include fossil fuel combustion, industrial emissions, vehicle emissions, etc. Consequently, most measures to reduce air pollution will help combat climate change and vice versa.

2 Climate change impacts for the GMS and individual countries

The GMS

The future climate of the GMS is likely to be warmer and wetter with more frequent extreme weather events. Models of the regional climate of the region to the end of this century suggest that the climate will be slightly warmer, but the daily and seasonal warm periods will become much longer in the future, especially in the latter half of the century. Both daily maximum temperature and daily minimum temperatures will increase (See Figure 1). In addition, the hot season will become longer, and expand to a wider area of the region. Precipitation is likely to fluctuate in the first half of the century but in the latter half of the century higher precipitation is likely throughout the region (See Figure 2).

The changes caused by climate change in the GMS will increasingly affect national development and poorer populations are the most vulnerable. Global warming poses significant risks to socio-economic development and the environment of the GMS through expected impacts on temperature, seasonal rainfall patterns, extreme weather events, flooding, droughts, increase in sea levels, with potentially severe impacts on biodiversity, agriculture, water resources and livelihoods. An Asian Development Bank (ADB) study of the economic impacts of climate change suggests that Southeast Asia is likely to suffer more from climate change than the global average, with economy-wide costs of climate change for Thailand and Viet Nam of 6.7% of GDP per year by 2100. Likewise, a recent World Bank study suggests that the East Asia and Pacific Region would have the highest cost of adaptation in both wetter and drier scenarios. Adaptation for agriculture and coastal zones will cost US$5 billion per year by 2020 for Indonesia, Thailand, Philippines and Viet Nam.

The region is the most vulnerable in the world to natural disasters resulting from climate change. Economy-wide GDP loss for Indonesia, the Philippines, Thailand and Viet Nam is estimated to be 6.7% of annual GDP by 2100.

Figure 1: Average daily maximum temperature from the 1980s to 2090s

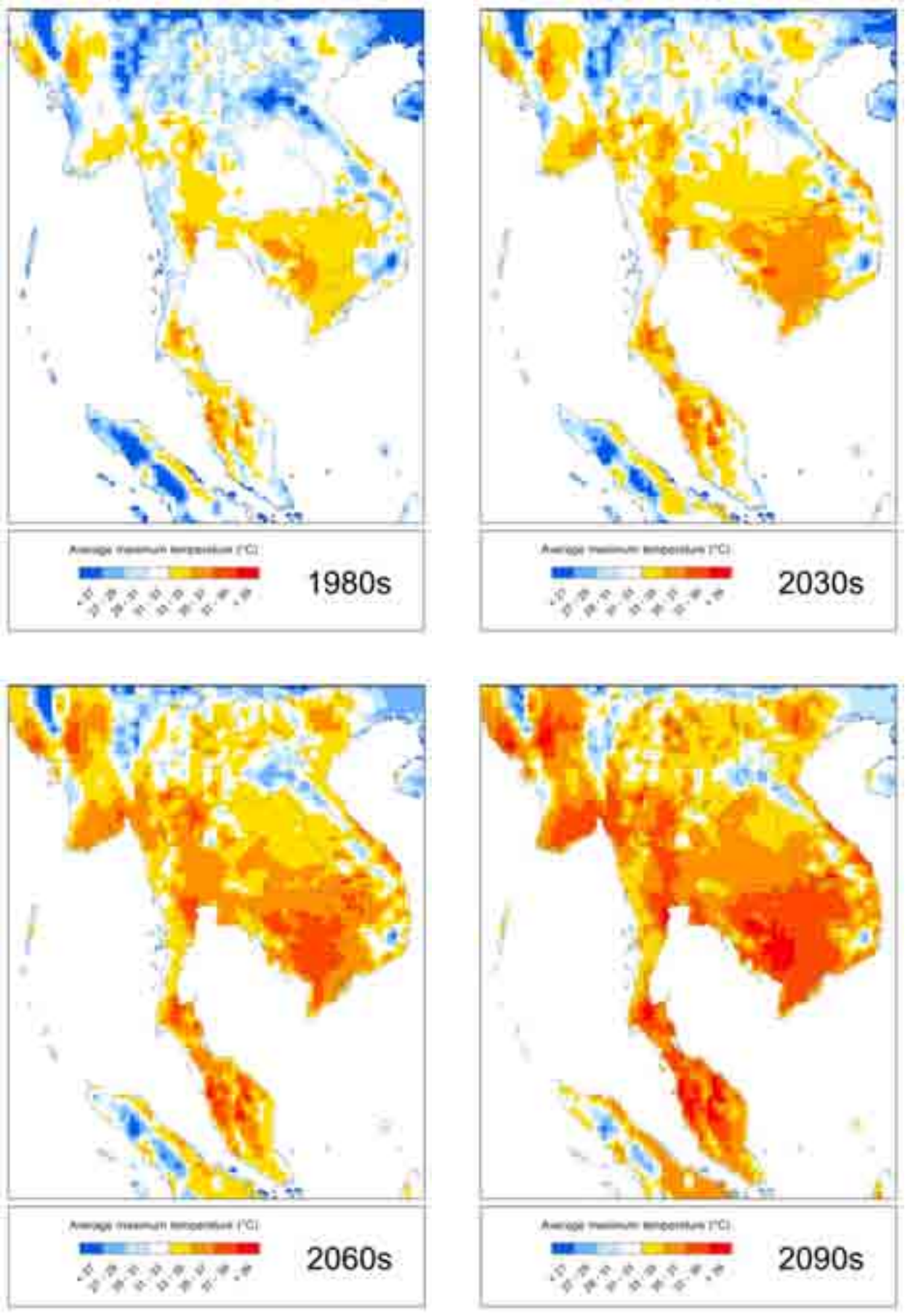
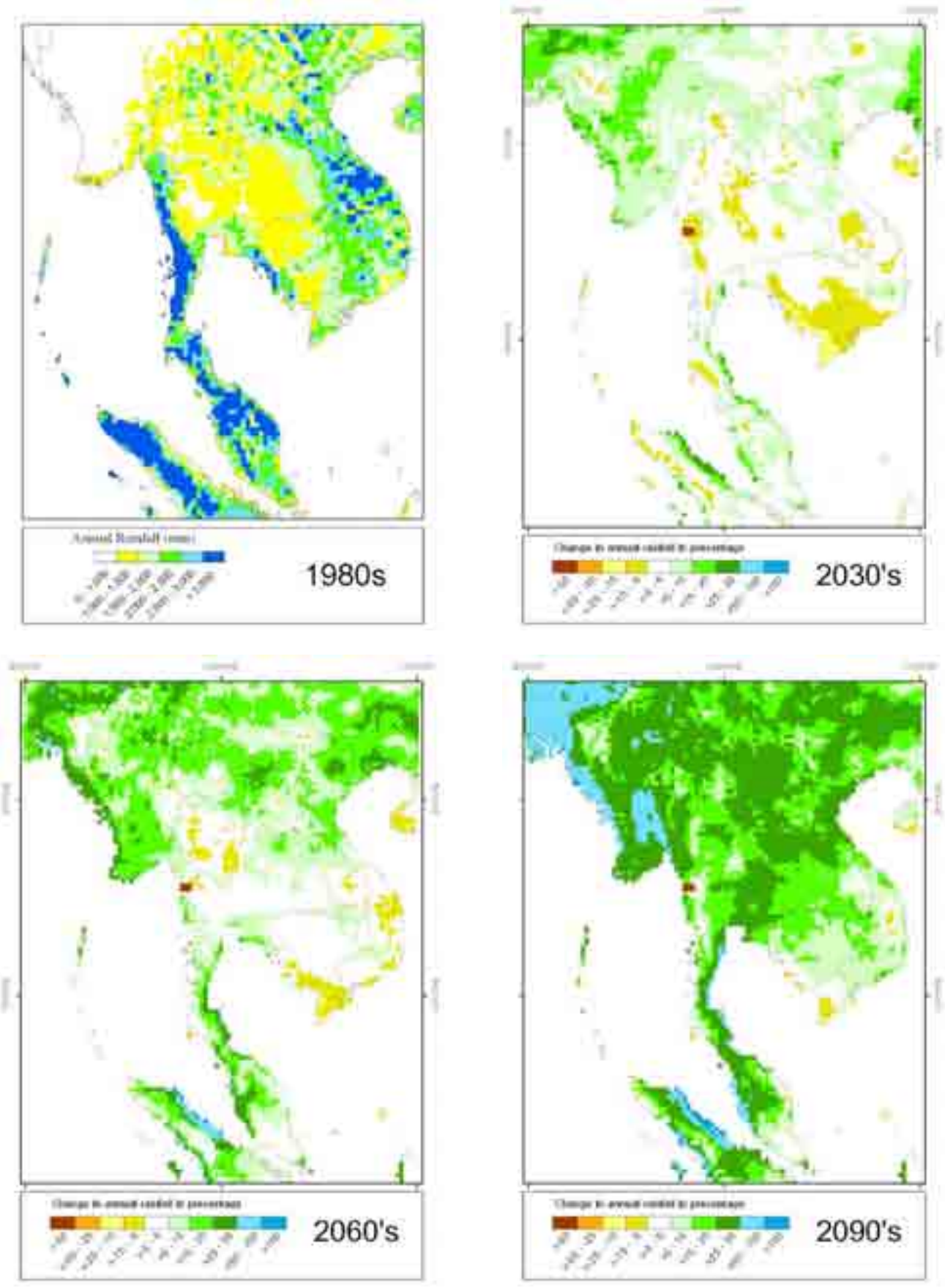


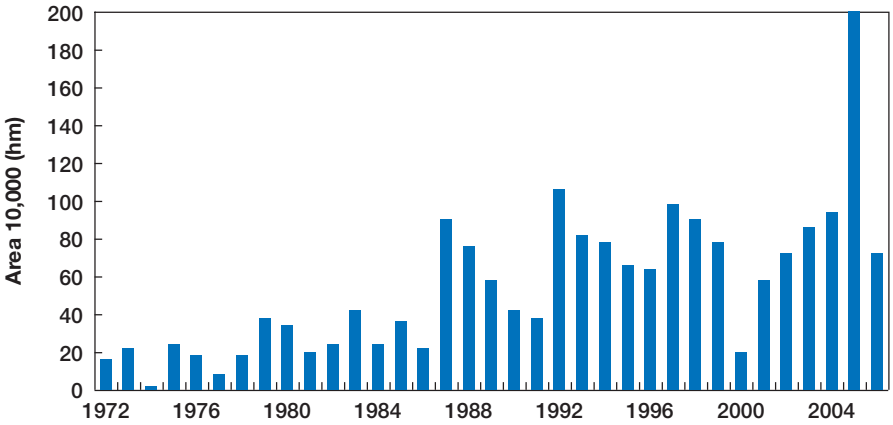
Figure 2: Annual precipitation (mm) and future change compared to 1980s



People's Republic of China (PRC)

The average losses caused by meteorological disasters in Yunnan Province, PRC, may account for 6% of the provincial GDP, even 10.0% in the most serious disaster year. From 1961 to 2006 the annual average temperature in Yunnan Province, PRC, increased by 0.64°C. Climate change and habitat destruction caused by irrational development and land use patterns, biological invasions and other factors have led to a reduction in biodiversity. Climate change has resulted in increased effects of extreme weather events on agricultural production, reduced water resources and drought in Yunnan Province as shown in Figure 3.

Figure 3: Area affected by annual drought disasters in Yunnan Province, PRC

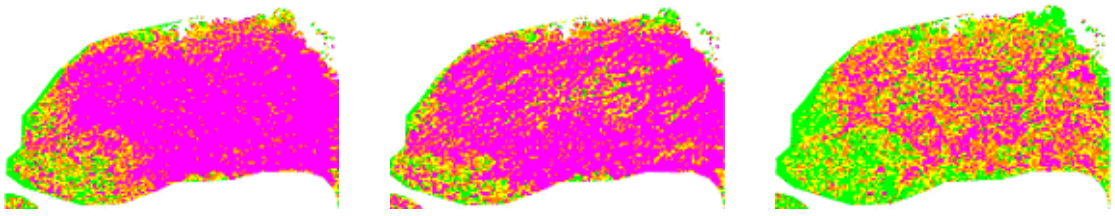


Climate change is also affecting Guangxi Province – rising temperatures and sea levels, changed rainfall distribution, and increasing frequency and intensity of extreme weather events has lead to massive flooding, landslides and drought causing damage to property and human life. Climate change is also affecting agricultural production and food security by exacerbating water stress. Other impacts include an increase in rock desertification, worsening rural livelihoods, degradation of forests and damage to coastal marine resources.

Demonstration Project for the Prevention and Recovery of Rock Desertification in Guangxi Province

Rock desertification is a process by which an area is transformed into a rocky landscape almost devoid of soil and vegetation. In recent years, some counties have been selected as demonstration project sites for the prevention and recovery of rock desertification in Guangxi Province. The project in Pingguo county has shown encouraging results, as can be seen in Figure 4 which illustrates the rehabilitation of land affected by rock desertification in the area.

Figure 4: The temporal-spatial change of rock desertification in Pingguo county based on satellite data. The area of purple, tawny and yellow represents high, intermediate and light rock desertification respectively, and the green area is vegetation.



Thailand

The risks to biodiversity in Thailand are invariably compounded by other pressures arising from human activities, in particular, those resulting in habitat modification. Droughts, floods and storms already have major impacts in Thailand. More systematic learning from these experiences could help to address future climate variability.

Food security in Thailand

Food security in Thailand is closely related to agricultural production and food prices, which depend on allocation of water resources and, increasingly, fossil fuel prices. In the short to medium term and at the national level, Thailand appears to have a relatively secure food supply. As the risks of climate fluctuations increase with global warming, this food security becomes undermined, especially at local levels where other factors also affect household access to food. Farmers of rain-fed rice may be among the most vulnerable groups to climate change. Diversification of livelihood strategies appears to be a key to maintaining resilience and may include off-site migration.

Viet Nam

Climate change is threatening Vietnamese people directly and affecting the safety and the economy of the country. If the temperature increases by 2°C, about 22 million people in Viet Nam would be affected and 45% of the land used for agriculture in the Mekong Delta, the granary of Viet Nam, will be under threat of inundation. There is growing evidence of climate change in Viet Nam, reflected by the increasing number of storms, major rain events and serious flooding and drought. An urgent task is to develop "Action Plans" to adapt to climate change and implement these plans in vulnerable regions. The Government of Viet Nam is giving special attention to adaptation in the agricultural sector, especially to rice production, in accordance with its goal is to ensure food security for the country.

Impacts of climate change on rural livelihoods in Viet Nam

The rural population in Viet Nam represents 73% of the total national population. The total production from agriculture and forestry in Viet Nam accounts for 20% of national GDP. Most of the poorest people live in rural areas. Thus, in Viet Nam, the links between poverty and environment for rural livelihood are becoming more evident as a result of climate change. Climate change poses a threat to the many Vietnamese people who rely on agricultural production and forest resources for their survival.

GMS economic cooperation and climate change

"Climate change impacts threaten to reverse decades of progress in poverty reduction in Asia and the Pacific." ***Ursula Schaefer-Preuss, ADB Vice-President for Knowledge Management and Sustainable Development***

Climate change has been identified as one of the priority areas for program development by the GMS Working Group on the Environment.

It is emerging as a cross-cutting thematic area in the Core Environment Program and Biodiversity Conservation Corridors Initiative (GMS CEP-BCI) with a focus on:

1. Strengthening risk and vulnerability assessment capacity, especially ecosystems services, livelihood and productive sectors such as agriculture, energy, infrastructure and tourism;

2. Implementation of activities to reduce CO_2 emissions from land-use changes and sectors such as energy and transport;

3. Integration of climate change within CEP-BCI programmatic components (SEA, BCI and EPA); and facilitation of cross-institutional coordination to synergize responses.

3 Air pollution impacts in the GMS

Emissions of air pollutants have major impacts on human health and the environment in the GMS. Most notably, fine particles in air are estimated to cause 520,000 premature deaths annually in Asia. In addition the projected increases in ground level ozone and acid deposition are expected to lead to significant crop losses and damage to biodiversity in the GMS in the coming years.

Future impacts of ozone and acid rain

Ground level ozone has harmful effects on human health, materials and plants, as well as having a global warming effect. Major sources of the precursors include industry, motor vehicles, gasoline evaporation and chemical solvents. Measured levels of ozone in the GMS are high and adverse effects of ozone may already be significant. In particular, many agricultural crops in the GMS (including rice, wheat, peanut, soybean, etc.) are sensitive to ozone toxicity with a threat of up to 35% reduction in agricultural crop yield by 2020. As a greenhouse gas, a strategy for ozone pollution reduction will lead to air quality and climate co-benefits as a win-win solution.

Modelling of future ozone and acid deposition rates indicate higher levels and larger affected areas in the GMS region due to increasing emissions of air pollutants. Simulation of ground level ozone and acid deposition over the GMS shows that the maximum hourly concentrations of ozone and deposition of acids will substantially increase. This would lead to increased adverse effects on health and crops if no measures are taken.

4 Building climate resilience in the GMS

Measures to adapt to the increasing impacts of climate change and mitigate air pollution in the GMS should focus on helping regions cope with uncertainty, learn from experiences, build adaptive capacities, and integrate these issues into national development priorities. Substantial investments are needed to adapt to climate change, conserve biodiversity, manage water resources effectively, maintain food security and sustain rural livelihoods.

Understanding the costs and benefits of adaptation to increasing impacts of climate change and mitigation of air pollution is important for national development planning. Existing cost estimates vary considerably from one study to another with UNFCCC, UNDP and World Bank making various estimates of costs of adaptation in developing countries ranging from US$9-US$109 billion per year.

Many of the actions that can address adaptation to increasing impacts of climate change and air pollution will require regional cooperation within the GMS. This may vary from sharing of critical information and lessons within the GMS through to, for example, joint major capital intensive infrastructure projects to share water resources, generate hydroelectric power, irrigate, develop agriculture, renew coastal infrastructure and reduce poverty. A recent ADB study shows the value of regional cooperation for poverty reduction. The 1997 Asian financial crisis and the 2008 global financial crisis exposed the vulnerability of infrastructure projects and the need to protect critical infrastructure projects that lose funding support as credit dries up. Regional cooperation can help address these issues.

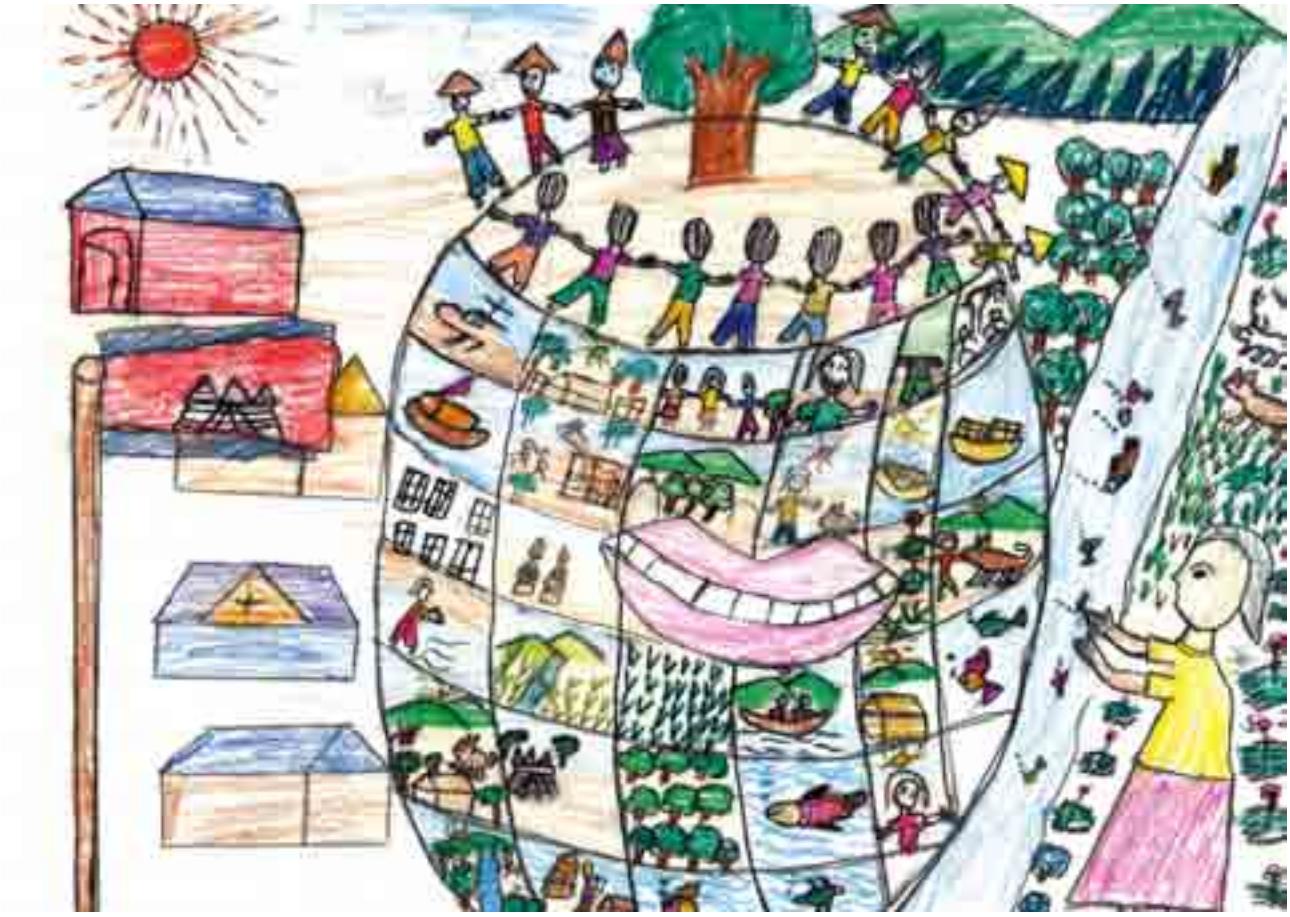
An international policy for reducing emissions from deforestation and land degradation (REDD) is a key issue. Estimates indicate that achieving a 50% reduction in deforestation would generate US$45 billion in carbon market transfers annually by 2020 and help protect biodiversity. In addition to mitigation potential, REDD will encourage public-private partnerships for reforestation and afforestation, provide employment, and help protect cultures, traditional land tenure and indigenous peoples' rights to forested territories.

Figure 5: Water storage plays a vital role in building resilience for adaptation to climate change. A wide range of storage options is available according to local circumstances.

5 Air-pollution climate change linkages: opportunity for an integrated policy response

Even if CO_2 emissions stopped, warming is expected to continue for 1,000 years, so efforts to limit CO_2 emissions alone will not prevent climate change. Effective strategies are needed to complement reductions in emissions of CO_2.

There are potential co-benefits in integrating climate change policy and air quality legislation for certain pollutants, as they may generate large net benefits from both perspectives. Potentially this could also increase the political acceptance of policy measures and allow targets to be achieved at lower costs than separate policies for climate change and air pollution. Understanding the costs and benefits of adaptation to increasing impacts of climate change and air pollution is important for national development planning.



The drawing of a happy, healthy globe was submitted as an entry in the children's art competition "My World, My Home", organized by GMS-EOC in close collaboration with ADB resident missions, youth organizations and local communities across the GMS.

Table 1: Adaptation measures common to all GMS countries

Some of these measures are already being implemented in some GMS countries. Many measures could be more efficiently developed through international cooperation among the GMS countries than what is possible through a purely national approach.

Agriculture	Water resources	Biodiversity	Rural livelihoods
Amend the cropping calendar and pattern	Improve irrigation and drainage facilities and provide more efficient water distribution	Select and monitor local indicators of ecosystem health	Encourage and provide more diverse rural income sources
Adapt agricultural practices to changing temperature and rainfall patterns	Promote small-scale irrigation schemes	Plan and implement species protection techniques	Prepare for and manage disasters and reduce risks
Use climate resilient varieties	Improve flood warning and flood control systems	Implement species recovery plans and ecosystem restoration	Strengthen the resilience of infrastructure
Diversify crops	Develop multi-purpose reservoirs and dams	Establish biodiversity conservation priorities in climate sensitive areas	Strengthen measures to reduce risks from droughts and floods
Improve long-range weather forecasting	Promote rain harvesting and storage technologies	Maintain connections within biodiversity conservation corridors	Build public awareness of climate risks and adaptation measures
Develop more flexible and suitable risk sharing and climate insurance schemes	Reclaim used water and encourage water conservation	Protect natural forests and prevent and manage forest fires	Improve coordination of government services to support adaptation in rural communities
Improve the water efficiency of irrigation techniques	Review integrated river basin and water catchment development policies to adapt to a changing climate	Implement programs for communities based on sustainable use of forest resources, biodiversity conservation, restoring forests and climate change	Identify high risk areas and more effectively use land-use planning with the participation of the local communities
Improve and use early warning of food shortages and expanding food reserves	Develop more systematic learning from local experiences with droughts and floods		Develop early warning and communications systems for extreme events
Develop and implement scientific techniques to adapt to climate change in agriculture	Review water rights and pricing and community-based management		Adapt environmental impact assessments to assess impacts of development projects in relation to climate change issues

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Bangkok 10330, Thailand

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The Greater Mekong Subregion (GMS) Core Environment Program and Biodiversity Conservation Corridors Initiative (CEP-BCI) is a subregional program facilitated by the Asian Development Bank. It aims at mainstreaming environmental considerations into the GMS Economic Cooperation Program. The program is implemented by the Environment Operations Center in partnership with GMS governments, local communities, university network, development partners and non-governmental organizations.