GREATER MEKONG SUBREGION CORE ENVIRONMENT PROGRAM

SEI Stockholm Environment Institute

TRENDS AND OPPORTUNITIES FOR GREEN GROWTH

Background Paper for the 5th GMS Environment Ministers' Meeting

KEY MESSAGES

(i) Long-term economic growth in the GMS countries will be compromised if natural capital stocks are not more sustainably managed.

(ii) Green growth will help the GMS countries achieve sustainable economic growth. It will do this by protecting the natural capital base, more efficiently using resources including energy, better managing development and climate risks, creating more resilient infrastructure, lowering health costs, and producing higher quality jobs.

(iii) Achieving green growth in the subregion will require large, system-wide, and structural transition, with a focus on:

- Innovation in technology,
- Policy and institutional reforms, and
- Mechanisms to mobilize private sector financing.

"Our ability to sustain economic and social progress in the long run will depend on our capacity to reduce dependence on natural capital as a source of growth, abate pollution, enhance the quality of physical and human capital and reinforce our institutions."

Green Growth Indicators 2017. Page 3. OECD, 2017.

Introduction

Since the early 2000s, the nature of the world's economic growth has been changing. In the past, growth often took place at the expense of the environment. Pollution was seen as the price of prosperity in a 'grow-now-clean-up-later' approach.

Economic growth has long been defined through the limited lens of increasing gross domestic product. Here in the GMS, as elsewhere, accelerating growth has often come at the expense of the environment as the countries have relied, to varying degrees, on their natural resources to drive growth.

The 2007–2008 global economic crisis as well as the ongoing trend of deteriorating environmental quality such as urban pollution is changing thinking on how economic growth should be measured. For example, Viet Nam is exploring opportunities to apply natural capital accounting at the national level.

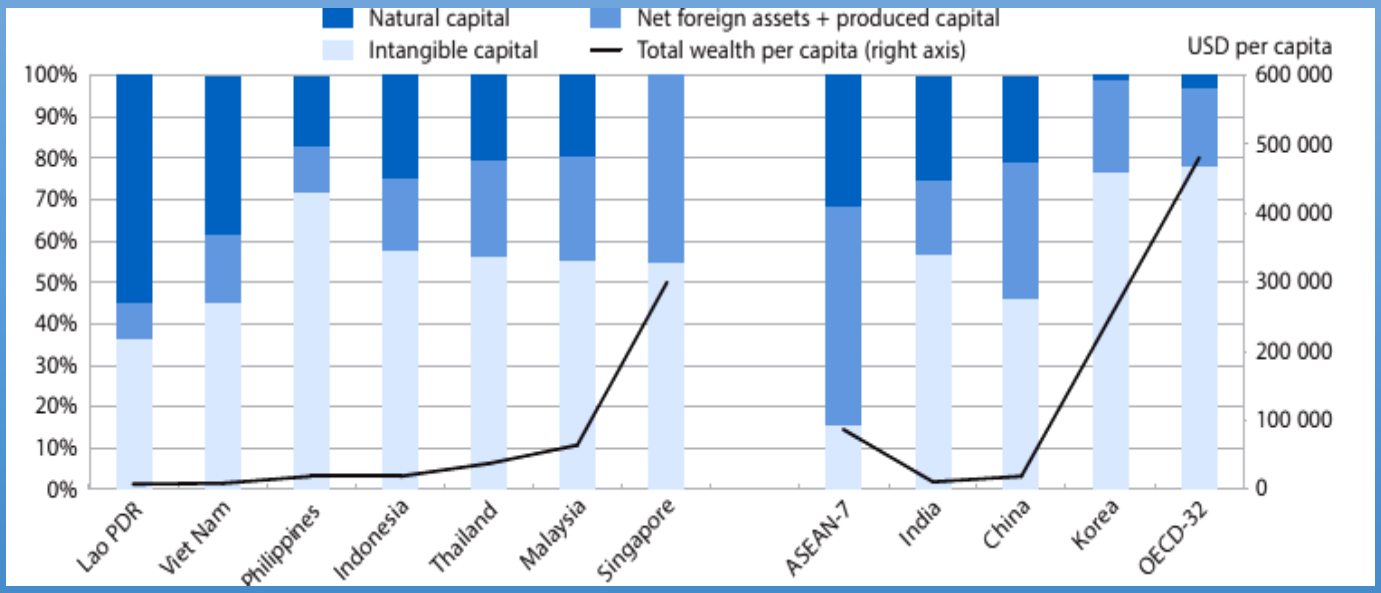
As we become more efficient in using natural resources and environmental services, it now seems possible to have strong *and* environmentally sustainable growth. In this green pattern of growth, the economy maintains and nurtures the natural capital base. It will more efficiently use resources including energy, manage development risks better, create more resilient infrastructure, lower health costs, and produce higher

quality jobs. This in turn contributes to higher profits for companies and sustainable economic growth. The Asian Development Bank (ADB) describes green growth as a pattern of development that promotes growth through the creation of new environment-friendly products, industries, and business models that also improve people's quality of life and is inclusive.

The transition toward 'green economies' is well underway globally and in Asia. A 2017 ADB report shows that Asian countries are among the world's leading producers of green goods and services.[1] And these countries have significant potential to develop and adopt green technologies. Asia also has the largest value of green sales in absolute terms and per unit of GDP compared with other regions, according to data on low carbon environmental goods and services (LCEGS). The ADB report shows that LCEGS sales in the People's Republic of China (PRC) are worth a tenth of the country's GDP.

While this development is clearly positive, the transition to a post-industrial new economy is on a decidedly uneven trajectory. GMS countries still rely heavily on natural capital for wealth generation, with natural capital contributing at least 20% of total wealth for each country (Figure 1). Significant policy shifts geared to green growth are needed to help ensure that natural capital stocks are maintained while economic growth continues.

Figure 1: Natural Capital Contribution to Wealth



Source: The Wealth of Nations dataset, World Bank, 2014.

[1] ADB (2017), *Green Growth Opportunities for Asia*. ADB Economics Working Paper Series, No.508.

The Benefits of Green Growth

Since the early 2000s, many studies have examined the benefits of moving to an economic model focused on green growth. There four main areas where green growth can provide better development outcomes.

First, one of the main aims of green growth is to maintain the world's natural capital base. In an economy defined as being strongly sustainable, natural capital is not traded off against other forms of capital in the production and consumption process. To achieve this, the total net stock of natural capital needs to stay constant.

Many nations, including GMS countries, have pursued economic development strategies that relied on the intensive use of their natural capital. These strategies undervalued the contribution of natural capital to human well-being, and treated ecosystem services as economically invisible. This approach led to overexploitation and widespread environmental degradation.

Second, evidence is growing that green economic policies can lead to the increased viability of green technologies that increase the efficiency of resource use and reduce waste and pollution. The result of this eco-innovation can also be highly profitable. A 2014 UNEP study showed that companies that adopt eco-innovation as a core strategy have an average annual profit growth of 15%.[2]

Third, many studies point to jobs in green businesses increasing as a proportion of total job growth, and that more jobs are created per dollar of investment in a green business than in other businesses. A study by the International Renewable Energy Agency estimated jobs in renewable energy had reached 6.5 million in 2013, with the largest employer being the PRC.[3] A 2015 Global Green Growth Institute study found that in Indonesia, renewable energy created 118 jobs per $1 million of investment, compared with 22 jobs for fossil fuel-based industries.[4]

Fourth, because green technologies have a smaller environmental footprint than the technologies they replace they can be less damaging to human health, resulting in lower public spending on health care. A clear example of this is the air pollution created by fossil fuel run vehicles compared to electric cars.

The Transition to Green Growth in the GMS

Evidence is growing that a transition to green economies is gaining traction in the GMS. The share of official development assistance committed to green objectives is larger on

[2] UNEP (2014), The Business Case for Eco-Innovation.
[3] International Renewable Energy Agency (2013), *Renewable Energy and Jobs – Annual Review 2104*. Abu Dhabi: IREA
[4] UNIDO and GGGI (2015). *Global Green Growth: Clean Energy Industry Investments and Expanding Job Opportunities. Volume I: Overall Findings.* Vienna and Seoul.

average in the GMS than the global average. Furthermore, the 2017 ADB report on green growth opportunities for Asia shows that the region has the largest value of green sales globally, and accounts for a higher share of climate change mitigation technology exports than Europe and Latin America. This indicates that Asia is beginning to see the value of eco-innovation. Below is an overview of four key areas in which efforts must be focused to achieve green growth, namely: transport, energy, natural capital, and climate resilience.

Sustainable Infrastructure

Infrastructure has an essential role to play in helping developing countries achieve their socioeconomic goals. At the same time, both directly and indirectly, it is a major driver of environmental degradation and pollution. Globally, the pace of infrastructure investment is accelerating dramatically. For transport infrastructure alone, 25 million kilometers of roads will be added by 2050; 90% of these roads will be in Asia, Africa, and Latin America. A 2017 ADB report on infrastructure development needs estimates that Southeast Asia requires nearly $2.8 trillion in infrastructure investment from 2016 to 2030.[5] And global demand for new infrastructure in about the same period could exceed $90 trillion, according to one estimate.[6] With the world's existing infrastructure valued at $50 trillion, this effectively means that the physical world will be rebuilt by 2030.

In the GMS, countries are planning and implementing many infrastructure projects under the GMS Economic Cooperation Program. Its Regional Investment Framework, 2022 has a project pipeline of over $63 billion, of which more than $50 billion is for transport infrastructure.[7]

The opportunity for making smart infrastructure choices is narrow. Once infrastructure investment decisions are made, capital and technology are locked-in for decades. If the decisions are based on old, unsustainable technology, little can be done to deal with the carbon emission implications that will persist until that infrastructure is replaced. Energy and transport infrastructure that adds more carbon into the atmosphere will ultimately undermine growth, and poor decisions on water and land-use infrastructure will make it difficult to cope with adaptation needs, which are especially important for GMS countries.

New infrastructure needs to be economically, environmentally, and socially sustainable. Socially sustainable infrastructure is that which is inclusive and respects human rights. It means infrastructure that meets the needs of the poor by increasing access to services, supporting poverty reduction, and reducing vulnerability to climate change.

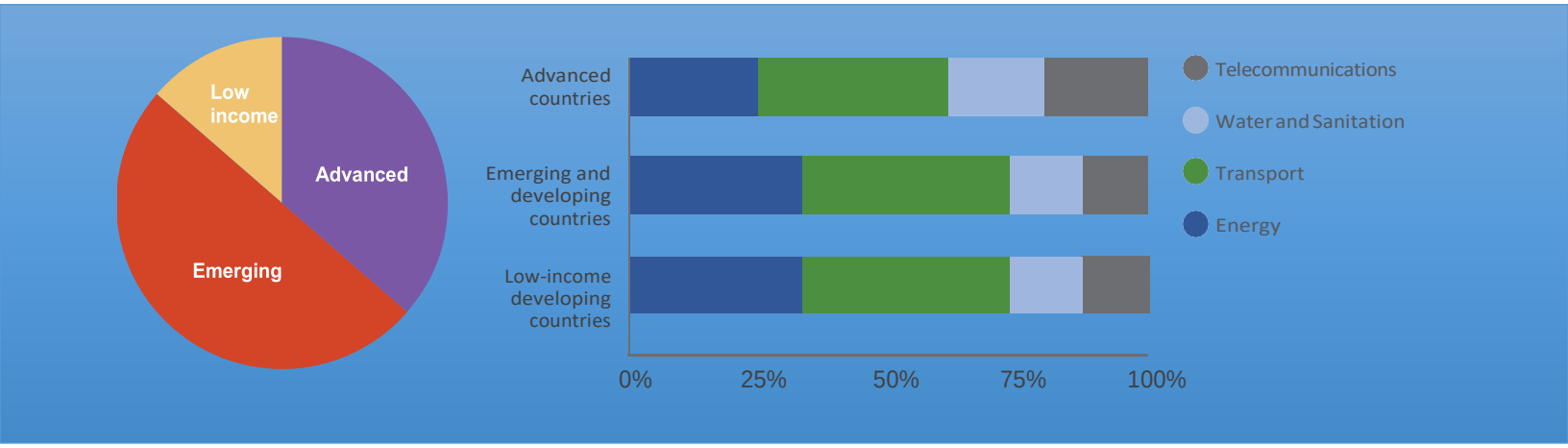
Economically sustainable infrastructure provides good jobs and helps boost GDP. It does not burden governments with unmanageable debt or users with overly high charges. It also seeks to build the capabilities of local suppliers and developers.

[5] ADB (2017), *Meeting Asia's Infrastructure Needs*. Manila: Asian Development Bank.
[6] New Climate Economy (2014), *Better Growth, Better Climate: The New Climate Economy Report.*
[7] ADB (2017), *Overview of the Regional Investment Framework, 2022*. Asian Development Bank.

Environmentally sustainable infrastructure mitigates carbon emissions during construction and operation, and contributes to the transition toward a lower-carbon economy. It is resilient to climate-change risks, such as rising sea levels and severe weather events, and minimizes negative impacts on water supply and air quality.

Developing countries will drive most infrastructure demand up to 2030 (*Figure 2*). About 70% of this demand will come from emerging and low-income countries, and 75% of their investment needs will be in energy and transport. While more developed countries will need to replace or rehabilitate existing infrastructure; developing countries will focus on infrastructure investments to expand access to basic services such as clean water and electricity.

Figure 2: Percentage of projected cumulative infrastructure demand by sector and income groups 2015-2030



Sustainable transport systems are crucial for enhancing the economic performance of GMS countries, and for them to reduce air pollution and be resilient to climate change. These systems are especially important for the subregion's rapidly growing urban areas. Urban travel makes up more than 60% of kilometers travelled in the GMS.

Economic development across much of the world is characterized by unmanaged urbanization. Urbanized areas tripled from 1950 to 2000, and increased five-fold in non-OECD countries. If this pattern of growth continues, it is estimated that the total urban land area will triple again from 2000 to 2030.[8]

[8] See footnote 6.

Rapid urbanization is being accompanied by fast growth in vehicle use, particularly in emerging economies including those in the GMS. The number of vehicles in the world has increased by 20% since 2010, reaching 1.2 billion, and this is expected to double by 2030. In Lao PDR, the ratio of vehicles per population in Lao PDR more than tripled between 2010 and 2015.[9] If such trends continue, global energy consumption and greenhouse gas emissions from transport will increase by 80%–100% by 2050.[10]

Changing urban development to reduce the reliance on cars, trucks, and two-wheelers in the GMS will require significant financing and policy reforms on several fronts, including to ensure better public transport infrastructure and systems. Some of these reforms will be difficult to carry out, especially those that aim to get fewer people using vehicles.

Roads are a part of the transport sector where sustainability improvements could be made relatively easily. The environmental, social, and productivity shortcomings of business-as-usual investments in roads are well known. For example, poor road infrastructure design for storm water management can result in costly and avoidable maintenance and fixes. Another example is that roads built near or through important ecosystem areas, such as biodiversity rich forests, often leads to damaging land use changes.

Green roads use more environmentally friendly construction materials and techniques and are designed to reduce congestion and pollution; lower maintenance costs, and reduce ecological impacts in sensitive areas. Examples of green road technologies and practices that require support from policy makers include bioengineering techniques, the use of recycled construction materials, and creating or maintaining forest buffers. For the vehicles that use the roads, fuel efficiency technologies (including better tires and even eco-driver training) and alternative fuels are essential.

How infrastructure is developed in the GMS, particularly in urban centers, will go a long way to determining energy consumption, pollution levels, and resilience to climate change for decades. GMS countries can still leapfrog 20th century technologies, land-use choices, and infrastructure to adopt clean, viable, and economical alternatives—if GMS leaders act now.

Globally, nearly all countries have agreed on targets for sustainability through the Sustainable Development Goals (SDGs), the Paris climate agreement, the Convention on Biological Diversity, and the Sendai Framework for Disaster Risk Reduction. These include the need for resilient, low carbon, and ecologically sensitive infrastructure that will not erode the welfare of current and future generations, or the productivity and stability of natural systems.

Taken together, these agreements are beginning to drive markets and encourage investors to find approaches for sustainable infrastructure. Implementation will be a big task and

[9] See: http://portal.gms-eoc.org/charts/all/vehicle-motorization-index?gid=29&gideoc=29&regoreoc=1
[10] UN-HABITAT, 2013. *Planning and Design for Sustainable Urban Mobility: Global Report on Human Settlements 2013*. United Nations Human Settlements Programme.

enhanced policies and incentives, as well as improved upstream planning are needed. These can help drive innovations in, and uptake of, green infrastructure investments. The policy instruments and incentives to mobilize capital for these investments will remain critical, as to will be ensuring the capacity is to implement environmental and social safeguards for them.

Clean Energy

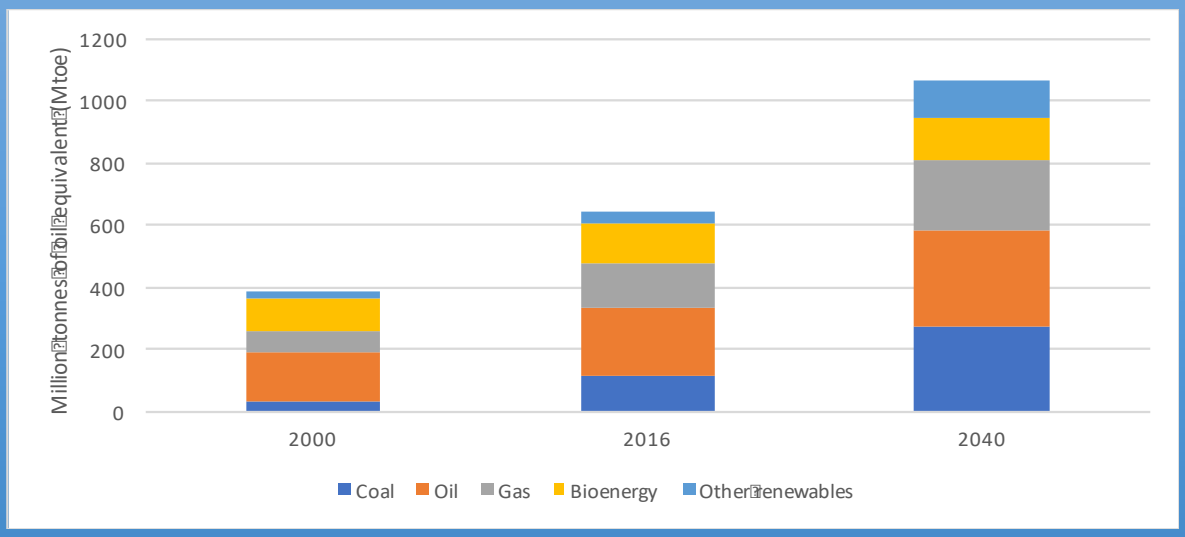
Southeast Asia's economic growth is coupled to significant increases in energy demand. From 2000 to 2016, primary energy demand grew by about 70%, and was driven by population growth, rising incomes, continued urbanization, increased access to energy, among other things. As Figure 3 shows, fossil fuels continue to dominate Southeast Asia's energy mix, accounting for 70% of total energy demand. Solid biomass is also an important component of the primary energy mix, with 250 million people in the region still reliant on fuel wood, charcoal, and agricultural residues for cooking. Although large hydropower has expanded in Cambodia, Lao PDR, and Myanmar, the use of other renewables is sporadic, despite abundant renewable energy resources in Southeast Asia.

Much of the region's continued dependence on fossil fuels is because of subsidies and national objectives to exploit domestic energy resources. Fossil fuels have been widely criticized for failing to deliver affordable energy to the poorest, encouraging wasteful energy use, burdening public budgets, and deterring much-needed investment in efficient technologies. International climate targets cannot be met without drastic reductions in fossil fuels for energy generation. Countries in Southeast Asia have made significant efforts to reduce fossil fuel subsidies, which fell from $51 billion in 2012 to $36 billion in 2014 and to $17 billion in 2015 ($9 billion in electricity and almost $8 billion in oil).[11]

Southeast Asia's growing demand for energy demand is expected to continue. The International Energy Agency (IEA) projections suggest an increase of about two thirds, up to 1,000 Mtoe, by 2040. Over this period, the region's economy is expected to triple in size, and its population rise from 640 million (2016) to 760 million (and with more than 60% of the population living in cities). Electricity demand is expected to more than double by 2040, reaching 565 GW of power generation capacity. The largest increases in supply are expected to come from coal and gas, with large hydropower playing an important role.

[11] The latest decrease owes much to low oil prices, which allowed Indonesia, Thailand and Malaysia to push through further subsidy reform without much opposition.

Figure 3: Change in Primary Energy Demand in Southeast Asia



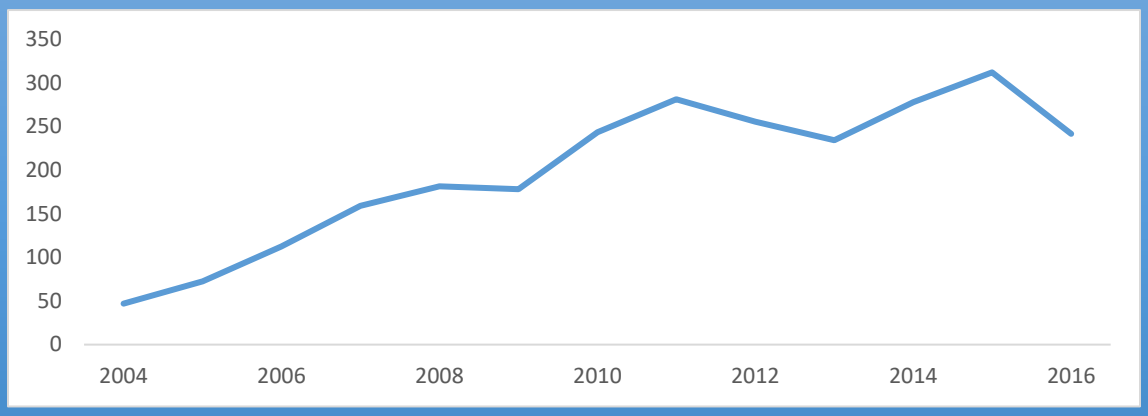
Source: International Energy Agency (2017)

Southeast Asian countries will need to address the problems posed by their reliance on fossil fuels. The traditional energy development pathway of expanding centralized energy systems based on large infrastructure, including fossil fuels and large hydropower, is no longer the way forward. For example, while hydropower is being promoted as low-carbon energy, significant environmental and social costs are involved in the construction and operation of large plants. The issues include biodiversity losses, sediment build ups, and the resettling of communities. At the same time, global commitments to climate mitigation make the continued development of fossil fuel-based energy systems untenable. Because energy systems need to be resilient to climate change, and given the changing global energy landscape, building large, capital-intensive fossil fuel and hydropower infrastructure is risky. Committing to expensive and rigid energy systems creates path-dependency that will become redundant, thus posing significant risks to sustainable development, as these systems may be unable to cope with climate and economic shocks.

Low-carbon energy options provide better energy development pathways. Renewable energy is becoming significantly cheaper due to the declining costs of batteries, cells, and other energy components, and from lower project finance costs as technologies for low-carbon energy are proven viable. Since 2004 investment in renewable energy, excluding large hydropower has been steadily rising globally, reaching $312.2 billion in 2015 (*Figure 4*). Renewable energy capacity continues to grow, with PRC leading the way and by far the biggest producer of solar and wind energy. For these investments to thrive in the other GMS countries, new green finance mechanisms are needed, as are policies and subsidies developed by governments and development banks.

Similarly, major shifts are taking place in the provision of energy services. These include distributed generation allowing people and organizations to avoid utility tariffs (and even generate income from selling energy back to national grids), and community off-grid systems allowing people and organizations to pay for and maintain control over systems designed to suit their needs.

Figure 4: Global investment in renewables – excluding large hydropower from 2004–2016 (USD billion)



Source: Frankfurt School – UNEP Centre/BNEF (2017)

Rethinking energy development is no easy task. Current path dependency on fossil-fueled industrialization means the continuation of current trends is the least disruptive. Also, the fossil fuel industry is politically influential, and has legitimate concerns about the depletion of their workforce from reduced reliance on fossil fuels. Yet the transformation to low-carbon energy systems is already underway, and the political economy suggests there is the awareness, political will, and capacity to continue to pursue green energy alternatives. This opens a window of opportunity for countries to build coalitions of actors to support a transition to cleaner energy. In Southeast Asia, Indonesia and Thailand have already started reforming fossil fuel subsidies to create a more equal opportunities in the energy sector. Large energy companies in these countries are exploring more diverse energy systems.

Southeast Asian countries need to consider a range of policy mechanisms to support the transition to low-carbon energy systems. These will need to foster a more flexible and agile approach to providing energy services, and support the development and uptake of diverse energy technologies. Doing this, will require building new skills and capabilities, ensuring energy systems are adaptable, and encouraging the formation of innovative and responsive electrical supply companies.

Within the GMS, the transition to sustainable renewable energy generation includes mini-grid development in Myanmar, increasing solar power capacity in Thailand, the widespread uptake of energy-efficient cooking stoves in Cambodia, and electric scooters for students in Viet Nam. China meanwhile, is well entrenched as a global leader in renewable energy, and is phasing out hundreds of coal fired plants.

Protecting and Maintaining Natural Capital

The GMS is richly endowed with oil, natural gas, minerals, forests, fisheries, and biodiversity. Maintaining and protecting these assets is fundamental for green growth.

Natural capital accounts for 20%–55% of the wealth of GMS countries and has underpinned rapid economic growth. Agriculture (including forestry) makes up about 30% of GDP in Cambodia, Lao PDR, and Myanmar; it is also the main source of employment in the GMS, engaging 38% of Thailand's workforce and 74% of Lao PDR's. The Mekong River supports the world's largest inland fishery, with annual turnover of up to $4 billion. Natural capital sustains the manufacturing and service sectors. Viet Nam's thriving furniture industry, for example, is the world's sixth largest furniture exporter.

Ecosystems such as watersheds, wetlands, and mangroves provide vital regulatory services that buffer the effects of extreme weather. Rural communities have long depended on forests and wetlands for subsistence as part of strategies for coping with and recovering from natural disasters. However, many of the ecosystems in the subregion are highly vulnerable to a changing climate, particularly in extensive low-lying coastal areas. Climate-change projections suggest that critical rainfall and temperature thresholds for many crops in the lower Mekong basin will be exceeded by 2050.

Natural capital is crucial to rural livelihoods. More than 60 million rural people in the Mekong basin rely directly on it for their daily energy, food, water, and income needs. Fisheries provide between 47%–80% of animal protein consumed in the GMS, and more than 80% of Cambodian and Lao PDR households depend on biomass for cooking and lighting. A significant decline in ecosystem services will likely directly affect the energy, food, and water security of these populations. Further land, water, and soil degradation, and the associated reduction in agriculture yields, could drastically lower the earning capacity of vulnerable groups, such as the rural poor and women.

Many countries, including those of the GMS, have pursued economic development strategies that rely on the intensive use of natural capital. Such strategies typically undervalue the contribution of natural capital to human well-being and treat ecosystem services as economically invisible. This approach has led to the overexploitation of natural capital through the widespread degradation and destruction of arable land, forests, and water resources. The overuse of pesticides and chemical fertilizers in agriculture has severely degraded groundwater and reduced soil fertility and crop diversity across the GMS. In the PRC's Yunnan Province, about 47% of available grazing land is classified as moderately-to-severely damaged. Wetlands are among the most diverse and productive ecosystems in the GMS, but these are severely threatened by land conversion, water

withdrawal, and dam construction. Less than 2% of the original area of natural inland wetlands in the Mekong Delta remain intact. Between 1990 and 2010, the GMS (excluding Viet Nam) lost more than 12.5 million hectares of forest, or almost half the total area of Lao PDR. Natural-capital losses in the GMS are valued at 10%–12% of GDP a year. If current trends in ecosystem loss continue, forgone ecosystem services in the next 25 years could cost the subregion an estimated $55 billion.

Rapid economic growth is expected to continue, thus increasing the demand for food, energy, and water—and accelerating the depletion of the subregion's natural capital. The GMS Regional Investment Framework, 2022 has just over $64 billion in priority investment projects. While aiming to create new economic opportunities, this level of investment carries potentially huge environmental and social costs that have yet to be fully understood.

Greater affluence and growing populations are changing consumption patterns in GMS, creating further pressure on natural capital. Once predominantly cereal-based diets are changing to increasingly protein-rich ones, putting higher demand on farmland and water use. Urbanization increases the demand for key ecosystem services such as energy, water, land and construction materials (sand and gravel).

Climate change will add to the pressure. Agriculture assets are highly sensitive to a changing climate, and yields could decline because of changes in temperature and precipitation patterns; the intrusion of saline water into croplands from rising sea levels; increased drought and flooding; and wind and soil erosion.

Policies and programs to support the protection and management of natural capital in the GMS must be more cohesive. Natural-asset policies currently focus on establishing and managing protected areas but more emphasis on reducing the fragmentation of broader ecosystems, such as by promoting biodiversity corridors, could greatly benefit ecosystem services. Even more important is to ensure policies are adopted and enforces that reduce economic development pressures on ecosystems, particularly those with high natural capital service values. Strengthened policies and systems for strategic environmental assessment and environmental impact assessment, for example, can help achieve this.

Legal systems and monitoring and evaluation processes must be put in place or strengthened for policies to protect and restore natural capital to succeed. Greater coordination is needed among international, regional, and national actors to achieve policy objectives under global agreements to protect the environment, such as the Aichi Biodiversity Targets, the Paris climate agreement, and the Sustainable Development Goals.

Some GMS countries have begun institutional reforms to strengthen the authority of their environmental agencies, consolidate their functions, and improve coordination with other sectors. Official development assistance and conservation projects traditionally funded by governments are the main sources of investment in natural capital. GMS countries are also exploring fiscal instruments to plug the investment gaps. These instruments include environmental taxes and incentives, and payments for ecosystem services and other

market-based mechanisms. Even so, more is needed, such as carrying out strategic environmental assessments on key natural capital areas; creating biosphere reserves and Ramsar sites (these protect natural capital but also engage in economic activities); and subsidizing land use systems which emphasize natural capital rather than resource consumption (land stewardship).

Greater use of these and similar approaches will ensure sustainable investments in natural capital, and gradually lead to the economic valuation of natural capital (internalizing the externalities) in the systems of economic accounts. To achieve the required financial, institutional, legal, and policy reforms, the economic and intrinsic value of natural capital must receive greater recognition at the political level. There is a large and growing body of information about the value of natural capital in the GMS, but national-level frameworks, such as natural-capital accounting, are in their infancy. Lack of technical and institutional capacity is another challenge to scaling up investments in natural capital in the subregion.

A natural-capital approach is the economic reflection of the value that natural assets and services contribute to human society. It represents a fundamental shift away from traditional approaches and toward natural resource management. This approach counters the widespread perception that natural resources are either valueless or unlimited merely because they are “free” (without market prices). Properly assessing and valuing natural capital (both stocks and ecosystem services), and capturing that value in a natural-capital accounting framework, can provide decision makers with essential information about the trade-offs in development decisions. This will also help decision makers to become more aware of the socioeconomic implications of their countries’ use (or potential use) of natural capital, and to make more informed decisions on how natural capital should be used.

Climate and Disaster Resilience

The frequency and severity of weather events is increasing due to a changing climate. Large parts of the subregion are at high risk of storms, floods, landslides, drought, and extreme temperature events, driven in part by climate change. There is also strong evidence that the impact of weather-related disasters in the GMS has been rising in recent decades due in part to population growth and the spread of human settlements in risk prone areas. In other words, more people are living in harm’s way.

The GMS has many areas particularly vulnerable to climate change, including the Ayeyarwady Delta in Myanmar, the Chao Phraya Delta in Thailand, the Mekong Delta in Cambodia and Viet Nam, and the east coast of Viet Nam up to the Red River Delta. All of these areas have large sprawling cities and growing populations. In 2014, 46 million people lived in these areas, and this is projected to rise to 66 million by 2030. These areas are also commercial and industrial hubs, and support vital food bowls that have local, regional, and global significance.

Natural disasters undermine human security and well-being, resulting in damage and loss to ecosystems and associated services, property, infrastructure, livelihoods, economies,

and places of cultural and recreational significance. The GMS's vulnerability and risk levels to disasters are set to increase because of compounding and interconnected drivers. These include climate change, poverty, demographic changes, unsustainable uses of natural resources, weak institutional arrangements, and inadequate policies.

Interventions to reduce climate and disaster risks will need to systematically address the underlying factors that contribute to social vulnerability and drive such risks. This means identifying and addressing the ways in which development choices and pathways can create or exacerbate risk, or how they can reduce risk.

Despite considerable efforts by many countries to manage disaster risks, interventions still tend to be largely reactive (rather than proactive and adaptive). A paradigm shift that moves from a focus on short-term recovery to long-term resilient and sustainable development is urgently required in the GMS to reduce risks, particularly in the face of climate change. The long-term solutions are policies and interventions that build and maintain strong and resilient communities and ecosystems that can cope with challenges from climate change or other shocks. For example, enabling communities to have more diverse livelihood opportunities, access to quality infrastructure and key services, risk financing, climate-friendly agriculture extension services, and education opportunities.

Actions to Achieve Green Growth

ADB's 2017 report on green growth opportunities for Asia shows that a substantial and thriving green economy already exists in the region, with Asian companies playing important roles in this process. Global sales of green goods and services are at close to $3 trillion a year. Developing Asia accounts for 22% of global high-value climate change mitigation technology patents and 35% of exports. Asia is on track to capture value from the design and export of key energy technologies such as energy storage, photovoltaics, and efficient lighting.

While these innovations are impressive, they focus on only one aspect of the needed transition to green growth. In addition to technological innovation, the emphasis must also be on securing the region's natural capital base, decreasing resource and energy consumption per capita, and protecting vulnerable populations from increasing disaster risks. Much remains to be done by individual GMS countries to reform their economies so that they grow in a sustainable fashion, continue creating green employment, and support eco-innovation. Enabling policies are needed to spur green growth investments Reforms are required in public expenditure, fiscal policy, trade policy, education, monitoring systems, and social protection.

Most green growth investments will need to come from the private sector as they drive innovation and can mobilize extensive and much-needed finance. That said, there are initiatives that governments can take to support private investment and stimulate markets. Studies by ADB and the Global Infrastructure Hub indicate that green infrastructure

investment demand in ASEAN will be more than $3 trillion between 2016 and 2030.[12] The larger investment opportunities are in power transmission and distribution grids ($700 billion), followed by water ($380 billion), telecommunications ($260 billion), and rail transport ($60 billion). The climate change adaptation and mitigation cost to make these investments climate resilient is estimated at $400 billion over 2016–2030. In 2016, green public expenditure and finance flows totaled $40 billion, compared with total annual investment opportunities of $200 billion in that year.

Public finance has so far played a dominant role in ASEAN green finance. Although the nominal amount of public green finance will likely increase from 2016 to 2030, the average percentage of public finance is expected to fall. The current level of public finance is estimated to be 75% of total capital. Annual green investment opportunities (estimated at $200 billion in 2016) will need to be met by a blend of public and private capital.

Although investments in green technologies are becoming more attractive, investments related to public goods, such as land use, are still perceived to be considerably less commercially viable and higher risk than some investments in renewable energy or energy efficiency.

Governments in the GMS as elsewhere, as economic actors in their own right, often fund public infrastructure, especially in energy and transport. There is plenty of information available on green infrastructure options to guide public agencies when they make investment decisions. Governments can stimulate markets and create demand for environmental goods and services by prioritizing procurement of green technologies and practices, as well as by creating standards and regulations (for example, energy efficiency standards for vehicles).

Fiscal measures, especially those relating to taxes and subsidies, can be a strong influence on the transition to a green economy. For example, subsidies for using natural resources can discourage investment in resource conservation. According to the OECD, fossil fuel subsidies, which promote polluting technologies and inefficient energy use, cost Southeast Asian countries $51 billion in 2012, equivalent to 11% of general government spending.[13]

Tax “shifting” can also encourage green investments and private sector innovation. Tax systems should ensure that the price of goods and services reflect their social and environmental value. Environmental taxes shift taxes away from labor, which discourages employment, toward activities that are heavy users of natural resources. Tax increases on energy in some European countries have resulted in clear reductions in CO_2 emissions, and the creation of many new jobs.

Environmental fiscal reform instruments can be (i) natural resource pricing measures, such as taxes on resource exploitation; (ii) reforms on product subsidies and taxes; (iii) user chargers on commodities, such as energy and water; or (iv) pollution charges.

[12] Source: Green Finance Opportunities in Asia, DBS and UN Environment 2017.
[13] OECD (undated), *Towards Green Growth In South East Asia: Solutions for Policymakers*.

The trade policies of countries can encourage or discourage the movement of goods across borders. Protectionist trade laws establish barriers for imports, and subsidize exports. Trade policy thereby affects market access and directly affects the goods and services that a country produces. International investment tends to target sectors with a high volume of international trade. The best approach in the GMS to maximize the use of international investment in green infrastructure and technology will be for the trade laws and policies of the subregion's countries equivalent as possible.

GMS countries will need monitoring systems that track progress along economic, social, and environmental indicators. This will enable each country to measure its progress toward green growth. To understand whether efforts to manage natural resources sustainably are working, countries need indicators that monitor the quantity, quality, and value of natural resources. These include the availability and quality of renewable natural resource stocks (e.g., fresh water, forests, fish); the availability and accessibility of nonrenewable natural resource stocks, particularly metals, minerals, and fossil fuels; and biological diversity and ecosystems, including species and habitant diversity.

Conclusion

GMS economies are at a turning point. The current pattern of economic growth is unsustainable. Innovations in energy, infrastructure, the efficient use of natural capital, and climate action and disaster risk reduction has created new opportunities for sustainable economic growth. However, green growth will require a large, system-wide, and structural transition.

There are several initiatives that the public sectors in the GMS can focus on to help drive green growth. These include enabling policies and regulations and dedicated project-preparation support and technical assistance to create bankable projects. They can also expand access to credit lines and de-risking schemes to attract private investors.