

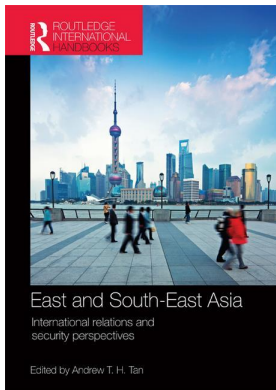
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Environmental challenges in East and South-East Asia

J. Jackson Ewing

Introduction

International co-operation on environmental issues is both difficult and necessary. A host of international and regional architectures recognized that environmental challenges often transcend political boundaries and as such require multilateral response strategies. The 2012 United Nations Conference on Sustainable Development (UNCSD or 'Rio+20') provides the latest manifestation of global environmental summitry in search of collective actions, and while its convening shows international co-operative resolve, its shortcomings reveal pervasive impediments to facing transboundary environmental challenges (Ewing 2012a; Brand 2012). Examples abound of the perceived importance of multilateral environmental efforts, from the annual meetings of the UN Framework Convention on Climate Change (UNFCCC), to frameworks seeking to protect forests, oceans and biodiversity, to attempts to reconfigure the ways that economic growth is conceived and measured. The fits and starts encountered within these sectors exemplify the challenges of constructing and actuating environmental policies in the international space, with regional efforts proving no exception.

There is no viable alternative to recognizing and addressing environmental challenges, however, and regional dynamics in East and South-East Asia exemplify both the acuteness of contemporary environmental problems and the necessity of multilateral engagement for responsive actions. East and South-East Asia is a widely differentiated physical and social space, with a range of both connected and disparate environmental stresses. As a large developing region, much depends on the capacity of Asian communities, states and regional bodies to pursue growth and prosperity in ways that do not compromise the environmental foundations of future progress. This chapter offers a primer on key environmental trends in East and South-East Asia and is organized along the three broad and interconnected physical categories of land, coastal zones and the atmosphere. Section one explores the difficult land use conundrums that accompany regional growth, with emphases on urbanization trends, food production, and the necessity of retaining the ecological services provided by forests and watersheds. Section two focuses on marine environments and evaluates stresses to fisheries, reefs, mangroves and other coastal resources. Section three considers emergent climate change challenges that have the potential to amplify existing environmental degradation as well as create new and unique problems.

Throughout these analyses, primacy is given to the causes of environmental stresses and the social contexts in which they play out, while the conclusion focuses upon some existing regional efforts to assuage them. The chapter's overarching goal is to illuminate significant environmental challenges facing the region and pose questions about the paradigmatic shifts that are needed in response.

Urbanizing Asia's land-use conundrum: food, forests and fresh water

The environmental significance of urbanization in East and South-East Asia is difficult to overstate. Throughout the region's history the lure of social connectivity and economic opportunity has brought people to cities and peri-urban areas (Reid 1999), and these movements have hastened in real and relative terms during the 20th and 21st centuries. Environmental changes are amplifying urbanization for numerous reasons, and the resulting more urbanized populations are in turn creating new demands on regional environments. Cities offer logical destinations for many people who are compelled to move in part because of protracted environmentally related challenges (such as droughts) or abrupt events (such as storms). As centres of culture, commerce, trade and family relations, cities are places where the immediate and longer-term needs of such populations can be most readily met (Ewing 2012b). The pull of urban locations thus has the power to draw people away from their homes in response to the challenges that they may be battling in rural settings, whether these be changing agricultural trends, reductions in water access, declining sanitation conditions, economic and food insecurities, and so forth.

Evidence of this powerful urban draw in South-East Asia is already quite apparent. The region's urban population has swelled from roughly 15% of the total in 1950 to almost 42% by 2010, and the increasing trend continues (ISEAS 2009). Much contemporary urbanization is occurring in the least urbanized states such as Laos and Cambodia even as the cities of these countries struggle to manage the rapid influx of people. Large megacities such as Jakarta, Manila and Bangkok will continue to swell while many small and medium-sized cities and towns, which house roughly 67% of the region's urban populace, will grow even faster (ISEAS 2009). The overall rapidity and scale of urbanization in South-East Asia and the People's Republic of China is without precedent historically (Rimmer and Dick 2009), and the multifarious drivers behind it certainly transcend environmental factors. Nevertheless, challenges facing the rural agrarian areas of the region can serve to speed urbanization and in doing so hasten the regional reshaping that is already well underway.

While cities and peri-urban areas in South-East Asia may provide some measure of respite for rural peoples seeking to escape hardships caused in part by the changing environmental conditions, continuing urbanization trends also create a number of challenges—both in their own right and in environmental contexts (WWF 2008). Multiple studies have illustrated particular environmental vulnerabilities faced by the vulnerable populations of East and South-East Asian cities (UNDESA 2008; World Bank 2010; Nurlambang 2012). These urban centres face a raft of climate-related challenges from flooding and sanitation problems to heat waves, disease and the lack of physical and/or economic access to food (World Bank 2010). Rapid population movements into cities also strain existing infrastructure, services and urban ecosystems and exacerbate the vulnerability of marginalized segments of urban society. In cities such as Jakarta and Manila, for example, many of the poor already live in areas that are flood-prone and lack basic adaptive services. In China, which accounts for much of the region's overall urbanization rates, the country's Minister of Water Resources Chen Lei has predicted that by 2020 41% of China's population will be living in economically developed areas and cities that are prone to

floods (Xinhua News Agency 2009). Rapid urbanization therefore both responds to and creates environmental challenges in East and South-East Asia. These issues are not confined to the cities themselves, but rather the appetites of city dwellers have ripple effects throughout the region's rural hinterlands.

Food

Feeding growing and increasingly urban and affluent populations poses unique challenges. Inescapable development trends mean that more food must be produced by rural communities that continue to decline in size relative to their city-dwelling neighbours. This is true both domestically, where rural hinterlands feed urban centres, and internationally, where countries with high rural agricultural capacities supply countries with significant food importing needs (Ewing 2011a). Globally, arable land has shrunk from 0.45 hectares (ha) per person in the mid-20th century to 0.25 ha per person in 1997 (Spiertz 2010). While perhaps alarming, this trend is unsurprising given the world's rapid population growth, mercurial gains in global economic production and the attendant land conversions that these changes necessitated. The trend is set to continue and estimates suggest that arable land per person will drop to 0.15 ha by the mid-21st century (Spiertz 2010). Moreover, as populations in East and South-East Asia become more urban and affluent, diets are changing to include more meats, fish and processed foods, which can intensify environmental stresses stemming from food production (Friel and Baker 2009).

These realities frame a fundamental question surrounding food production in East and South-East Asia: how can more food be produced on less land and with acceptable environmental and social impacts? The region already has a large agricultural footprint, with the world's largest producer and consumer of rice (China), two of the largest rice exporters (Thailand and Viet Nam) and significant production and exportation of a range of fruits, vegetables and processed foods. Unlike the agricultural zones of Europe and North America, much of this food is produced at local levels and on small scales, which ensures that agriculture plays a vital role in the economic and social fabric of the region. As such, continuing to make farming economically viable, warding off pervasive hunger problems and responding to the changing food needs of a growing and developing region are paramount goals for governments and other stakeholders throughout the region. While environmental considerations can easily get lost in the shuffle, in these pursuits there is a growing recognition that mitigating environmental stresses are necessary for future agricultural progress. Such recognition amplifies an already clamorous debate on what role technology and advancing agricultural methods should play in regional food production.

Speaking to modern (and often large-scale) farming methods, environmentally focused voices call attention to the high greenhouse gas emissions released by some food-producing and -distribution practices, the degradation and depletion of freshwater systems to meet agricultural needs, and the conversions of valuable ecosystems that accompany many modern farming operations (Horlings and Marsden 2011). Decades of agricultural intensification have certainly had serious side-effects, with the overuse of nitrogen-based fertilizers and high inputs of phosphorus, insecticides, fungicides and heavy metals all creating lasting problems for soil and freshwater systems and for overall nutrient flows throughout food chains. These conditions give oxygen to arguments for a return to or perpetuation of more 'traditional', small-scale farming techniques. Countervailing voices argue that agrotechnology provides environmentally prudent tools for managing the ecological footprint of food production (Spiertz 2010; Ewing 2011a). Burgeoning new technologies, the logic goes, can reduce water usage through targeted low-volume irrigation systems, combat soil erosion through less invasive tilling practices and increase yields so that less land must be brought under cultivation. New approaches also present

opportunities to mitigate greenhouse gas emissions and genetically modified plants can require fewer external inputs such as fertilizers and insecticides.

These seemingly polemical positions on meeting the needs of agricultural production in an environmentally sustainable way are not necessarily mutually exclusive (The Royal Society 2009), and East and South-East Asia will continue to host a mishmash of farming methods and strategies that meld the traditional with the modern. Looking broadly, however, it is clear that food-related decisions made at sub-national, national and regional levels will continue to have implications for environments throughout the region. Moreover, as food demand continues to shift, the importance of the agricultural sector to regional environmental conditions will become more pronounced.

Forests

The primary traditional means for increasing food production in East and South-East Asia, as with much of the world, has been to expand cultivation. Likewise, the expanding infrastructure that accompanies urbanization necessitates substantial conversions and changes in the character of affected lands. Such cases, in conjunction with the extraction of timber resources for economic reasons, have led to the large-scale felling of East and South-East Asian forests. Current regional trends in forest resources are mixed. The region houses roughly 470 million ha of forests, some of which are stable and expanding while others continue to face pronounced threat (FAO 2011). Significant afforestation efforts in China have increased forest cover throughout the 1990s and 2000s, while during these same decades South-East Asia has witnessed consistent forest losses. These trends continue and South-East Asia lost just under 1 million ha of forest in 2011, which is the largest regional decline in a decade but pales in comparison to annual net losses of 2.4 million ha in 1990–2000 (FAO 2011). While forest management strategies and mechanisms should be praised for contributing to regional improvements, part of the decrease in deforestation rates is attributable to the fact that much of the easily accessed forested lands of the region have already been cleared.

While clearing activities take place around the world, and are often understandable and justifiable given economic imperatives, examples of regional deforestation with little regard for environmental implications present a confronting phenomenon. Forests house primary watersheds and act as a linchpin for irrigation, energy generation, and commercial and individual freshwater needs. The degradation of forests can therefore lead to deteriorating water quality and availability, which in turn threatens agricultural and industrial productivity as well as household access to fresh water. Forest root systems play an essential role in preventing soil erosion, particularly in highland areas such as the large swaths of tropical and equatorial regions of South-East Asia. When left unchecked, soil erosion can further degrade freshwater resources and leave behind land with little agricultural or otherwise strategic value (Dauvergne 1998). Such challenges are exacerbated further when forest conversions alter hydrological cycles and local weather patterns within which forests play a key role. Additionally, forests are often hubs of biodiversity, which lends them both economic and social value and places them at the centre of longstanding questions about humankind's duty and ability to act as a steward of the earth's flora and fauna (OECD 2002; Dickens 2004).

Despite these wide-ranging roles that forests play in both natural and social systems, they have traditionally been valued only for their commoditizable resources (Poffenberger and Smith-Hanssen 2009). As the values of ecosystem services have not traditionally been reflected in the prices of the commodities that drive forest clearing, governments, companies and farmers 'often decide that forests are worth more cut down than standing' (Lawlor and Huberman

2009: 269). Such systemic socio-economic factors have contributed to large-scale forest conversions in many parts of the world, with East and South-East Asia being no exception (Poffenberger and Smith-Hanssen 2009; FAO 2011). This is changing, and forests' role in storing carbon has been earmarked since the mid-2000s as a potentially major way to reduce the greenhouse gas emissions driving global climate change. In East and South-East Asia, this has been a boon for efforts to protect forests for the ecological services that they provide, as projects to reduce emissions from deforestation and forest degradation (REDD) have provided capital and support for forest protection. The overall regional impacts have been mixed, however, and countries such as Malaysia, Myanmar (Burma) and Viet Nam have actually seen protected forests reduced since 2000 (FAO 2011). REDD programmes, moreover, have met with criticisms of insensitivity to the rights and desires of forest-dwelling populations, difficulties in measurements and quantification and have struggled in some instances to compete financially with the capital that can be gained through harvesting timber and clearing forest lands for other purposes (Ewing 2011b).

Forest management in East and South-East Asia faces pronounced challenges which will be surmountable in some locations and less so in others. Outright demonizations of activities that drive forest clearing, such as expanding food cultivation zones, the growth of land-intensive export products such as oil palm and rubber, and the infrastructure development that is driving urbanization, are unlikely to meet with success. The necessary element of effective forest management is prescient spatial planning that leaves forests standing in areas where they provide essential ecological services, and allows for judicious forest clearing in ways that provide social and economic benefits without compromising the future environmental viability. Such approaches require substantial co-ordination among domestic agencies, intrastate governments and international players in relevant sectors. This is difficult to achieve but is without substitute as a guiding principle for managing forests.

Fresh water

Water problems in much of East and South-East Asia result largely from poor management rather than natural vulnerabilities. As discussed in the previous subsection, deforestation impacts freshwater systems both by altering precipitation patterns and leading to erosion and watershed degradation. Agriculture, meanwhile, is far and away the largest source of water usage in the region and inefficient irrigation practices cause significant water wastage. Through much of the region, however, these challenges occur in the context of relative water abundance. In South-East Asia, for example, average annual per caput water resources are almost double the world average, and this despite the region having a population density some 2.6 times higher than the global mean (UNEP 2009). The region withdraws only 4.5% of the available water resources (UNEP 2009), which is a safe aggregate level. Problems arise not from overall supply shortages, but from localized water management challenges that leave areas of the region prone to flooding, salt-water intrusion and dry season water deficits. Damming is prevalent within debates over these water management challenges, and scores of dams along South-East Asia's most important river, the Mekong, can cause changes in river flow volume and timing, water quality and biodiversity. Major agricultural zones such as Viet Nam's Mekong Delta risk exhausting local water availability during the dry season, and the pressures on these resources continue to climb. Industrial pollution and agricultural runoff further compound water challenges in some of the region's key water basins, and industry growth, population pressures and greater food demands create more pollution sources (MRC 2007).

China's water challenges are more pronounced. China has significant water resources, but they are distributed very unevenly throughout the country both temporally and spatially, and

the distribution of population and economic activity often does not coincide with the presence of water resources (Qin 2012). This reality is most visible in the North China Plain, which hosts some one-third of the country's population and economic output but contains less than 8% of the national water endowment (Ministry of Water Resources Planning Department 2004). China's population growth, economic success and changing social standards have placed growing pressure on the country's water resources and led to significant water scarcity in certain vital river basins (the Yellow River being perhaps the most significant). To compensate for surface water shortages, agriculture has relied increasingly on groundwater tables and thus depleted key aquifers and groundwater tables (Qin 2012). Like its neighbours to the south, China's economic development has also increased the disposal of hazardous waste, industrial discharges and agricultural runoff so as to reduce the availability of fresh water through pollution. In sum, these dynamics place water challenges among China's top concerns, and the perpetuation of its impressive growth and poverty reduction depends in large part on its capacity to manage a far from ideal water distribution situation.

Coastal zones: key environments in a maritime region

Several of the challenges posed by coastal resource degradation relate to the environmental dynamics occurring inland. Deforestation and resultant soil erosion and the siltation of inland waterways can degrade coastal ecosystems (Gomez 1980). Ecological destruction in upland areas during the periods of major deforestation and land conversion often lead to increased turbidity and pollution in the freshwater bodies emptying into nearby seas, as witnessed in many parts of East and South-East Asia. Altered turbidity reduced light penetration into the water and, when these heavily silted waters reached the coast, damage and in some cases destroy the offshore seagrass beds and coral reefs that are essential fish habitats. Such habitat destruction has the corollary potential to alter the breeding patterns and lifecycles of aquatic fauna, leading to pronounced and lasting shifts in coastal ecosystems.

Environmental changes to East and South-East Asia's coastal regions are not, however, solely the result of inland deforestation and land conversions. Similarly to land-based shifts, the past decades of development have witnessed substantial growth in commercial fishing operations in the seas throughout the region. These operations significantly altered regional fish stocks and reduced yields for many small-scale municipal fishermen. Coastal environmental changes also reflect population pressures and unsustainable coastal resource exploitation methods that have been the norm in parts of the region for decades (Stobutzki *et al.* 2006). These dynamics can create a vicious cycle in which poor communities are compelled by increasing number to degrade coastal environments while seeking the necessities of life, which in turn further degrade coastal ecosystems and perpetuate the communities' impoverished plight (Homer-Dixon 1999).

Regional data are confrontational on these points, with fish populations, reefs and mangroves all exhibiting signs of significant stress. Asia accounts for well over one-half of global fish production and consumption and much of the expansion in aquaculture and fish catches in recent decades has occurred in East and South-East Asia (Garces *et al.* 2008). Specifically, annual per caput fish consumption has risen from 10.6 kg in 1961 to 34.5 kg in 2009 in East Asia and from 12.8 kg to 32 kg in South-East Asia over the same period (FAO 2012). China has been responsible for the largest aggregated increases in fish consumption by a large margin, and has met these growing needs through substantial increases in fish catches and aquaculture. As such, China's share of global fish production grew from 7% in 1961 to 34% in 2009, and Chinese consumers continue to increase and diversify their fish consumption as the country becomes more affluent (FAO 2012). Couple these figures with the large, albeit less acceleratory, seafood

consumption patterns in Japan and the Republic of Korea (South Korea), and the picture of a voracious regional appetite emerges.

Unsurprisingly, aquatic resources have come under stress as a result of such expanding consumption. By the turn of the 21st century it was clear that much of the near-shore fishing territories of South-East Asia specifically had been overfished (Silvestre *et al.* 2003), and total world catches of marine fish continue to flatten out, as many of the major fishing areas of the region are either fully exploited or overexploited (FAO 2012; Garces *et al.* 2008). Much of this over-exploitation has occurred through offshore commercial fishing operations that have the capacity to harvest and process large volumes of fish and other marine products. This in turn has led to declining catches in municipal waters close to many East and South-East Asian coasts and created attendant threats to the livelihoods of small-scale and subsistence fisherfolk throughout the region. Many such small-scale operations are unable to access fish further out to sea, leading to an erosion of livelihoods and food insecurities.

Habitat destruction is occurring in tandem with and at times as a causal underpinning of these decreasing fisheries. The destruction and degradation of key habitats such as reefs, mangroves and grassbeds means that fish and other marine species have fewer areas in which to reproduce and grow. Activities leading to the widespread destruction and alteration of important aquatic habitats in coastal zones include the reclamation of intertidal areas, destruction of mangrove forests for fuel wood or to build aquaculture ponds, damming of rivers and subsequent disruption of flooding cycles, extraction of corals and sand for construction materials or to create navigation channels, and the use of destructive fishing methods (Garces *et al.* 2008). As a result, during the last century South-East Asia lost some 70% of the region's mangrove forests, 11% of its coral reefs, and at least 20% and possibly as much as 60% of seagrass beds (UNEP 1998). These valuable ecosystems continue to come under threat from expanding aquaculture ponds, destructive fishing techniques and coastal development more generally, and are affected by physical changes within the marine ecosystem such as those accompany shifting climatic conditions. This final point is germane to many of the environmental challenges facing East and South-East Asia, as it has the potential to compound existing levels of environmental stress and create emergent difficulties.

The atmosphere: global causes, local impacts

The atmosphere is the ultimate global resource, with the actions of parties anywhere in the world potentially impacting the conditions faced in any other location. The planet's warming will affect natural systems that are essential for sustaining the viability and progress of many communities in East and South-East Asia—particularly those that lack the means to adapt effectively to the changes. The Intergovernmental Panel on Climate Change (IPCC) predicts that during the coming half century, drought-affected areas will expand while other locations will experience greater heavy precipitation events and flood risks, river runoff will decrease between 10% and 30% across many dry regions and mid-latitudes, and glacially stored water supplies will decline, reducing water availability for over one-sixth of the global population (IPCC 2007). The changes in rainfall patterns and ice volumes at the source of these problems will affect both freshwater availability and agricultural production (IPCC 2007). For populations dependent upon local agriculture for food and income, smaller crop yields can lower individual caloric intake, which negatively affects human health, while reducing vitally important household incomes (UNDP 2008). For areas of water abundance, major precipitation events, flooding and greater runoff and erosion will have negative consequences for agricultural production and render many previously productive lands at least temporarily unviable for habitation and human utility.

Such scenarios understandably lead to notions that climate change will cause widespread hardship, particularly in parts of developing countries that will struggle to adapt to climate-induced challenges. Adaptation to climate change is not a simple or straightforward issue, but rather encompasses a range of activities from basic coping to advantageous pursuits in response to the changing climate. The ability of a system to 'adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with consequences' is defined by the IPCC as the system's 'adaptive capacity' (IPCC 2007: 21). It is primarily in developing countries where vulnerability is often high, adaptive capacity regularly low, and livelihoods frequently tied closely to natural resources where climate change has the most acute impacts (Smith and Vivekananda 2007; Global Humanitarian Forum 2009).

While many uncertainties persist, it is clear that East and South-East Asian communities face pronounced challenges as a result of the changing climate. A striking level of uniformity exists in recent analyses regarding the character of areas exhibiting the greatest risks to climatic changes (IPCC 2007; Parry *et al.* 2007; Smith and Vivekananda 2007). Two key themes in the literature are: 1) that developing regions often have economic systems in which significant portions of the population rely directly on natural resources for livelihood and sustenance; and 2) that these same developing regions have relatively low capacities for responding and adapting to climate shifts (particularly if they occur abruptly). Elaborating upon susceptibility to resource alterations, the IPCC notes that the most vulnerable industries, settlements and societies are those 'whose economies are closely linked with climate-sensitive resources', and explicitly denotes '[p]oor communities that depend on local food and water supplies' as being uniquely exposed (Parry *et al.* 2007). Territories throughout much of developing East and South-East Asia exhibit these characteristics.

The maritime character of much of the region is accompanied by acute vulnerabilities for coastal communities. Escalating global temperatures are predicted to be accompanied by increases in extreme ocean weather events, coastal erosion, rising sea surface temperatures and an accelerated rise in global sea levels (IPCC 2007). Increasing ocean temperatures can lead to increased coral bleaching and mortality, more frequent flooding in low-lying areas, and greater coastal wetland and mangrove degradation, all of which would pose particularly acute challenges to many of East and South-East Asia's coastal zones (IPCC 2007; Yusuf and Francisco 2010). Higher ocean temperatures also affect fish breeding patterns, aquatic plant cycles and may cause an increase in the frequency and power of coastal storms. Rises in sea levels accompanying increased global temperatures are also particularly dangerous for low-lying coastal areas which can be rendered uninhabitable through inundation, saltwater intrusion into freshwater systems, and untenable flood risks.

In addition to coastal concerns, parts of East and South-East Asia face risks to freshwater availability and agriculture deriving from warming temperatures and changing precipitation patterns. Warmer temperatures for longer durations can alter germination periods and growing cycles in agricultural zones such as those in the Greater Mekong sub-region and the large islands of the archipelagic states (Rerkasem 2011; Thuan 2011). Changing precipitation patterns may lead to dry days that are drier and wet days that are wetter, and bring rains that facilitate erosion and runoff. Existing weather fluctuations, such as the El Niño phenomenon, already contribute to droughts during the dry season and floods during the wet, and these effects are likely to become more acute in a changing climate (IPCC 2007).

The physical manifestations of atmospheric change that are threatening South-East Asia can act in conjunction to create multiple stresses that are greater than the sum of their parts (Parry *et al.* 2007). For example, precipitation changes coinciding with sea-level rise and greater storm

intensity could result in hydrological changes that prove catastrophic for coastal ecosystems and the strategic resources present within them. The contemporary state of land and coastal degradation in parts of East and South-East Asia further increases the potential for climate change to exacerbate already present environmental challenges, as these degraded conditions reduce the ecological resiliency of vital natural systems. Whether by affecting water quality or availability, degrading agricultural lands through drought, flooding or erosion, or rendering of entire lands unviable by an encroaching sea, atmospheric changes create risks for a region, and there is reason to expect that these risks will become more formidable.

Conclusion: growth undermining growth?

Clearly, East and South-East Asia faces daunting environmental challenges. These challenges vary widely in their physical and social causes, and will be met with responses of widely divergent effectiveness. However, the common thread running through this chapter's attempt to outline these dynamics is that rapid development and social change has been the primary driver of regional environmental stress, and that there is reason to expect that many such stresses will become more pronounced. This somewhat gloomy thesis should not, however, lead automatically to dystopian narratives of a region on the precipice of environmental crises and set to devolve into social instability and greater human suffering. Regional development in areas such as agricultural production and urban infrastructure, which have come under focused environmental scrutiny in this chapter, have also helped pull millions of people out of poverty and have led to fantastic, if quite uneven, improvements in quality of life. The importance of such shifts should not be discounted or subverted by environmentally based critiques, nor should future development goals fall victim to radical or overzealous environmental constrictions. None the less, there is a need to recognize that the nature of environmental systems dictates that short-term actions can have intergenerational implications, and that balancing development ambitions with sober and strategic longer-term environmental assessments is essential.

Finding such a balance is difficult, and the degree to which aspects of 'sustainable development' logic still come into conflict with systemic regional economic trends should not be underestimated. Competition for resources through geopolitical rivalry, economic policies focusing solely on resource availability and price, and paradoxes surrounding the curbing of consumption for environmental reasons and its encouragement for economic growth can all impede the environmental-development balance. Globalized systems of production and consumption see comparative advantages sought in different economic sectors the world over. In practice, this means that many countries and economic actors will make seemingly rational decisions (in the sense that they will maximize financial benefits), in areas such as resource extraction and industrial and agricultural policy, which are in fact socio-economically and environmentally untenable in the longer term. The rapidity of modernization in much of East and South-East Asia ensures that these dynamics are playing out in hyper-speed, and it is an enduring challenge for local, state and regional policy makers to craft timely environmental legislation and implement it effectively.

The physical systems upon which the region depends are indifferent to the plights of its citizenries, however, and once key environmental thresholds are passed, the ramifications can extend along time horizons far beyond current political and economic outlooks. For this reason environmentally focused development strategies have no substitute, and the relative effectiveness of environmental management in East and South-East Asia will continue to be a harbinger of the region's path towards prosperity.

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