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Southeast Asia: The Impact of Climate Change to 2030:

Geopolitical Implications

This paper does not represent US Government views

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Southeast Asia: The Impact of Climate Change to 2030:

Geopolitical Implications

Prepared jointly by

CENTRA Technology, Inc., and Scitor Corporation

The National Intelligence Council sponsors workshops and research with nongovernmental experts to gain knowledge and insight and to sharpen debate on critical issues. The views expressed in this report do not reflect official US Government positions.

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Scope Note

Following the publication in 2008 of the National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030, the National Intelligence Council (NIC) embarked on a research effort to explore in greater detail the national security implications of climate change in six countries/regions of the world: India, China, Russia, North Africa, Mexico and the Caribbean, and Southeast Asia and the Pacific Island States. For each country/region we are adopting a three-phase approach.

- In the first phase, contracted research explores the latest scientific findings on the impact of climate change in the specific region/country. For Southeast Asia and the Pacific Island States, the Phase I effort was published as a NIC Special Report: *Southeast Asia and Pacific Islands: Impact of Climate Change to 2030, A Commissioned Research Report* (NIC 2009-04, June 2009).
- In the second phase, a workshop or conference composed of experts from outside the Intelligence Community (IC) determines whether anticipated changes from the effects of climate change will force inter- and intra-state migrations, cause economic hardship, or result in increased social tensions or state instability within the country/region. This report is the result of the Phase II effort for Southeast Asia and the Pacific Island States.
- In the final phase, the NIC's Long-Range Analysis Unit (LRAU) will lead an IC effort to identify and summarize for the policy community the anticipated impact on US national security.

In July 2009, a group of regional experts convened to explore the socio-political challenges, civil and key interest group responses, government responses, and regional and geopolitical implications of climate change on Southeast Asia through 2030. The group of outside experts consisted of social scientists, economists, and political scientists. While the targeted time frame of the analysis was to 2030, the perceptions of decision makers in 2030 will be colored by expectations about the relative severity of climate changes projected later in the century. The participants accordingly considered climate impacts beyond 2030 where appropriate.

To support research by the NIC on the National Security Impacts of Global Climate Change, this assessment on the climate change impacts on Southeast Asia and Pacific Islands through 2030 is being delivered under the Global Climate Change Research Program contract with the CIA's Office of the Chief Scientist.

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Executive Summary

The National Intelligence Council-sponsored workshop entitled, *The Implications of Global Climate Change in Southeast Asia and the Pacific Island States*, held on July 21, 2009 brought together a panel of regional experts to consider the probable effects of climate change on Southeast Asia from a social, political, and economic perspective. The workshop focused on Indonesia, Vietnam, Cambodia, Laos, Thailand, the Philippines, Malaysia, Singapore, and Burma. The panelists concluded that ***Southeast Asia faces a greater threat from existing manmade environmental challenges than from climate change to 2030.***

- The impact of dam building on the Mekong River Basin poses a potential catastrophic threat to agriculture, fisheries, and human habitation in Cambodia and Vietnam's Mekong Delta. Disruption of the Lower Mekong will pose a greater near-term challenge to mainland Southeast Asia than global climate change.
- Unsustainable development practices such as deforestation and overfishing threaten to bring about the near-term collapse of vital regional ecosystems, including the tropical forests and the fisheries of the South China Sea.
- Massive manmade forest fires threaten the environment and public health across the region and are major contributors to global greenhouse gas emissions.

While the states of Southeast Asia will face similar threats from climate change to 2030, the severity of the threats will vary both between and within states.

- The region will face a serious water management challenges as climate change renders water resources more unreliable. Both urban areas—such as Bangkok, Dili, Kula Lumpur, Manila and Singapore—and rural areas across the region may face threats from water scarcity, flooding, and storms.
- Food security is already a problem in many Southeast Asian states, including the Philippines, Laos, Cambodia, Burma, and Indonesia. The most at-risk areas for climatic or environmental disruption are "rice basket" regions that feed not only the rest of their countries but others in the region as well. The most serious of which is Vietnam's Mekong Delta, which feeds as much as half the country's population.

Climate change will increase prospects for conflicts within states. Disruptions to traditional lifestyles, water and food stress, and more frequent or more severe natural disasters will destabilize Southeast Asian societies and increase social tension. The poor, ethnic and religious minorities, and those living in peripheral areas of states will suffer disproportionately.

- The highland regions of Laos and Vietnam are a classic example of ethnic minority concentration in disadvantaged peripheral areas. A similar dynamic has helped drive long-standing conflicts in Burma.

- Large-scale migration from rural and coastal areas into cities and will increase friction between diverse social groups already under stress from climate change. The country most in need of massive resettlement planning is Vietnam.

In addition to creating outright refugees, climate change may drive major increases in migrant workers seeking employment in neighboring countries. Overseas migrant labor acts as a safety valve for employment pressures and a source of economically critical remittances. Conflicts over migrant workers are already on the rise in the region and countries under increasing domestic employment and societal pressure are unlikely to welcome a major influx of foreign labor.

- Climate change may drive cross border movements of Vietnamese and Indonesians to Malaysia, Cambodians and Laotians to Thailand, Burmese to Thailand and Malaysia, and Filipinos throughout the region.
- Millions of Filipinos and Indonesians currently work overseas within or outside the region—over two million Indonesians work in Malaysia alone, where they make up over 10 percent of the country's population.

Civil society will likely bear much of the initial burden of responding to climate change in Southeast Asia. The nongovernmental organization (NGO) and civil society sector is growing across the region, and climate change-induced challenges will likely be forces for deepening citizen participation and influence.

- Where civil society is robust, such as in the Philippines and Thailand, it is likely to grow stronger and expand its engagement with climatic and environmental issues.
- In authoritarian regimes such as Burma, Cambodia, and Laos, the state's hostility to civil society mobilization is a major limitation on adaptive capacity, resulting in relatively underdeveloped NGOs and civil society.
- Civil organizations have considerable experience filling in the widespread gaps in state-provided social services, addressing social problems such as education, poverty, and public health. Indonesia, for example, relies on civil society for relief efforts—including groups with links to militant Islamist organizations.

The combination of climate change and other environmental, social, political, and economic factors could cause the failure of one or more states in the region by 2030.

- Laos, Burma, and Cambodia are most at risk of partial or complete state failure.
- Although Vietnam will face the most severe overall challenges in the region, its national resilience renders it unlikely to fail.
- Indonesia may suffer local state failure or disintegration in peripheral areas of the archipelago, but is unlikely to suffer overall failure.

China has a major economic and political presence in the region and may play a greater role in determining the trajectory of Southeast Asia to 2030 than climate change or any of the states in the region.

- China's development activities in Southeast Asia, such as dam construction and resource extraction, pose as great an environmental threat as climate change.
- China's assertive presence in Southeast Asia and unwillingness to compromise on sovereignty over the South China Sea or the damming of the Mekong River will create friction with states in the region, especially Vietnam and Indonesia.

The framing of climate change as a Western-generated phenomenon creates the potential for major anti-Western backlashes over virtually any climate change-induced crisis that arises in the region.

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Introduction and Background [1]

Southeast Asia and the Pacific Islands are at risk from the impacts of climate change in the next 20 years due to the region's large and growing population, long coastlines, abundant low-lying areas, reliance on the agricultural sector, and dependence upon natural resources. This report focuses on Cambodia, Indonesia, Laos, Malaysia, the Philippines, Singapore, Thailand, and Vietnam. These countries have a diverse range of governments, populations, religions, economic growth, development, and allocation of natural resources, but they all have a similar tropical maritime climate and face similar threats from climate change.

The effects of climate change have already begun in the Southeast Asia and Pacific Islands region:

- Average annual surface temperatures in the region increased by 0.5-1.1 °C during the period 1901-2005.[i]
- Precipitation patterns are changing regionally, with increases in some locations and decreases in others. For example, annual rainfall decreased across most of the southern regions of Indonesia (Java, Lampung, South Sumatra, South Sulawesi, and Nusa Tenggara) and increased across most of the northern regions of the country (Kalimantan and North Sulawesi) during 1931-1990.[ii]
- Sea level is rising, but the magnitude of the rise varies regionally. During the period 1993-2001, the largest increases in sea level (15-25 mm per year) in the region occurred near Indonesia and the Philippines, while only moderate changes (0-10 mm per year) occurred along the coasts of Thailand, Cambodia, and Vietnam.[iii]

Global circulation model projections indicate that climate change will continue to occur in the region throughout the 21st century:

- Climate model simulations clearly indicate that average annual temperatures are likely to increase across the region by approximately 1°C through 2030, and they will keep increasing through the remainder of the 21st century.
- The magnitude, location, and trends of future precipitation changes are much less certain due to the inherent difficulty of modeling such changes. Future precipitation changes due solely to climate change are difficult to resolve because they are superimposed on significant inter-annual variations that occur naturally in the region. Climate model simulations suggest that net precipitation rates will increase across the region in the next 20 years, but decreases probably will vary geographically and temporally.
- It is difficult to project future changes in monsoon patterns and the effects of El Niño-Southern Oscillation (ENSO) on precipitation in the region, due to the challenges

[1] This section is extracted from the Executive Summary of the Phase I report (see Scope Note): NIC Special Report: *Southeast Asia and Pacific Islands: Impact of Climate Change to 2030, A Commissioned Research Report* (NIC 2009-04, June 2009). Some of the judgments in this report (Phase II) may differ from the Phase I report.

associated with modeling these phenomena. Climate model results suggest that the onset of the monsoon in Thailand, Laos, Cambodia, and Vietnam may be delayed by ten to 15 days during 2030-2070, but the duration of the monsoon will not change.[iv] There is no evidence from climate model simulations that ENSO events will become more frequent due to climate change, but their intensity may increase.[v]

- Sea level will continue to rise, although rates will vary across the region. By the end of the 21st century, sea level is projected to have risen by approximately 30-40 cm.[vi]

There is overwhelming evidence that climate change will impact a variety of sectors in Southeast Asia and the Pacific Islands through 2030. All of the major effects of climate change on the region are interrelated; thus it is impossible to assess one impact independently of the others. The most high-risk impacts of climate change in the region are related to fresh water and ocean water resources, and include the following:

Sea-level Rise. Throughout the region, rising sea level causes a number of devastating effects in the region, including saltwater intrusion into estuaries and aquifers, coastal erosion, displacement of wetlands and lowlands, degradation of coastal agricultural areas, and increased susceptibility to coastal storms. These effects are interrelated with impacts on agriculture, natural disasters, river deltas, water resources, coastal ecosystems, human livelihoods and infrastructure, and national security. Sea-level rise has overarching socioeconomic impacts as well, due to loss of income associated with degradation of agricultural areas and loss of housing associated with coastal inundation, for example.

Water Resources. Future changes in regional water resources are closely tied to changes in precipitation. The number of local regions under severe water stress is projected to increase dramatically in the next few decades, although model results suggest that the region as a whole will not be at risk for water shortages. Fresh water resources on all island nations in the region are especially vulnerable to any variability in precipitation because many rely on rainwater collection for their supply of fresh water. The management of water resources is one of the most challenging climate-related issues in the region, as it is central to health and sustainable development. The impacts of climate change on water resources are interrelated with impacts on agriculture, river deltas, forests, coastal ecosystems, diseases and human health, and national security.

Agriculture. Assessment of the specific impacts of climate change on agriculture is challenging because it is difficult to reliably simulate the complicated effects of future variations in temperatures, precipitation, and atmospheric CO_2 concentrations on crop growth. Temperature increases associated with climate change could result in a northward expansion of growing areas and a lengthening of the growing season. Rising atmospheric CO_2 levels are expected to stimulate plant photosynthesis, which would result in higher crop yields. Studies show that the beneficial effects of CO_2 on plants may be offset by average temperature increases of more than 2°C, however. Overall, it is likely that future crop yields will vary by region and by crop, with yield increases in some locations but decreases in others. Management of the agricultural sector by regional nations is critical to their economic growth and national security. The impacts of climate change on agriculture are interrelated with impacts on sea level, river deltas, natural disasters, water resources, and national security.

Coastal Regions. Coastal regions are some of the most at-risk areas for the impacts of climate change in the region due to their prevalence and high population density.

Mangroves and coral reefs across the region are two key coastal ecosystems that are expected to be significantly impacted by climate change. Many coastal areas are already degraded by pollution, sediment-laden runoff, and destructive fishing practices. Climate change-related destruction and degradation of mangroves and coral reefs will exacerbate these effects and result in long-term economic repercussions because these ecosystems are central to the tourism, agriculture, fishing, and aquaculture industries. The area's coastal regions are also susceptible to inundation associated with sea-level rise and destruction of infrastructure from flooding and storm surges, which are likely to increase as a result of future climate change. Careful management and safeguarding of coastal regions by regional governments is therefore essential in the next 20 years, as the effects of climate change manifest themselves. Impacts on coastal regions are interrelated with sea level, river deltas, natural disasters, water resources, agriculture, forests, and human livelihoods and infrastructure.

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Social, Political, and Economic Challenges

Agricultural Challenges

Southeast Asia is a globally important agricultural region which is a major exporter of agricultural and forestry products. Despite trends toward urbanization and growth of light manufacturing and services, agriculture remains the major employer in the region. Large segments of the population in Southeast Asia remain dependent on subsistence agriculture, particularly in the less developed countries such as Laos, Cambodia, and Burma. The only countries without an important agricultural sector are the micro-states of Singapore and Brunei.

Southeast Asian agriculture faces a wide array of existing challenges. The region's monsoonal climate generates highly variable weather conditions including severe storms and extreme droughts and flooding. The productivity of the region's arable land is threatened by unsustainable agriculture practices, erosion caused by loss of forest cover, industrial pollution, and pesticides. Limited infrastructure in the less developed countries, particularly Laos and Cambodia, hampers the movement of agricultural goods beyond local markets, and monoculture—growing of a single crop—is prevalent. These factors combine to render the agricultural populations most vulnerable in the countries that also have the least capacity to cope with climatic challenges.

The overall impact of climate change on agricultural productivity in Southeast Asia to 2030 is uncertain. To a large extent, it appears likely that climatic impacts on agriculture will be determined by a complex interaction of localized factors. Benefits from longer growing seasons, expanded growing areas, increased photosynthesis, and CO2 fertilization may be offset by delays in the monsoon, unreliable precipitation, temperature increases, inundation of fertile coastal areas, and increases in pests and plant diseases. Crop yields may increase in some areas and decrease in others, perhaps consistently, perhaps on a shifting basis. Changes in overall conditions will be overlaid by more frequent extreme weather events, which will severely disrupt agriculture on a recurring basis.

Some of the most disruptive climate change-induced effects may be the loss of fertile agricultural land and shifts in growing areas. Land availability is already a major problem in densely populated areas such as Java or the Mekong and Red River Deltas. Sea-level rise, flooding, and erosion will all contribute to a reduction in arable land, particularly in fertile riparian and coastal areas. This will increase the density of farmers on the remaining land, making conflicts more likely. Moreover, the concentration of high-density, intensive farming in areas—such as coasts, river flood plains, and deltas—that are the most vulnerable to climate change-induced challenges acts as a force multiplier for adverse impacts on the region's agricultural sectors. Adaptation to shifts in growing areas will involve the movement of farmers onto new land—most likely land already occupied by others—or switching to new crops. Traditional agricultural communities that have occupied the same location and grown the same crops since time immemorial will have difficulty adapting to such shifts.

Rice Production. Rice is not only Southeast Asia's most important agricultural product but by far the region's most important dietary staple. Although Indonesia is the world's

third largest rice producer, domestic demand makes it the largest world importer. The region nevertheless leads the world in rice exports—Thailand is the world's largest rice exporters, and Vietnam the second largest. Both Laos and Cambodia are essentially rice monoculture economies—agriculture dominates the economy and employment, and rice dominates agriculture. A failed rice harvest could cause not merely an economic disaster, but a humanitarian one as well.

The impact of climate change on regional rice production is the single most important agricultural consideration to 2030. As is the case with other aspects of agriculture, climate change is expected to have mixed consequences for rice production. Production may increase in parts of Indonesia and Malaysia while prospects for the Philippines and Thailand are uncertain. Rice production is water intensive, and more intermittent rainfall or delays in the monsoon may dramatically cut rice yields. Upland cultivation will suffer from erosion and increased surface runoff due to deforestation and increased rainfall. If rice paddies remain flooded for longer periods due to increased rainfall or sea-level rise, rotting vegetation will increase methane emissions, contributing to greenhouse gas emissions. In coastal areas, rice paddies face risks of saltwater intrusion from sea-level rise and storm surges. The threat is especially serious in Vietnam, where fresh water from the Mekong and Red River Deltas allows a second rice crop to be cultivated during the dry season, making a critical contribution to Vietnam's rice production and export. By 2030, salinity intrusion in the rice paddies of the Mekong is expected to push up to 12 miles inland during the dry season, causing a loss of dry season rice production.

Rural Labor. Although the region hosts many major urban areas and rural-to-urban migration averaged over three percent per annum from 2000 to 2005, many countries in Southeast Asia remain heavily rural. With the exception of Malaysia, at least two-thirds of the population in the states of the Southeast Asian mainland remains rural. The populations of Laos, Cambodia, and Burma are overwhelmingly rural, while in Indonesia almost half the population remains rural.[2] Even in mixed economies such as Thailand, Indonesia, the Philippines, and Vietnam, agriculture remains a huge employer.[3]

Much of the economic growth in the region has been in light manufacturing, commerce, and services that are comparatively less labor-intensive than traditional agriculture. The beneficiaries have mainly been established urban populations, and the demand for new labor from rural areas, while it has increased, has not done so precipitously in most countries. As a result, many countries in the region have had trouble addressing the surplus rural labor generated by high population growth rates. In Indonesia, for example, the government turned to a controversial transmigration program to relocate surplus rural labor from overcrowded Java and Madura to less populous islands rather than into industrial jobs in Java's cities. Urban industrial growth was not robust enough to accommodate them. These dynamics pose a huge problem for the next two decades. Climate change is likely to drive mass, involuntary migration from overstressed rural

[2] Rural population shares are Cambodia 78 percent, Indonesia 48 percent, Laos 69 percent, Malaysia 30 percent, the Philippines 35 percent, Thailand 66 percent, and Vietnam 72 percent. Singapore is 100 percent urban.

[3] Agriculture accounts for 75 percent of the labor force in Cambodia, 43 percent in Indonesia, 80 percent in Laos, 37 percent in the Philippines, 42 percent in Thailand and 58 percent in Vietnam.

areas into overstressed cities. Absent a sea-change in industrial growth patterns, urban economies in the region will not be able to provide employment to the newcomers. The result could be mass unemployment in both the cities and the countryside. The humanitarian threat from rural unemployment or major losses of rural income is compounded by the fact that much of the rural population in Southeast Asia already lives in poverty. In addition, because of the number of men leaving the countryside in search of work, the poor, marginal rural labor force is disproportionately female. Climate change-induced rural challenges will therefore disparately impact women.

Food Security. Despite the region's agricultural productivity, overpopulation and mismanagement of food distribution mean that food security is already a problem in many Southeast Asian states, including the Philippines, Laos, Cambodia, Burma, and Indonesia. Singapore is dependent on the importation of nearly all its foodstuffs, but the country's relative wealth allows it to purchase ample food on the world and regional markets. Agricultural disruptions arising from climate change to 2030 will raise food security to the top tier of national challenges in the region. Climate change will likely cause both absolute food shortages and sharp increases in food prices. In many cases, the most at-risk areas for climatic or environmental disruption are "rice basket" regions that feed not only the rest of their countries but others in the region as well. The most serious such challenge to 2030 is likely to be the loss of Vietnam's Mekong Delta, which feeds as much as half the country's population.

Food security will be a particular problem where rural populations are heavily dependent on subsistence agriculture. Climate change will increase the frequency of localized agricultural crises depriving subsistence farmers of food and livelihood. This will drive a major increase in rural to urban migration; it will also shift millions from self-sufficiency to dependence on the region's underdeveloped food distribution networks. Infrastructure limitations may prevent surplus food from being used to address local shortages in other areas. Laos, the region's most acutely underdeveloped state, is especially susceptible to this problem. Uneven distribution of food security could be a major source of unrest, especially where it correlates with ethnic or other differences.

Land currently allocated to export crops may have to be reallocated to domestic needs. Crop prices are also likely to increase significantly due to reductions in supply and disruptions of distribution networks. States such as Laos or Cambodia that lack the financial resources to purchase substantial amounts of food overseas are likely to become chronically dependent on humanitarian food aid.

Deforestation. Massive deforestation across Southeast Asia is one of the region's most serious current environmental problems. Southeast Asia hosts roughly five percent of the world's forests and is a major source of global forest products, including valuable hardwoods such as teak. Unsustainable forestry practices represent a greater and more proximate threat to the region's forests and the indigenous peoples who depend upon them than does climate change. Fast-rising global demand for palm oil, rubber, coffee, and other plantation crops have led to the replacement of large swathes of tropical forest with plantations. Indonesia has one of the largest tropical forests in the world, but its rate of deforestation is the highest in the world, more than 14,000 square miles a year. At

current rates of deforestation Indonesia and many other Southeast Asian countries will have lost the vast majority of their forest cover by 2030.

In addition, climate change will significantly exacerbate collateral threats associated with deforestation. Heavier monsoon rains caused by climate change will combine with deforestation to drastically reduce the absorption of runoff, leading to increased erosion, flooding, and landslides. These problems already pose major threats across the region, including in the Philippines, Indonesia, Burma, Laos, and Cambodia.

Climate change is also expected to bring hotter, drier conditions during the dry season, which is likely to increase the extent and incidence of forest fires in the region. In recent decades Southeast Asia has suffered some of the world's worst forest fires, notably in 1997. Forest fires and peat bog fires associated with deforestation have been estimated to contribute 80 percent of Indonesia's greenhouse gas emissions, which are among the world's largest behind China and the United States. The major cause of the fires is large-scale burning of forest vegetation and carbon-rich peat bogs for land clearance, primarily in Sumatra and Borneo. Up to 30 percent of total global carbon is currently sequestered in peat bogs in Indonesia and Malaysia, which can smolder underground for years, igniting forest fires every dry season. Forest fires generate an annual blanket of smoky air over the region that can cover as much as two million square miles. Indonesia is the largest contributor to this phenomenon, which is euphemistically called "the haze." The haze represents a major regional environmental hazard that has a significant economic and public health impact not only on Indonesia but on neighboring Malaysia and Singapore. Burning may substantially decrease as Indonesia runs out of forest land suitable for clearance.

Coastal and Maritime Challenges

The maritime impacts of climate change are critical to Southeast Asia due to the concentration of population, agriculture, and economic activity in low-lying coastal areas.[4] In Indonesia, for example, coastal and marine development, including fishery production and shrimp farming, account for 25 to 30 percent of GDP and provide employment for 20 million people. The region's coastal lands and waters are already under threat from environmental and developmental pressures such as pollution, sediment-laden runoff, and destructive fishing practices. Climate change will exacerbate the degradation of the region's coasts through sea-level rise, coastal erosion, increased storm activity, and damage to littoral ecosystems. The archipelagoes of the Philippines and Indonesia, with some 22,000 and 33,000 miles of coastline respectively, are by far the most susceptible to coastal climatic impacts and are also expected to experience the greatest sea-level rises in the region. Nevertheless, the greatest proportional humanitarian and socio-economic impacts may be felt on the densely populated, agriculturally vital deltas of Vietnam and Burma. Further offshore, changes in ocean conditions may significantly disrupt marine ecosystems.

Fisheries. The seas of Southeast Asia host some of the world's most important fisheries, and fish is the most important source of dietary protein for many of the region's

[4] The percentage of the population living within 60 miles of the coast is 98 percent in Indonesia, 87 percent in the Philippines, 78 percent in Vietnam, and 40 percent in Thailand.

inhabitants. Despite large-scale commercial fishing both by locals and by Chinese, Japanese, and American fishing fleets, much of the region's fish catch goes to individual subsistence fishermen. Fish stocks in the region have been under threat for the last several decades from overfishing and pollution. Maritime climate change will cause shifts in water temperature, salinity, ocean circulation, and acidity. At a minimum, the movement of fish schools will be altered, but at some point climatic effects could have a gross disruptive impact on the marine food chain. Crucial regional fisheries such as those of the South China Sea could be seriously depleted or even collapse entirely. The economic and food security impact from such a catastrophic scenario could create instability across the region.

Coral Reefs. The coral reefs of every littoral state in Southeast Asia are already seriously threatened by coastal economic development, shipping lanes, overfishing, sedimentation, and wastewater pollution. Climate change is expected to compound the pressure on reefs, primarily through coral bleaching and reduced marine biodiversity brought about by rising ocean temperatures. Indonesia's 18,000 square miles of coral reefs generate annual economic benefits estimated at US$1.6 billion, while the Philippines' approximately 9,000 square miles generate US$1.1 billion. Thailand, Indonesia, and the Philippines have already suffered major coral bleaching episodes. Even though coral reefs usually recover from bleaching events, more frequent disruption of the reefs would have a significant regional impact on both fishing and tourism.

Coastal Erosion and Island Losses. The impact of erosion on coasts will vary across the region, depending on coastal topography and other factors. Coastal erosion will particularly threaten the coasts of Vietnam, Indonesia, and the Philippines. In addition to fishing, intensive agricultural activity is concentrated along Southeast Asia's coasts and particularly in the fertile silt of the region's river deltas, such as the Mekong and Red River Deltas in Vietnam and the Irrawaddy Delta in Burma. Saltwater intrusion is already a problem in delta regions and is expected to move further inland, contaminate the soil and irrigation water of low-lying croplands in areas such as Java and Sumatra. Over the long term, most of the deltas in the region will be permanently submerged or eroded away. Inundation of fertile coastal farmland will be compounded by storm surges that will destroy additional farmland and infrastructure, reaching far inland in flat delta regions. Sea-level rise, changes in sea temperature and salinity, and storm activity will also threaten the coastal mangroves. Like forested hillsides on land, the mangroves play a crucial role in anchoring the fertile silt washed down into the deltas. If the mangroves die off, deltaic erosion would accelerate dramatically. Vietnam stands to lose over 14,000 square miles of delta, and significant deltaic areas may disappear in Thailand and Indonesia as well.

Sea-level rise is set to completely submerge numerous small islands in the region, especially in Indonesia. Islands and reefs often form the basis for offshore oil and gas claims, making their potential disappearance a contentious issue. Some estimates indicate Indonesia may lose 2,000 small islands to sea-level rise by 2030. It is worthwhile to put this impressive figure in perspective, however. Less than half of Indonesia's more than 13,500 islands are inhabited, so even the large-scale loss of islands may not be directly felt by the Indonesian population. The most serious socio-political

impact may be the effect losing key boundary islands will have on territorial and seabed claims.

Coastal villages, towns, and cities will face the risk of inundation as a result of sea-level rise, more frequent major storms, and associated storm surges. Storms and flooding will take a considerable toll in destroyed housing and infrastructure and socio-economic disruption. Public health risks will increase due to such factors as contamination of drinking water. Coastal settlements at risk include some of Southeast Asia's most important cities, such as Bangkok, Jakarta, and Rangoon. While major coastal cities will likely suffer the greatest economic losses, the humanitarian toll may be higher in smaller coastal settlements which lack the infrastructure to cope with disasters. Cyclone Nargis in 2008 illustrates this distinction—although Rangoon suffered extensive damage, the vast majority of deaths occurred elsewhere in the Irrawaddy Delta.

Hydrologic Challenges

The overall abundance of water in Southeast Asia is tempered by the monsoonal wet-dry seasonal variation. Southeast Asia thus faces both challenges from excessive water (flooding, erosion due to runoff, severe storms) and from water scarcity (droughts and reduced river flows). The combination of high population density and water-intensive agriculture in some areas also leads to severe localized stress on water resources and distribution systems. Water quality is also a major issue, with high levels of industrial and agricultural pollutants tainting many water sources.

Climate change will have a mixed impact on regional water resources in Southeast Asia. Although the region as a whole does not appear likely to suffer a major loss of water to 2030, shifts in hydrologic systems and precipitation patterns could nevertheless create severe local crises. Precipitation projections vary, but in general significant increases in precipitation are predicted in western maritime Southeast Asia and the southern Philippines. Southern Vietnam, East Malaysia, and particularly eastern Indonesia and the northern Philippines are predicted to suffer sharp decreases in rainfall. In practical terms, this intra-regional variation renders the overall net water availability in the region irrelevant—local conditions will determine incidence and severity of water stress. In addition to geographic variations, the already strong seasonal variation in precipitation will become even more extreme, bringing more severe droughts, flooding, and storms, and exacerbating water management problems across the spectrum. On the mainland, climate change-induced glacial melting in the Himalayas, the source for the major rivers of mainland Southeast Asia such as the Mekong, Irrawaddy, and Salween, is expected to generate increased near-term river flows but drastic decreases in the longer term as the glaciers disappear.

Because water stress-induced crises could arise from either extreme—water scarcity or excess—such crises could occur virtually anywhere in the region. The most at risk areas will be those subject to pre-existing water scarcity or abundance. For example, Thailand is among the countries with least potable water available per capita, and its northeastern Isan region is already drought-prone. The margin of available water resources relative to population and agricultural and urban water use is already narrow in most of the densely populated areas of the region, such as Java. Water excess poses the greatest threat to

low-lying flood-prone areas such as the region's river basins and deltas. Water stress in such areas could generate large-scale refugee flows and humanitarian crises that the region is ill-equipped to handle. In addition, agricultural areas where cultivation is dependent on finely balanced traditional hydrologic patterns will face severe disruption. The foremost example is the lower Mekong Basin, where agriculture depends on the complex and unusual hydrology of the Mekong River.

Urban Water Challenges. Although many of Southeast Asia's agricultural areas will face acute water stress, the potential for disastrous humanitarian consequences may be greater in the region's cities. Urban growth already strains the region's water infrastructure, which is underdeveloped in many areas. During the height of El Nino cities such as Bangkok, Dili, Kuala Lumpur, Manila, and Singapore went through sporadic water shortages and rationing. The combination of unreliable rainfall and massive urban growth as people are displaced from the coast and countryside could deplete critical aquifers and lead to severe urban water shortages. Southeast Asian states will face the need to allocate a significantly greater proportion of water resources to urban areas, diverting water away from already stressed water-intensive agriculture. Water resource allocation is already a point of contention within and between the states of Southeast Asia. For example, Singapore depends on Malaysia for most of its water, which has led to recurring tension between the two countries. Although most of the governments in the region subsidize water, cities across Southeast Asia are likely to face sharp increases in water costs.

In addition to shortages, some cities will also face increased risk of severe flooding. Urban flooding is already a widespread phenomenon in the region, both as a result of wet season riparian flooding and storm surges. During the 2008 monsoon season both Hanoi and Vientiane had their worst flooding in generations. In early 2009 extreme rainfall caused a dam near Jakarta to collapse and sweep away a suburban neighborhood. Manila and Bangkok face similar flooding challenges. The impacts from more frequent and severe urban flooding will be compounded by major urban population growth and overstressed infrastructure.

The Mekong River. By far the most serious water resource issue in the region concerns the Mekong River Basin. Between now and 2030, the events taking place in the Mekong River Basin will have greater adverse impact on the ecology of mainland Southeast Asia than will global climate change as a whole. The Basin is an area of over 900,000 square miles, home to more than 320 million people in six countries—Burma, Thailand, Laos, Cambodia, Vietnam, and China's Yunnan province. Of those countries, Laos, Cambodia, and southern Vietnam are almost wholly dependent on the Mekong River. In Vietnam alone, some 30 million people are dependent on the Mekong River Delta. The Delta accounts for half of Vietnam's rice production and Mekong fisheries provide 80 percent of the dietary protein intake in southern Indochina.

The Mekong Basin is already under stress from pollution, overpopulation, declining fish catches, deforestation, and erosion and saltwater intrusion in the delta. Like other rivers in mainland Southeast Asia, the Mekong is expected to suffer disruptions in flow as a result of glacial recession in the Himalayas and more variable precipitation. Sea-level

rise, salinity intrusion, and coastal erosion will pose major threats to the river's delta in southern Vietnam. Sea-level rise in the delta will put at risk large swathes of cultivable land, critical fisheries, and nearly two million inhabitants. Although climate change poses a longer term threat, the massive hydroelectric dam construction program under way on the river poses a much greater and more proximate threat.

The risk to the Mekong stems from the river's complex hydrology. The strong seasonal variation in precipitation associated with Southeast Asia's monsoon climate generates a unique "flood pulse" hydrologic pattern in the Mekong River. The coming of the monsoon rapidly swells the river's flow, sending a flood wave downstream that irrigates the fertile rice paddies and croplands of the lower Mekong in Cambodia and Vietnam, also bringing nutrient-rich silt to rejuvenate the soil. In addition, the Mekong's flood pulse drives the hydrology of Cambodia's Great Lake, the Tonle Sap. The lake supports three million people and its exceptionally rich fisheries provide 60 percent of Cambodians' protein intake as well as stocking the fisheries of the Mekong Delta. The lake empties into the Mekong at Phnom Penh, but the Mekong's monsoon flood pulse reverses the flow, driving water back north into the lake. As a result, the Tonle Sap quadruples in size during the wet season, irrigating much of central Cambodia. The lake also acts like a tidal basin, preventing the increased monsoon flow from flooding or scouring the away the Mekong Delta. When the Mekong's flow drops during the dry season, the vast reservoir of freshwater held in the Tonle Sap empties back into the Mekong Delta. This doubles the dry season flow into the delta and permits year-round rice cultivation that accounts for much of the area productivity.

If all the dams and infrastructure projects are implemented, the Mekong Delta will disappear much faster than it would due to Sea-level rise*sea-level rise*. The river's complex hydrologic system could be catastrophically disrupted even by modest dam construction and water diversion, let alone the massive programs now underway. Without the seasonal flow reversal into the Tonle Sap, the lake would shrink drastically, devastating Cambodian agriculture. Without dry season drainage from the Tonle Sap, the Mekong Delta would no longer be able to produce a second rice crop. The migratory fish population would be cut off from spawning grounds in the Tonle Sap or further upstream, collapsing the fisheries. In addition, even a few dams on the lower Mekong will prevent renewal of the delta silt deposits and the reduction in flow will allow permanent saltwater intrusion that would kill the mangroves and prevent rice cultivation. The disruption of the lower Mekong hydrology would represent a massive catastrophe for southern Indochina. Simultaneous huge losses in rice production and in the fish catch would generate a food security crisis for millions in Cambodia and Vietnam. In combination with accelerated erosion, millions of Vietnamese would be driven from the Mekong Delta, one of the most densely populated areas in Southeast Asia. This would not only generate a humanitarian crisis but could lead to major conflicts across southern Indochina.

Demographic and Public Health Challenges

Southeast Asia has experienced rapid population growth that has led to overpopulation and consequent strains on land availability, food security, water resources, and social stability. Large segments of the region's population are concentrated in fairly small, overstressed areas such as Java, the Mekong and Red River Deltas, the Bangkok area, and islands across the Philippine and Indonesian archipelagoes. Such population concentrations are already at high risk from climate change-induced challenges, and population is likely to become even more concentrated as a result of climate change. Climate change is likely to spark the next wave of urbanization, which none of the countries in the region are prepared to deal with. Whereas rural-to-urban migration has traditionally been a safety valve to alleviate rural poverty and discontent, it will increasingly become a matter of survival. At the same time, the capacity of Southeast Asia's cities to absorb migrants will decline as a result of climate change-induced stress on already inadequate infrastructure.

As a result of high population growth rates in recent decades and a fairly low life expectancy in some states, Southeast Asia has a relatively young population. Demographically younger countries tend to be those with lower levels of economic development and weaker state capacity, such as Laos (median age 19), Cambodia, the Philippines, and Timor-Leste (all median age 22). Reduced opportunities and greater climatic and economic hardships may create a generation of alienated youths with adverse impacts on the social stability of countries in the region.

Public Health Challenges. Public health has been a persistent challenge for Southeast Asia. Apart from Singapore and to a lesser extent Thailand, the region has weak health care infrastructure, particularly in Burma and Laos. Public health sectors in many countries are already struggling with very high prevalence of chronic diseases such as HIV/AIDs as well as periodic severe outbreaks of a host of tropical ailments. Sanitation and water treatment also remain rudimentary in many areas. Although public health systems may become more robust over the next two decades, they are nevertheless likely to be severely taxed by the effects of climate change. Regional vulnerability to disease will increase as higher temperatures and humidity combine with projected increases in population, urbanization, and declining water quality. The collateral effects of food, water, and heat stress may weaken immune systems, and climate change-induced migration will aid in the spread of diseases.

Economic Challenges

Southeast Asia is an economically heterogeneous region with widely varying levels of economic development. At one extreme, Laos and Cambodia remain underdeveloped agricultural economies, with most of their population engaged in subsistence rice farming. At the other, the city-state of Singapore is a trading, financial, and manufacturing powerhouse. Although each economy faces specific challenges, the region has also faced a number of common challenges, including major regional financial crises, the need to transition from agriculture to manufacturing and services-based economic models, depletion of natural resources, and the challenge of addressing widespread poverty.

Southeast Asia was badly shaken by the Asian Financial Crisis of 1997-1998 and is again under severe stress from the continuing global economic downturn. As was the case after the financial crisis, success in economic restructuring and recovery will be a key determinant of socio-political stability over the next two decades. Most Southeast Asian states have staked their domestic political legitimacy on the maintenance of economic growth and development coupled with spending on social programs such as poverty reduction, agricultural subsidies, and public health. In those countries that fail to undergo a robust recovery, persistent economic weakness and climate change-induced stress will compound each other. Climate change is likely to seriously threaten both economic growth and state budgetary largess on a sustained basis, which could translate into widespread political instability.

Resource Depletion. The rapid depletion of natural resources such as timber, hydrocarbons, and minerals is a major problem across the region, with the loss of timber being particularly acute. Many of the countries in the region, particularly Indonesia, Malaysia, the Philippines, and Burma depend heavily on natural resource rents for state revenues. Over the next 20 years unsustainable resource exploitation is likely to undermine the flow of public funds, as well as generating intense competition over resources. Climate change-induced disruptions such as storm activity, flooding, and erosion will make natural resource extraction more costly and difficult. Climate change will thus disrupt a principal source of public revenues while generating a major simultaneous need for increased public expenditures to combat climate change-induced impacts. This will increase the need for sustainable development models as well as economic diversification programs such as that undertaken in the East Malaysian state of Sarawak, which responded to depletion of timber resources by turning to manufacturing, commercial agriculture, and services.

Poverty. Millions of Southeast Asians live in poverty, with a narrow margin of subsistence and few resources to respond to climate change or cushion a loss of income resulting from it. In both Vietnam and Indonesia, 85 percent of the population lives on less than $2.00 a day. Poverty is far worse in countries such as Laos, Cambodia, and Burma. Thailand, Malaysia, and particularly Singapore have higher overall standards of living—in Thailand less than five percent live on $2.00 a day or less. Poverty reduction is a major aspect of economic development in the region and a major source of popular legitimacy for leaders and regimes. In Indonesia, for example, President Yudhoyono was re-elected in large part because of his allocation of subsidies to the poor. Income inequality in Southeast Asia has increased since the 1997 Asian Financial Crisis, which stalled the momentum built up by poverty reduction efforts in the preceding decades.

Climate change in Southeast Asia will disproportionally affect both the poorer countries in the region and the poorer populations within individual countries. Poorer states are more susceptible to state breakdown and poorer populations face greater risks and vulnerabilities. The net effect may be to push millions into a position of abject dependence on humanitarian aid, most of which will have to come from overseas. Shortages of available funds in the long-term will force leaders to make hard choices between climate change adaptation and policies such as poverty reduction.

The Energy Sector. A global shift away from reliance on fossil fuels in response to climate change could cause some loss of revenues for Southeast Asian economies that depend on hydrocarbon resource rents, such as Malaysia, Indonesia, and particularly Brunei. Even if developed countries move away from fossil fuels, however, growing demand in the developing economies combined with dwindling world supply may keep oil and gas revenues high.

The region's abundant energy resources, particularly fossil fuels and hydroelectricity, mean that Southeast Asia is not likely to face a major overall energy deficit to 2030. As with food and water, the problem is more the need to expand energy distribution infrastructure so that energy can be sent where it is needed. Massive climate change-driven urban growth will increase urban energy demand and energy costs across the region over the next two decades. Countries in the region expect to meet much of the increased electricity demand with hydropower, driving potentially disastrous dam construction, notably on the Mekong River. Despite the attractiveness of hydropower, climate change may have an adverse impact on the region's hydroelectric resources due to reduced river flows.

Trade and Industries. Aside from extractive resource-based industries such as mining, hydrocarbons, and timber, industrial growth in Southeast Asia has been focused on light manufacturing such as electronics, textiles, clothing, and food processing. Heavy industry is not an important economic factor and the pace of industrialization has been solid but not explosive. Although destructive events such as storms or floods could cause damage to plants and equipment, the major climate-related challenge will likely be the need to absorb an influx of rural labor into the industrial labor pool. A growing industrial labor surplus may drive down wages and quality of life for urban workers. Conversely, climate change-induced urbanization may drive a shift toward more rapid industrial-ization.

Situated astride some of the world's most important maritime trade routes, Southeast Asia has long been a major trading region, with Singapore its unquestioned hub. Southeast Asian countries do a brisk trade in both manufactures and primary products such as hydrocarbons, minerals, and timber. In addition, re-export trade is very important due to the region's location on the trade routes from Northeast Asia to South Asia, the Middle East, and Europe. Climatic pressure may reduce the availability of certain resources and goods, altering the composition and volume of trade in the region, with significant impacts on Singapore and other states. Increased storm activity may depress maritime trade and along with sea-level rise may threaten port infrastructure. In addition, the possible opening of new, shorter Arctic trade routes between Northeast Asia and Europe could have a major effect on re-export trade over the longer term.

Tourism. The tourism industry is very important in Southeast Asia and may suffer disproportionately from climate change. Tourism is an established economic staple in Thailand, Indonesia, and the Philippines. It accounts for over seven percent of GDP in Thailand, which receives upwards of five million visitors each year. In recent years tourism has also become a major driver of economic growth in the less developed countries of mainland Southeast Asia, particularly Cambodia and Vietnam. Cambodia's

burgeoning tourism sector brings two million visitors a year to the ruins of Angkor Wat and the beaches around Sihanoukville and Kep, providing much needed hard currency. Eco-tourism is also very important in places such as East Malaysia and Indonesia. In the East Malaysian state of Sabah, for example, eco-tourism brings roughly two million visitors a year and is the second largest sector in the local economy.

Despite its economic benefits, tourism also increases environmental degradation and disrupts local socio-economic patterns. For example, the many new tourist hotels around Siem Reap in central Cambodia are draining the area's water table, to the detriment of local agriculture. In addition, tourism-driven development has led to conflicts over real estate and forced farmers from their land. These factors will become more disruptive as climate change further restricts water and land availability. Moreover, degradation of coastal, coral reef, and rainforest ecosystems due to climate change poses a major threat to regional tourism, particularly coastal and eco-tourism.

Civil and Key Interest Group Responses

Civil society will likely bear much of the initial burden of responding to climate change in Southeast Asia. The nongovernmental organization (NGO) and civil society sector is growing across the region, and climate change-induced challenges will likely be forces for deepening citizen participation and influence. Where civil society is robust, such as in the Philippines and Thailand, it is likely to grow stronger and expand its engagement with climatic and environmental issues. Even where civil society is weak, the challenges posed by climate change are likely to force it to expand to fill the void left by ineffective or selective state responses.

In authoritarian regimes such as Burma, Cambodia, and Laos, the state's hostility to civil society mobilization is a major limitation on adaptive capacity, resulting in relatively underdeveloped NGOs and civil society. On the other hand, populations in those states may be more resilient to sustained hardship. The states with more open political systems, such as the Philippines, Indonesia, or Thailand, tend to have well-developed social resources and civil society organizations. These groups range from family-clan organizations to national-level socio-religious networks. Even in nominally open, democratic countries in the region, however, the capacity of civil society to influence state policy in Southeast Asia will likely remain relatively limited. The divide between civil society and political, economic, and bureaucratic elites in the region remains wide and mechanisms to redress public grievances are weak. Rather than challenging or pressuring the state, civil society is more likely to work in parallel to the state. Civil organizations have considerable experience filling in the widespread gaps in state-provided social services, addressing social problems such as education, poverty, and public health. For example, Indonesia relies on civil society for relief efforts—including groups with links to militant Islamist organizations. This backup social support network could readily be mobilized to address climate change-induced challenges.

Public awareness of climate change-related issues remains weak across much of Southeast Asia but most likely will strengthen as challenges manifest themselves with increasing frequency and severity. Awareness is a prerequisite for mobilization and effective action, but not a guarantee of either. Sensitivity to environmental issues among

the educated urban elite is important but may not translate into action in the rural periphery where it is most needed. One of the most important roles civil society can play regarding climate change is to help translate sensitivity into action on the climate change issue.

Political mobilization is already on the rise across the region, among both elites and the traditionally depoliticized masses. Farmers in Thailand have mobilized to protest the government's decision to import Chinese agricultural products, while many young, Western-educated Indonesians can be found heading environmental groups. Climate change will expand the range of grievances around which such mobilization will take place and consequently increase the scope of active civil society. Much of this mobilization will occur at the local level, where civil society groups may be better able to pressure local government. The expansion of participation by civil society in the political process may not always be constructive. In Thailand, for example, the coups and political turmoil in Thailand have resulted in the growth of the competing Red and Yellow Shirt protest movements whose clashes with each other and the state have sometimes turned violent. Similar "uncivil society" movements may arise around climate change-induced social conflicts.

Climate change is likely to expand civil mobilization even in heretofore authoritarian states in the region, potentially leading to more open political processes. Vietnam probably provides the strongest example of this process. Thousands of village and local organizations have emerged that are not under the direct control of the pro-government umbrella group for "mass movements," the Vietnamese Fatherland Front. Although the National Assembly remains controlled by the Communist Party, it is becoming more important and better at representing local interests. Because the Vietnamese Government will rely on the assistance of NGOs to help mobilize to prevent damming of the Mekong River, the state is likely to become more comfortable with such groups over time. By 2030, this emerging trend toward increasing openness may render Vietnam one of the more representative governments in the region, even if it remains a one-party state.

Interest Groups in Civil Society

Environmental Movements. Over the last decade, environmental movements have increased in size and influence, forming networks across the region and increasingly spreading into rural and peripheral areas. The growth of environmentalism has been spurred by concern among the expanding middle class over unrestrained devastation of the region's environment by such practices as logging, mining, and overfishing. Environmental groups obviously have an important role to play in raising awareness of climate change and pressing for mitigation measures. Moreover, the increasing social salience of climate change-induced challenges will likely continue to bolster the membership and influence of environmental groups.

Although their policy leverage remains limited, environmental groups are becoming increasingly engaged in the political process. In Malaysia, for example, environmental groups were able to secure concessions by joining the political opposition, thus allowing the latter to cross the two-thirds threshold in parliament. Environmental groups are well established in the Philippines and increasingly influential in Indonesia and Thailand.

Over the next two decades, environmental groups might take hold even in repressive regimes such as Burma, Laos, Cambodia, and most promisingly in Vietnam. Authoritarian regimes tend to permit such groups space in the public discourse because they are seen as non-threatening. As the example of former Soviet states shows, however, such groups can become the first wedges that allow broader civil society to make inroads against state repression.

On the other hand, the state and powerful economic interests have in many instances responded with violence as environmental movements have increased in prominence and mobilization. Under the government of Prime Minister Thaksin Shinawatra in Thailand, for example, environmental activists were murdered and efforts were made to marginalize environmental activism nationally. Environmental activists have similarly been targeted in Cambodia and elsewhere in the region. Such violence is likely to increase as climate change creates new environmental conflicts and raises the stakes on competition over resources.

The Media. The degree of freedom of the press varies widely across Southeast Asia. In the more authoritarian states in the region, the media remains strictly controlled. Like other institutions in the region, the media generally is not well-informed about climate change and its implications for Southeast Asia. Nevertheless, the media has already begun to play a significant role in covering environmental issues, at least at the local level. Although explicit criticism of state policies is generally prohibited in states such as Vietnam or Laos, the media circumvents this by covering what is going on in China as a metaphor for domestic issues. In the more developed countries such as Indonesia, new media and the Internet are becoming increasingly important.

Religious Organizations. Southeast Asia hosts a number of large, influential religious organizations that could play a critical role in addressing climate change. The Catholic Church in the Philippines and the Buddhist *Sangha* in Thailand have taken strong stands on environmental issues. For example, Buddhist monks in Thailand have taken action against deforestation by blessing trees so that no one will cut them down. Indonesia hosts two large mass-based Muslim organizations, the *Nadhlatul Ulama* which claims 40 million members and *Muhammadiya* with 35 million members. These organizations have helped mobilize Indonesian society behind government efforts such as family planning and childhood vaccination. All of these institutions are well organized at the local level, and their leaders are influential nationally. They therefore serve as important political transmission belts, bringing local concerns to the national level and vice versa. With sufficient political and financial backing, they could help raise awareness of climate change and techniques to mitigate it.

Business Interests. Business interests are and will remain the most important nonstate actors with regard to policymaking on climate change mitigation and response. Business interests have strong ties to the state and are the civil groups most able to exert pressure on state decision-making. In general, business interests and allied political elites are concerned with present profits rather than warnings about the future. Many climate change mitigation measures will be expensive, will require industries to radically change their practices, or will significantly reallocate resources. Business interests—particularly

extractive industries such as mining, logging, or energy—are likely to use their influence to oppose climate change mitigation measures, as they have opposed other environmental oversight or sustainability measures.

Some influential elements within the economies of Southeast Asia have an interest in addressing climate change. Insurance companies and investors may press for climate change mitigation because of the losses they might suffer from climate change-induced damage. There is money to be made from green technology and the massive infrastructure projects needed to respond to climate change may bring new industries to the fore, challenging the hold established economic interests have on the political and economic systems of the region. Mobilization of countervailing economic forces may turn out to be a more promising avenue to address climate change than the activities of less self-interested groups within civil society.

Criminal Networks. Southeast Asia hosts a wide array of major criminal networks, primarily organized around trafficking. The region is a major drug producer and transit point for illicit drugs. The cultivation of heroin and other drugs forms the primary economic activity in the "Golden Triangle" region of northern Laos, Burma, and Thailand. Human trafficking is likewise a serious problem in Southeast Asia where an estimated 200,000 to 500,000 people are trafficked each year. Climate change will divert state resources away from combating crime and create opportunities for criminal networks to expand their activities. For example, refugees and stressed populations are particularly vulnerable to trafficking. Criminal networks may profit from trafficking natural resources that increase in value due to climate change mitigation efforts. For example, tropical timber could increase in value on the black market as efforts expand to keep forests standing to mitigate climate change and as timber shortages grow.

Internal Migration

Among the most destabilizing impacts climate change may have in Southeast Asia will be large-scale population shifts both within and between countries. It is difficult to project the source, magnitude, and direction of migration within the region without detailed projections of climatic impacts on particular areas. This is particularly the case when considering migration within states in the region. Intra-state migration might involve population shifts driven by highly localized pressures. Even migration over very short distances—a few tens of miles from outlying districts into a city, for example—could have profound socio-economic effects. Further complicating the migration picture, rapid movements due to extreme climatic events or tipping points will be superimposed on gradual movements due to long-term climatic shifts. Nevertheless, at least two dynamics are likely to recur in intra-state migration throughout the region: movement into cities, and movement away from vulnerable coastal areas.

Rural-to-Urban Migration. The most significant aspect of internal migration in Southeast Asia probably will be the mass population movement from the countryside into the cities. The massive rural influx will create serious social tensions and will place a major strain on urban infrastructure already strained by the effects of climate change. Municipal governments will in most cases be unable to keep pace with urban growth and to provide adequate social services and urban planning. Newcomers may end up in

shantytowns that lack the infrastructure needed to counter the impacts of climate change. They may not be welcomed by the established urban population, particularly if they are ethnically or culturally distinct. Competition for housing and real estate are already fierce in many cities, and this will only intensify. Unchecked urban growth may bring about major increases in crime, unemployment, and other destabilizing factors. Currently, many urban migrants maintain ties with their native villages and in times of urban economic downturns will often return there, where traditional familial and social networks provide an informal social safety net. This safety valve may no longer be viable due to climate change-induced rural disruption.

Setting aside the city-state of Singapore, Peninsular Malaysia probably has the most robust urban infrastructure and greatest capacity to absorb rural refugees into its light industrial economy. Malaysia is already heavily urbanized, however, and faces comparatively less climatic threat to its rural areas. Among the more rural states, Vietnam should be able to absorb the refugees from the countryside better than other countries in the region due to the rapid growth of its urban export-led manufacturing. That said, Vietnam's cities are still likely to be overwhelmed by the magnitude of internal population movement the country will face as the Mekong Delta succumbs to climate change or dam-building. In Cambodia, the Philippines, and Laos the government, urban infrastructure, and economy are particularly unprepared to absorb an explosive growth in rural migration to the cities.

With the exceptions of Indonesia and the Philippines, the states in the region only have a limited number of major urban centers apiece—in the case of Cambodia and of course Singapore, only one, and in Laos, none. While major established cities probably will receive the lion's share of migration, another aspect of rural-to-urban migration will be the rapid growth of smaller regional towns and cities into new urban centers. These communities will face an even greater challenge than the large cities, since by and large they lack the infrastructure or economic base to accommodate major rapid expansion. This phenomenon may be especially prevalent in Thailand. Despite Thailand's fairly expansive territory and large population, Bangkok is currently the sole major city, but explosive growth will occur in regional cities in the hinterland over the next two decades.

Inland Migration. Apart from rural-to-urban migration, the other major aspect of climate change-induced internal migration in Southeast Asia will likely be a movement of population inland from the coasts. The region's coastal areas will become less hospitable and economically viable as a result of Sea-level rise, increased storm activity, declining fisheries, and degradation of coastal ecosystems. While many coastal cities may suffer periodic catastrophic events such as floods or major storms, coastal fishing and farming communities will face such challenges as well as sustained climatic stress on their means of subsistence. Rural coastal populations are therefore more likely to be forced to relocate. In the next 20 years population retreats from receding coastlines will intensify the search for areas where potable ground water has been traditionally plentiful, s creating social disorder.

Similarly, many of the inhabitants of the region's smaller islands are likely to relocate to larger islands or the mainland, where there is more shelter from adverse weather and sea-

level rise, more reliable sources of fresh water, and greater economic opportunity. The latter type of migration probably will be most significant in Indonesia and the Philippines. Climate change-induced internal migration in Indonesia may result in a consolidation of population onto the larger islands with more resources and better infrastructure. These migration patterns will overlay continued diffusion of population from overpopulated Java to Kalimantan, Papua, and elsewhere in the archipelago. Indonesian internal migration has already proven to be a cause of ethnic conflict, which is only to worsen. In the Philippines, major migration is probable from Palawan and other low-lying islands to Luzon and perhaps Mindanao—the latter raising a serious threat of increased sectarian conflict.

The majority of those displaced from coastal areas are likely to join the flow of rural population into the region's major urban areas. Some coastal farmers will instead move into rural areas farther inland, where they will have to compete for land with established rural populations and may need to switch to new crops as well. Vietnam is the country at greatest overall risk for mass inland migration. The decimation of the Mekong Delta will push millions of Vietnamese north into Ho Chi Minh City and beyond into the Central Highlands, as well as over the border into Cambodia. A more generalized movement of ethnic Vietnamese from lowland to upland areas throughout the country will likely cause ethnic conflict or displacement of native ethnic minorities.

Prospects for Civil Conflict

Increased socio-economic stress resulting from climate change-induced challenges will act as an accelerant or force multiplier for existing friction within the states of Southeast Asia. The particular conflict dynamic through which this friction expresses itself will vary from state to state and locality to locality. The variation in probable climatic impacts between internal regions and localities makes it inevitable that some climate-change induced challenges will be disproportionately felt by particular communities and groups within society. When differential effects coincide with ethnic, sectarian, political, or socio-economic divisions, they could easily stoke existing resentment and lead to conflict. Inadequate state responses to climate change-induced challenges may also feed civil unrest. In most cases, several varieties of conflict will be closely intertwined. The more these circumstances are combined, the more acute the risks of civil conflict. The particular areas and groups most strongly driven toward conflict by climate change will depend on the severity of climatic effects at local levels, which cannot as yet be accurately projected. In overall regional terms, however, climatic stress will create more opportunities for social frictions to flare into civil conflicts.

A number of major underlying dynamics fuel the potential for civil conflict in Southeast Asia. They are closely related and in most cases multiple dynamics will be active simultaneously. All are susceptible to aggravation by climatic stress in the region.

Domestic Migration. Domestic and cross-border migration may be the single greatest driver of civil conflict in Southeast Asia. As has been previously noted, climate change is likely to generate very large population shifts within the region. In practice, domestic and cross-border movements will be overlapping, and many of the resulting conflicts will likely combine both civil and interstate elements. In terms of intra-state migration, the

intensity of potential conflict may depend in large part on how rapidly the movement of people occurs. The movement of large numbers of environmental refugees into new areas already facing climatic stress is a potent recipe for civil conflict. The more gradual the shift, the more ability local and national societies and governments will have to adapt to a new distribution of population. In cities whose populations swell beyond the capacity of their infrastructure and economies, the added stress of periodic climate-induced shortages of water, food, or electricity or episodes of flooding or heat waves are likely to create an extremely volatile situation. In rural areas already struggling to cope with disruptions to agriculture and water supplies, migration is very likely to result in intense and often violent competition for land, water, and other necessities between established communities and newcomers.

Socio-economic Inequalities. Climate change-induced challenges are likely to disproportionately affect the poor, exacerbate existing economic inequalities, and increase economic hardships. This may increase the salience of socio-economic and class conflict, which has not heretofore been a major catalyst for political conflict in Southeast Asia. Class differences in the region have been mitigated by ethnic differences. In addition, societies in the region have traditionally mitigated socio-economic differences using patronage. Patron-client ties were a means of building trust and crossing the class divide between the haves and have-nots. Patronage networks also provided a rudimentary social safety net that cushioned some of the adversities faced by the region's poor. The patronage system has deteriorated as populations have increased and become more urbanized and state funds available for patronage have decreased. Southeast Asia's poor are now more alienated from local elites, disengaged from the political process, and discontented. This large reservoir of public disaffection can be mobilized behind a wide array of grievances. In the Philippines, the lingering Communist-based insurgency will take advantage of rural poverty. In Thailand the socio-economic and rural-urban split persists and shows no signs of dissipating, particularly as long as deposed former Prime Minister Thaksin Shinawatra is politically active.

Majority-Minority Dynamics. With few exceptions, the states of Southeast Asia are ethnically diverse. Ethnic conflict between majority and minority groups is an ongoing problem that could become significantly worse when combined with climatic stress. Such conflicts may revolve around control of critical resources, economic disparities, discrimination and limited opportunities, or access to the political process. The more common majority-minority dynamic involves marginalization, persecution, or attempts at forcible assimilation of minority groups by the dominant majority. For example, political control in both Laos and Vietnam rests with the lowland ethnic majority, while highland minorities are marginalized. The bloodiest and most persistent majority-minority conflicts in the region have been between the Bamar majority in Burma and a host of ethnic minorities such as the Karen, Kachin, and Shan. In other cases the overall majority group exerts dominance even in regions where it is not the majority; this is the case with Malay dominance in East Malaysia, where Bumiputra minorities form the majority of the local population.

Successful minorities may also face persecution, both from resentful majorities or other disaffected minority groups. The most prominent example is the ethnic Chinese diaspora throughout the region, which has enjoyed considerable commercial success. The ethnic Chinese face resentment from groups of rural origin who are less well established in business and urban commerce. This has led to sporadic outbreaks of anti-Chinese violence, particularly in Indonesia.

Sectarian divisions play less of a role in most areas, but there are notable exceptions. The sectarian majority-minority conflict in the southern Philippines between the Catholic majority and the Muslim Moros has been a perennial driver of insurgency, political instability, and terrorism. The Muslim minority in southern Thailand is engaged in a similar conflict with the Buddhist majority. This revolt has intensified in the last year, damaging Thailand's reputation as well as draining government resources. In the Central Highlands of Vietnam, ethnic and sectarian divisions coincide, with Catholic highlander minority groups threatened by an influx of secular Kinh (ethnic Vietnamese) lowlanders. Climate change-induced Kinh migration into the minority-dominated uplands is likely to worsen ethnic divisions in Vietnam.

Marginalized groups, whether they are in the numerical majority or minority, face an intrinsically greater risk from climate change. They are typically more economically disadvantaged, enjoy a narrower margin of subsistence, have less political influence, and are less likely to receive state assistance. The need to respond to climatic stress may reinforce ethnic solidarity built up in the face of pre-existing adversity and exacerbate shared grievances, potentially leading to conflict.

Core-Periphery Dynamics. Most of the states in Southeast Asia comprise a more economically developed and populous "core" area, typically centered on the capital city, and a less developed periphery. The dominance of power, wealth, and resources by narrow political and economic elites located in the core puts the periphery in a far less advantageous position to face climate change. The political dynamic between core and periphery could therefore be crucial in how states and societies in the region respond to climate change.

Peripheral areas are geographically, politically, and economically remote from the heartlands and capitals of states in the region. These areas are typically underdeveloped, have poor infrastructure, little access to government services, and fewer economic opportunities. They are likely to be dependent on either subsistence agriculture or natural resource extraction such as logging or mining. These features make peripheral areas highly vulnerable to climate change-induced challenges. Localized impacts in peripheral areas, such as water shortages or agricultural stress, are often ignored by the central government, magnifying the adverse effects. At the same time, communities in peripheral areas face the risk of greater marginalization as climatic stress forces governments to focus on threats to more proximate and politically and economically influential regions. The inhabitants of peripheral areas could easily respond to increased climatic stress and lack of central government aid with local unrest, anti-state insurgency, or demands for regional autonomy or secession.

The core-periphery dynamic is also closely linked to the majority-minority dynamic, creating a mutually reinforcing source of conflict. From hill tribes to Dayaks, ethnic minorities are often concentrated in peripheral areas. Core-periphery disparities are therefore often viewed through an ethnic lens. The highland regions of Laos and Vietnam are a classic example of ethnic minority concentration in disadvantaged peripheral areas. A similar dynamic has helped drive long-standing conflicts in Burma. The military government and ethnic majority dominate the central basin of the Irrawaddy River. The Arakan Hills to the west and the extensive highlands along the Thai and Chinese borders to the east are inhabited by disadvantaged and marginalized minority groups who have warred continually with the state.

Thailand faces a Muslim insurgency in its peripheral southern provinces on the Malay Peninsula and unrest in the highland northeast fed by spillover from Burma. In the future, Bangkok might face unrest in the agricultural northeastern Isan region, which retains ethnic ties to Laos despite assimilation policies and is largely dependent on the threatened Mekong River. The fact that the Thai Government regards the Chao Phraya River as a "Thai" river while the Mekong is seen as a peripheral "minorities" river affects the policy priority Thailand places on the Mekong issue.

Most of the vast archipelagoes of Indonesia and the Philippines consist of peripheral areas. These areas are also among those likely to suffer most from climatic impacts such as sea-level rise, shifts in forest belts, coastal degradation, and water and agricultural stress. Borneo is a peripheral area for both Malaysia and Indonesia and faces severe environmental threats, particularly from deforestation. Indonesia probably has the greatest potential for wide-ranging core-periphery conflict. Most of Indonesia's population is concentrated on Java and Sumatra, with half the country's population on Java alone. State control is tenuous and tensions and sporadic conflicts are endemic in Aceh in far northwestern Sumatra, Kalimantan (Indonesian Borneo), Sulawesi, the Maluku islands, and Papua. Peripheral islands like the Malukus and Sulawesi have limited water and arable land and are particularly vulnerable to climate change. Ethnic and sectarian frictions could be exacerbated on these islands, especially if the government reinstates some sort of transmigration policy to relieve population pressures on Java. In the Philippines, the Muslim southern periphery of Mindanao and the Sulu Archipelago is a perennial source of conflict and terrorism. Climatic stress is likely to exacerbate conflict in Mindanao.

Resource Competition and Scarcity. Natural resources have historically been relatively abundant in Southeast Asia. In recent decades, however, resources have come under severe strain as a result of population growth and unrestrained, unsustainable resource exploitation. Resource depletion has been most apparent in rampant deforestation and overfishing, both of which have reached crisis proportions. Climate change appears set not only to exacerbate problems facing these already depleted natural resources but to introduce significant scarcity in additional critical areas such as food, water, and arable land. Even resources that are not anticipated to decline across the region—such as water—will be subject to local shortages and stress.

Resource competition could play out at a number of social levels. A diminished pool of resources will likely increase the prospects for conflict between individual farmers and fishermen, potentially destabilizing local communities. Inter-communal violence and seizure of land, water resources, livestock, or fishing grounds will likely increase at the village level. Smallholders may attempt to seize land or water from larger owners, generating conflict between local groups and local or even national elites. Where control over resources coincides with ethnic or sectarian divisions, resource competition may erupt into ethnic conflicts. Ethnic nationalism remains highly salient in the region, often encouraged by state policies that reinforce ethnic and regional differences, and provides a vehicle to aggregate and mobilize individual grievances over resource distribution. Overall, competition for scarce resources could become a significant source of rural unrest throughout the region. Research in Indonesia has shown that land and water conflicts are already increasing, particularly in remote areas with water shortages.

Coastal and deltaic regions are likely to face the greatest natural resource challenges as a result of climate change. Those areas face not only degradation of fish stocks and coastal ecosystems but also wholesale loss of arable land and living space to the sea. Large-scale social unrest is possible in coastal communities, particularly the most threatened areas such as the deltas of Vietnam or Burma. Coastal and deltaic regions may not necessarily be the most prone to resource conflicts, since the loss of land and livelihood is likely to force the local population to migrate elsewhere. Conflict may prove more prevalent in agricultural areas further inland, where much of the rural population will attempt to persevere in the face of climatic stress while migrants from areas such as the coasts will move in. Cambodia may be particularly vulnerable to this sort of scenario, with internal conflict driven by agricultural stress exacerbated by a large influx of Vietnamese fleeing the Mekong Delta.

In addition to competition over resources necessary for subsistence, competition for resource rents is also likely to increase. Economic instability and stress on traditional revenue sources such as agricultural products will put a premium on control of lucrative commodities such as oil and gas, timber, and minerals. Much of this conflict will be between elites and business and criminal elements rather than farmers or laborers. The local population will nevertheless be profoundly affected by the resulting violence and interruptions in employment and revenues.

Conflict over resources will not be confined to rural areas. Faced with burgeoning populations, cities will need to drastically increase their resource intake. This will probably manifest itself most acutely in terms of access to water resources. Competition between cities is likely to increase significantly, and within cities periodic shortages are likely to generate protests and rioting. In addition, climate change is likely to generate considerable conflict over access to employment. As cities experience massive influxes of new labor and agricultural or fishing employment dries up or becomes unreliable, jobs are likely to become very scarce in many areas. Large unemployed segments of the urban population represent an acute threat to social stability. Violence may be directed particularly at commercially successful urban minorities, as has occurred periodically against ethnic Chinese in Indonesia.

State Responses

The challenges associated with predicted climate change to 2030 will put severe pressure on the states of Southeast Asia. Climate change will not only exacerbate existing socio-economic and environmental problems facing the states of the region, but simultaneously create a host of new challenges for them to respond to. Adaptive or maladaptive state responses to the challenges of climate change in Southeast Asia will be a test of good governance, political will, and state capacity.

State Decisionmaking

Although the governments in the region vary widely in terms of their structure, capacity, stability, and approaches to policymaking, power traditionally tends to be concentrated in the hands of narrow governing elites which steer the developmental paths of their countries and set state policy. The nature and effectiveness of state responses to climate change in Southeast Asia will depend primarily on the decisions and priorities of those governing elites.

Good governance entails the formulation and implementation (to the degree possible given the state's resource base) of political, social, and economic policies clearly designed to promote the public good. In Southeast Asia, public policies more often are intended to promote the interests of the ruling elite and vested economic interests than the public good. States in the region share a bureaucratic, hierarchical structure that insulates decision-makers from pressure by the public and civil society. State leaders will be loath to contravene the interests of powerful elites for the sake of climate change mitigation. The lack of leadership capacity and political will to take politically or economically painful measures to address climate change will likely prove one of the most significant obstacles to effective state responses. In addition, greed, incompetence, and ingrained corruption play a major role in government decision-making across the region, often trumping objective, cost-effective planning and administration.

State Priorities. In most Southeast Asian states, the most important—although usually unstated—state priority is to maintain the political and economic power of the ruling elites. Although this is accomplished in part through varying levels of state coercion, economic legitimacy is a more important overall pillar of elite control. Economic development is the principal overt state priority in the region, both in developed states such as Singapore and those struggling to overcome an agrarian Communist past, such as Laos or Vietnam. The governing elites in the region maintain their public legitimacy through the promise of economic growth and increasing prosperity, as well as by disbursing subsidies and funding poverty alleviation. For example, the Vietnamese Communist Party knows that unless it improves the standard of living of the Vietnamese people, its political power will be in jeopardy.

The region's "development first" mentality has fostered general disregard for sustainability or environmental damage, even in the face of pressure from international actors or civil society or such obvious adverse effects as "the haze." Climate change, which has yet to manifest major tangible effects, is even more easily dismissed by skeptical leaders in the region. For example, even though Indonesia is highly vulnerable to climate change, most Indonesian policymakers have yet to show evidence of serious

alarm or urgency. As a result, climate change will remain at best a secondary priority until its effects begin to demonstrably challenge state security and economic viability in the region. Nevertheless, regional states are beginning to show greater concern about environmental challenges such as public health, food security, or water management. Even if policymakers have yet to link these discrete environmental issues to climate change, action to address such issues will have beneficial collateral effects in adapting to future climate change.

Taking into account the limited urgency accorded to environmental and climatic issues, there is nevertheless significant variation between the states in the region. These issues are taken most seriously in Vietnam, Singapore, and the Philippines. Driven primarily by concerns over the fate of the Mekong River, Vietnam has recently shown more alertness to environmental challenges than its neighbors. It is not yet clear whether Hanoi's concerns over the Mekong will translate into a proactive stance on broader environmental and climatic issues in the region. Singapore is more serious about environmental issues due to its constrained geography and lack of direct dependence on resource exploitation. The Philippine Government is aware of the country's vulnerability to climate change and takes it seriously due to its long experience with environmental disasters but lacks political will. Climate change is less of a priority in Thailand, Laos, Cambodia, and Burma. Indonesia's international rhetoric on the issue has not yet translated into genuine domestic policy motivation. As an oil exporter and one of the region's least vulnerable states to climate change, Malaysia has largely ignored the issue.

Changing Leadership Perspectives on Climate Change. The prevailing attitude toward climate change among most Southeast Asian leaders is dismissal. Continuing international debate over the causes and effects of climate change and equivocal or contradictory scientific data encourage skepticism on the part of policymakers. Most lack technical backgrounds and tend to dismiss scientific or technical reports. Over the next two decades, however, a number of dynamics may shift leadership perspectives on climate change. First and foremost, as climate change unfolds in Southeast Asia, leaders will be presented with increasing evidence of the threat it poses to their states. Nevertheless, climate change will in many cases need to generate major socio-political challenges or economic impacts before states in the region muster the political will to respond. For example, the Thai state is likely to address the issue when its surplus agriculture and aquaculture industries start to see significant downturns in output or in the face of socio-political schisms from an event such as a major drought in the Isan region. If climate change is mainly gradual and incremental, leaders may adjust to the "new normal" without mustering the political will to make drastic decisions on climate change mitigation.

A dramatic shift in perspectives could result from one or more unprecedented, catastrophic events attributable to climate change. Such events would provide tangible examples of the systemic threats to social, political, and economic well-being. Possible examples include a mass crop failure, a collapse of regional fisheries, or a climate change-induced disaster affecting a concentrated population, such as a massive urban flood. Disastrous climatic events may shift overall elite attitudes or, alternatively, generate splits within the ruling elite. Conflicts between elite factions may be generated

or exacerbated by debates over how to respond effectively to climatic challenges. Such conflicts may significantly influence the political direction in some Southeast Asian states. In Thailand, for example, the 2004 tsunami discredited the political opposition, facilitating the re-election of Prime Minister Thaksin Shinawatra. Climate change may become part of a broader clash between "old" and "new" thinkers among elites. Cyclone Nargis provides an example of these dynamics at work. The storm shifted the attitude of the Burmese junta on how to respond to humanitarian disasters and the importance of climatic issues. Cyclone Nargis also split the junta over how much foreign assistance to admit.

Leadership perspectives may also shift over the next several decades due to generational turnover. A younger generation of leaders who emerge in a context of increasingly apparent climatic changes may be more concerned about climate change mitigation and muster the political will to take on entrenched elites who perpetuate unsustainable practices. For example, Indonesia's dynamic President Susilo Bambang Yudhoyono has set as his priorities poverty alleviation, development, and environmental preservation in that order. The current Vietnamese Prime Minister, Nguyen Tan Dung, from Ca Mau province on the tip of the Mekong Delta, is extremely concerned about the damming of the Mekong and its potential effects on the Delta. Not all generational leadership transitions will be so constructive. In Thailand, the passing of King Bhumibol, currently 81 years old and in poor health, may generate extraordinary political unrest. The succession may threaten Thailand's ability to cope with the global climate change challenges of the next few years, if not longer.

Political Responses to Climate Change

The need to mobilize popular support and resources behind large-scale, costly climate change mitigation policies will inevitably politicize the climate change issue. While political mobilization is necessary and will boost adaptive capacity, over-politicization could lead to policies driven by political advantage rather than efficient climate change mitigation. Scarce resources could be diverted to corrupt, ineffective pork barrel projects which provide no climatic benefits. For example, if Vietnam's National Assembly continues its slow rise to prominence it could become a locus for rampant pork barrel resource allocation. Because climate change-induced challenges will have different impacts in different regions and localities, governments will be compelled to make difficult resource allocation choices. Such decisions may become highly politicized, and perceptions of favoritism could provoke inter-regional or center-peripheral conflicts.

As both leaders and populations in the region are more forcefully confronted with climatic and resource challenges, they are likely to respond with increasing economic and environmental nationalism. Such responses are most likely in Indonesia, Vietnam, and Burma. Nationalistic responses could either help or hurt efforts at climate change mitigation and conservation. On the one hand, nationalism is a basis to argue for protecting and conserving the nation's sovereign natural resources and environment. On the other hand, it is a means for entrenched elites to gain legitimacy and counter criticism from civil society or outside actors on environmental issues. Leaders could argue that outsiders or domestic malcontents are attempting to limit the nation's sovereign right to exploit its own resources in order to develop.

Governments in Southeast Asia have varying degrees of authoritarian and democratic elements, and could respond to climate change-induced challenges by leaning in either direction. Climate change-induced political instability could lead to coups and regime changes, but changes in the overall structure of government are less likely. For example, the single-party political systems in Vietnam and Laos will likely persist to 2030 and beyond. The conditions of global climate change may in some respects favor the prospects of such enlightened despotisms or police states more than democratic regimes. The greater the repressive capabilities of the state, the easier it may be for it to ride out the socio-political consequences associated with climatic shifts as well as pursue broad, sustained mitigation and adaptation programs. On the other hand, cracking down without effectively addressing the underlying problem could lead to a degenerative spiral of destabilization. More open forms of government have greater accountability and are better able to cooperate with society to effectively tackle large-scale changes and challenges—the state is able to share the burden of response with civil society. Conversely, greater institutional responsiveness and accountability may also restrain the state from using its capacity to full effect or overcoming civil resistance to necessary but unpopular climate change mitigation measures. Ultimately, there is no guarantee that the varied political systems in the region will be able to come up with a balanced approach to coping with climate change, either domestically or regionally.

State Capacity

The states of Southeast Asia have widely varying levels of overall capacity to meet climate change-induced challenges. Raw state capacity correlates strongly with economic development. At the high end, Singapore's proportionate state capacity probably exceeds that of many Western states. Conversely, poverty-stricken Laos has extremely limited state capacity. In general terms, Malaysia, Thailand, and Vietnam fall toward the high end of the spectrum between Laos and Singapore, while Indonesia and the Philippines occupy the middle and Burma and Cambodia are at the lower end. In practice, however, simply ranking the raw resources and capabilities available to states in Southeast Asia may paint a misleading picture. State capacity will depend on specific decision-making on the mobilization and management of human and physical resource and will be significantly constrained by widespread deficiencies in governance and political will. Governments in the region have a long track record of inability or unwillingness to deal with social, political, economic, and environmental issues. They may not confront the challenges of the future any more effectively than those of the past and present.

Even where states muster the will to tap into the inherent adaptive capacity of their states and societies, the leadership's political capability to move the institutions of the state to carry out mitigation policies may be limited. The center cannot drive enforcement along the periphery by itself; doing so requires the involvement of local and provincial governments, as well as the judiciary, police, armed forces, and others. These potential enforcers are often part of the problem. State responses will be most significantly constrained by such factors in the same underdeveloped countries where inherent capacity is already weakest.

In many areas, state capacity has been hollowed out or eroded by corruption and criminal activities. Corruption is widespread at all levels of government in the region. Many key industries in Southeast Asia, such as logging or mining, operate at least partially illegally. In Indonesia, for example, corruption plagues the nexus of the government and the timber industry despite promises of reform. Local and even national authorities are beholden to the international criminal networks that control Indonesian mining and logging. Rampant criminality and corruption are particularly severe in Burma, Cambodia, and Laos. The Cambodian regime is more of a criminal conspiracy than a government—corrupt, weak in capacity, and lacking transparency. Burma, traditionally a leading opium producer, is now one of the world's leading producers of methamphetamines, and Laos continues to be a major opium producer.

In terms of individual state capacity levels, Singapore has the human capital, national resilience and political will to deal with the challenges of climate change, but depends on its neighbors for resources. Vietnam is a strong state with a much improved infrastructure and reserve of human capital. The government has the political will and capacity to marshal resources and respond quickly to challenges, but it remains a poor country with constrained state resources. Malaysia and Thailand are also fairly strong states with robust national infrastructures, plenty of human capital, and the capacity to marshal resources effectively should a crisis emerge. Indonesia has a weaker state capacity, lacks political will, and the technical competence of the Indonesian government bureaucracy is questionable. The public health sector is weak, the government is unable to stem deforestation, and there is so far only moderate capacity for agricultural innovation. The Indonesian government exhibits a systemic failure to translate rhetorical policies into actual policies. Nevertheless, democracy has been firmly established and the government's capacity to deal with the effects of climate change is improving.

Laos, Cambodia, Burma, and the Philippines are unlikely to be able to respond in time or cope with the consequences of climate change absent strong political will and outside assistance. The Philippine state is hampered by a fractious and disorganized government, abysmal national infrastructure, and very weak resource management. Burma remains a weak, underdeveloped state fractured by decades of civil conflict, but the military regime can mobilize the limited state capacity to address issues when necessary. Neither Cambodia nor Laos have much in the way of human capital, national resilience or political will to deal with the issues of global climate change. They will be highly reactive and heavily dependent on foreign assistance and aid programs. Laos in particular has an inadequate infrastructure, particularly in rural areas: the nation has no railroads, a rudimentary road system, and limited external and internal telecommunications. Laos' poverty, inadequate infrastructure, and dependence on subsistence agriculture make it arguably the country with the least ability to cope with climate change-induced challenges.

Financial Resources. Besides material resources, the states of Southeast Asia will need considerable financial resources to address the problems of climate change. For the region's less economically developed states, these resources will have to come from overseas donors. Burma, for example, may become more financially dependent on China. Not only are many climatic impacts likely to be very expensive to address, but

their secondary effects on the region's economy and resources may also reduce revenues, creating considerable pressures on state budgets. Pressures on public finances are likely to produce deficits in the delivery of public goods such as education and health care. The need for new sources of income may trigger a vicious cycle of dependence on unsustainable resources that trigger more intense climate change effects.

Most Southeast Asian states depend to varying degrees on natural resource rents, but the region's resource bases are depleting. Climate change will further narrow the resource base, exacerbating shortages of land and resources. Deforestation is already producing acute stress in areas such as East Malaysia that depend on the dwindling timber industry. Much will depend on how well states in the region are able to manage their diminishing resources. For example, Timor-Leste has managed its oil resources relatively well, while Cambodia is sitting on reasonable oil wealth that is disappearing into a black hole rather than adding to state capacity. Cambodia's oil revenues largely disappear into the personal bank accounts of Prime Minister Hun Sen.

The Judicial System. The capacity of Southeast Asia's court systems to manage local conflicts arising from climate change will be a pivotal dynamic in determining whether climatic challenges lead to internal instability. In the Philippines, for example, the judicial system has handled many important environmental cases. The courts will face a significant increase in disputes related to climatic and environmental issues and their consequences. Unfortunately, the region's court systems tend to be weak and corrupt, lacking in competence, independence, efficiency, and resources. The courts have little capacity to override even local officials and the relevance of their rulings depends on the often limited willingness and ability of the executive authorities to implement them.

The Military. The lack of well-developed civil disaster response capabilities in many states in Southeast Asia means that the military will in many cases act as the first responder and logistic facilitator for state responses to climate change-related incidents. In addition, the prospects for large-scale, heterogeneous civil unrest and even interstate conflict as a result of climate change mean that the military will be a key element in maintaining state security. Singapore has the most capable and professional armed forces in the region. The armed forces in most other countries in the region are beset by corruption, politicization, profit-seeking activity, and a lack of resources and training. These institutional problems severely limit the capacity of military forces in Southeast Asia to respond effectively to climate change-induced challenges.

Military coups have been a common feature of Southeast Asia's politics. Prime Minister Thaksin Shinawatra of Thailand was unseated by a coup in 2006. The military rules outright in Burma, as it did in Indonesia for much of the country's history. The imposition of military rule in the event of major national crises arising from climate change is a distinct possibility in most states in the region. Most of the region's armed forces are also heavily involved in legal and illegal economic activity, including drug production and trafficking, logging, and other extractive industries that could align the military against climate change mitigation efforts. In many cases military units are forced to resort to self-financing due to chronic budget shortfalls, but weak state oversight also allows endemic corruption.

In recent years, military reform has taken place in some of the region's militaries. The Indonesian military is showing some movement toward shedding its legacy of corruption and politicization, aided by moves to fully fund the military budget. It remains unclear whether reforms will filter down to the local level, which in many areas is dominated by corruption and criminality.

Crisis Response. More so than the sustained, incremental effects of climate change, large-scale crises generated by extreme weather events or ecological or socio-political tipping points will pose a serious threat to state stability in Southeast Asia. Given the limitations in state capacity across the region, such crises will sorely test state responses, as well as divert resources from other development goals and create an atmosphere of sustained political uncertainty. States in the region have varying capacity to cope with crises, and for those that cannot cope effectively, the consequences may be large-scale humanitarian disasters. For example, Indonesia was able to cope with the 2004 Indian Ocean Tsunami, albeit with heavy reliance on assistance from foreign donors and civil society groups. In contrast, Burma failed a similar test with 2008's Cyclone Nargis—most of the deaths were caused by the failed state response rather than the cyclone itself. These and other natural disasters that have struck Southeast Asia over the last few years have prompted efforts to improve disaster response. Singapore, Malaysia, and to a lesser extent Thailand have strong capacity to respond to environmental catastrophes, and are also less at risk than other states in the region. Vietnam has growing competence in disaster response and emergency management although its resources are limited. The governments of the Philippines, Laos, and Cambodia have limited capacity to respond to natural disasters and are among the states most at risk from such challenges.

Decentralized Implementation. Central governments face a variety of structural obstacles to effective policy implementation and enforcement. The state apparatus in most Southeast Asian countries tends strongly toward inertia and implementation and enforcement capabilities are in most cases weak. In addition, Indonesia, Thailand, and Vietnam have undertaken decentralization programs in recent years, which have transferred critical powers away from the central governments. Decentralization constrains the ability of the central government to transfer resources and funds from those parts of the country least affected by climate change to adaptation programs in areas experiencing difficulties. Moreover, decentralization increases reliance on the will and capacity of local levels of government for implementation. Local capacity varies widely. In places such as West Kalimantan, income from natural resources has produced an effective government that has significantly improved public services. In other places, local governments are controlled by powerful political or economic interests that squander public resources. Decentralization also results in competition for access to resources, funding, and authority between local jurisdictions. In Jakarta, for example, multiple jurisdictions of authority in management of land within the city boundaries limit investment in infrastructure and render the city more vulnerable to climate change.

Climate Change Mitigation Policies

Effective, comprehensive national climate change mitigation policies face difficult political hurdles. Not only will mitigation measures require very ambitious planning and resource allocation far in advance of the catastrophic observable impacts, but tangible

results from such measures may take decades to emerge. States in the region have yet to begin serious planning for such eventualities, but current trends and climatic projections suggest a wide array of areas in which state climate change mitigation action will be needed.

Substantial innovation will be needed to adapt the region's agricultural systems and rural communities to the new, more variable conditions anticipated due to climate change. Traditional agricultural models may no longer be viable and subsistence-level farmers may lack the capacity to adapt on their own. In many cases, the state will need to step in to provide advice on new farming practices and access to new crops more suited to the new conditions, identify new growing areas, and potentially resettle farmers. Climate change-induced constraints will necessitate improving the efficiency of agricultural water use. Thai agriculture is already in the process of commercializing, making it more resilient than subsistence-oriented agriculture elsewhere in the region. Vietnam is coming to terms with the changing circumstances better than other Southeast Asian countries, but the government faces an immediate food and security challenge as the majority of the population lives in the vulnerable river deltas.

Many of Southeast Asia's existing forests will perish over the next 20 years, whether from deforestation or climate change. Some countries, such as Thailand and Vietnam, have already begun reforestation programs, but others, such as Cambodia, Laos, and parts of Indonesia, may face the loss of all significant forest cover before such programs are under way. Rather than replacing previously indigenous species of trees, adaptation will require reforestation with different species appropriate to new growing conditions. Serious efforts also will be needed to reduce the burning of forests and peat bogs—progress on that front could bring about a major reduction in regional emissions without sacrificing economic development.

Regional states will face simultaneous large-scale needs for improvements to urban, coastal, transportation, and water management infrastructure, all of which will be extraordinarily expensive and potentially disruptive. Water resource management is one of the most fundamental and daunting climate change mitigation challenges facing the states of Southeast Asia. Southeast Asian states will need to rely far more heavily on manmade water management infrastructure to distribute water resources rather than on natural drainage patterns. In most states this will require the construction of whole new systems of reservoirs, dams, canals, water pipelines, and aqueducts. Water conservation will become a priority and variable precipitation will force increased exploitation of groundwater resources. To combat more frequent flooding, flood management infrastructure will need to be improved both inland and on coast. Water treatment, irrigation, and transportation systems will need to be reinforced against flooding. States will need to construct extensive levees, canals, and seawalls to protect their coasts and ports from sea-level rise. Concurrently, states will need to plan for major urban population growth. Water treatment and distribution, power, housing, urban transportation, public health, and food distribution will need to be rapidly expanded to avoid major degradation of urban living conditions that are already tenuous in many parts of the region. Education and job training will be needed to prepare rural population for urban employment, as will state investment and subsidies to urban industries, such as

green manufacturing, to provide that employment. As cities expand, construction will be a major employer of incoming rural labor.

States may also need to develop planned resettlement programs away from threatened coastal and rural areas to avoid destabilizing, uncoordinated mass migrations. The historical legacy of Suharto-era Indonesia's transmigration (Transmigrasi) program will make it extremely difficult for any future government to undertake a similar program. The program, which relocated millions of people from overpopulated Java and Madura to less populated areas, was plagued by mismanagement and corruption and ultimately ignited ethnic conflict in many areas. Climate change will drive mass migration and resettlement whether or not the states seek to manage it. Even poor state management may be better than none. The country most in need of massive resettlement planning is Vietnam. The country's Ho Chi Minh City Metropolitan Area development plan envisions building up the city into an urban center the size of New York City. If pursued aggressively, such a plan could help absorb the millions who will be displaced from the Mekong Delta and other coastal areas.

Given limitations on state capacity, political will, and policy implementation, in many Southeast Asian states the most likely outcome appears to be a delayed or less than effective response to climate change in the region. Constraints of time, funds, and resources dictate that the states of Southeast Asia will only be able to undertake a limited number of the mitigation measure outlined above—in effect, states will need to conduct national triage. Regardless, the region will require major injections of assistance from outside powers to effectively cope with climate change to 2030 even on a constrained basis.

Prospects for State Failure

Climate change to 2030 will have severely disruptive effects in Southeast Asia, particularly in deltas and coastal areas. The impact of the severe localized effects that climate change causes is significantly magnified when such changes occur within a small state that depends on a limited resource, population, and agricultural base. Some states in Southeast Asia are less capable of responding to climate change and some may not succeed in adapting. Absolute state failure is unlikely barring a catastrophic climatic event. States in the region are more likely to suffer temporary state breakdowns, the failure of local constituent governments, and probable long-term instability. At the very least, states will suffer more frequent and unpredictable challenges and will have to bolster state responsiveness, planning, and awareness or risk undermining regime credibility. The prospect of state failures is not as alarming to regional leaders as might be expected, since most have taken precautions to avoid facing the consequences of their policy mistakes.

The states with the greatest potential for severe instability and those most at risk for state failure are not necessarily the same. Vietnam, for example, faces among the most serious challenges to 2030 and is likely to suffer massive population displacement and food and water stress. The Vietnamese state, however, is strong, motivated, and used to perseverance, so it is unlikely to fail. Prime Minister Hun Sen's grip on political power in Cambodia is ruthless and firm, and will be further strengthened if off-shore oil and

natural gas resources are developed successfully. In contrast, states such as Laos or Timor-Leste may suffer comparatively milder challenges but their weak state capacity, limited resources, and narrow margin of subsistence make failure more likely. Timor-Leste, with its relatively immature political system, is the most likely state in the region to fail, particularly if it absorbs major collateral challenges from Indonesia. Laos and Cambodia have dealt with precarious situations for much of the last several decades. Both may have a reserve of resilience to persist at a very low functional level even in the face of severe disruption. Whether the formal state survives or not, that such an outcome would be tantamount to state failure in terms of the impact on the population.

Burma also faces a major risk of state failure due to the combination of an unpopular autocratic regime, international isolation, extreme levels of corruption and crime, and well-established ethnic insurgencies already in control of large swathes of territory. The junta has negotiated what it calls "peace agreements" with many of these ethnic minorities. In most cases, these do not extend the center's authority into the ethnic areas nor create peace but permit some minority groups to profit from resource extraction and drug trafficking while giving the junta a portion of the profits. Climate change will likely intensify existing conflicts between the Bamar majority and the ethnic groups along the periphery as well as between the repressive military regime and its citizens. In addition, the likelihood of spillover from catastrophic instability in neighboring Bangladesh further erodes Burma's prospects.

Although unlikely, state failure in Indonesia would pose the most serious challenge to the region. Indonesia is a fairly robust state with considerable resources and capabilities, but its heterogeneous and geographically non-contiguous nature makes it particularly prone to localized failures. Rather than an outright collapse, a state failure in Indonesia is far more likely to take the form of disintegration. Inter-communal tensions could spiral out of control in areas where climatic stress is expected to be most severe, such as the eastern portion of the archipelago, including the Malukus, Sulawesi, and Papua. Jakarta's administrative relevancy and authority, already attenuated by decentralization, could erode altogether in these peripheral areas of the archipelago. The viability of the state itself could be put at risk as it was after the collapse of the Suharto regime, and it might splinter between local governments and military warlords.

Singapore is in the best position to remain stable in the face of climate change—it is run by a powerful authoritarian government while facing few challenges. Malaysia is similarly well situated to overcome climate change-induced challenges. Although Thailand and the Philippines may be more prone to instability and face moments of crisis, they are also unlikely to fail.

Regional Implications

Prospects for Regional Climate Change Cooperation

Regional cooperation will be necessary to effectively address climate change in Southeast Asia. Despite the existence of a regional multilateral organization, the Association of Southeast Asian Nations (ASEAN), prospects for effective regional cooperation are mixed. Events such as the 2004 Indian Ocean Tsunami or outbreaks of pandemic disease have spurred some steps toward expanding regional cooperation and state planning.

Apart from humanitarian crisis response and public health, however, regional cooperation in Southeast Asia has been mainly rhetorical. Political will to tackle climate change remains limited and regional cooperation is lower on the agenda than domestic responses. Regimes in the region are motivated by self-interest rather than concerns over regional public goods. In the absence of a tipping point generated by a climate change-induced catastrophe, the path toward cooperation in the region is likely to proceed at a cautious, limited pace.

The Association of Southeast Asian Nations (ASEAN). As the political face of Southeast Asian multilateralism, ASEAN appears to offer a promising institutional base from which to address climate change-related issues. It already has extensive bureaucratic structures in place intended to deal with climatic and environmental issues. ASEAN's environment programs include working groups on Coastal and Maritime Environments, Environmentally Sustainable Cities, Nature Conservation and Biodiversity, and Water Resources Management. ASEAN has expressed considerable rhetorical concern about climate change, but its track record in dealing with regional environmental issues is weak. In the past 20 years ASEAN has not implemented any programs to address climate change.

ASEAN's paralysis in part reflects the low priority of climate change among its member states and in part the organization's structure. It was designed as a deliberately weak institution inhibited from interfering with the sovereign independence of its member states. ASEAN is and will remain a consensus-based organization, leading to slow, lowest common denominator policymaking. The member states retain individual discretion to implement any initiatives adopted by ASEAN, which in many cases means they are not effectively enforced. For example, five years of discussion of the disastrous 1997 forest fires and the resulting regional "haze" resulted in a weak ASEAN Agreement on Trans-boundary Haze Pollution in 2002. Indonesia, the primary offender behind the "haze" still refuses to ratify this watered-down agreement. Meanwhile, the "haze" continues to afflict the region every fire season. These sorts of results are typical of ASEAN's environmental efforts. Public health is the one major transnational area in which ASEAN has been effective.

Climate change will put greater pressure on ASEAN to respond to bilateral conflicts, transnational issues, and humanitarian challenges. ASEAN's response to Cyclone Nargis in 2008 demonstrated its utility as a facilitator for multilateral crisis response, increasing the organization's institutional self-confidence and setting a precedent for a more active role. ASEAN may play a similar role in response to future climate change-induced crises, but its institutional constraints limit how quickly and effectively it can respond and its prospects for improvement are not encouraging. To effectively address climate change on a regional basis, Southeast Asia either needs a radical reform of ASEAN or a new, more robust multilateral organization. States in the region would need to accept a multilateral framework with genuine oversight and enforcement powers. It would need to engage outside powers such as China and the United States to be effective. ASEAN and its constituent structures such as the Treaty of Amity and Cooperation in Southeast Asia (TAC) provide a viable basis upon which to build such a framework.

China's Role in Southeast Asia

Although some of the transnational challenges the region will have to cope with to 2030 will play out between states within Southeast Asia, many also will involve China. China is the most influential external Asian actor in Southeast Asia and its involvement in the region will increase by 2030. China's influence runs through nearly every major regional issue in Southeast Asia, including two of the most critical and contentious—control of the Mekong River and of the South China Sea.

China's expanding presence in Southeast Asia is a spillover effect of China's economic dynamism as much as it is a product of a grand strategy. China seeks markets for its goods, profitable investment opportunities, and access to natural resources. Southeast Asian economies are becoming increasingly dependent on China, which will erode the ability of countries in the region to stand up to China's policies. China is in an advantageous position to compete for resources and protect its economic interests against local actors. As a result, China may continue to extract a wide range of Southeast Asian resources even as local states experience climate change-induced scarcity.

China's diversified resource extraction presence in Southeast Asia links it to a wide range of sectors, including fishing, timber, mining, fossil fuels, agriculture, and hydropower. As climate change exacerbates challenges in these sectors, China may take much of the blame for adverse environmental effects in the region. For example, Vietnam may be set to lose the Mekong Delta to climate change regardless of whether China or other countries build upstream dams. Vietnamese leaders and citizens may nevertheless prefer to blame human agency rather than impersonal climatic forces. Over time, the degree to which Southeast Asians blame China for regional challenges could significantly shift the relationship between Beijing and the states in the region. China's heavy-handed stance and perceived contribution to climate change could arouse considerable nationalist resentment in the region and generate an anti-Chinese backlash, especially in Vietnam, Indonesia, and Malaysia. Such a reaction against China's exploitative resource policy in Southeast Asia could threaten China's economic interests in the region.

In many respects, China's prioritization of economic interests, extractive resource policies, and inattention to sustainability or collateral effects mirrors the policy perspectives prevalent in most states in Southeast Asia. Like most regional states, China has little intrinsic interest in climate change in the region. This could change if turmoil from climate change begins to spill over into southern China or disrupts China's access to critical resources. China's response, however, could be to suppress or control the problem rather than try to solve it.

Even if it is couched in the softer terms of a "regional sphere of influence," the reality of increasing Chinese dominance in Southeast Asia will be one of the central political factors in Southeast Asia to 2030. China's dam construction appears likely to ultimately result in Chinese control over the water system of Asia. Control of access to critical water resources will put the downstream countries of mainland Southeast Asia at China's mercy. This assumption of direct control over water may be replicated in other sectors as well. China is developing ports, roads, and oil pipelines in Burma, with the aim of creating a strategic link between China's Yunnan Province and the Indian Ocean. China

increasingly exerts de facto suzerainty over the northern areas of Laos and Burma, through its plantations and economic presence if not by overt policy.

China's uncompromising position on the damming of the Mekong River and its assertiveness in the South China Sea may generate tensions between China and states in the region. China's relations with regional states are mixed. It is Burma's key ally and benefactor, providing substantial military and economic aid. The governments of Laos and Cambodia are closely tied to China, but the people are not. Leaders in Thailand are confident about their ability to deal with China. The states likely to prove most intransigent are Vietnam and Indonesia, rising powers with strong national identities and contentious histories with China. Vietnam and China have competed for influence in Southeast Asia since the 1970s and have engaged in periodic maritime and border clashes, including an ill-fated Chinese invasion in 1979. China's dam-building on the Mekong River poses a profound, even existential threat to Vietnam. Indonesia perceives itself as the natural leader and regional hegemon in Southeast Asia, putting it at odds with China's ascendance toward regional hegemony.

Regional Migration

Southeast Asia already faces a regional migration problem in the form of illegal cross-border migration. Cambodia and Laos face illegal migration and incursions from Vietnam. Vietnam in turn is concerned with increasing numbers of migrants from Cambodia in the south and China in the north. Thailand faces significant security threats from Muslim separatists in southern Thailand crossing back and forth over the Malaysian border, and major refugee flows and illegal crossings from Burma. The flow of illegal migrants brings with it criminal activity, particularly human and drug trafficking.

Climate change-induced challenges will contribute to pressures for cross-border migration, creating the potential for regional conflict. Southeast Asia may experience movements of Vietnamese and Indonesians to Malaysia, Cambodians and Laotians to Thailand, Burmese to Thailand and Malaysia, and Filipinos throughout the region. In addition to creating outright refugees, climate change may drive major increases in migrant workers seeking employment in neighboring countries. Millions of Filipinos and Indonesians currently work overseas within or outside the region—over two million Indonesians work in Malaysia alone, where they make up over 10 percent of the country's population. Overseas migrant labor acts as a safety valve for employment pressures and a source of economically critical remittances. Conflicts over migrant workers are already on the rise in the region, however, and countries under increasing domestic employment and societal pressure are unlikely to welcome a major influx of foreign labor.

Boat People. The maritime geography of Southeast Asia means that many population movements will occur not over land borders but by sea—the phenomenon of migrant "boat people." During the late 1970s, the Communist victory in the Vietnam War generated an exodus of Indochinese boat people. Malaysia, Thailand, and Singapore pushed the refugees back to sea, with devastating humanitarian consequences. The Southeast Asian states' willingness to accept the refugees as nations of first asylum was obtained only with the promise of extensive international aid and permanent resettlement

elsewhere. Over a million boat people were resettled in the West, alleviating pressure on Southeast Asia.

Today, Southeast Asia faces an influx of boat people from South Asia, principally Rohingyas, a Burmese minority largely displaced into Bangladesh. The flood of Rohingyas into southern Thailand and Malaysia is already a major problem. In Thailand, the navy has pushed the refugees back out to sea, as occurred in the 1970s. No country in the region wants them, and at a time when the United States and Europe both view immigration as a problem, it is difficult to imagine outside actors willing to accept large numbers of immigrants from Southeast Asia. Climate change—most likely in the form of sudden, more severe storms and flooding—is likely to create a vast new flow of boat people moving between the islands of Indonesia and the Philippines as well as into neighboring countries such as Australia and New Zealand.

Southern Indochina. Some of the most destabilizing cross-border migration over the next two decades probably will occur in Cambodia, southern Vietnam, and eastern Thailand. The two primary components of migration in this region will most likely be Vietnamese moving into sparsely populated areas of northeastern Cambodia or even into the densely populated provinces in southeastern Cambodia; and Cambodians into Thailand. The driver of this migration pattern will be the disruption of the lower Mekong River, whether caused by upstream damming or climate change impacts such as sea-level rise and saline intrusion. This migration will bring culturally antagonistic groups into contact with one another and could lead to a regional conflict in Indochina.

Although many ethnic Vietnamese (Kinh) displaced from the Mekong Delta would move north within Vietnam, others also could move into eastern Cambodia. In addition, as more lowland Kinh move into the Central Highlands, Vietnamese minorities could be driven over the border into Laos and Cambodia. Given the intense animosity between Vietnamese and Khmers, this movement portends a high probability of bitter ethnic and national conflict. Cambodia itself will also be under severe environmental stress if the vital Tonle Sap and lower Mekong are disrupted. The combination of water stress and the influx of Vietnamese could force large numbers of Cambodians out of the country's rural heartland. If they move north or west into Thailand, serious ethnic and border conflict could occur.

Burma and Bangladesh. Bangladesh is likely to suffer catastrophically due to climate change, with the potential for millions of refugees to be displaced from the Ganges Delta, particularly in the wake of severe storms and flooding. Although most of the resulting cross-border migrants probably will move into India, significant numbers of refugees might move into the Arakan region of western Burma as well. In addition, refugee camps in Bangladesh host large numbers of Rohingya driven from Burma. Climatic pressure in Bangladesh will drive them out of the camps. Rohingya refugees could try to cross back into Burma, where the regime is ill-equipped to handle a large refugee influx and hostile to the Rohingya. Many displaced Rohingya would join the flood of boat people seeking entry into other Southeast Asian states.

Chinese Migration and the Chinese Diaspora. The Chinese diaspora is also a source of tension in the region; it has led to periodic explosions of anti-Chinese violence,

particularly in Indonesia. The tensions surrounding the established diaspora will over the next several decades be supplemented by increased flows of Chinese migrants. A major expansion of Chinese emigration into Southeast Asia could intensify economic, social, and political instability. In Thailand hundreds of thousands of illegal Chinese migrants have set up businesses, with much of the revenue flowing back to China. Meanwhile, Thailand's broader economy has suffered, in part due to competition with China, helping fuel Thailand's recent political instability. The existing trend of Chinese migration from southern Yunnan province into the northern panhandle of Laos also will intensify. A plan to build a city of 50,000 Chinese laborers near the Laotian capital of Vientiane prompted public protests. Local concerns about the influx of Chinese may lead to violence in some areas, particularly if coupled with environmental stress. A similar dynamic may play out in Burma, where Chinese migrants from Yunnan make up almost as large a proportion of the population of Mandalay as the dominant Bamar (Burmans). Some Southeast Asian countries may become suspicious of their Chinese minorities, perceiving them as Fifth Columnists or extensions of Chinese imperial domination. As China becomes more assertive in the region and its ability to project power increases, Beijing may feel obligated to defend the Chinese diaspora from local grievances.

Prospects for Regional Conflict

Climate change to 2030 is likely to exacerbate existing bilateral and multilateral disputes in Southeast Asia and generate new ones.

Migration Conflicts. Cross-border migration represents by far the greatest potential driver of large-scale interstate conflict in Southeast Asia. Other points of contention, such as maritime disputes, carry more risks of provoking military clashes, but these are likely to be limited in scope. Large-scale cross-border population movements, particularly when combined with historic cultural and national antagonisms, could potentially escalate into major regional wars, involving practices such as ethnic cleansing or genocide. The most dangerous climate change-induced migration flashpoints probably will center on the nexus of Cambodia, Thailand, and Vietnam. In addition, Thai and Burmese forces have engaged in border clashes in recent years that Thai security officials claim have left hundreds dead.

Territorial Disputes. Conflicting territorial claims both on land and at sea have been a perennial source of conflict in Southeast Asia. Major land disputes have either long since been settled or—as with the Philippines' claims to the Malaysian provinces of Sabah and Sarawak—remain dormant. Outstanding border disputes remain between Vietnam and China, Laos and Thailand, and Cambodia and Thailand. Tensions are mainly driven by symbolic, nationalist issues. The recent Thai-Cambodian dispute, for example, concerned control of portions of the historic Preah Vihear temple ruins, awarded to Cambodia by the International Court of Justice in 1962 but still claimed by Thailand. Climate change may increase the salience of border disputes as displaced populations encroach on border areas and illegal immigration expands in scope.

Resource Competition. Climate change-induced financial pressures will place a premium on securing access to natural resources rents. Zero-sum competition rather than cooperation may become the regional norm. Existing conflicts over oil and gas claims

probably will be joined by more clashes over dwindling timber resources and potentially even production areas for illicit drugs such as opium. Continued legal and illegal logging by Thai firms and nationals in Laos, Burma, and Cambodia could provoke conflict. As both China and India become major players in resource extraction in the region, their activities will both complicate and exacerbate Southeast Asian resource competition.

Climatic pressures also will drive competition for less lucrative but far more essential resources such as water, arable land, and fisheries. If scarcity of staple resources remain manageable, states probably will compete more for revenue-generating resources. Once a tipping point is reached where a state feels it can no longer provide enough food or water for its population, however, it faces a threat that may well provoke a desperate resource grab. For example, Singapore has the military capacity to seize control of Malaysian water resources in the unlikely event that future water scarcity seriously reduced the available water resources in the area or prompted Malaysia to withhold water for its own use.

Trans-border Environmental Spillover. Disputes over environmental spillover effects will become increasingly prominent in the region as a result of climate change. If climate change worsens the forest fires in Sumatra and Borneo, leading to more fire seasons like that of 1997, tensions between Indonesia and its neighbors could reach a breaking point. Malaysia, Singapore, and other Southeast Asian countries have suffered the effects of the haze generated by the fires year after year, while Indonesia has not taken serious domestic steps to curb rampant burning. Other similar trans-border threats may arise as a result of climate change. The most serious conflicts probably will involve upstream water management of trans-border rivers. Under conditions of water scarcity or irregular rainfall, upstream users might divert water from downstream countries. By far the most significant and potentially contentious issue is that of the Mekong.

Maritime Disputes

At various times most Southeast Asian states have had maritime disputes with their neighbors, and many unresolved disputes remain. Singapore has disputes over maritime boundaries and islands with both Malaysia and Indonesia. Cambodia has similar disputes with Thailand and Vietnam, and unresolved issues remain between Indonesia and Timor-Leste. China occupies the Paracel Islands also claimed by Vietnam and Taiwan. The salience of the remaining maritime disputes in the region has increased with growing competition for seabed hydrocarbon resources and fisheries. The increasing tendency of Southeast Asian states to send naval and coast guard forces to protect their claims is in turn increasing the potential for disputes to escalate into open conflict. The active dispute between Malaysia and Indonesia over the Ambalat block, a fossil fuel-rich area of seabed in the Celebes Sea off eastern Borneo, is a case in point. In May 2009, tensions over Ambalat led to a confrontation between Malaysian and Indonesian warships.

Climate change will increase existing competition over dwindling maritime resources. For example, as fish stocks have declined, conflicts have increased among fishermen who regularly enter waters outside of their national boundaries. Shifts in fisheries due to climate change will intensify fishing conflicts. Based on previous patterns, the Vietnamese will likely be the most aggressive in pressing their fisheries claims. As states

in the region compete bitterly for resources and face greater domestic political pressure, they may not act with restraint in the face of maritime provocations.

Coastal changes and loss of islands due to sea-level rise might generate demands for revisions of baselines and jurisdictional boundaries, increasing the potential for maritime disputes. The loss of strategically located islands could have profound ramifications in terms of the Law of the Sea and seabed fossil fuel rights.

The South China Sea. The multilateral dispute over control of the South China Sea is the most significant maritime dispute in Southeast Asia and the one most likely to spark a major regional naval conflict. The South China Sea is the world's largest sea at over a million square miles and among the world's most important maritime trade routes. The sea hosts major fisheries and seabed hydrocarbon reserves and forms the maritime boundary between China and Southeast Asia. China, Taiwan, Vietnam, Malaysia, Indonesia, Brunei, and the Philippines have been party to a series of complex and longstanding disputes over various portions of the sea. The most contentious concern is the Spratly Islands, a series of tiny rocks and coral atolls whose central location make them critical determinants of maritime claims. China, Taiwan, Vietnam, the Philippines, Malaysia, and Brunei claim sovereign control over some or all of the islands. Tensions escalated in the mid-1990s, contributing to a naval arms race in the region, but agreements such as the 2002 "Declaration on the Conduct of Parties in the South China Sea" have led to over a decade of relative calm. The maritime claims nevertheless have not been definitively resolved and increased competition over fisheries and seabed hydrocarbons appears set to resurrect the South China Sea dispute.

The key outstanding issue is China's claim. China considers the South China Sea a territorial sea based upon right of first discovery, a claim that is in direct conflict with the Law of the Sea and the claims of the other parties. China's claim includes portions of the continental shelves of Vietnam, Malaysia, and the Philippines. It extends as far south as Indonesia's Anambas Islands, including the Natuna Islands—which China claims despite acquiescing to de facto Indonesian control. China has sought to control economic activity in the sea, even objecting to oil drilling in Vietnamese territorial waters in the Gulf of Tonkin. The normal avenue of seeking a ruling from the International Court of Justice is closed because China will not submit to international arbitration of its sovereign claims. China adamantly refuses to accept any multilateral initiative that might question the legitimacy of its sovereign rights in the South China Sea, and its expansive claims are backed by growing military power. If China were to enforce its claims, it would end freedom of navigation in the South China Sea, a vital artery for trade and oil between Northeast Asia and points west. The strategic implications would be profound, and such a move could precipitate a major regional naval conflict.

Southeast Asian countries have tried to engage China on the sovereignty issue for 20 years but to no avail. China is unlikely to back down from its claims in the South China Sea but wants to be a responsible stakeholder in managing maritime resources. Setting aside sovereignty, progress is possible on settling the constituent disputes over fisheries and seabed resources and meeting the common challenges of climate change. The predicted new energy demands caused by development, urbanization, and climate change

raise the stakes in the territorial and jurisdictional claims to potential oil and gas reserves. The littoral states will most likely come to a compromise with China on joint resource exploitation even if China's sovereignty claim is not directly addressed.

Climate change will complicate efforts to settle the South China Sea maritime dispute. Sea-level rise is likely to permanently submerge some of the disputed Spratly Islands, where some maritime claims are based on coral reefs that only emerge from the water at low tide. In response, China is reinforcing the islands and building up the reefs to be self sustaining. Climate change also poses a significant threat to the South China Sea's maritime ecosystems, which are at the point of collapse due to overfishing and pollution. The countries of the region have failed to arrive at an international agreement to stave off such an outcome. Efforts such as the Indonesian-led South China Sea workshop process to find areas of functional cooperation on environmental management have foundered on conflicting sovereign claims.

The maritime effects of climate change, such as changes in sea temperature, salinity, and acidity, will further deplete and strain the fisheries. Confrontations between illegal fishing vessels and national maritime police or navies are becoming routine. In addition, China's exploitation of Southeast Asian fisheries is backed by aggressive maritime patrolling deep into the claimed Exclusive Economic Zones of its ASEAN neighbors. Fishing confrontations involving China have led to tensions with both Indonesia and Vietnam.

The Mekong River

The challenges associated with the Mekong River represent a regional political and ecological tipping point for Southeast Asia. The concurrent effects of manmade development activities and climate change have created the potential for a regional disaster. The combination of agricultural disaster on the lower Mekong and resulting mass refugee flows could dominate the course of development, stability, and foreign relations in mainland Southeast Asia to 2030 and beyond.

Dam Construction. Energy demand and hydropower potential have led to an explosion of dam construction on the Mekong and its tributaries, posing a significant threat to the health of the Mekong Basin. There are already seven dams on the Mekong River system, most of them built on tributaries such as the Mun River in Thailand or the Nam Ngum in Laos. With China leading the way and providing investment and construction, the states of the Mekong Basin are set to triple or quadruple that figure. China's ambitious program in Yunnan Province projects a cascade of eight large to mega-sized hydropower dams, four of which were already under construction as of July 2008, with the possibility of eight more further upstream. China's upstream activities may have a far greater and more rapid effect on downstream volume in the major rivers of mainland Southeast Asia than climate change. China's diversion of Mekong River water may become even more critical if the Mekong's flow from Tibet is diminished due to climate change.

Although China receives the lion's share of the criticism for rampant dam construction, Laos, Thailand, and Cambodia are also planning a further 11 dams on the Mekong—seven in Laos, two on the Lao-Thai border, and two in Cambodia. The upstream reservoirs in China will act as cisterns to ensure adequate downstream river flow to the

planned downstream Mekong dams during the dry season. Chinese companies are involved in more than half of the downstream dam projects. Both Thailand and Cambodia are also constructing water management infrastructures on Mekong tributaries.

The impetus behind the Mekong dam projects is the creation of a regional electrical grid that will facilitate the development of the Mekong Basin. By 2030, the Mekong and its tributaries will support an elaborate, interlocking electric power generation grid supplying Laos, northern Thailand, parts of Cambodia, and much of Yunnan. The economic stakes for dam construction are high, and the states of the Mekong Basin are set to compete for whatever developmental benefits they can obtain with little regard to the consequences for others further downstream. By adeptly playing off the Chinese against the Vietnamese and the Thais against both, poverty-stricken Laos is set to become a leading regional electricity provider.

The Mekong problem points to the larger issue that governments in Southeast Asia may not alter their policies even when confronted with definitive scientific warnings of the consequences. The riparian states continue to pursue infrastructure projects designed to interfere with the natural flow of the Mekong in spite of the potential adverse effects. Even Vietnam, despite facing disaster as a result of upstream dam construction, is building dozens of small and medium-sized dams in its Central Highlands, reportedly without adequate impact studies. The flow of foreign investment and the allure of establishing a Mekong Basin hydroelectric grid trump the scientific data. Dam construction is set to bring major economic and energy benefits to China, Laos, and Thailand. These states will suffer few of the adverse impacts on water availability, agriculture, and freshwater fisheries that will disrupt Cambodia and Vietnam. Paradoxically, climate change may have more prospects of bringing a halt to dam construction than concerns over collateral effects. The reduction in river flows to the dams due to the disappearance of the Himalayan glaciers could limit hydroelectric potential to the point that they are no longer viable projects.

Multilateral Management of the Mekong. The lack of cooperative and sustainable multilateral water management is one of the most serious potential sources of regional instability in mainland Southeast Asia to 2030. The Mekong issue is an example of the failure of inadequately empowered multilateral organizations in the region to provide effective management of high-priority environmental policy issues. The two multilateral organizations charged with managing development of the Mekong are the Mekong River Commission (MRC) and the Greater Mekong Sub-region (GMS). Cambodia, Laos, Thailand, and Vietnam are members of both organizations, while GMS members China and Burma have declined membership in the MRC, in part because of the MRC's criticism of upstream dam-building. While the MRC is concerned with riparian issues exclusively the GMS coordinates regional road networks and multilateral trade cooperation as well as hydrologic issues. Both organizations are weak, ineffectual consultative bodies whose executive authority is limited to managing the initiatives arrived at by consensus of the member states. They have no voice in the decision-making of the member states or independent ability to enforce regulation of the Mekong. The MRC and GMS nevertheless provide an institutional basis for the development of a

future, more effective multilateral framework to address both developmental and climatic challenges in the Mekong Basin.

China and the Mekong. As in the South China Sea dispute, China is the central player whose policies will determine the course of development of the Mekong Basin to 2030. The states of mainland Southeast Asia have little effective leverage over China even when they can agree on a joint position. Because of its major strategic stake in pipelines and ports in Burma, China has proven responsive to Burma's concerns about dam construction on the Nu (Salween) River. On the other hand, Beijing has less direct stake in Laos, Cambodia, and Vietnam and may prove much less cooperative regarding its dams on the Mekong. Ultimately, China does not need the approval of any downstream state to build its dams in Yunnan. Nevertheless, China faces potential for political blowback if the countries of the lower Mekong Basin reach a consensus that the dams are threats to their security. Such a reaction could metastasize into a broader reaction against China's deep involvement in Southeast Asia. The dam construction is already becoming a major bilateral source of tension between China and Vietnam. Regional mobilization to restrain China's dam construction and other high-impact activities in Southeast Asia may have a limited window of opportunity. Once the dams are in place, China will exercise decisive control over the river and by extension, over the states dependent on it.

Broader Regional Implications

Northeast Asia. Japan, South Korea, and Taiwan—like China—have major interests at stake in Southeast Asia in terms of investments and resource access. The Northeast Asian countries have a strong incentive to provide assistance to Southeast Asian states in meeting the climatic challenge. Moreover, the states of Northeast Asia are critically dependent on both the free flow of maritime trade and oil through Southeast Asia and the South China Sea. Disruption of the sea lines of communication, whether caused by climate change or the activities of China, would be extremely destabilizing and could lead to regional conflict.

South Asia. India, like China, is a rising power with deepening involvement in Southeast Asia. Like the Northeast Asian states, India has a strategic maritime interest in maintaining open sea lanes through the chokepoints of Southeast Asia. India is opposed to the establishment of unchecked Chinese hegemony in Southeast Asia, which may give it common cause with states like Vietnam and Indonesia, not to mention the United States. India shares Southeast Asian concerns over water management and upstream dam construction by China, environmental refugee flows, food security, and the threat from climate change and overfishing to the fisheries of the Bay of Bengal and Andaman Sea. The gravest climate change-induced challenge shared between South and Southeast Asia, however, is the potential for a humanitarian emergencies and mass refugee flows from Bangladesh. Such a catastrophe could have major collateral effects on Burma and prompt mass migration into other Southeast Asian states as well.

Australasia and the Pacific. Climate change-induced instability in Southeast Asia would pose a major security challenge for neighboring Australia. In particular, deteriorating conditions in Indonesia could absorb most of Australia's attention and military resources. A worst-case scenario would be a massive flow of Indonesian refugees into Australia. A

proximate threat to Australia's security would draw in the United States in support of its close ally.

Papua New Guinea will likely face major climate change-induced challenges of its own, including an acute vulnerability to sea-level rise and island loss. The country's poverty and underdevelopment provide little capacity to deal with such challenges. Moreover, Papua New Guinea's climate change-induced troubles could spill over into Indonesia's Papua province or vice versa. Illegal migration across the border between the two halves of New Guinea is already a problem, and climate change could create much larger refugee flows in either direction.

Overall Foreign Policy Implications

Most of the countries in Southeast Asia are Western-oriented and integrated into the global economy, with strong economic and political ties to the United States and the developed countries of Northeast Asia and the West. Even the formerly Communist states of the Southeast Asian mainland are becoming more outward-looking and integrated into Western economic and trade structures. The major exception is Burma, which remains the most disconnected and xenophobic state in the region. Climate change may affect foreign policies in different ways across the region, but the overall need for external assistance to meet humanitarian and climatic crises should encourage greater openness. For example, Cyclone Nargis has made Burma slightly more open to engaging with foreign aid organizations and states. Even where climate-induced crises force states to concentrate on internal challenges, limited state capacities will necessitate continued engagement with outside sources of aid.

The rise of China and its foreign policy toward Southeast Asia is likely to remain the central driver of the foreign policies of states in the region to 2030. The effects of climate change on China itself will in part drive China's domestic and foreign policies in ways that impact Southeast Asia. Moreover, each country in the region must strike a balance in its relations with China on the one hand and with the United States and its regional allies on the other. Climate change will factor into this balancing of foreign policy orientation, especially the degree to which states in the region decide or are compelled to rely on China rather than the West for assistance in combating climate change. States such as Burma, Laos, and Cambodia probably will increase their already heavy dependence on China. Malaysia, the Philippines, Singapore, and Thailand, with much stronger pre-existing ties to the West, will have more leverage to avoid becoming critically dependent on China. Vietnam and to a lesser extent Indonesia are likely to strongly resist dependence on China and could become more pro-Western in their orientations. Whether this likely split in orientation within the region becomes a source of major tension will depend to a large degree on how aggressively China decides to pursue regional hegemony over the next 20 years.

In addition to the China and foreign aid factors, the effect of climate change on Southeast Asia's relations with the West will depend on how the issue is framed within the region. To date, much of the global debate on climate change has been framed in terms of the West versus the developing world. The states of Southeast Asia share the concerns of other developing countries over the perceived inequity of having to accept limitations on

their development to address problems caused by the already developed states. The United States and other Western states are seen as hypocritical on environmental concerns due to their own misuse of resources and environmental damage. If the states of Southeast Asia are asked to make major sacrifices or perceive their economic development options being limited, tensions will occur with the West.

The West is currently seen as the primary culprit, and as climate change-induced challenges become more severe and apparent, this could bolster anti-Western sentiment in the region. In many cases, Southeast Asian leaders unable to effectively address climate change-related issues will try to blame external actors, as they have done over regional public health issues. The framing of climate change as a Western-generated phenomenon creates the potential for major anti-Western backlashes over virtually any climate change-induced crisis that arises in the region. These nationalistic reactions may hamper cooperation on international mitigation efforts and strain broader relations between Southeast Asian states and the West, particularly the United States.

The West, however, may increasingly share the blame for climate change with China and other global actors. One emerging factor is the move by wealthy countries such as the Republic of Korea or Saudi Arabia to secure control over Southeast Asian commercial agriculture to grow crops to meet their own domestic food security needs. By doing so, they are using Southeast Asia's land and water to produce non-Southeast Asian food, in effect redistributing resources out of the region. As regional resources are strained by climate change, this may become a major point of contention.

China's growing involvement in the region, particularly in exploitation of natural resources that may exacerbate climatic effects, is generating an increasing tendency to blame China rather than Western actors. Deft Chinese investment in green technologies in Southeast Asia might deflect some negative perceptions of China's role as a contributor to climate change and threat to the region's environment. Nonetheless, the negative effects that are likely to be blamed on China—such as a crisis on the Mekong River—are of such a scale that China probably will not be able to counteract the damage to its image. The Mekong River issue is the most salient area where China risks a major regional backlash, and China's approach on the Mekong may be the most important determinant of what direction its relations with mainland Southeast Asia take to 2030. Over the next 20 years, countries in the region may come to regard China as a far greater climatic and environmental threat than the West and political mobilization may shift to an anti-Chinese focus.

Southeast Asia and Global Climate Change Policy

To date, Southeast Asia has played a relatively larger role in the debate over global climate change policy than the widespread dismissal of the issue within the region would indicate. For example, the ASEAN countries were early signers to the Kyoto Protocol, and have participated constructively in subsequent climate change policy forums. Indonesia has been particularly engaged, hosting the December 2007 Bali Conference on the United Nations Framework Convention on Climate Change (UNFCCC) as well as arranging a September 2007 climate change summit involving the eight leading tropical rainforest countries. Apparent commitment to the global debate notwithstanding, at the

regional and individual state level climate change policy remains hollow and rhetorical, with little sense of urgency or common purpose. In a few cases, the surprising global engagement on the issue may be driven by pressure from civil society. Thailand and the Philippines have lively nongovernmental and "cause-oriented" sectors, and such voices are growing in Indonesia as well. For the most part, however, the engaged rhetoric and diplomacy on global climate change may represent the sort of superficial multilateral engagement characteristic of regional-level engagement in ASEAN. If so, the political will and capability of the Southeast Asian states to follow through effectively on international commitments is questionable.

Even if professed concerns over climate change are superficial, a number of different factors may explain the region's level of involvement. Southeast Asian states may be motivated by unwillingness to allow the major powers to dictate climate change policies that might adversely affect Southeast Asia's economic interests. Indonesia, for example, has a major interest in keeping the emissions debate focused on regulating industrial and transportation contributions to greenhouse gases rather than causes such as manmade forest fires. Countries in the region also do not want to end up having their future industrial development constrained. Conversely, global climate change mitigation policies have the potential to play out to the economic advantage of many states in Southeast Asia. Apart from Indonesia, most countries of the region still have a comparatively small carbon footprint. Tighter global emissions controls and carbon credit schemes are therefore comparatively advantageous to Southeast Asia. The light manufacturing capabilities and cheap labor in Southeast Asia may also be highly suitable for certain kinds of green technology production. In addition, engagement with the international climate change debate and apparent willingness to promote mitigation policies provide good public relations with Southeast Asia's important trading partners in the developed world. Singapore's 2006 decision to sign the Kyoto Protocol exemplifies these dynamics. The decision was primarily made to protect the country's international image and to benefit from economic opportunities under the "Clean Development Mechanism" rather than from a desire to grapple with climate change.

Southeast Asia's involvement in global climate change mitigation has so far been largely constructive and could become more important over the next 20 years. The continued growth of concern and mobilization on climate change within civil society may push governments in the region to take a more activist position. In particular, Thailand and conceivably the Philippines might become more vocal regionally and internationally due to civil activism. It is unlikely that ASEAN or any of its members will take the lead in championing fresh international norms to slow global climate change. Southeast Asia might nevertheless be among the first regions to support a positive approach if the developed world, India, and China establish an effective approach to global climate change.

The Role of the United States in Southeast Asia

Since the end of the war in Indochina, Southeast Asia has been a region of secondary importance to the United States. Although the United States has a number of critical economic and strategic interests in Southeast Asia, US policy in Southeast Asia since the late 1970s has largely been determined by US interests in neighboring Northeast Asia.

The states in the region have been mainly pro-Western and those that are not have been closed and inward-looking. Security problems in the region, while serious, generally have remained manageable and have not had major spillover. Following the withdrawal of the United States from its bases in the Philippines, the primary US military presence in Southeast Asia has been naval deployments to protect the region's sea lines of communications (SLOCs) and more recently anti-terrorism support to local governments. Trade and economics continue to dominate the US agenda in the region. Policy attention has not kept pace with the region's growing global importance and the growing US equities at stake there. The combination of climate change and China's growing regional dominance may put substantial US interests in the region in jeopardy over the next two decades. The negative interaction of climate change and unsustainable development policies raises the prospect of severe regional instability while China's increasing regional dominance threatens to exclude the United States from Southeast Asia and provoke regional conflicts.

US Interests in Southeast Asia. Southeast Asia is of critical economic importance to the United States in a number of respects. Most directly, the trade and investment links between Southeast Asia and the United States are very strong. Taken as a whole, ASEAN is a larger US trading partner than China. Serious climate change-induced economic destabilization in the region or economic exclusion by China would be very costly to the United States and US companies. Due to the important role the countries of Southeast Asia play in the global economy, instability in the region could also have serious indirect repercussions for the economic interests of the United States. It is in the interests of the United States to help maintain economic stability, free trade, and open markets in the region.

The maintenance of a free flow of maritime trade and military assets through Southeast Asia's vital SLOCs is of both critical economic and strategic interest to the United States. Half of the world's maritime trade passes through the region. A third of the world's oil passes through the Strait of Malacca, including nearly all the oil imported by China, the Republic of Korea, Japan, and Australia. Climate change threatens to increase piracy, already a major threat in the region, particularly in the Strait of Malacca. Piracy has declined significantly in recent years due to the establishment of joint maritime patrols by the littoral states combined with strong police work on land, particularly in Indonesia. Since most piracy in the region involves impoverished fishermen seeking an alternative livelihood, however, climatic stress on coastal communities and fisheries could drive a major uptick in piracy. China's assertion of sovereignty over the South China Sea, spurred in part by climate change-induced resource scarcity and fisheries impacts, would jeopardize freedom of the seas and could spark a broader regional conflict. The United States has a strong interest in promoting regional maritime security and heading off a regional conflict with China.

The United States has a strategic interest in promoting a Southeast Asia that is regionally integrated, at peace, and resists the hegemony of any power—particularly China. If China's regional dominance assumes an exclusionary character, it will threaten the interests of not only the United States but also key allies in the Asia-Pacific, including Japan and Australia. By 2030 Southeast Asia is likely to become the primary zone of

contention between Asia's two rising giants, China and India. A relatively robust, integrated Southeast Asia supported by a US naval presence would act as a buffer between the two powers. In contrast, a weak, unstable Southeast Asia without a US presence could draw them into direct strategic conflict over the region.

A weakened and unstable Southeast Asia will also provide greater functional space for international terrorist groups, while climate change-induced grievances may push more disaffected recruits into such groups. Terrorists may flourish in peripheral areas expected to suffer severe climate change-induced stress, particularly the potential "arc of anarchy" in the islands from Sulawesi to Mindanao. Social disruptions and migration will provide more opportunities for terrorists to blend into local communities and move freely. State resources will be diverted to managing the effects of climate change, not only weakening the state's ability to combat terrorism but providing the terrorists with an opportunity to win hearts and minds by stepping in to fill shortfalls in social services. In addition, Southeast Asia will be subject to humanitarian crises of increasing frequency and scale. The United States is likely to be one of the primary international responders to such crises, as it was during the 2004 tsunami or Cyclone Nargis. The less the states in the region can do for themselves, the more the United States has to expend to help them.

The United States has an overall interest in preventing sustained economic or political weakness and instability in Southeast Asia. Developments in the region could not only have major direct adverse consequences for US interests but could affect the overall foreign policy of the United States in Asia and elsewhere. The effectiveness of Southeast Asian governments' responses to the climate change-induced challenges that face their societies is an important concern for the United States.

Sino-US Relations and Southeast Asia. Any realistic US policy options in Southeast Asia must take China's role into consideration. China factors into every US bilateral relationship in the region. The United States will be challenged to balance regional interests with the broad array of complex bilateral issues involved in the Sino-American relationship. Both the United States and China tend to be reflexively antagonistic when their geopolitical interests overlap, but climate change mitigation is a potential area for cooperation. The United States should carefully consider how China's growing influence in Southeast Asia will affect key US interests in the region.

Over the next two decades, the United States will face critical foreign policy decisions regarding its posture toward China's expanding influence in Southeast Asia. On the one hand, the United States could acquiesce to inevitable Chinese hegemony and focus on cooperation with China on climate change and other issues in the region. On the other hand, the United States could support those states in the region hostile to Chinese domination, building strong relationships with them as a counter to China. A middle ground might be to attempt to engage China in a multilateral regional structure that would introduce some institutional constraints on China's influence. Such an approach would have to be adroitly managed in order to assuage China's suspicions and aversion to joining what it perceives as US-dominated institutions.

The course the United States chooses regarding China has major implications for US climate change policy in Southeast Asia. If China's hegemony is considered a fait

accompli, the important negotiations and agreements on climate change in the region will be between Washington and Beijing. The need to cater to the states in Southeast Asia proper would be secondary. This might result in more efficient mitigation policies in areas where the United States and China agree, but deadlock where they disagree. The viability of a multilateral course would similarly depend heavily on areas of Sino-US agreement and disagreement. Even if a multilateral approach is effective in moderating China's position in Southeast Asia, it might result in lowest common denominator climate change mitigation policies. Conversely, if the United States sides with regional powers, the focus of climate change policy would be on building state capacity in the region. This might be effective in improving regional resilience, but China would not share in the costs and would probably seek to undermine mitigation policies.

Climate change-driven regional dynamics such as antagonism toward China's exploitative role in the region or dependence on Chinese aid will play a significant role in the China-US-Southeast Asia interaction. If contentious issues such as the Mekong or the South China Sea are allowed to develop into full-fledged regional conflicts, it could have a decisive effect on the course of Sino-US relations to 2030 and beyond. The United States could play a useful role as a facilitator for negotiations toward an agreement on these potential inflammatory issues. US efforts to manage these disputes should take into account China's nationalism-driven refusal to compromise its sovereignty. The sovereignty issue is non-negotiable and should be avoided rather than confronted. China might be open to compromise solutions on allocation or joint development of resources and shared maritime access if they derive from an environmental and resource management perspective. The introduction of sovereignty into the debate would scuttle any prospect for agreement.

US-Southeast Asian Relations. Despite China's inroads in Southeast Asia, the United States remains in a strong diplomatic position in the region. Singapore, Thailand, and the Philippines have longstanding close relations with the United States. Despite periodic strains, the United States has also maintained constructive relationships with Malaysia and Indonesia and has made substantial progress in improving relations with Indochina. Only Burma and to a lesser extent Laos remain diplomatically isolated from the United States. Even those diplomatic obstacles are mitigated by the strong cooperative relationship the United States has built with ASEAN. The overall context for the United States to mobilize support for climate change mitigation in Southeast Asia is therefore robust relative to many other regions.

Southeast Asian states tend to be wary of becoming too closely tied to the United States, particularly as China becomes more assertive in the region. The China factor will determine what kinds of climate change-driven cooperative relationships states in the region are willing to accept. To date, Southeast Asian states have been unimpressed by Washington's disinclination to muster an effective counter to China's expanding influence. Their lack of confidence in the level of US commitment will affect their willingness to sign on to US-led climate change initiatives. The United States will need to demonstrate its bona fides in the region.

Aside from the crucial relationship with China, the two most important US relationships in the region to 2030 may be with Vietnam and Indonesia. The United States needs to carefully consider these relationships in light of their potential impact on US-China relations. The relationship between the United States and Vietnam is becoming closer because of shared concerns regarding China. Vietnam is eager to continue building the relationship and for US development assistance and investment. Vietnam is also more concerned about adapting to environmental and climatic challenges than other states in the region. Creating a partnership to tackle climate change adaptation in the region could be an easy sell as part of an expanding US-Vietnam relationship. On the other hand, a partnership with Vietnam carries significant risks of drawing the United States into a showdown between China and Vietnam over the Mekong or the South China Sea. Indonesia is by far the most important state in the region from a climate change perspective. The United States currently has an opportunity to assist Indonesia in developing its capacity to act in a leadership role in meeting the challenges of climate change in Southeast Asia. The new comprehensive partnership between the United States and Indonesia provides an avenue for the United States to engage across the board. A combination of US support, international pressure, and incentives such as debt alleviation could encourage Indonesia toward greater attention and commitment to proactive climate change mitigation.

US Engagement on Climate Change in Southeast Asia

US engagement with the Southeast Asian states on the climate change issue is likely to be a protracted and difficult process due to the lack of commitment to substantive action on the issue within the region. Different countries in the region will respond to different types of US diplomatic approaches on climate change and related issues. Some prefer multilateral approaches; others prefer to be consulted on a bilateral basis and included in the policy formulation process. Enthusiasm for greater US engagement in the region also varies widely. US efforts will be more effective when tailored to the circumstances and interests of each individual country in the region.

Highlighting the economic costs associated with climate change will be very important to achieving US policy objectives. In addition, states and leaders in the region are accustomed to dealing with problems such as food security, water supply, or public health as discrete issues. An approach that starts by addressing discrete aspects of the environmental and climatic issue that resonate in the region will be better received than a comprehensive climate change initiative. The latter will encourage rhetorical rather than substantive responses, while the former are manageable enough in scope so that states in the regions can engage effectively. Forstates in the region to buy into US initiatives, they will need evidence of a sustained US commitment backed up by considerable resources and policy attention.

While wary of involvement with the United States, most states in the region would welcome a quiet leadership role by the United States in addressing climate change-related challenges and in offering concrete program assistance. More so than China, the United States can act as a comparatively honest broker, able to keep needed regional programs on track despite internecine rivalries and maneuvering. The United States should also be prepared to bring diplomatic and economic pressure to bear in order to encourage climate

change mitigation measures. Many leaders in the region may not be convinced of the need to start mitigation programs within the limited timeframe available. Ultimately, climate change mitigation measures implemented at the behest of the United States rather than because leaders are fully convinced of their necessity still represent progress.

Raising Awareness and Education. Awareness and acceptance of climate change issues remains superficial in Southeast Asia, posing a major obstacle to the adoption of effective mitigation policies. What is needed in Southeast Asia is not just wider knowledge about climatic issues but wider acceptance of the validity of the problem and the proposed solutions. The United States has a comparative advantage in terms of knowledge on climate, environment, and health issues. It can exploit this to provide education and outreach to Southeast Asian states, simultaneously promoting awareness of climate change. The region needs centers of excellence on climate and environment issues, and the United States could help establish them. It will be a challenge, however, to overcome the inclination of decision-makers in the region to ignore scientific reporting. Increased use of video, computer animation, and geographic information systems to visually convey climate data in a more striking and readily digestible format could help communicate the science of climate change more effectively. In addition, decision-makers as well as the public can be influenced indirectly by promoting climate change awareness among regional opinion leaders. The United States could hold workshops for Southeast Asian officials, parliamentarians, and members of the regional media to present the case for climate change mitigation in an accessible way. Such an education initiative would create regional stakeholders in the climate change discussion who can help reframe the climate change debate and increase the priority of climate change on the regional agenda.

Boosting Local Capacity. The United States could both improve its image and standing in Southeast Asia and ameliorate climate change-induced impacts by building up state capacities in the region. Most states in the region have broad deficiencies in multiple areas of state capacity and could significantly benefit from US assistance in areas such as urban planning and infrastructure, water resource management, civil engineering, agricultural policy, conservation, public health, and disaster response. The United States should continue to build on initiatives such as the July 2009 agreement to increase cooperation on education, public health, the environment, and water management between the United States and the states of the Lower Mekong Basin. The new Comprehensive Partnership with Indonesia is focused on education but could just as easily be focused on building capacity to address climate change.

Besides financial assistance, technical expertise, and humanitarian aid, another important element of capacity-building is to encourage the development of green technology and clean energy in the region. The United States could incentivize green investment by setting it as a precondition for closer economic relations. Green technology is an area of convergence between the United States and China, which is investing heavily to become a leader in renewable energy technology. Although China may undercut Western firms and offer competing investment and aid packages in Southeast Asia, the net result could still be beneficial from a climate change mitigation perspective.

Poor governance, lack of transparency, and corruption in the region will undercut efforts to increase the capacity of regional states to mitigate climate change effects. Resources directed to central governments may often not find their way down to the local governments which will be the primary responders to climatic challenges. Without robust US oversight of how assistance is used, much of it may prove ineffective. Encouraging governance reform, increased transparency, and state accountability will be an important aspect of capacity-building. The United States could enhance accountability and ensure resources are directed to relevant applications by emphasizing technology transfers and expertise and directing funding and investment to specific programs rather than providing general aid packages.

Given the lack of state capacity, the development of more effective environmental groups in civil society presents a possible alternative avenue for the United States to exert influence in the region. Outreach to civil society would have to be subtle and take the sensitivities of local governments and public sentiment into account or risk eroding the credibility of civil actors and subjecting them to state repression.

Military-to-military contacts and training could provide a vehicle to encourage the aspirations of the new generation of military leaders in the region toward greater professionalism, de-politicization, and rooting out corruption. More professional, reliable armed forces will increase state capacity. The US military could facilitate the growth of regional military capabilities for infrastructure-building and disaster response. Creating units equivalent to the US Army Corps of Engineers could play a major role in climate change mitigation.

Strengthening Multilateral Institutions. In addition to boosting the capacity of individual states, the strengthening of multilateral institutions in the region would create an effective joint framework to address climate change-related challenges. The United States can leverage its greater institutional experience, expertise, and capabilities in managing environmental issues to support Southeast Asian institutions such as the Greater Mekong Sub-region or Mekong River Commission. The newly-announced partnership between the Mekong and Mississippi River Commissions, for example, could pave the way for the development of broader-ranging regional environmental management organizations. United States engagement with multilateral institutions in the region needs to take place in a context that does not threaten either China or the Southeast Asian countries. One possible approach would be to use the Treaty of Amity and Cooperation in Southeast Asia as the normative basis for a new multilateral consultative framework, since both the United States and China are signatories.

The Copenhagen Negotiations

In approaching climate change negotiations with Southeast Asian states, the United States needs to bear in mind that in many cases governments in the region lack the capacity or will to deliver on their policy promises. Both ASEAN and individual states in the region have a long history of failing to act on their rhetoric and policy initiatives. Although Southeast Asian states may readily sign on to an agreement at Copenhagen, robust accountability will be necessary to insure that they follow through. To that end, the

United States needs to consider making aid to countries in the region conditional on performance and assured allocation to climate change-related applications.

Because of its size and status as a major emitter of greenhouse gases, Indonesia is the Southeast Asian state most critical to the climate change negotiations. The international community needs to make a major effort to motivate Indonesia to engage on the climate issue. Indonesia desires to play a constructive international role on the environmental issue commensurate with its importance as a source of greenhouse gas emissions. Indonesian leaders would rather have the country seen as a good international citizen than an obstructive polluter. As a largely agricultural developing country that is also a major emitter, Indonesia could act as an intermediary in negotiations between the developed and developing worlds.

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CONFERENCE REPORT

SOUTHEAST ASIA: THE IMPACT OF CLIMATE CHANGE TO 2030:

GEOPOLITICAL IMPLICATIONS

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