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Vietnam's Urgent Task: Adapting to Climate Change

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The 2016 Paris Climate Agreement is rightfully recognized as a major step toward slowing future emissions of greenhouse gases that contribute to global climate change. The agreement, ratified by more than 150 countries, requires signatories to make voluntary emissions reductions, known as mitigation actions, against benchmarks and targets that will be adjusted over time to try to hold global temperature increases to no more than 2 degrees Celsius above pre-industrial levels. But scientists have warned that even with these pledges, the world is on track for warming of as much as 4 degrees or more by the end of the century. Therefore, a fundamentally important, but usually overlooked, piece of the Paris Agreement is a strong focus on adaptation in addition to mitigation.

**Changing with
the Climate**

First in a series

Climate adaptation requires adjusting to and overcoming changes that are already occurring, even with the relatively small temperature increase to date, and anticipating what will be needed if it rises to the 2-degree threshold or above. After many years of concern that attention to adaptation might take away from the urgency of promoting mitigation, the parties to the United Nations Framework Convention on Climate Change (UNFCCC), the umbrella pact under which the Paris accord was negotiated, agreed in 2010 that adaptation and mitigation must be treated as equal priorities. A new funding source, the Green Climate Fund (GCF), is now operating with a \$10 billion pot to help pay for adaptation actions in developing countries.

The focus of the GCF on developing countries is due to the recognition that climate change is not experienced evenly around the globe; poorer tropical countries are at greater risk, because of both physical geography and lack of resources to tackle the problem. The Socialist Republic of Vietnam is emblematic of the climate change challenges facing poorer nations, including shifting weather patterns and risks. Some are more extreme versions of what occurred in the past, while others will be unprecedented. The World Bank has listed Vietnam as one of the five countries most affected by sea level rise, with “potentially catastrophic” consequences. The Mekong Delta, known as the rice basket of the country for its export-oriented production, faces the possibility of a 40-percent loss in land area, leaving six whole provinces completely submerged, if the sea level rises one meter—currently an entirely plausible forecast for the end of this century.

For Vietnam, climate change is not just a future risk; it is here already. New weather patterns are increasingly evident and already affecting households' decision making, including what crops they choose to grow, when they plant and harvest, and even how and where they build their houses.

Vietnam provides a compelling case study in the problems that nations face in overcoming widespread vulnerabilities to climate change, enabling adaptation through policy and planning, and assisting millions of citizens to become more resilient. In 2008, the government decided to create a National Target Program to respond to climate change, following a series of concerning reports from the World Bank regarding the country's vulnerabilities. Since then, the state, multilateral and bilateral donors, and nongovernmental organizations in Vietnam have been taking climate change adaptation seriously in policy and projects. The

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country has requested international pledges and earmarked national funding of more than \$7 billion over the past decade for adaptation actions.

But the evidence to date indicates that raising money alone will not be enough, either for the GCF at the global level or for national governments. More attention must be paid to how vulnerabilities to climate change intersect with other existing inequalities, and how development trajectories must be reconfigured in a world that is 2 or more degrees warmer.

HIGHLY VULNERABLE

There is no agreement on which countries are the most vulnerable to forecasted climate change impacts. The Intergovernmental Panel on Climate Change (IPCC), whose regular assessments of the state of climate science have included discussions of how different areas of the world are at risk, emphasizes that vulnerability is a function of *exposure*, *sensitivity*, and *adaptive capacity*. Exposure is the presence of populations, assets, and resources in areas where they could be subject to climate hazards (such as homes built along a coast). Sensitivity describes the ways harm is felt by different populations and systems unequally (such as the poor or elderly who lack air-conditioning and might be exposed to heatstroke). Adaptive capacity has been defined as the capacity to absorb, manage, or bounce back after stress.

Based on these three criteria, Vietnam ranks as one of the countries in the world most vulnerable to the impacts of global temperature change. Physical geography, notably a 3,200-kilometer-long coastline facing the South China (East) Sea, exposes Vietnam to hurricanes and sea level rise. High population densities leave many millions of people endangered in river deltas, along the coasts, and in a megacity, Ho Chi Minh City (Saigon), that already experiences regular tidal flooding. Vietnam faces the additional challenge of regional weather variability, given its long latitudinal gradient from 9 to more than 25 degrees North, which makes it hard to tailor one-size-fits-all policy responses. In the sheer range of these climate threats, from droughts to floods to sea level rise, it is difficult to imagine another country facing more peril than Vietnam.

According to the Center for Prevention and Mitigation of Natural Disasters, a government

department in Hanoi, the country currently experiences 19 different categories of natural hazards and disasters. The top three in terms of damage are hurricanes and storms, floods, and drought. Hurricanes kill more people and damage more property than any other climate risk, leaving nearly 19,000 dead in Vietnam since the 1950s. Vietnam is in the top 15 countries in terms of population exposed to hurricanes, ranking slightly lower than its neighbor the Philippines, which buffers some storms sweeping west from the Pacific Ocean. In an average hurricane season from September to November, ten storms emerge from the South China Sea, some of which make landfall on or near Vietnam, bringing a myriad of impacts—high winds that can damage houses, roofs and crops, heavy precipitation leading to localized flooding, and, in some cases, storm surges along coastlines.

Climate projections are inconclusive on whether hurricane intensity or frequency will increase, but two trends do appear to be clear in

Vietnam: climate change is causing hurricanes to occur later in the season, and storms are trending southward away from the Red River Delta and North-Central Coast, which have borne the brunt of impacts, toward the

South-Central Coast and even the Mekong Delta, which have typically seen very few. In 1997, the devastating Hurricane Linda hit west of Ho Chi Minh City; it killed 3,000 people and damaged or destroyed more than 100,000 houses. It was a harbinger of these trends, which expose more people to storms that they are unfamiliar with and unequipped to survive.

Another clear trend is the increasing economic damage from hurricanes, given rapid development of infrastructure and settlements along Vietnam's coastlines. These losses are likely to increase as more rural households move to urban areas to seek employment, since most of Vietnam's largest cities (Hanoi, Ho Chi Minh City, Da Nang, Can Tho, and Hue) are either directly in or less than 100 km from a coastal zone.

Floods are the second-deadliest climate hazard, and Vietnam was fourth in a recent global ranking of nations with the largest populations exposed to floods. Floods are more frequent, particularly in the central and southern parts of the country, since extreme rainfall events have become more

Rising temperatures and water shortages are increasingly part of everyday life in Vietnam.

common. Future scenarios include an increase in rainfall during the rainy season and a decrease in the dry season of around 10 percent or more, and large volumes in shorter periods, leading to alterations to traditional flood patterns in terms of timing, intensity, and duration. An underappreciated consequence will be riverbank erosion, a growing problem in the Mekong Delta, which occurs during high flood peaks as a result of saturated soil and strong water currents. It is estimated that more than 10,000 households are exposed to riverbank erosion in the delta.

In addition to more floods and hurricanes, sea levels rose by around 20 centimeters along the coastline of Vietnam in the twentieth century, and continue to rise 2.8 millimeters per year. Rising seas cause salinity intrusion, which has spread as far as 70 km inland in the Mekong Delta, harming domestic water supplies as well as rice and aquaculture productivity. (Vietnam is a big exporter of shrimp and catfish.) Sea level rise will also result in increased intensity of storm surges, amplifying hurricane risks.

Most models for Vietnam predict a sea level rise of 30 cm by 2050 under medium emissions scenarios, relative to a baseline of 1980–99. A high-end estimate of 1 meter or more by century's end cannot be ruled out. (The IPCC estimates future greenhouse gas emissions under different conditions, in areas such as economic growth, population, and technology access, to produce around 40 scenarios, which are then used to estimate what temperature changes might occur. For planning purposes, Vietnam uses the B1 emissions scenario, which predicts rising emissions though not at the high end, leading to a temperature rise of 1 to 3 degrees Celsius by the end of the century.)

A 1-meter rise would partially inundate 7 percent of Vietnam's land area, home to 11 percent of the total population. That is the largest percentage of people in such danger in any country in the world, excepting small island nations. The geography of two river deltas in the north and south, giving Vietnam the appearance of two baskets on a pole, has concentrated dense populations in these risk-prone areas. Should the sea level rise by as much as 5 m (this is unlikely to happen for several centuries), more than a third of the country's population would be in harm's way.

Rising temperatures and water shortages are increasingly part of everyday life in Vietnam. Drought incidence has been on the rise, and 2015

saw the first-ever state of emergency declared by provincial authorities in response to a drought: the Mekong Delta required emergency food supplies for close to a million people for several months. Projections to the year 2050 show a likely increase in drought incidence and duration across most of Vietnam, particularly in spring and summer. Moisture stress in crops is expected to worsen and significant production losses are expected for rice, maize, cassava, sugarcane, and coffee—all major staple and export crops. The numbers of consecutive hot days (defined as days in which the temperature is above the 90th percentile over the yearly mean) and heatwaves are also expected to rise, with an overall increase of 2.5 degrees Celsius by century's end.

SENSITIVE POPULATIONS

The concept of sensitivity refers to the fact that different people exposed to the same climate risk (such as a flood or hurricane) will experience the impact in different ways. Fatalities from floods in Vietnam are often linked more to sensitivity than to exposure. Floods will have a strong impact on people living alongside rivers in shoddy housing, while richer people may have more durable houses on higher ground. Those who are in remote areas and do not have access to televisions or radios, or ethnic minorities who do not speak Vietnamese, may be less likely to hear and be able to act on advance warnings of floods.

Exposure to rising temperatures is also likely to be uneven across different communities. The poor are less likely to have air-conditioning or fans to reduce heat stress, particularly in urban areas like Ho Chi Minh City and Hanoi where urban heat island effects occur. The poor are also less likely to live in well-ventilated homes or near parks and shade trees, which help reduce temperatures. Poor households are likely to have members working outside in the heat at low-skill jobs like agriculture and portering, whereas members of richer households might have office jobs.

In a recent report to the World Bank, my colleagues and I asserted that there are key factors of sensitivity that all climate policies in Vietnam should take heed of: the economic status of households; whether they have climate-sensitive livelihoods; whether they are ethnic minorities, women, or children (all more vulnerable); whether they have uncertain migration status; and whether they have access to public services like water and sanitation, education, and health care.

All of these factors can intersect with previously existing vulnerabilities to work in concert with climate shocks, a phenomenon other researchers have referred to as “double exposure.” In these cases, climate change stresses are threat multipliers, and cannot be separated out from other forms of existing vulnerability.

The final factor of vulnerability is whether or not affected households and communities can adapt to changes. There are a number of indicators of adaptive capacity that have been highlighted by other researchers, including education, levels of economic development, and governance capacity. In Vietnam, my colleagues and I have argued for paying particular attention to access to social capital, collective action, common lands, institutional support, and government safety nets.

In all these areas, adaptive capacity seems to be on the decrease despite rising living standards. Households report declining social relations within communities with increasing wealth, making people less likely to contribute to public collective activities, such as dike maintenance, that would help provide resilience against climate change. Environmental income, derived from natural goods freely collected from common property or open-access resources, is also declining, due to privatization of public lands such as collective forests and mudflats, as well as overexploitation of fish and other foods and goods collected in the wild, such as medicinal plants. This means people have reduced access to buffers that could help sustain livelihoods during climate events.

HARD AND SOFT OPTIONS

Definitions of climate adaptation vary, but the IPCC generally refers to “an adjustment in natural or human systems in response to climate changes,” undertaken in an attempt to cope with these changes, moderate harm, or take advantage of opportunities. Overall, however, it is rarely clear what the best approach to adaptation should be in any given location. Adaptation efforts often must strike a delicate balance, sometimes relying on past experience and local knowledge while at other times introducing whole new ways of coping with climate change that may involve the use of unfamiliar crops or technologies.

In the rapidly growing scholarship on climate adaptation, studies have noted that some adaptive actions arise spontaneously, without any policy or intervention from authorities, while

others are planned. These studies are often focused on the merits of anticipatory versus reactive planning.

There is also much work on identifying and categorizing different types of adaptation actions, including a key distinction between “hard” and “soft” options. Hard options are those that require technology and capital, such as infrastructure, while soft adaptation options involve information, adaptive capacity (which can be improved through training), or policies such as insurance schemes. For example, in an agricultural sector facing forecasts of less rainfall under climate change, a country might be faced with hard options such as building new irrigation canals, or soft options like shifting to more drought-tolerant crops. Hard options tend to be less reversible, should climate impacts be different than forecasted, while soft options tend to be more flexible.

Other key topics in the study of adaptation concern the costs of different adaptation options, and what the unforeseen consequences of adaptation decisions might be (for example, locking in path dependence, whereby future options are narrowed due to choices in the past, when climate patterns at the local level remain somewhat uncertain). “No regrets strategies,” which would yield benefits no matter what the climate eventually looks like, have been one approach promoted by scholars. An example is making residential buildings more energy efficient, which would save money even if a trend of hotter days does not materialize to stress the energy grid. On the other hand, “high regrets” adaptation options, which are irreversible or bear high costs, should be considered only as a last recourse.

Given the importance of thinking through these issues systematically, and spending money in places that need it the most, the UNFCCC has suggested that poorer countries develop National Adaptation Programs of Action to indicate where they intend to focus their efforts and where they need financial assistance. Vietnam has not yet submitted one, but policies such as the National Climate Change Strategy (NCCS), adopted in 2011, give an indication of what the government sees as its primary adaptation options.

The key principle in the NCCS is that Vietnam’s response to climate change will aim to “strengthen people and natural systems’ adaptability to climate change while developing a low-carbon economy in order to protect and improve quality of life, guarantee national security and sustainable devel-

opment in the context of global climate change, and proactively work with the international community in protecting the earth's climate system." This strategy is the backbone of the country's Nationally Determined Contribution (NDC) to the Paris Agreement, which estimates that the cost of adaptation will exceed 3 to 5 percent of Vietnam's gross domestic product by 2030, requiring international support and financing.

Vietnam's NCCS and NDC both focus on three priority areas for adaptation policy, planning, and projects: responding proactively to disasters and improving climate monitoring; ensuring social security; and responding to sea level rise and urban inundation. To improve disaster response, they call for better climate observatory and forecasting systems, emergency plans, more resilient infrastructure, and the resettlement of households away from vulnerable areas. Proposals to ensure social security include expanding insurance options (which currently are quite limited) through the private or state sectors, improving regulations and land use planning, using ecosystem- and community-based adaptation approaches, promoting food security through climate-resilient agriculture, and practicing better forest management, including preservation of coastal mangroves that protect shorelines from storms. The response to rising sea levels and flooding will focus on integrating coastal zone management policies, constructing urban drainage infrastructure, and strengthening and expanding sea and river dikes.

To implement these priorities, each national ministry and every individual province (over 60 in total) has been asked to develop its own action plan—leading to an overabundance of sectoral approaches, whether for adaptation in the water, agriculture, or energy sectors. As a result, cross-sectoral problems have not been approached in a holistic manner (which might take the form of integrated city planning that would be important to help address urban flooding). There have also been problems with integrating the national strategy's priorities for adaptation into five-year socioeconomic development plans, a legacy of the socialist past but still the clearest roadmaps for local development priorities.

Looking in more detail at what is actually being proposed for funding reveals that many of the mea-

asures prioritized in ministries' action plans tend to fall in the category of hard adaptation: river and sea dikes, new or reinforced infrastructure such as roads and bridges, and major building projects like deeper ports. In many cases, ministries have requested more money for long-sought pet projects, which are recast as adaptation-focused. For example, the Ministry of Agriculture and Rural Development has long wanted system upgrades to rice irrigation infrastructure in the Red and Mekong river deltas, at an estimated cost in the billions of dollars. These requests have been folded into adaptation proposals to international donors despite the fact that rice may not be best crop to choose under future climate scenarios. Unfortunately, large-scale hard adaptation measures are usually the least likely to be pro-poor; often it is the poorest households that are displaced by infrastructure, or excluded from access to the benefits of development projects.

Relatively less funding has been directed toward soft adaptation measures like insurance schemes, livelihood diversification, increasing institutional capacity, or building social capital outside of government programs. Furthermore, some soft adaptation options are actively discouraged, such as labor migration, which many officials still view as a problem, not as a potential solution to displacement. The focus on hard adaptation at the expense of soft approaches that require policy changes results largely from the fact that Vietnam's leaders, similar to their counterparts in other countries in the region, see adaptation projects as a way to reduce exposure without necessarily understanding the complexity of what makes people vulnerable to climate change in the first place.

LOCAL REALITIES

What is happening on the ground is very different from what policy makers and planners prioritize. In a study of household adaptation actions in six regions that Vietnam-based colleagues and I conducted in 2010, most local interviewees prioritized soft over hard adaptation options, though they felt they had limited capacity to do much more than short-term coping when experiencing climate changes. After exposure to events like floods or droughts, households often tried to restore their livelihoods by shifting the focus of their

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labor—for example, focusing more on pig keeping if rice fields are flooded. Income diversification through seasonal, wage, and piece-rate work after climate events is another common coping strategy for many, often entailing short-term and circular migration to large urban centers.

Farmers are experimenting with new crops and shifting away from vulnerable ones, such as rice, to hardier plants like cassava; changing cropping calendars and delaying planting or harvesting earlier; or using new varieties of crops with shorter growing seasons or climate-resistant properties. Authorities in Ha Giang province in the northern mountains noted that after severe droughts in 2009, nearly 30 percent of land once used to plant corn had been converted to Guatemala grass (*Tripsacum andersonii*), locally known as “elephant grass.” Villagers found that the grass is resistant to both drought and cold spells, and grows well on sloping lands, helping to combat soil erosion. They also observed that buffalo enjoy grazing on it, so households began raising the animals for sale. In this case, climate adaptation opened up new and more lucrative economic opportunities.

Overall, however, among many households adaptation actions were limited, even in the areas of highest vulnerability. Uncertainty about the future prevented people from taking more proactive measures. In interviews in Bac Lieu province in the Mekong Delta, more than 75 percent of households said they had done nothing to adapt to impacts such as heavier floods and eroding lands, and nearly 70 percent of respondents strongly agreed with the statement, “serious natural disasters are fated or beyond man’s control.”

There is a danger that some responses to climate change may be maladaptive. Selling assets such as draft animals after floods or storms is a coping mechanism that can have longer-term impacts, since it may prevent households from expanding production later. Another short-term coping strategy with long-term negative consequences is reducing fallowing time for fields, which are often used more intensively to help farmers cope with weather losses. This may require investments in chemical fertilizers and can lead to long-term land degradation.

Finally, there is concern that some formal adaptation policies prioritized by the Vietnamese government may actually increase vulnerability,

not reduce it. For example, the government views the resettlement of households away from some coastal areas or riverbank erosion sites as a key adaptation option, but interviews with households who have already moved revealed that the resettlement sites often lack livelihood opportunities and have shoddily-built dwellings that are vulnerable to storms. The sites also lack the social capital and neighborly ties of previous communities, which may result in impoverishment, social unrest, and other long-term problems.

ALL HANDS ON DECK

A major challenge for Vietnam, as for other countries, is that climate change can contradict or complicate development trajectories set by state authorities. In many cases, current economic growth trumps future climate risk. Even in Vietnamese provinces that are vulnerable to river flooding, local governments often authorize upstream mining and sand dredging or forest-degrading activities like logging, which increase the impacts of floods in lower rivers.

Another example is the promotion of rice, a low-value and climate-sensitive crop, but one for which current agricultural policy is strongly geared. Particularly in the Mekong Delta, recent government policy encourages farmers to plant three consecutive crops of rice. To enable this extension of cropping seasons into the traditional fall flood time, new protection dikes have been built by the state, and the total cultivation area of triple-cropped rice has doubled in just five years. But the pursuit of expanded rice production in the face of climate change may put households at greater risk from weather variability, and the protective dikes prevent flood waters from washing salinity out during the traditional flood season, which in turn causes deeper salinity intrusion during the dry season.

In other words, Vietnam’s vulnerability to overall climate change is not simply a matter of being an unfortunate victim of geography and the West’s overuse of fossil fuels. Rather, vulnerability is in part due to government decisions regarding the country’s economic development goals. In some instances, these decisions have put more people, assets, and resources in the path of encroaching climate change. Managing this risk requires an understanding that tinkering around the edges with adaptation projects will not be enough; explicit

*Climate change
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considerations of climate change risk and hard decisions about economic growth and development strategies are necessary.

Finally, one-size-fits-all adaptation will not work, given the wide variety of regional climate change impacts in Vietnam. Communities and households living in different areas will have different ideas about how best to match their development aspirations to the realities of climate change. But many communities in Vietnam lack space for autonomous decision making, since there is a long history of waiting for the government to take the lead. Civil society has been able to play only a minor role in shaping adaptation policy. A Climate Change Working Group comprised of both inter-

national and local NGOs meets regularly in Hanoi, but there are few opportunities to weigh in on the development or design of large-scale projects.

Because diverse views have not yet been given a hearing in the development of policies like the National Climate Change Strategy, there is a danger that decisions may be made in a top-down fashion, and even generate maladaptation that increases vulnerability rather than reduces it. Given the severe climate risks now facing Vietnam, an “all-hands-on-deck” approach that encourages community-based planning and participation will be an important part of preparing the country for the most serious challenge it has faced since the end of the US-Vietnam War. ■

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