

Toward Integrated Disaster Risk Management in Vietnam

Recommendations Based on the Drought and Saltwater Intrusion Crisis and the Case for Investing in Longer-Term Resilience

Overview



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Foreword

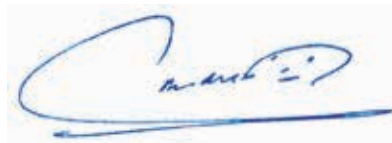
Vietnam's economic success, initiated by the **Đổi Mới** reforms in the late 1980s, lifted over 40 million people out of poverty. Lately, however, Vietnam has been facing a new wave of challenges. Adverse impacts of natural hazard shocks and rapid degradation of natural resources threaten its gross domestic product (GDP) and related social development gains. The 2015–2016 drought and saltwater intrusion (SWI) event has had far-reaching socioeconomic effects, including food insecurity, water scarcity, associated health issues, and loss of livestock. It developed into a national crisis, with close to 2 million people affected due to damaged livelihoods and the country seeking international help. Though drought and SWI are cyclical events, the severe impacts in 2015–2016 were exacerbated by the combination of adverse El Niño effects and the complex water resource management challenges in important tributaries of the Mekong River. Given that over 18 percent of GDP comes from the agricultural sector, the crisis revealed an urgent need for the government of Vietnam (GoV) to take immediate and long-term actions to address the critical gaps in disaster preparedness and to adopt a holistic and integrated approach toward a resilient future for people and their livelihoods.

Climate change is real and is having broad impacts across the world. Climate change projections draw a grim picture of Vietnam's climate vulnerability in the coming decades. A transformation of different sectors—including agriculture, water resource management, energy, fisheries, forestry, and infrastructure—is needed to counter climate threats and enhance Vietnam's adaptive capacity. To improve disaster preparedness and build longer-term resilience, Vietnam should act now to adapt to changing climate. As in many countries, Vietnam's risk and vulnerability are intensified by unplanned urban development, inappropriate land use, and ecosystem degradation. Yet it is still possible for the country to correct course if its policy makers and communities take action.

This report takes a deeper look at the drought and SWI crisis faced by Vietnam, identifies the gaps across key sectors, and recommends the principal short- and longer-term actions needed for integrated disaster risk management. The recommendations are based on global experiences in good governance with intersectoral coordination in disaster forecast and early warning, and in community empowerment in water resource management and agricultural production.

Several of the measures proposed by the GoV to strengthen critical infrastructure and to build capacity for greater climate resilience are already part of the World Bank's active portfolio. With the Bank's financial and technical support to the GoV in implementing and adopting the identified measures, the country will be better prepared to sustain its growth in the face of increasing climate risks. The Bank has substantial experience in helping to build resilience of communities through sustainable development of agriculture and water resources, disaster risk management, and climate change adaptation. The Bank aims to support Vietnam's recovery efforts, including its efforts to increase resilience by adopting longer-term vulnerability reduction measures.

These challenges are not unique to Vietnam, and are being experienced by other developing countries as well. In view of this, this report is highly relevant and provides timely recommendations for both Vietnam and other countries in the fast-evolving climate change context.



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Abbreviations

ASP	adaptive social protection
CAD	Comprehensive Agricultural Development
CCA	climate change adaptation
CCNDPC	Central Committee for Natural Disaster Prevention and Control
CONAGUA	National Water Commission (Mexico)
CSA	climate-smart agriculture
DARD	Department of Agriculture and Rural Development
DRM	disaster risk management
GAP	good agricultural practices
GDP	gross domestic product
GEF	Global Environmental Facility
GFDRR	Global Facility for Disaster Reduction and Recovery
GoV	government of Vietnam
GWP	Global Water Partnership
ha	hectare(s)
IAIL	Irrigated Agriculture Intensification Loan Project
MARD	Ministry of Agriculture and Rural Development
MoLISA	Ministry of Labor, Invalids and Social Affairs
MoNRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
MT	metric ton(s)

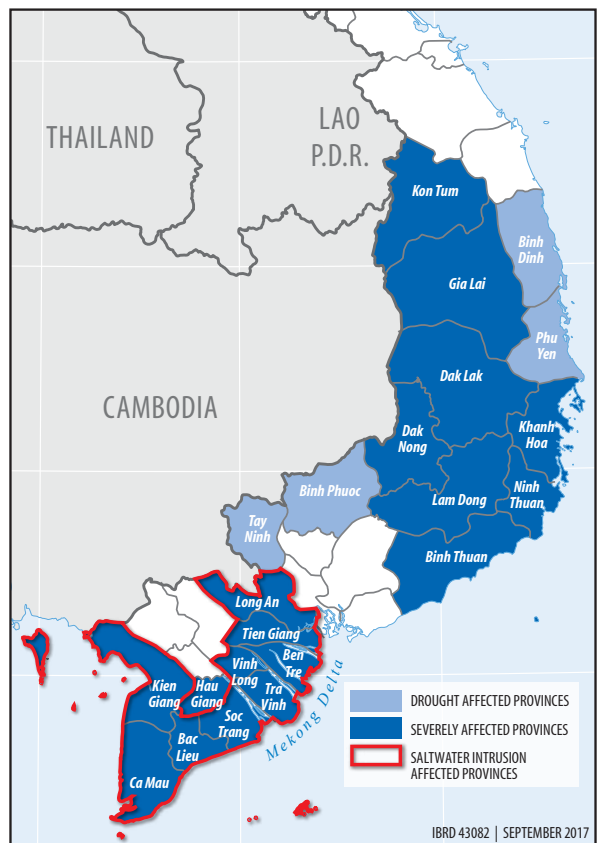
MY	marketing year
NAWAPI	National Center for Water Resources Planning and Investigation
NGO	nongovernmental organization
PMPMS	Prevention and Mitigation Measures for Drought Programmes
PRONACOSE	National Program Against Drought
SASSP	Social Assistance Strengthening Project
SEDP	Socio-economic Development Plan
SOCAD	State Office of Comprehensive Agricultural Development
SWI	saltwater intrusion
VnSAT	Vietnam Sustainable Agriculture Transformation Project
WMO	World Meteorological Organization
WPP	Water Partnership Program
WUA	Water User Association
WUC	Water User Cooperative

Currency: Vietnamese dong (VND)

Overview

Vietnam is one of the most hazard-prone countries in the East Asia and Pacific region, with droughts, severe storms, and flooding causing substantial economic and human losses. Over the past two decades, disasters in Vietnam have caused more than 13,000 deaths as well as property damage in excess of US\$6.4 billion.¹ Climate change is projected to increase the impact of disasters, especially the timing, frequency, severity, and intensity of hydro-meteorological events. Vietnam’s 2015–2016 drought and associated saltwater intrusion (SWI) offer a preview of what could become the new normal, and make clear the need to take action to ensure the country’s economic and societal well-being. According to the Ministry of Agriculture and Rural Development (MARD), 18 provinces were severely affected (figure O.1, table O.1), resulting in direct economic losses of VND 15,032 billion (about US\$674 million), representing 0.35 percent of national GDP and resulting in negative agricultural growth for the first time in decades.²

FIGURE O.1: Drought- and SWI-affected provinces



Sources: UN and GoV 2016; World Bank.

The boundaries, colors, denominations and other information shown on any map in this work do not imply any judgment on the part of The World Bank concerning the legal status of any territory or the endorsement or acceptance of such boundaries.

¹ World Bank 2010.
² UN and GoV 2016.

The drought and SWI may make it harder for Vietnam to meet its targets under the Socio-economic Development Plan (SEDP) 2016–2020. These targets include a gross domestic product (GDP) growth rate of 6.5–7.0 percent a year, and a reduction in the share of poor households by an average of 1.0–1.5 percent a year. The impact of adverse climate conditions on the economy is already evident: in the first half of 2016, GDP growth was recorded at 5.5 percent³, much lower than the 6.5 percent average growth in 2015. The World Bank lowered its 2016 growth projections to 6.2 percent, down from earlier estimates of 6.5 percent. The average GDP growth was recorded at 6.2 percent for 2016,⁴ below the government’s 6.7 percent target.

Like past floods and typhoons, the prolonged drought and SWI of 2015–2016 have hurt people’s livelihoods and assets, making it difficult for affected households to bounce back and recover. Although disasters do not discriminate, poor and near-poor households are often more exposed to and disproportionately affected by the impacts of disasters. Other disproportionately affected groups include women and girls, who are typically responsible for household water gathering, and ethnic minorities located in the drought-stricken provinces of the Central Highlands. Such impacts underscore the importance of efforts that target the most vulnerable and that promote inclusive planning and implementation at the local level.

The serious socioeconomic and environmental effects of the 2015–2016 drought and SWI in Vietnam are due to both adverse climate conditions associated with El Niño and gaps in the capacity of the government and communities to manage the impact of those conditions. Although many good practices have been initiated in programs and policies across the country, the current situation shows that more investment is needed to meet the growing challenges arising from climate change and from increasing disaster risks.

³ See Eckardt et al. (2016).

⁴ AEC News Today, “2016 Vietnam GDP Grows 6.2%,” January 15, 2017, <https://aecnewstoday.com/2017/vietnams-economy-grows-6-2-in-2016/>.

TABLE O.1: Overview of Damage Impact of 2015–2016 Drought and SWI in Eighteen Severely Affected Provinces in Vietnam

Region	Number of severely affected provinces	Production area affected (ha)			Number of households lacking access to water for consumption and daily use	Number of livestock lost	Total economic loss (billion VND)
		Rice	Crop	Aquaculture			
National	18	243,762	168,064	69,008	457,796	—	15,023
South Central Coast	3 (Ninh Thuan, Binh Thuan, & Khanh Hoa)	10,776	15,000	—	43,482	5,126	1,457
Central Highlands	5 (Kon Tum, Gia Lai, Dak Lak, Dak Nong, & Lam Dong)	17,541	141,756	—	72,060	496	6,004
Mekong Delta	10 out of 13 (Long An, Tien Giang, Ben Tre, Tra Vinh, Vinh Long, Soc Trang, Hau Giang, Bac Lieu, Ca Mau, & Kien Giang)	215,445	—	68,916	342,254	933	7,517

Source: MARD 2016.

Note: — = not available.

Key Findings

Vietnam’s capacity to manage drought and SWI risks with timely warnings linked to effective disaster preparedness, response, and recovery needs to be strengthened. Institutional fragmentation across water supply, energy, and agriculture sectors limits efficient and sustainable land and water resource management, particularly at the river basin or watershed level. In addition, Vietnam’s disaster risk management (DRM) and climate change adaptation (CCA) policies, plans, and investments are fragmented. As a result, DRM and CCA are not consistently or effectively integrated into socioeconomic development planning at national and subnational levels or within sectors. Furthermore, given the absence of a systematic, participatory, and inclusive approach to socioeconomic development planning, it is

difficult for the country to ensure that resilience measures are appropriately planned and implemented at local level.

Fragmented sectoral approaches and institutional arrangements are limiting Vietnam’s capacity to manage risks from drought and disasters more broadly.

There are existing interministerial coordination bodies related to DRM, climate change, and water resource management;⁵ but their mandates overlap somewhat and also leave potential gaps in critical functions of integrated drought risk management. These gaps are reflected both horizontally (between ministries), and vertically (between central and subnational levels). Furthermore, many actions developed under the planning processes of these interministerial committees are not implemented because the bodies lack both the necessary authority and the necessary budgetary and financial resources.

The country has plans to improve and better coordinate regulations, policies, and actions related to climate change, disaster risk, natural resources, environmental protection, and land use.

The SEDP 2016–2020 recognizes that drought and SWI in particular require immediate attention. To accommodate both the broader and more specific agendas, Vietnam needs an integrated approach that not only addresses the recent crisis but also institutionalizes mechanisms to promote longer-term resilience and address the country’s vulnerabilities to drought, SWI, and other hydro-meteorological hazards.⁶ These efforts must also recognize that unplanned urban development, vulnerable rural livelihoods, inappropriate land use, and ecosystem degradation are key drivers of risk in Vietnam and compound the country’s vulnerability.

⁵ The relevant bodies are the Central Committee for Disaster Prevention and Control, chaired by the Ministry of Agriculture and Rural Development (MARD) minister, with a standing office in the MARD Department of Disaster Prevention and Control; the National Committee on Climate Change, chaired by the prime minister, with a standing office in the Ministry of Natural Resources and Environment (MoNRE) Department of Hydrometeorology and Climate Change; and the National Water Resources Council, chaired by the deputy prime minister, with a standing office in the MoNRE Department of Water Resource Management.

⁶ See Eckardt et al. 2016; Hallegatte et al. 2015; World Bank 2010.

VIETNAM'S POLICY MAKERS AND COMMUNITIES ARE IN CONTROL OF THE DRIVERS OF DISASTER RISK IN THE COUNTRY

Not investing in risk reduction today misses an opportunity for social, economic, and environmental progress that will have impacts for years to come. Potential solutions and opportunities for action sit at the nexus of these core development questions:

- Although the average 2016 GDP growth of 6.2 percent represents a recovery from a lagging 5.5 percent in the first half, it was still below the government's target of 6.7 percent, and can partially be attributed to the agricultural losses due to the drought and SWI. *How does the current rice production policy increase Vietnam's risks for even greater losses in the future?*
- Vietnam could see losses of over 9 percent of GDP per capita in the case of a major disaster, and given that currently only about 5 percent of assets in the country are covered by insurance, *is the government prepared to pay the outstanding bill?*
- Water is Vietnam's most precious natural resource, but the per capita use of nearly 1,000 liters per year is about twice the global average. Without changing incentives for more sustainable water usage, *how can the country manage the increasing risks of drought and water scarcity?*
- Climate hazards are a threat to vulnerable people across the world, with the power to push more than a million people back into poverty in the next 15 years. Given that farmers are especially likely to fall back into poverty, *how many of these million people will be in Vietnam?*

Sources: Standard & Poor's 2015; FAO Aquastat main database 2016.

Next Steps: Developing an Action Plan

A phased approach is proposed to address urgent needs for drought and SWI risks and longer-term resilience to all types of disaster risks across key sectors.

Vietnam needs to undertake strategic planning and coordinated implementation of critical measures and recovery efforts to tackle the impacts of drought and SWI and work toward greater climate resilience. Such an approach will raise awareness among stakeholders in both the public and private sectors. One main goal is to ensure that current and future development activities are sustainable and climate resilient. Such planning must be backed by sound knowledge and scientific understanding in order to target and prioritize investments in technology development and adoption, in infrastructure, and in capacity building. The phased approach would include actions for the short, medium, and long term:

- In the short term, Vietnam must evaluate the multi-sector coordination and implementation challenges specifically related to drought and SWI.
- In the medium term, it must empower the existing Central Committee for Natural Disaster Prevention and Control (CCNDPC) to assist interministerial coordination and serve in an advisory role for integrated DRM.

- In the long term, it must mainstream multi-hazard DRM and CCA planning mechanisms for managing natural resources and land use across all climate-sensitive sectors.

BOX O.1: Mexico's National Program Against Drought

In January 2013, in response to recurrent drought that had affected most parts of Mexico since 2010, the country's president announced the National Program Against Drought (PRONACOSE). Coordinated by the National Water Commission (CONAGUA), the program aims to develop tools for a new proactive and preventive approach for integrated drought management at the level of the 26 basin councils across the country. Its specific objectives can be summarized as follows:

- Initiate a targeted training program on drought basic concepts and best practices in order to develop local capacity for sustainable integrated drought management in Mexico.
- Raise awareness at the basin level and develop a host of drought prevention and mitigation measures.
- Establish an interagency committee to coordinate and direct existing drought programs, guide and assess PRONACOSE, and fund the actions proposed by stakeholders at the basin level.
- Involve experts and researchers in responding to the identified needs in drought management.
- Develop a communication and outreach program that emphasizes vulnerability, participation, prevention, and the evolution of drought.

Assessing implemented activities and ensuring sustainability through feedback in various phases are important elements of the framework of PRONACOSE, which is due to run till 2018. As a starting point in 2013, CONAGUA developed the Prevention and Mitigation Measures for Drought Programmes (PMPMS) for each basin council, building on global experiences. PMPMS addresses the drought characteristics and vulnerability of each basin. CONAGUA staff and researchers from 12 national institutions were trained to standardize the activities and contents of these programs, which were implemented in the second and third years (2014–2015). After evaluation of the implemented programs in 2016–2017, the programs are to be improved, updated, and implemented again from the sixth year (2018). A continued gradual implementation beyond the sixth year is expected through ownership of the programs by the basin councils.

Source: Adapted from WMO and GWP 2014.

In the short term, Vietnam should evaluate the multi-sector coordination and implementation challenges specifically related to drought and SWI. The objective is to identify gaps in the policies, programs, and investments undertaken by MARD, the Ministry of Natural Resources and Environment (MoNRE), and other relevant ministries. Based on the detailed evaluation, overall guidance could be provided to improve the effectiveness and coordination horizontally across sectors as well as

vertically at national, regional, and provincial levels. The CCNDPC should establish a dedicated task force to identify measures that specifically address drought and SWI. Selected global experiences from Mexico and Brazil show how drought management has been integrated effectively into government policy, as highlighted in boxes O.1 and O.2.

BOX O.2: Transition to Proactive Drought Management Approaches in Brazil

Northeast Brazil experienced a prolonged and severe drought between 2010 and 2014—the region’s worst drought crisis in 100 years. The event focused federal attention on drought management approaches, with authorities seeking to move away from ad hoc and reactive crisis response mechanisms toward a more proactive drought preparedness, planning, and management approach.

There were considerable short- and long-term challenges that threatened to hamper the transition. For instance, the paucity of information available on the economic and social impacts of the drought made it difficult to draw up disaster preparedness plans. In addition, the responsibilities of different institutions for the various drought preparedness activities (e.g., vulnerability assessments, monitoring, and recovery) were ill-defined. To close these gaps, national and state dialogues were held with the aim of introducing an integrated National Drought Policy and highlighting specific priority areas for the institutions involved. Led by the Ministry of National Integration, these discussions resulted in the formalization of a National Drought Policy with three broad pillars:

- Monitoring and forecasting/early warning activities
- Vulnerability/resilience and impact assessments
- Mitigation and response planning and measures

The policy was piloted within regions most affected by the drought, and concrete adaptation plans were implemented at the regional and local levels. For example, in Northeast Brazil, an online drought monitor was launched, and tailored drought preparedness plans relevant to different environments were catalyzed and put in place—e.g., for river basins, urban water supply systems, and rural agricultural systems. Based on the forecasted severity of an upcoming drought and the affected geographical areas identified by the drought monitor, different preparedness activities are triggered.

Source: Gutiérrez et al. 2014.

Medium- and long-term actions are needed to strengthen the country’s path toward institutionalizing resilience through integrated disaster risk management and climate change adaptation approaches. In the medium term, an empowered CCNDPC offers a new model for implementing integrated DRM, one that requires multi-sector coordination. A national program should be integrated within the broader DRM and CCA policy frameworks, and empowerment of the CCNDPC should be

facilitated by enabling legislation to carry out coordination and advisory roles at the central and provincial levels.

To sustain economic growth and build climate resilience, there must be a long-term commitment to integrated water resource management and land-use planning. Vietnam needs to implement comprehensive water-use policies that maximize efficiency between and within sectors and that are appropriate across the country at the river basin or watershed level. To optimize efficiency within sectors, policy interventions should encourage adoption of water-saving and soil moisture–retaining technologies. Through area-based planning, DRM, community engagement efforts, and other interventions, policy tools should facilitate the “waterproofing” of economies. Policies should seek to reduce the socioeconomic impacts of extreme weather events, rainfall variability, and uncertainty.

The actions listed and discussed below take account of the impacts at national, eco-regional, and community levels and bring a multi-hazard perspective to bear on climate change impacts and extreme events.

Short Term: Design, pilot, and standardize proven practices
Medium/Long Term: Scale up and institutionalize practices

Smarter Disaster Preparedness, Response, and Recovery

1. Integrated drought monitoring and warning systems linking hydro-met systems to preparedness and response procedures
2. Financial protection strategy for effective financing of response and recovery
3. Adaptive social assistance systems to support vulnerable household
4. Risk and vulnerability analysis for target areas and populations to provide location-specific and effective last-mile delivery of support

Tools for Mainstreaming Resilience in Development

5. Systems to enable integrated water resource management (both supply and demand side) and climate-sensitive land-use planning at river basin, coastal zone, and watershed levels
6. Climate-smart good agricultural practices from crops, livestock, aquaculture, and other productive assets
7. Inclusive, community-based approaches for DRM and CCA, and skilled human resources to implement them
8. Empowerment of vulnerable populations to access available risk reduction opportunities to enhance risk resilience and livelihoods

Sources: UN and GoV 2016; World Bank.

1. Balance investments in modernizing hydro-meteorological monitoring and forecast systems with processes to enable effective use of forecast and early warning for better disaster preparedness and response actions.

Location-specific drought monitoring and seasonal forecasts are critical to improving the effectiveness of drought mitigation measures for agriculture. Timely and accurate information is critical for rural communities; there must be better operational guidelines for issuing warnings connected to a drought monitoring system. Translating weather and early warning information into different sets of user advisories will ensure more efficient use of information. It will also maximize benefits of favorable weather conditions and reduce the adverse impacts of hazardous weather events. Advisories that are linked to well-designed preparedness plans and response protocols are an essential element of proactive risk management.

2. Devise a national financial protection strategy so that the government can better plan for the efficient financing of rapid response and recovery in the aftermath of disasters.

A cost-effective financial protection strategy builds on an optimal combination of financial instruments that allows disaster losses to be absorbed. The mix of instruments could include contingency budgets, multi-year national and local disaster reserves, contingent credit, and risk transfer instruments such as insurance. International experience shows that if large-scale agricultural insurance is properly implemented as a public-private partnership, it can smooth agricultural income during droughts and other extreme weather events and thereby provide protection for vulnerable populations (see box O.3 for an example). It is also important to thoroughly review the policy, legal, and operational frameworks for the disaster reserve funds, as well as the funds' actual operations, particularly in drought-hit provinces where existing funds were not used effectively.

3. Use social assistance programs that provide livelihood support to help people recover from disasters.

Regular social assistance programs like cash transfers and public work programs buffer individuals from shocks; they also equip them to improve their livelihoods and create opportunities to build a better life for themselves and their families. Some countries have successfully adapted these programs and their delivery systems to make them more responsive to disasters, and such solutions are also being considered in Vietnam. Under a pilot program currently being carried out in Can Tho City, the local social assistance delivery system is being strengthened and adapted so that in the event of flooding it can scale up operations and deliver assistance to flood-affected households. Institutionally, the role of Ministry of Labor, Invalids and Social Affairs (MoLISA) and its social assistance portfolio and programs would need to be elevated within the overall national DRM framework. This would allow MoLISA to play a meaningful role in DRM, and by extension create an enabling environment for post-disaster

social assistance. Example 1 in box O.4 describes ongoing social protection work in Tra Vinh Province in the Mekong Delta.

BOX O.3: Public-Private Partnership in Agricultural Disaster Insurance in China

China has implemented many policy measures to strengthen agriculture insurance. These include (i) providing a legal foundation for the management of agriculture insurance operations; (ii) providing premium subsidies for certain crops covered by insurance; and (iii) providing tax benefits for agriculture insurance operators. In addition, China is in the process of establishing a more mature catastrophe insurance framework. An agriculture insurance disaster risk reserve system has been established as protection against the risk of major agricultural disaster. Under this system, insurance companies set aside reserves at a defined ratio to the agriculture insurance premium and accrued underwriting profit, to gradually establish a mechanism for dealing with agricultural disaster shocks.

To improve insurance coverage and compensation standards for large-scale farmers, agricultural disaster insurance will be piloted in a total of 200 major grain-producing counties in 2017–2018. These pilot counties mainly plant rice, wheat, and corn, and are located in 13 major grain-producing provinces, including the top three producers, Heilongjiang, Henan, and Shandong. As post-disaster reconstruction is mostly financed by the state, the disaster insurance system is designed to ease the government’s financial burdens.

In 2016, about 26 insurance companies operating at the agricultural insurance market offered about 170 types of insurance products covering main crops, cash crops, livestock, forest, fruits, vegetables, medicinal herbs, and local agricultural products. In this successful public-private partnership model, from 2014 to 2016, the average agricultural insurance coverage amount accounted for 20 percent of agricultural output value. Moreover, 9.67 percent of direct economic loss of agricultural production was covered by the compensation amount of RMB 26.7 billion, which is seven times the amount of government relief funds.

Sources: OECD 2015; State Council of China 2017; XinhuaNet, “Chinese Counties to Pilot Agricultural Disaster Insurance,” May 31, 2017, http://news.xinhuanet.com/english/2017-05/31/c_136328581.htm.

4. Undertake a thorough analysis of risks and vulnerabilities. Different risks are faced by different sectors (agriculture, water management, and natural forests) and different regions (for example, the Mekong Delta and Central Highlands), and these differences have to be understood to properly tailor risk reduction. Vietnam has to shift focus from post-disaster crisis management to pre-disaster risk management for drought and SWI, just as it has done for other more frequent and rapid-onset disasters. Factors in different eco-regions that compound communities’ vulnerability—for example, population density and rice monoculture practice—have to be taken into account. A more comprehensive nationwide risk and vulnerability

BOX O.4: Examples of Ongoing Activities In Vietnam to Support Integrated DRM Across Sectors**1. Adaptive Social Protection Feasibility Assessment for Tra Vinh Province in Mekong**

Delta: Since January 2016, more than 2 million people in 18 provinces in southern Vietnam have been affected by the El Niño–linked drought and saltwater intrusion crisis. The capacity of the government and communities to manage the impact of the adverse climate conditions was limited by fragmented sectoral approaches and institutional arrangements; as a result, there was no policy integration, and the serious socioeconomic and environmental effects of the crisis were exacerbated. Efforts are now under way to adapt social assistance programs to provide livelihood support to affected people to help them recover from climate disasters. For example, Tra Vinh—one of the 18 provinces to declare a state of emergency during the crisis—is now piloting the World Bank’s Social Assistance System Strengthening Project (SASSP). In collaboration with MoLISA and the Tra Vinh Department of Labor, Invalids and Social Affairs (DoLISA), the World Bank is currently assessing the feasibility of developing adaptive social protection (ASP) in Tra Vinh. Building upon and leveraging the work already undertaken on flooding (a rapid-onset disaster) in neighboring Can Tho City, the Tra Vinh engagement focuses on both flooding and drought (slow-onset disaster). The objective is to better prepare the provinces to manage household disaster risk. Specifically, it is intended to help to integrate MoLISA and social assistance into ASP and move Vietnam toward more integrated DRM.

2. Water Balance Assessment in Ninh Thuan Province in South Central Vietnam: To improve the institutional framework and technical capabilities for better drought preparedness in Ninh Thuan Province, and to assess gaps in and opportunities for water resources management, a preliminary assessment of water resources availability was conducted in the Dinh River basin in 2015–2016. In view of DARD’s (Department of Agriculture and Rural Development’s) 2020–2030 Agriculture Development Plan (pending the government of Vietnam’s approval) for new reservoir construction in the province, new water supply alternatives have to be identified to make Ninh Thuan’s water supply systems more resilient to extreme weather conditions. In October 2016, the Water Partnership Program (WPP) approved a work plan to enhance drought/climate resilience with full technical support from government counterparts acting at national and provincial levels, including NAWAPI (National Center for Water Resources Planning and Investigation). The program has undertaken water system analysis in the entire Dinh River basin. It addresses water use across sectors (hydropower, irrigation, urban/rural water supply, and aquaculture) and covers both surface water and groundwater sources. Keeping environmental constraints and minimum supply cost in mind, the ultimate objectives are to determine the optimal size of reservoirs (present and future) and the optimal level of groundwater extractions to meet current and future demands.

3. Supporting Sustainable Coffee Production and Rejuvenation in Central Highlands: Climate change–induced higher temperatures and frequent dry spells have significantly affected coffee yields in the Central Highlands. To facilitate a sustainable transformation in coffee production that would increase farmers’ income while reducing negative environmental impacts, a component of the Vietnam Sustainable Agriculture Transformation Project (VnSAT) is under way. A total of 62,000

box continues next page

small-scale coffee plantations were selected in five target provinces in the Central Highlands to promote good farm management practices, increase adoption of water-saving technologies and tree management, and train farmer organizations and cooperatives. The objective is to integrate DRM into all these activities while helping provinces to improve coffee production. In 2016, VnSAT provided training on “three reductions, three gains” (3R3G) and “one must, five reductions” (1M5R) cultivation techniques. 3R3G refers to reduction in three inputs (seed, chemicals, and water) and gains in three outputs (productivity, quality, and economic efficiency). 1M5R refers to use of registered seeds and reductions in five inputs—seed, chemical fertilizer, pesticide, water use, and post-harvest losses. In May 2017, an assessment of coffee planters who had received training revealed that Dak Lak and Lam Dong Provinces achieved positive results in general, though some criteria were not met.

Note: The three examples above are the most recent activities supported by GFDRR (Global Facility for Disaster Reduction and Recovery) to strengthen and integrate DRM into ongoing larger World Bank-supported projects.

analysis, carried out at commune level (as mandated under the government’s community-based DRM program) will identify the priorities and provide solutions for a more efficient last-mile delivery of support for risk reduction and adaptation.

5. In deltas, river basins, and other ecosystems, work to coordinate integrated water resources management and appropriate land use across the water, energy, and agriculture sectors.

The interlinked impacts of development from various sectors, and the efficacy of different investments in the face of climate change and dynamic upstream development, remain poorly understood in these highly complex environments. More generally, a sustainable urban and rural water supply will require province- and basin-wide integrated planning in addition to new technical and institutional solutions, given that groundwater and surface water are two major and separate water sources. Local communities affected by water insecurity need to become more involved in decision making about water management, and provinces should develop their own integrated water resource management plans. Example 2 in box O.4 describes a project to assess water balance in the Dinh River basin in Ninh Thuan Province in South Central Vietnam.

6. Climate-smart agriculture practices should be more widely adopted.

Climate-smart agriculture (CSA) leverages good agricultural practice (GAP) and integrates the three dimensions of sustainable development (economic, social, and environmental) by jointly addressing food security and climate challenges. While rice remains Vietnam’s dominant food staple, its importance in the national economy and diet is declining; policy makers should therefore consider forward-looking approaches to enable flexible land-use planning based on agro-ecological suitability, likely climate change impact, and risks and profitability to the producers. Existing policies

and incentives that encourage rice production in marginal areas need revisiting. To reduce the risk that climate change poses to agriculture, it is also important to identify the exposure, sensitivity, and vulnerability of different eco-regions and take appropriate measures to meet their specific needs. Various short-, medium-, and long-term solutions for increasing the adaptive capacities and resilience of communities are available, revolving around early warning and climate information services, “designer” crop varieties, adjustments to cropping calendars and intensities, proper natural resource management (water, soils, forests, aquaculture), diversification (rice-shrimp; salt- and drought-tolerant fruit trees; grass/fodder and vegetable intercropping; multi-species fish culture; livestock), and improved information and knowledge dissemination. Investment in research and development and continuous technology generation are important with effective information dissemination. Example 3 in box O.4 describes an ongoing activity under the Vietnam Sustainable Agriculture Transformation Project (VnSAT) to promote sustainable agriculture by helping small-scale coffee farmers in the Central Highlands to increase income while reducing negative environmental impacts. Box O.5 gives an example of how farmers in Thailand benefited from the government’s policy to restrict winter dry-season rice cultivation as an emergency response to climate disaster.

7. Use community-based approaches—including investments, capacity building, and planning activities—to promote the implementation of resilience measures.

Community-based approaches enable genuine participation in decision making across all sectors and can be implemented as stand-alone projects or as part of larger-scale investment programs. Experience shows that mainstreaming DRM and CCA in socioeconomic development plans needs to happen first in communes, where budgets are small but risk and vulnerability reduction can be achieved. Several international nongovernmental organizations (NGOs) have supported local planning in communes and at higher administrative levels.⁷ This approach has proved successful when carried out as part of community-based projects in provinces with high levels of poverty, significant climate-related vulnerabilities, and limited financial and human resources. Given that the drought-stricken areas involve many micro-climate zones, the planning of recovery investments should involve the participation of stakeholders at the commune level. In this way solutions can be tailored to specific circumstances.

8. Identify vulnerable populations and communities that are at most risk to climate change and support communities by empowering individuals. Livelihoods can be improved by providing timely information and adequate training about good agricultural practices and opportunities available for risk reduction and mitigation. Communities can also be empowered through building farmers’ groups,

⁷ See United Nations Vietnam (2016).

BOX O.5: Restricting Rice Production and Sales as Emergency Response in Thailand

Thailand's rice harvest dipped to its lowest in nine years in 2016 due to El Niño–caused water shortages. The following measures were taken to manage the water crisis:

- **A shift from rice to corn production:** The government worked with private associations, including the Thai Feed Mills Association, the Thai Seed Trade Association, and the Bank for Agriculture and Agricultural Cooperatives (BAAC), to encourage farmers in irrigated areas to shift from marketing year (MY) 2016/17 off-season rice production to corn production. Close to 0.3 million hectares (ha) of farmland located in the northern and northeastern regions was targeted to reduce off-season rice supply by 1.25 million metric tons (MT) and increase corn production by 1.4 million MT. Participating farmers are eligible for a loan of B 4, 000 per rai (US\$714 per ha) from the BAAC.
- **Stabilization of domestic rice prices:** In November 2016, the cabinet approved the On-Farm Rice Pledging Program for fragrant and glutinous rice (for farmers) and the Interest-Rate Subsidy Program (for millers/traders) with the aim of keeping about half the newly harvested fragrant and white rice off the market in order to stabilize domestic prices. Participating farmers receive a direct payment of B 13,000 per MT of pledged fragrant rice (US\$371 per MT). Nonparticipating farmers receive a direct payment of B 2,000 per MT (US\$57 per MT).

The restriction on winter dry-season rice cultivation was lifted following abundant rainfall in early 2017, which replenished major reservoirs supplying the agriculture sector and resulted in a remarkable recovery in rice crop acreage (estimated increase of 975,000 ha) and vegetative vigor compared to 2016.

Sources: USDA Foreign Agricultural Service 2017; GAIN 2016, 2017.

improving gender and overall equality (by involving women and youth in local development), encouraging good governance, and promoting cooperation from government agencies. Such inclusive approaches also help vulnerable groups and individuals to understand their rights, responsibilities, and entitlements. For example, a dynamic partnership between the government, an international NGO, and local communities enabled farmers in Thanh Hoa Province in the North Central Coast region of Vietnam to successfully form the Water User Cooperative (WUC) to manage their water resources.⁸ Set up by the Cam Phu Commune as part of the Thai Long Dam Project, the WUC mobilized local farmers to actively participate and manage the local resources in a sustainable manner, leading to increased government responsiveness and accountability. The farmers were fully involved in decision making regarding water distribution plans and schedules, and in resolving conflicts. The WUC benefited people at multiple levels—for example, by promoting better access to irrigation and drinking water through controlled

⁸ See Sinh (2002).

water supply. This, in turn, reduced the work load of men, women, and children, as farm activities became easier and collection of water for domestic use became less time-consuming. Farmers gained better incomes due to increased crop yields, crop diversification, and livestock and fish farming. For an example of a comprehensive development project in China, see box O.6.

BOX O.6: Helping Chinese Farmers Adapt to Climate Change Through Comprehensive Agricultural Development (CAD)

Irrigated Agriculture Intensification Loan Project III (IAIL3) in China was a large-scale initiative under Comprehensive Agricultural Development (CAD) implemented by the State Office of Comprehensive Agricultural Development (SOCAD) within the Ministry of Finance. Activities under CAD are funded by the central government of China to support agricultural and ecological development, strengthen agricultural infrastructure, ensure national food security, advance agro-processing production, and increase farmers' income. Building on the success of IAIL1 and IAIL2, and partly financed through a World Bank loan, IAIL3 aimed to enhance adaptation of agriculture and water management practices by increasing awareness about climate change and through capacity building. It was implemented from 2005 to 2010 in five provinces—Hebei, Jiangsu, Anhui, Shandong, and Henan—in the 3H Plain of the Yellow, Huaihe, and Haihe River basins. The 3H Plain is the major agricultural zone in China. SOCAD incorporated climate change adaptation actions into IAIL3 with additional funding by the Global Environmental Facility (GEF) through the Mainstreaming Climate Change Adaptation in Irrigated Agriculture project. Engineering, agronomic, and management measures were taken to promote water saving, increase agricultural yield, and secure farmers' livelihood, as summarized below:

- **Yield improvement.** Farmers' income was increased by the use of early maturing and drought- and pest-resistant varieties of wheat to improve yields. Greenhouses were built through the project to encourage farmers to grow off-season vegetables, thus increasing their income.
- **Infrastructure improvement.** Water-stopping walls and sluices were introduced as an adaptive water-saving measure. The walls help maintain the water table in addition to containing discharge of harmful chemicals into water bodies, and the sluices enable storage of irrigation water.
- **Education and outreach.** Expert teams organized farmer training to raise awareness of and build capacity for climate change adaptation. Experts from China Agriculture University and the Home of Rural Women, a nonprofit organization, delivered targeted training to women, particularly addressing their active role in the project and adaptation activities.
- **Farmers' participation.** To encourage active participation of farmers, specifically women, water user associations (WUAs) and specialized agricultural associations were promoted. To encourage farmers to take ownership of managing and maintaining the facilities and adaptation methods, irrigation facilities were constructed and handed over to WUAs.

Source: Wang and Li 2013.

Recommended Actions

A holistic and integrated approach that includes both structural and nonstructural measures is proposed to address impacts of drought and SWI and to promote longer-term resilience measures across key sectors. Tackling the impacts of all types of disaster risks nationally will require well thought-out strategic planning and coordinated implementation of medium- and long-term measures from a multi-hazard perspective. Such planning must be backed by sound local knowledge, scientific understanding (for targeting and prioritizing investments for technology development and adoption), infrastructure creation, and capacity building. To effectively address the drought and SWI, an integrated approach using both structural and nonstructural interventions (policies, capacity building, information, technologies, infrastructure, and services) is needed.

Table O.2 provides options drawn from global good practices as well as from Vietnam’s experience with the 2015–2016 drought and SWI. To develop location-specific action plans (short and longer term) for different geographic areas based on their vulnerability to external shocks (such as extreme weather) and socioeconomic characteristics, these preliminary recommendations should be further prioritized and refined.

Some recommendations are grouped together in the table below, but they can be further expanded as necessary. Actions that are needed in the immediate or short term (less than two years) are given under the “short term” time frame. Those that require a longer implementation period (more than two years) are addressed under the “medium/long term” time frame. In the table, the time frames are indicated by green bars. When action begins in the short term and continues over a longer term, the green bar spans both time frames.

TABLE O.2: Summary of Recommended Actions Based on National and International Experiences to Address Drought and SWI and to Promote Short- and Longer-Term Resilience

Sectoral Scope	Options to be considered based on national and global good practices	Proposed Time Frame	
		Short Term (less than 2 years)	Medium/Long Term (2–5 years)
Cross-sectoral	Institutional		
	<ul style="list-style-type: none"> • Coordinate programs and investments across ministries and agencies at national and subnational levels • Establish high-level interministerial commission to oversee drought and SWI risk management activities • Improve institutional capacities and accountability to ensure effective response to future crises and longer-term resilience 		
	Social		
	<ul style="list-style-type: none"> • Integrate drought and SWI resilience into socioeconomic development plans • Enable household-level recovery through effectively delivered social assistance and promote community-based approaches 		
	Capacity Building		
	<ul style="list-style-type: none"> • Empower all stakeholders, especially vulnerable groups, through capacity building and training at all levels (e.g., administrative/technical staff, community level) • Involve local communities, especially vulnerable groups, in decision making and community asset building • Enable productive vertical and horizontal linkages between stakeholders through community-based approach 		
	Financial		
	<ul style="list-style-type: none"> • Develop a viable financial protection mechanism for emergency response and recovery 		

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Sectoral Scope	Options to be considered based on national and global good practices	Proposed Time Frame	
		Short Term (less than 2 years)	Medium/Long Term (2–5 years)
Cross-sectoral	<ul style="list-style-type: none"> Remove inconsistencies in existing subsidy policies being implemented, particularly those that encourage rice production in high-risk areas 		
	<ul style="list-style-type: none"> Identify and pilot a functional insurance program such as weather index-based insurance to protect affected households and small value-chain enterprises from financial impacts of drought, floods, and SWI 		
	<ul style="list-style-type: none"> Provide adequate resources for both short- and longer-term priority activities and improved impact monitoring and accountability 		
	<ul style="list-style-type: none"> Support private and public agribusiness enterprises and farmers' cooperative organizations 		
	<ul style="list-style-type: none"> Consider protective financing to establish shrimp breeding enterprises and greenhouses in Mekong Delta 		
	Hydro-meteorological		
	<ul style="list-style-type: none"> Develop detailed current and projected risk profiles for different regions for natural hazards such as drought, SWI, floods, landslides, coastal storms, and wildfires 		
	<ul style="list-style-type: none"> Implement user-focused hydro-meteorological services, improve medium- and longer-duration reliable weather forecasting, and raise awareness of the threat from related hazards among all stakeholders 		
	<ul style="list-style-type: none"> Produce and continually validate maps of high-risk areas for early warning and advisory services 		

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Sectoral Scope	Options to be considered based on national and global good practices	Proposed Time Frame	
		Short Term (less than 2 years)	Medium/Long Term (2–5 years)
Water Resource Management	<ul style="list-style-type: none"> Improve surface water and groundwater resource monitoring (availability, flows, quality, and salinity levels) and management; improve emergency water allocation at basin and subbasin scale, including transboundary and inter-basin water transfer initiatives 		
	<ul style="list-style-type: none"> Coordinate integrated water resource management across the water, energy, and agriculture sectors and for different purposes 		
	<ul style="list-style-type: none"> Maximize the benefits from existing urban and rural water supply and irrigation infrastructures using climate-resilient and efficient water storage, supply, on-farm irrigation, and drainage systems for sustainable water use 		
	<ul style="list-style-type: none"> Conduct economic and financial analysis of all water-related activities to assess productivity and efficiency; conduct water systems analysis to serve as a modern planning tool 		
	<ul style="list-style-type: none"> Consider water charges to reduce wasteful use of water 		
	<ul style="list-style-type: none"> Ensure appropriate water management practices during high-salinity period 		
	<ul style="list-style-type: none"> Implement watershed management and water-saving technologies in upstream provinces to allow higher water flow to coastal provinces 		
	<ul style="list-style-type: none"> Support groundwater recharge practices in suitable locations as well as rainwater harvesting 		
	<ul style="list-style-type: none"> Support communities and local authorities in developing suitable desalination plants 		
	<ul style="list-style-type: none"> Improve wastewater treatment and biosecurity standards to better control shrimp disease as part of GAP 		

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Sectoral Scope	Options to be considered based on national and global good practices	Proposed Time Frame	
		Short Term (less than 2 years)	Medium/Long Term (2–5 years)
Agriculture	<ul style="list-style-type: none"> Ensure availability and affordability of food stocks in the affected areas and maintain strategic grain reserves 		
	<ul style="list-style-type: none"> Shift away from a current emphasis on rice production in favor of more diversified agriculture and cash-cropping systems 		
	<ul style="list-style-type: none"> Identify and deploy location-specific climate-smart agriculture and GAP, including appropriate land use, to reduce the damage from drought, floods, and SWI; facilitate compulsory adoption through improved policies and investments 		
	<ul style="list-style-type: none"> Support R&D and promote the use of cultivars tolerant of drought, salt, and water submergence 		
	<ul style="list-style-type: none"> Protect animal assets from these disasters by improving fodder and feed stock availability, pasture management, drinking water, and veterinary services 		
	<ul style="list-style-type: none"> In the highlands, improve tree cover in watershed areas and promote integrated crops, agro-forestry, and livestock mixed farming systems 		
	<ul style="list-style-type: none"> In the coastal areas, facilitate transition from freshwater crops to sustainable brackish water aquaculture 		
	<ul style="list-style-type: none"> In the Mekong Delta, provide economic incentives and other support services to seafood value chains and households converting salinity-affected rice fields into integrated rice-shrimp and other aquaculture farming 		
	<ul style="list-style-type: none"> Enhance farm-to-market links to strengthen value chains, including improvement of storage facilities 		
	<ul style="list-style-type: none"> Employ targeted preventive interventions for risk and vulnerability reduction (for example, protecting seed reserves, improved agricultural extension services, etc.) 		

Support from the World Bank

The World Bank can offer both financial and technical assistance to support the government of Vietnam (GoV) in implementing resilient development investments. Drawing on lessons from global good practices and from tested and proven measures in Vietnam, as well as on country-specific knowledge from an active and long-standing investment portfolio, the Bank has developed priority actions for the short, medium, and long term. Using proven global practices and involving stakeholders at all levels will encourage adoption of the identified measures and thus help to build resilience to drought and SWI.

The World Bank's development assistance objectives fit into the longer-term recovery time frame. The emergency response plan prepared by the United Nations and the GoV provided both a summary of recommended actions for the humanitarian phase (three to five months) and recommendations for longer-term recovery. An initial review of the Bank's active portfolio focused on several of the actions listed in the emergency response plan's recovery table, including measures to strengthen priority infrastructure and to build capacity for greater climate resilience in the government and among local communities. Considering that a portion of recovery could be supported by reprogramming from existing development allocations, there is also an urgent need to transform risk management over the longer term so that the normal flow of development interventions is not jeopardized. Efforts that build on or address gaps in the country's ongoing programs to promote resilience will have immediate and substantial benefits for future economic growth.

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