

THAI FLOOD 2011

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OVERVIEW

Rapid Assessment
for Resilient Recovery and
Reconstruction Planning



GFDRR
Global Facility for Disaster Reduction and Recovery



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FOREWORD

In 2011, Thailand suffered its worst floods in more than half a century. Caused by excessive and continuous rainfall from successive, powerful monsoons and subsequent, numerous dam breaches, the floods inundated more than six million hectares of land in 66 of the country's 77 provinces, and affected more than 13 million people from July through December 2011.

In response to the disaster, the Royal Thai Government established centralized flood monitoring and relief operations in mid-August, allocated extra flood-relief financial support to the affected provinces, and pledged investment in resilient recovery and reconstruction for all impacted sectors.

In October, the Royal Thai Government, led by the Ministry of Finance, initiated an exercise to assess the economic and social impact of the floods and prepare recovery and reconstruction plans. This exercise was done in collaboration with the World Bank and various development partners. This Rapid Assessment for Resilient Recovery and Reconstruction Planning report is the result of the exercise which took place from November 4-25, 2011. Twenty-six of the country's 66 affected provinces were included in the assessment, which examines 18 main sectors and used a comprehensive and internationally established methodology looking at damage and losses caused by the disaster. The report determines the country's needs for post-disaster recovery and reconstruction and proposes short-, medium-, and long-term measures in each of the 18 sectors for a sustainable post-disaster reconstruction program. Drawing on global good practices for disaster risk management and building-back-better strategies, the report also gives suggestions on how to improve the resilience of the country's infrastructure and its communities to the impacts of disasters.

This report was made possible through the concerted efforts of government agencies, private sector partners, civil society organizations, and development partners. The speed with which such a comprehensive report was prepared is testimony to the remarkable dedication of a broad range of agencies and individuals, who came together as a team with one serious task at hand; to help the government of Thailand and its people form a full picture of the situation and the challenges ahead. There are many agencies and individuals whose great contributions deserve acknowledgement. This report, and the experience of producing it, will provide a strong foundation for the continued efforts of the government to develop a framework for strategic and rapid responses to future disasters and the integration of disaster prevention and mitigation efforts into a range of development activities for the benefit of the people of Thailand and the country's future economic growth and prosperity.



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Development Partners



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ACRONYMS

BBB	Build-Back-Better
CSOs	Civil Society Organizations
DALA	Damage, Losses and Needs Assessment
EWS	Early Warning System
FY	Fiscal Year
GDP	Gross Domestic Product
GPP	Gross Provincial Product
IWRM	Integrated Water Resources Management
NESDB	National Economic and Social Development Board
NGO	Non-Governmental Organization
THB	Thai Baht
USD	United States Dollar

OVERVIEW

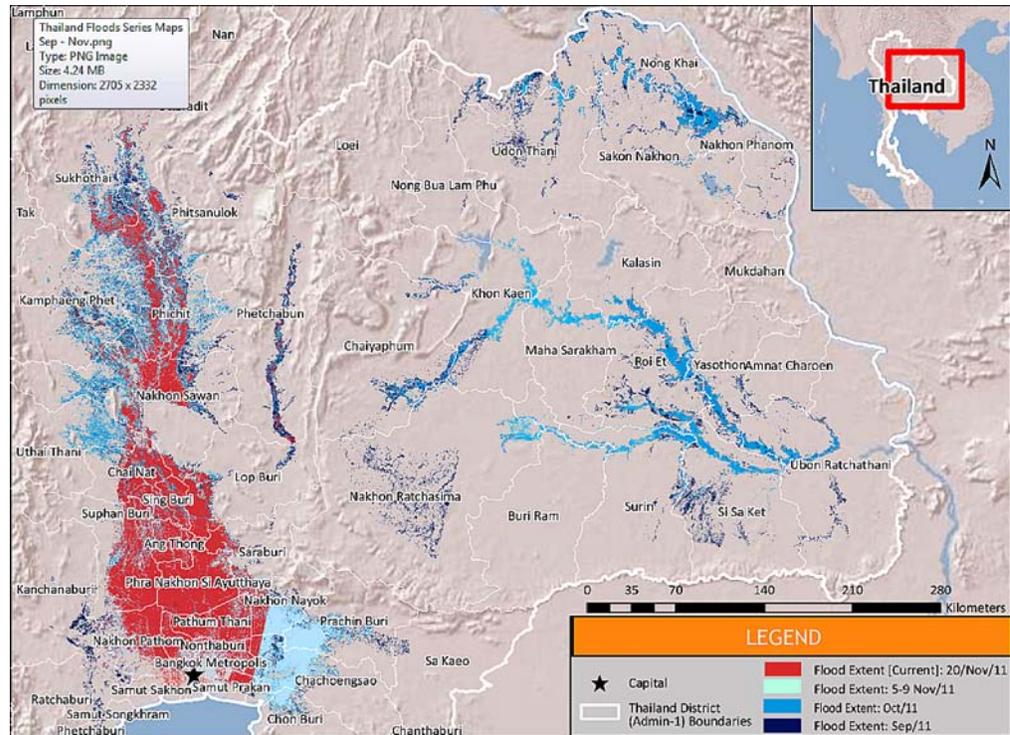
In response to the prolonged and widespread flooding throughout Thailand in 2011, the Royal Thai Government, in conjunction with the World Bank and other development partners, undertook this rapid assessment of the impact of the floods in 26 of the 66 affected provinces. This report outlines these findings, including damage and loss estimates, social and economic impacts, and proposes strategies for resilient recovery and reconstruction planning.

The Disaster

Heavy rain combined with multiple tropical storms throughout the extended rainy season played a large part in the extensive flooding. Flash floods were

reported in several areas in the north in May, and tropical depression Haima arrived in June followed by Nock-Ten in July, the combination of which caused widespread flooding. The southwest monsoon in August-September and the northeast monsoon in October added to the flooding, which was making its way into the central plains, filling many major dams to capacity and causing breaches in 10 major flood control structures. Some 66 provinces were affected by severe, record-high flooding, including the Bangkok metropolitan area and its surrounding areas.¹ By November more than 5.5 percent of the total landmass in the country had been inundated, and at the time of writing, approximately 11.2 million rai (18,000 km²) of farmland

Figure 1.
Map of the maximum extent of the floods:
September – November 2011



Layer Sources: Admin. Boundaries (DIVA-GIS), Flood Extent Layers (GISTDA).

Disclaimer: The borders and country names used are indicative and do not represent the views of The World Bank Group.

¹ From Thailand's Meteorological Department (http://www.tmd.go.th/en/event/flood_in_2011.pdf).



Christophe Archambault/AFP/Getty Images

remained under water.² Overall, the floods affected more than 13 million people and resulted in more than 680 deaths.

Economic and Social Impacts

The total damage and losses from the 2011 floods in Thailand amounted to THB 1.43 trillion (USD 46.5 billion), with losses accounting for 56 percent of the total. The manufacturing sector bore roughly 70 percent of the total damage and losses due to the flooding of six industrial estates in Ayuthaya and Pathum Thani from mid-October to November 2011. Overall, approximately 90 percent of the damage and losses from the 2011 floods were borne by the private sector.

Rehabilitation and reconstruction needs³ over the next two years and beyond are estimated at THB 1.5 trillion (USD 50 billion). Approximately three-quarters of the needs will be borne by the private sector. The manufacturing sector's needs

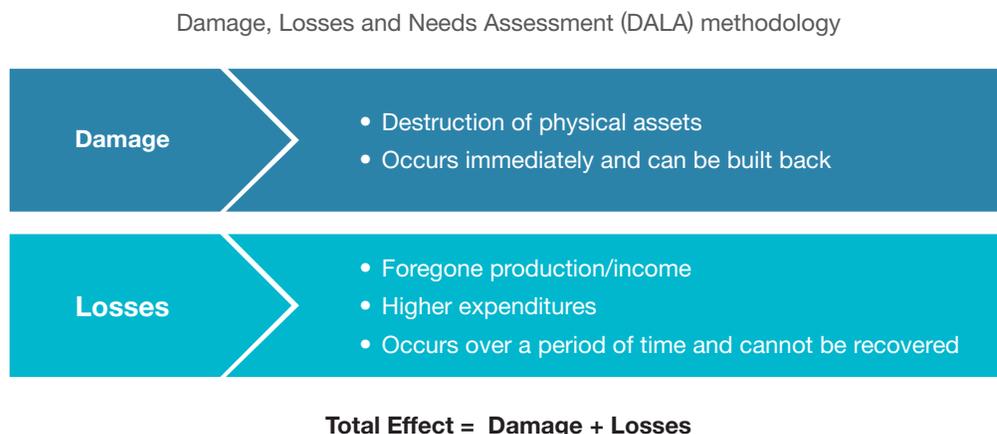
account for 80 percent of the private sector needs. As for the government, the majority of needs are estimated to be for water resources management and for the rehabilitation of transportation facilities such as roads and bridges. Both commercial financial institutions and the government's specialized financial institutions require approximately THB 411 billion (USD 14 billion) in loans for rehabilitation and reconstruction.

Based on the DALA methodology, it is estimated that the floods will reduce real GDP growth in 2011 by 1.1 percent from pre-flood projections. But the reconstruction that started in 2012 and will largely be completed by year-end is expected to increase real GDP growth in 2012 by 1.7 percent. That is, real GDP growth in 2011 would fall from the NESDB's pre-flood projection of 4.0 percent to 2.9 percent. However, if reconstruction did not take place, projected real GDP would fall by THB 50 billion (USD 1.7 billion) in 2012.

² UN Situation Report 14, dated December 8, 2011.

³ Needs include not only building back a part or all of the damage in each sector, but reconstructing to a higher quality that is more weather resilient and/or has better technology.

Figure 2.
Methodology of study



The floods will negatively affect the current account in 2011 and 2012. In 2011, exports fell by an estimated USD 7.9 billion due to the floods hampering manufacturing firms' production in the last quarter of 2011. The reduction in manufacturing, coupled with a significant fall in tourism revenues, meant the current account in 2011 was USD 11.9 billion, compared to a projected USD 20.6 billion had the floods not occurred. In 2012, the current account balance is estimated to be USD 12.4 billion, down from an earlier projection of USD 22.2 billion, mainly due to the increase in imports for reconstruction, estimated at USD 7.5 billion, and a shrinking of exports by roughly USD 1.9 billion.

Government revenue will be negatively affected most in 2011 due to interruptions in manufacturing and reduced consumption in the last quarter of the year. The estimated tax revenue loss is around THB 66.5 billion, or 3.7 percent of the estimated pre-flood revenues. In 2012, the projected revenue losses of THB 52.6 billion – or 2.6 percent of pre-flood projected revenues – are mainly due to the continued low levels of manufacturing plus import tariff exemptions on capital goods for the replacement of manufacturing production machinery damaged by the floods.

The government's fiscal stance will allow it to meet rehabilitation and reconstruction needs. The government's flood rehabilitation and reconstruction expenditure could amount to THB 389

billion (USD 13 billion). The bulk of the needs will be in the period of 6–24 months after the floods have receded, when most of the reconstruction is expected to take place. In FY 2013, government expenditure could amount to almost 11 percent of its revenue. To be able to finance such expenditure, the government will need to both prioritize spending and borrow additional resources to fund the required reconstruction needs. It should be noted that, under the current public debt law, the government still has enough headroom to fund these additional expenditures.

Poor and marginalized households were heavily affected and livelihoods severely disrupted. At least THB 110 billion in wages have been lost due to the floods and a large proportion of these losses occurred within vulnerable populations with limited social protection. Total income loss from the beginning of the flood to 2014 is estimated to be around THB 129 billion. Highly affected wage-paying sectors are wholesale and retail trade and repairs, hotels and restaurants, and financial intermediation, which are all labor-intensive sectors, with losses totaling THB 25 billion.

Livelihoods have been severely disrupted in both rural and urban areas. Urban poor groups and tree crop farmers in rural areas emerged as some of the most affected groups. Agricultural laborers and daily wage earners in urban poor areas have been severely affected with their income generation activities

Sub Sector	Disaster Effects			Ownership	
	Damage	Losses	Total	Public	Private
Infrastructure					
Water Resources Management	8,715	–	8,715	8,715	–
Transport	23,538	6,938	30,476	30,326	150
Telecommunication	1,290	2,558	3,848	1,597	2,251
Electricity	3,186	5,716	8,901	5,385	3,517
Water Supply and Sanitation	3,497	1,984	5,481	5,481	
Production					
Agriculture, Livestock and Fishery	5,666	34,715	40,381	–	40,381
Manufacturing	513,881	493,258	1,007,139	–	1,007,139
Tourism	5,134	89,673	94,808	403	94,405
Finance and Banking	–	115,276	115,276	74,076	41,200
Social					
Health	1,684	2,133	3,817	1,627	2,190
Education	13,051	1,798	14,849	10,614	4,235
Housing	45,908	37,889	83,797	–	83,797
Cultural Heritage	4,429	3,076	7,505	3,041	4,463
Cross Cutting					
Environment	375	176	551	212	339
TOTAL	630,354	795,191	1,425,544	141,477	1,284,066

Source: DALA estimates, NESDB, and Ministry of Industry.
Note: Losses for each sector include higher expenditures due to floods.

temporarily suspended. In addition, alternative, short-term, informal work opportunities are difficult to find. Resorting to borrowing both for basic expenditures seems, therefore, to have been a widespread coping strategy in both rural and urban areas. The majority of rural farming households have loans with the Bank for Agriculture and Agricultural Cooperatives. With harvests lost and significant additional investments required to re-establish their livelihoods, farmers are concerned that they will default on their loans and thus will not be able to borrow further. For the urban poor, loss of earning opportunities has been compounded by limited access to formal sources of credit due to collateral requirements and a lack of steady income. The only sources of funds available to these groups are informal lenders, who charge extremely high interest rates (as much as 20 percent daily).

Damage, Losses and Needs Assessment

The rapid assessment estimated damage, losses and needs for reconstruction and recovery. Damage refers to direct impacts on physical assets, products, raw materials, machinery, and properties. Losses refer to reduced or lost production opportunities, i.e. loss of income, reduced production efficiency, and increasing expenditures over a period of time. Reconstruction and recovery needs are projected from the damage estimates, and are counted as additional economic activities in the macroeconomic assessment. The estimated damage and losses total approximately THB 1.43 trillion (USD 46.5 billion – **Table 1**). The damage to physical assets amount to THB 630.3 billion (USD 21 billion), where associated losses in economic activities add up to about THB 795 billion (USD 26.5 billion). It should be

Table 1.
Summary of damage and losses by sector in Thai baht, millions

noted that these estimates assume losses will occur over the three-year period of 2011-2013.

The floods impacted heavily on the private sector, particularly manufacturing.

Manufacturing makes up about 38.5 percent of Thailand's GDP and is one of the main drivers of Thailand's exports. The majority (around 70 percent in GPP values) of manufacturers are located in five flood-affected provinces, namely Bangkok, Ayuthaya, Nakhon Sawan, Pathum Thani, and Samut Sakhon. Tourism, housing and the financial sector were also heavily affected. Though there was some damage to tourism infrastructure, the greatest impact came from losses in revenue from accommodation, transportation, shopping, food and beverages, entertainment and sightseeing. In housing, some 1.9 million houses were affected with about 19,000 homes destroyed. But the greatest damage was to household goods. Damage in the housing sector were the second largest – after manufacturing – with comparable losses as a proportion of damage. The financial sector incurred

very little damage, but will be heavily impacted by losses during the reconstruction period in which there will be a substantial need for the extension of credit repayment plans, and new credit line extensions.

Recovery and reconstruction needs are estimated to be THB 1.5 trillion (USD 50 billion) over a five-year period. THB 413 billion (USD 13.7 billion) is needed for immediate recovery, whilst more than half of the total needs (THB 927 billion or USD 31 billion) will be spent in the medium-term. More than 70 percent of needs (THB 1.1 trillion or USD 37 billion) are in the private sector. Within the private sector, the manufacturing sector accounts for around 77 percent of the rehabilitation needs as it incurred most of the damage.

Recovery and Reconstruction Strategy

The 2011 floods were a powerful and intense force of nature that had a huge impact on the lives of many. The floods caused widespread damage and losses



that have contributed to a decline in productivity; but they also offer opportunities for advancement and growth. If planned effectively, the recovery and reconstruction program could offer opportunities to rebuild better, taking advantage of economically productive options. Below, recommendations from the sectoral assessment teams have been grouped into three overarching areas that broadly encompass the findings and recommendations of the rapid assessment. Detailed recommendations by sector can be found in the sectoral chapters.

I Provide support to the affected population with a particular focus on vulnerable groups

Providing support to the affected populations (and to vulnerable groups in particular) to help prevent further indebtedness and allow people to resume normal livelihood activities is the immediate priority. Key guiding principles of equity, beneficiary/community participation, transparency and accountability should inform the implementation of these recovery programs. The development of a robust monitoring and evaluation system will be essential to assess progress and take corrective action where needed. The proposed rapid response is expected to cover vulnerable and marginalized households with limited sources of income and no ability to participate in

Table 2.
Total public and private needs for rehabilitation and reconstruction in Thai baht, millions

Sub Sector	Needs			Needs			
	Public	Private	Total	~6 mths	6-24 mths	> 24 mths	Total
Infrastructure							
Water Resources Management	54,075	15,000	69,075	3,023	15,462	50,590	69,075
Transport	23,583	–	23,538	6,866	14,376	2,296	23,538
Telecommunication	2,026	2,052	4,078	1,675	1,422	980	4,078
Electricity	5,625	–	5,625	899	3,037	1,689	5,625
Water Supply and Sanitation	5,633	–	5,633	2,997	2,635	–	5,633
Productive							
Agriculture, Livestock and Fishery	4,570	–	4,570	3,425	1,125	20	4,570
Manufacturing	–	854,356	854,356	172,640	668,045	13,671	854,356
Tourism	3,218	2,186	5,466	4,343	1,123	–	5,466
Finance and Banking	234,520	176,919	411,439	170,140	187,907	53,392	411,439
Social							
Health	2,318	–	2,318	1,128	870	319	2,318
Social	20,700	–	20,700	13,300	7,400	–	20,700
Education	13,343	–	13,343	8,045	5,298	–	13,343
Housing	5,110	46,870	51,980	14,990	12,510	24,480	51,980
Cultural Heritage	7,514	2,640	10,153	6,183	3,971	–	10,153
Cross Cutting							
Environment	6,181	2,004	8,184	3,724	1,619	2,841	8,184
TOTAL	388,431	1,102,027	1,490,458	413,378	926,801	150,278	1,490,458
Private needs				304,012	681,587	116,428	1,102,027
Public needs				109,366	245,214	33,850	388,431
as % post-flood revenues				5.5	10.8	1.4	

Source: DALA.

Note: The needs of the manufacturing sector include loans from the finance and banking sector of around THB 160 billion. Similarly, the needs of the agricultural sector will be mostly financed through loans from the Bank for Agriculture and Agricultural Cooperatives (BAAC). The needs of these two sectors are also included in the finance and banking sector needs. Loan needs of the other sectors are not included in their respective sectors, but are only counted in the finance and banking sector's needs.

Figure 3.
Deriving needs from
damage and losses



labor-based recovery and reconstruction intervention (including the elderly, sick, people with disabilities and children). It would also address the needs of those in both urban and rural areas that suffered heavy losses during the flooding. Additional social assistance should be put in place to: i) provide one-off supplemental cash transfers to poor affected households (THB 4,000 per household); and ii) provide additional income support for the elderly and people with disabilities for approximately three months (increase from THB 500 to 1,000). In addition, labor-intensive public works programs with a strong community participation component would provide much-needed additional income for those able to work; priority would be given to vulnerable and marginalized groups including migrant workers. Finally, addressing the need for credit at specialized financial institution (SFI) rates for the urban and rural poor will be critical in the recovery process to prevent escalating levels of debt (particularly for those borrowing from informal money lenders). This could be achieved through non-profit organizations and by expanding the membership of community-based savings groups.

Providing recovery assistance to the recovering productive sectors such as agriculture, SMEs and other businesses will facilitate the rapid restoration of business. The cash-for-work programs mentioned above can couple the compensation with employment opportunities, benefit communities and businesses with cleanup and restoration of infrastructure. In the agriculture sector, equitable compensation to affected farmers and the rapid distribution of quality inputs, while closely monitoring the effectiveness of the distribution system, along with the alleviation of

financial pressures through debt suspensions and extending loans, can support heavily-affected families and facilitate the resumption of profitable activities in this principal productive sector. Repairing damaged infrastructure would be a pre-condition for resuming activities in the productive sectors, for which access to financial services will be required.

Ensure a comprehensive social accountability framework is in place for the recovery effort, particularly given the emerging tensions observed in communities (THB 0.1 billion). Some key features of the proposed system include: i) ensuring information on available programs, resources and levels of assistance are made public and accessible to beneficiaries on a timely basis through appropriate channels and that a complaints mechanism is established; ii) that stringent community validation processes are used to confirm lists of eligible beneficiaries for the measures proposed above (in particular for the targeting of cash transfers and selection of participants in public work schemes); and iii) that partnerships with civil society organizations, research institutions and the media are established for effective third party monitoring of the recovery effort.

A strong communications strategy with clear lines of communication and timely information dissemination is a vital component in any effective recovery and reconstruction strategy. Strong communications, itself, is a form of aid in that it helps people understand who, what, how and where to access the support available to help get their lives back on track. Strategic communication also helps build consensus among major stakeholders, including different levels of

government, communities, and the private sector; this will take mere ideas related to recovery support programs, policy initiatives, financial access, and technical assistance to the next level of successful implementation with widespread coverage and support.

II Invest in a more climate resilient Thailand

Creating a more climate resilient Thailand will require a range of measures, only some of which are highlighted here.

Strengthen flood management through integrated water resources management

as a key step towards water management for consumption, productive use and disaster risk management related to droughts, floods and tropical storms. The concept of integrated water resources management (IWRM), founded on the river basin model, exists in the Thai framework, but would benefit from improvements, and strengthening and streamlining IWRM throughout sectoral planning and programming. A panel of local and international flood experts could: i) review and analyze the 2011 flood event; and ii) provide recommendations to the Strategic Committee on Water Management to ensure that lessons learnt in 2011 are integrated into any strategic plans going forward. In addition, reviewing and passing the pending water bill and appointing a high-level 'champion' for the IWRM model would give it the political power required to effectively institutionalize IWRM throughout development planning.

Key structural recommendations for flood management prioritize the immediate rehabilitation of hydraulic assets and an increase in drainage capacity. Ensuring regular maintenance of these assets in the future will improve the efficiency and extend the life of flood management infrastructure. Undertaking a design review of critical flood embankments, and carrying out dam safety reviews immediately are integral to ensuring the safety of flood control structures going into the next rainy season. The Royal Initiative for Flood Management suggests a rethink on flood barriers that would

allow more space for water and rivers to expand during peak water periods – a measure that must carefully consider social impacts and land use compensation. Investment in small- and medium-sized water reservoirs upstream and implementing community watershed management programs would also improve flood management capacity.

Understanding the nature of disaster risks through hazard mapping is of paramount importance for disaster risk management and disaster resilient development planning, and requires a detailed mapping and modeling exercise that includes climate change projections. The key is really to understand the nature and geographical distribution of risk and expected damage and to incorporate these risks into planning, design, and specifications of infrastructure assets. Making these risk maps available to the public in conjunction with training can improve general understanding and is the first step towards planning a strong disaster risk management strategy.

Establishing an effective early warning system (EWS) is a vital tool for mitigating the impacts of disasters. An effective EWS must be based on high-quality, real-time data gathered from detailed hazard mapping that takes into account geographic and infrastructure characteristics, and historical disaster information. An EWS can be established over time, starting with the most deadly or costly disasters before integrating all other disasters. This comprehensive approach will ensure an effective, efficient system that provides clear messaging that the public can trust.

Infrastructure should be built-back-better (BBB), stronger and safer than it was before the flood in order to ensure households and businesses are more resilient to future disasters. The housing and heritage sector assessments highlighted useful lessons from traditional houses and structures that fared better in this flood than some of the more modern homes, whilst the flood control chapter highlighted the need for stronger dikes around the industrial estates that will be

integral to mitigating such severe losses in this sector in the future. The BBB principle holds true for all sectors that have damaged infrastructure. Disseminating targeted, technical information to community groups, CSOs, businesses, industry, the public and individual home owners will help people understand best practice, and what can feasibly be done with the support the government is offering and with their limited means. If any hazard mapping information is made available during this reconstruction phase, these inputs should be included as an integral part of this process.

III Invest in the competitiveness of the country to support resilient recovery

Take advantage of the opportunities the reconstruction period presents. Despite its negative impacts on loss of lives and the economy, this reconstruction-planning period also represents a strategic opportunity for the country to rethink development priorities and create momentum to address some of the long-standing structural issues that may have remained unaddressed. This turns crisis into opportunity, and paves the way for a range of improvements to the legal

framework and economic options for the country. Some of these opportunities include reviewing land use planning, which has the potential to improve Thailand's economic planning, development strategies and environmental management, thereby reducing vulnerability to hazards and mitigating social conflict. The tourism industry has the potential to come back stronger than before with strong promotional campaigns, refurbishment and regeneration of cultural heritage attractions, and the opportunity to re-examine priorities for strategic positioning and future growth. In the agriculture sector, investing in research and development (R&D) to improve yield and quality of floating rice – which is less vulnerable to flood risk than short-duration rice – and intensification of crop varieties could improve overall competitiveness of farmers in flood-prone areas. Climate-friendly investments through BBB strategies could improve energy-efficient equipment and technologies which could reduce energy consumption and operating costs in the long run. Finally, the insurance sector has an opportunity to profit from the current situation through expanding its insurance products, including weather insurance and agricultural insurance products.

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The Rapid Assessment teams comprised members from line ministries in the Royal Thai Government and the international and local organizations in which their names are listed here according to the sector teams.

Agriculture Sector comprised Bank for Agriculture and Agricultural Cooperatives (BAAC), Food and Agriculture Organization of the United Nations (FAO), Geo-Informatics and Space Technology Development Agency (GISTDA), Kasetsart University, Office of Agricultural Economics (OAE), and Thailand Development Research Institute (TDRI) as a team leader.

Cultural Heritage Sector comprised Asian Disaster Preparedness Center (ADPC), Geo-Informatics and Space Technology Development Agency (GISTDA), International Council on Monuments and Sites (ICOMOS), United Nations Educational, Scientific and Cultural Organization (UNESCO), and the World Bank as a team leader.

Disaster Risk Management Sector comprised Department of Disaster Prevention and Mitigation (DDPM), and United Nations Development Programme (UNDP) and the World Bank as joint team leaders.

Education Sector comprised Bangkok Metropolitan Administration (BMA), Ministry of Education (MOE), SEAMEO Regional Center for Higher Education Development, United Nations Children's Fund (UNICEF), and the World Bank as a team leader.

Energy Sector comprised Electricity Generating Authority of Thailand (EGAT), Energy Policy and Planning Office (EPPO), Metropolitan Electricity Authority (MEA), Provincial Electricity Authority (PEA), and the World Bank as a team leader.

Environment Sector comprised Ministry of Natural Resources and Environment (MNRE), Bangkok Metropolitan Administration (BMA), Department of National Parks, Wildlife and Plant Conservation (DNP), Mahidol University, Office of Natural Resources and Environment Policy and Planning (ONEP), Pollution Control Department (PCD), Thailand Development Research Institute (TDRI), United Nations Environment Program (UNEP), and the World Bank as a team leader.

Financial Sector comprised Bank for Agriculture and Agricultural Cooperatives (BAAC), Bangkok Bank, Bank of Thailand (BOT), Cooperative Promotion Department, Fiscal Policy Office (FPO), Government Housing Bank (GHB), Government Saving Bank (GSB), National Village and Urban Community Fund Office, Office of Insurance Commission (OIC), Public Debt Management Office (PDMO), Securities and Exchange Commission (SEC), Stock Exchange of Thailand (SET), Small and Medium Enterprises Development Bank of Thailand (SME Bank), Thai Bankers' Association, Thai Bond Market Association, Thai Chamber of Commerce (TCC), Thai Credit Guarantee Corporation (TCG), Thai General Insurance Association, and the World Bank as a team leader.

Flood Control, Drainage and Irrigation Sector comprised Royal Irrigation Department (RID), Hydro and Agro Informatics Institute (HAI), Geo-Informatics and Space Technology Development Agency (GISTDA), Marine Department, Department of Groundwater Resources (DGR), Food and Agriculture Organization of the United Nations (FAO), Japan International Cooperation Agency (JICA), and the World Bank as a team leader.

Health Sector comprised Faculty of Medicine, Chulalongkorn University, Health Insurance System Research Office (HISRO), Ministry of Public Health (MOPH), National Economic and Social Development Board (NESDB), National Health Security Office (NHSO), and the World Bank as a team leader.

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Industry Sector comprised Department of Industrial Works (DIW), Federation of Thai Industry (FTI), International Finance Corporation (IFC), Ministry of Industry, and the United Nations Industrial Development Organization (UNIDO) as a team leader.

Livelihoods and Employment Sector comprised International Labor Organization (ILO), Mahidol Migration Center, Ministry of Labor (MOL), and the International Organization for Migration (IOM) as a team leader.

Macroeconomic Sector comprised National Economic and Social Development Board (NESDB), Food and Agriculture Organization of the United Nations (FAO), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and the World Bank as a team leader.

Social Impacts Assessment comprised and was led by members from the World Bank.

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Tourism Sector comprised Tourism Authority of Thailand (TAT), Tourism Council of Thailand (TCT), Thai Travel Agents Association (TTAA), and the World Bank as a team leader.

Transport Sector comprised Airports of Thailand (AOT), Department of Highways (DOH), Department of Rural Roads (DRR), Marine Department, Office of Transport and Traffic Policy and Planning (OTP), State Railway of Thailand (SRT), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and the World Bank as a team leader.

Water Supply and Sanitation Sector comprised Department of Groundwater Resources (DGR), Department of Water Resources (DWR), Geo-Informatics and Space Technology Development Agency (GISTDA), Metropolitan Waterworks Authority (MWA), Pollution Control Department (PCD), Provincial Waterworks Authority (PWA), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), Wastewater Management Authority (WMA), and the World Bank as a team leader.

A full list of acknowledgements can be found in the main report.



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