Supplementary material

This supplementary material presents the updated hazard-specific vulnerability templates for multiple climate hazards (extreme temperatures, drought, wildfires, floods, storms).

Extreme Temperatures (heatwaves and coldwaves)

Key Themes	Factors	Guiding questions
Hazard characteristics and impacts	albedo heat duration natality and mortality speed of temperature change altitude geographic location air pollution climatic pre-conditions moderate winter climates	What are the characteristics of the heat/cold wave including timing, location, intensity, length and compounding hazards? What heat or cold-related impacts are known in the affected area (e.g. mortality, morbidity, disruptions to key sectors)? How do the impacts reported to date compare to similar heat or cold waves experienced in the past? Are there any compounding or cascading impacts (e.g. on food security)? Are there existing heat/cold risk maps for the location of the study?
Geophysical	terrain conditions high impervious surface ratio low albedo surfaces low sky view factor thermal radiation and heat flux surface temperature low soil moisture landform/elevation vegetation cover fire-prone ecosystems natural ventilation	Describe the urban heat island effect in the impacted city(ies). What are the differences between cities, between city and rural areas, and micro-islands within cities?
Sociodemographics	family structure homeless populations household availability isolation race and ethnicity single-household residents working and living conditions population density minority groups total civilian non-institutionalized population education illiteracy alcohol consumption	Who are the most vulnerable groups specific to the location of the study and hazard? Why are those people vulnerable? Do the most vulnerable populations disproportionately live and work in hotter areas of the city [heat island effect]? Are there gaps in people's ability to access services based on sociodemographics? What is the human development index in the countries that are covered by the extreme heat or cold?

	individuals with limited mobility	Are there relevant historic processes/policies/events influencing vulnerability and exposure, such as systematic exclusion, conflict, political instability, and colonialism?
Health	substance users disability or mobility issues acclimatization (or lack of) chronic health conditions cognitive impairments confinement to bed dependent on caregivers mobility people with psychiatric illness physical and mental health higher number of co-morbidities asthma diabetes gender disparities pregnancy sex age life expectancy cardiovascular disease dementia diabetes digestive diseases endocrine diseases history of respiratory illness hormone levels immune function injury issues with thermoregulation medications mental illness nervous system diseases nutrition conditions populations with diseases of the circulatory system	Are there a large number of people who are known to be more physiologically vulnerable to extreme heat or cold in the study area? Are there gender and age-based differences in those impacted?
Cultural	foreign-born population language ability caste social class behavioral characteristics cultural unfamiliarity with heat/cold having more social activities aboriginal status indigenous populations tribe living habits and routines	Are there cultural differences in the population that would increase risk?

Economic context, capacity and livelihoods	GDP per capita job specification economic or income levels education high-risk occupations household income occupational exposure physically active jobs poverty outdoor or manual labor unemployment/employment workload duration and severity health worker socio-economic deprivation	What are the major income-generating sectors for the country, and are they affected by heat or cold risks? Are any temperature-related worker safety laws in place, planned, or discussed? Are there known or likely gaps in existing laws or barriers to developing new laws? Are there examples of maladaptation?
Agriculture	cropland exposure eroded or degraded soils food-insecure regions land cover/use monoculture farming systems agricultural population deforestation and land degradation limited irrigation infrastructure	What is known about the risks faced by agricultural workers in the affected areas (mortality, morbidity, labor productivity loss, crop/livestock loss, etc) and how does it compare to other groups? Do those working in agriculture-related jobs have access to cooling interventions? What are heat/cold-related vulnerabilities of the food production system itself?
Urban built environment	urban heat island effect density of highways building density community center row house structures living in old structures landscape of urban periphery non-opening windows poor ventilation surface material heat-retaining materials limited shade or cooling heat-prone neighborhoods poor urban planning thermal comfort-based urban planning weak urban governance urban population urbanization rate living in high-density living in hot neighborhoods living in inner city overcrowded living proximity to city center street canyon effects street design high-rise buildings cities	How are neighborhoods and housing organized? How does it affect vulnerability or exposure to cold or heat? How is the urban planning of the city either exacerbating or helping to reduce heat/cold risks, intentionally or unintentionally? What do we know about future urban plans? Are there examples of maladaptation? Are there any limits to adaptation, hard or soft?

Infrastructure	building age building orientation coastal dwelling construction materials top-flood apartments living on the top floor pollutant exposure roofs incoming solar radiation housing condition building materials housing type other housing characteristics	Which structural strategies have been implemented on household level to mitigate heat risk (e.g. cool roof technologies, access to cooling devices, etc)? Do we know to what degree these are systematically implemented across the affected area? Are there gaps or barriers?
Informality	rural and informal settlements home ownership rental housing dependence under-representation in research low levels of housing homelessness homeless shelters informal/slum settlements	What does informality look like in this city (housing stock, building material, social connectivity, access to services and cooling/heating measures, location, size of households) and how does that impact people's vulnerability and exposure to heat or cold?
Critical systems and services	heating/cooling communication technologies air quality high energy costs vehicle availability proximity to public transportation energy-inefficient design/power grid overload medical infrastructure walking time to clinic electricity supply AC dependence healthcare services ecosystem conversation proximity to green/water/cooling proximity to hospitals lack of green cover lack of green spaces lack of microclimate design lack of shading lack of water features limited access to services open spaces wind and water use bathing water (in context of housing conditions) drinking water availability occupied housing units: lacking complete plumbing health care systems	Do people have access to green spaces or ecosystem services? Are there gaps in access, if so where and who tends to lack access? Are there cascading risks on food security and what actions are reducing or exacerbating those risks? Are systems and services (e.g health, transport, water) able to expand to meet increased demand and/or pressure during extreme heat or cold? If any of these systems failed, why did they fail? If they were highly stressed and they did not fail, is there a reason behind this? Is there a provision to avoid water and electricity shutoffs during a heat/cold wave? Are there key spatial gaps in the distribution of the system that intersect with vulnerability? Are there examples of maladaptation?

Heat/Cold risk management		
Governance	Poor disaster governance data and measurement gaps lack of integrated planning poor risk communication uncoordinated disaster management	Is heat/cold risk integrated into key plans and policies across sectors? (ie. disaster management, urban planning, education)? Which agencies are integrating heat or cold into their plans across timescales? How are they coordinating with each other? Are there governance challenges?
Policies and plans	accessibility to cooling/heating space heat/cold protection measures lack of cooling/heating infrastructure lack of localized heat/cold plans lack of preparedness measures	Does the region have a Heat/Cold Action Plan for heatwaves? If so, does the HAP include risk reduction action across timescales? Was action taken in the pre-heat season to build capacity and preparedness (e.g. training, awareness raising campaigns)? Have there been updates to the Heat/Cold Action Plan (if existing) based on lessons from previous heat/cold waves?
Early Warning System	ineffective early warnings lack of monitoring systems limited heat risk awareness limited public outreach weak climate services	Does the region have a functional heat/cold wave early warning system? Was this heat/cold wave forecasted? If so, with what lead time, accuracy, etc.? Were there internal government and/or public warnings of the heat/cold wave? If so, what do we know about who can access the information; are there any gaps and other challenges? What early actions were implemented immediately before or during the early stages of the event?
Emergency response	poor emergency protocols distance from hospital having an emergency button lack of emergency capacity lack of emergency planning underfunded response systems proximity to cool shelters	Did the government declare a state of emergency or equivalent? What response actions were taken by the government, city authorities or implementing partners? What personal coping strategies have been implemented during the heatwave? Is there evidence on effective cooling interventions for the location affected? Are there any trade-offs or gaps in implementing or accessing interventions (e.g. financial barriers to

		purchasing cooling or heating devices or increasing water, rest, shade)? Do the implemented response actions address gaps in people's access to critical services and systems? If yes, are they based on income, demographics, distances, stigma, etc.? What was planned but didn't happen, or not planned that probably should have been?
Individual and household coping behaviors	low behaviour adjustment limited education and awareness low adaptive capacity high risk perception reduced risk awareness barriers to behavior change	What positive or negative coping strategies are being used at the individual and household level?
Insurance and social protection	no private insurance receiving social benefits health insurance	Are there shock-responsive social protection programmes that have been utilised or upscaled during the event?

Drought

Key Themes	Factors	Guiding questions
Hazard characteristics and impacts	drought characteristics temperature precipitation rainfall departure evaporation solar radiation	What are the characteristics of the drought (location, timing, intensity, duration)? What drought risk maps exist? What kind of drought is it (agricultural, hydrological, or socioeconomic)? What drought-related risks are known in the affected area (mortality, morbidity, key sectors and infrastructure)? How do the impacts reported to date compare to similar droughts experienced in the past? Are there relevant compounding hazards and cascading impacts (e.g. wildfires, air pollution, heat etc.) or events (e.g. inflation and high prices, health crises, cultural events, conflict) that are worsening impacts?
Geophysical	elevation potential water storage of soil slope (%)	How do the physical characteristics of the drought area contribute to or reduce drought risk?

	topographic features geological formation mountain range watershed geography groundwater level lakes within region surface water availability groundwater availability inland water bodies soil water-holding capacity	
Sociodemographics	total population population density human displacement literacy rate education expenditure and skilled people net migration gender social status social networks beliefs and values equity	Who are the most vulnerable groups, specific to the location of the study and hazard? Why are those people vulnerable?
Health	restricted mobility/disability life expectancy at birth prevalence of anemia among children disease prevalence mortality rate under -5 prevalence of HIV health status (alcohol and substance use) mental health maternal mortality ratio	What health characteristics increase risks associated with drought?
Economic context, capacity and livelihoods	economic welfare (GDP or GNI per capita) inflation/consumer prices expenditure market fragility consumption unemployment rate of population health expenditure per capita socioeconomic relevance of industry access to credits and loans labor force investments access to markets mobile cellular subscriptions problematic debt taxes economic and financial resources (labor)	How do the economic conditions of the country(ies) (e.g. GNI, GDP, unemployment rate, market access, inflation) affect the ability of people to cope with the drought? How does the drought impact key economic sectors in the country(ies)?

	number of land holdings innovation capacity inability to finance loss tourism	
Agriculture	agricultural occupation multiple-crop index (%) double cropping index (%) aspects of agricultural innovation being irrigated or rain-fed farmer cultivation pattern (sowing once a year to twice a year) fixed capital (yuan/farmer) irrigated or non irrigated agriculture cropland dry farming field size fishery poll improved seeds pasture land permanent irrigated agriculture probability of seasonal crop moisture deficiency (%) productivity using drought resistance varieties agr electricity supply (kWh) agricultural area agricultural machinery animal arable land agricultural water use soil type irrigation water withdrawals range land the effective irrigation rate (%) irrigation method fraction of crop land use fodder type rain-fed crops fertilizer rate pesticide use soil condition and quality (degradation/desertification) diversification	What drought-related risks do agricultural workers, farmers and/or pastoralists in the affected areas face? (e.g. labor productivity loss, crop/livestock loss, etc.)? How have farmers and pastoralists responded to the drought? (e.g. crop rotation, mixed cropping, using adaptive planting calendar in response to weather patterns, harvesting water run-off for irrigation etc.) What are the land and agricultural management practices? Are they sustainable?
Food security	prevalence of undernourishment malnutrition GDP in agriculture (yuan/capita) price of agricultural commodities farmer income food production food security (agricultural value added/GDP) assistance (availability of food aid)	What are the vulnerabilities of the food production system itself (e.g. crop yield and quality losses, pollinator health, overall food security concerns)? Are there cascading impacts on food security?

	livestock health condition	
Rural-urban interface	urban land fraction of urban area urbanization rate (%) pressure on resources (population density) ratio of rural to urban population rural population human habitation	What is the connection between rural and urban areas affected by drought? (e.g. migration, resource competition, depopulation etc.)
Land cover and ecological condition	aquatic ecosystem status bare lands biodiversity barren/waste land natural resource structure artificial surfaces well yield capacity woodland range protection and conservation (protected areas) wetland forest coverage rate (%) semi natural area vegetation scrub	How are land-use practices, changes, or environmental degradation exacerbating or alleviating drought conditions? Are soil pollution, erosion, water contamination, and saltwater intrusions an issue in the region? Is drought exacerbating these? Are soil pollution, erosion, water contamination, and saltwater intrusions an issue in the region? Is drought exacerbating these? What is the status of biodiversity in the region and is this impacted by the drought?
Critical systems and services	availability and quality of infrastructure technology qanat discharge remoteness (rural/remote populations) rail density (km/km2) improved sanitation facilities	Were critical systems (e.g. water, energy, transport, infrastructure) and services built to withstand this event? Elaborate by type of system or service.
Water and energy systems	access to electricity energy water and sanitation reservoirs safe water total water use (% of renewable) water availability water tanks water use by industry potential loss municipal water withdrawal actual domestic water consumption actual irrigation water consumption availability and utilization of ground water and the extent of water resources development in the region dams + groundwater resources	Are the water and electricity systems able to respond to demand? How has the drought impacted power generation? Are the hydroelectric dams functioning at capacity? Are coal power plants receiving the coal despite lower river levels? Are nuclear power plants able to cool down their systems? Are energy systems able to respond to the extreme heat commonly associated with drought (including the shocks of (i) direct

	dams capacity distance from water resources population with access to safe drinking water public water supply infrastructure renewable internal fresh water resources total renewable water resources per capita water demand/utilization water resources development share of municipal water consumption	heat exposure, and (ii) cooling-driven spikes in energy demand)? What is the state of the surface and groundwater resources? How do households access these? Have they been overexploited? What are the water consumption habits of the area? Are these sustainable in normal conditions? What about during drought years? Is there evidence of high water wastage in public supply systems? Has population and water demand increased recently? What is the age of the existing water management system and is it efficient? Can it deal with recurring droughts? What populations do they serve? What are the main sources of water? What type of infrastructure is present? When were the systems developed and when were they last updated?
Drought risk management		
Governance	governance lack of trust in institutions political representation public participation institutional coordination participating in local institutions government presence or programs decision making war and conflict	Which agencies are responsible for managing drought risk? How are they coordinating with each other? Are there governance challenges? Does the country/region have transboundary water resources? If yes, how are those water resources managed?
Policies and plans	environmental taxes communications governmental programs river basin management plans drought management tools land tenure system	What policies, programmes, and other initiatives are in place to reduce risk and impacts (e.g. land, resource, water management, deforestation)? Are there any trade-offs or gaps in drought policy?
Early warning and early action	drought awareness and information access to information sources early warning	Does the region have a functional drought or food security early warning system?

	underestimation of drought risk	Was this drought/food insecurity forecasted? If so, with what lead time, accuracy, etc.? Were there internal government and/or public warnings of the drought? Was early action taken before the forecasted drought to build capacity and preparedness (e.g. training, awareness raising campaigns)? If so, what do we know about who can access the information; are there any gaps and other challenges?
Emergency response	drought recovery capacity war and conflict	What response was prompted by government and city authorities? How resilient are management practices to address prolonged drought conditions? What best practices are used to increase this resilience? Are there examples of maladaptation?
Individual and household coping behaviors	human and civic resources savings self-coping assets access to resources risk taking behavior social networks non-agricultural incomes access to information dependence on government help indigenous and local knowledge	How do individual households cope with drought, considering differences between households based on sociodemographic or economic status? Does livelihood diversification help buffer against some of the drought shocks? Does social capital (e.g. social networks, informal insurance schemes, a bartering economy, etc) help mitigate drought impacts on vulnerable households? Have various types of migration (e.g. transhumance, seasonal migration, rural-urban migration, managed retreat) been used to cope with the drought? How did people's risk perception support or dissuade coping behaviors?
Insurance and social protection	drought insurance health insurance agricultural insurance	Are any insurance schemes in place or planned? Are there known gaps or barriers to accessing existing schemes?

Wildfires

Key Themes	Factors	Guiding questions
Hazard characteristics and impacts	fire frequency fire intensity heat release ecological impacts	What are the characteristics of the fires (timing, location, intensity, length,)? What was the cause (spark) of the fires? How do the impacts compare to similar hazards experienced in the past? Are there any compounding or cascading impacts (e.g. on food security)? Are there existing fire risk maps for the location of the study?
Landscape and fuel availability	forest vegetation structure main/secondary ground covering reproductive strategy of vegetation terrain slope elevation overhanging trees potential leaf accumulation on roof/gutters	How does the landscape and fuel availability influence the size, intensity and spread of the fire?
Ecological condition	ecological environment quality ecological regeneration delay (soil erosion potential habitat fragmentation soil loss threatened species biodiversity richness mortality rate or survival response of species	What is the ecological condition of the place at risk? How ecologically sensitive is this location to wildfire?
Sociodemographics	citizenship education ethnicity total number of households age female % in labor force female-headed HH gender single parent households sex community dynamics (cohesion) culture class values & perception minority	Who are the most vulnerable groups, specific to the location of the study? Why are those people vulnerable?

	place dependency (economic: natural resource dependency / noneconomic: dependence on local social networks and identity-based place attachment) receiving social security employment status financial/social capital land tenure	
Health and air pollution	chronic obstructive pulmonary disease health/abilities county prevalence rates for diabetes hypertension mental and physical health	How is the wildfire impacting air quality? If air quality is poor, what are the knock on effects? (e.g. health impacts, closure of schools etc.) Are people with pre-existing medical conditions predominantly affected?
Wildland-urban interface	location directly/indirectly exposed size of wildlife urban interface coupling of ecology and urbanization land-use values of houses in the wildland-urban interface urban development rapid growth nursing facility	Who and what is located at the wildland-urban interface? How has this changed over time? What factors are driving the changes?
Built environment	number of multi-family residential units overcrowding ownership mobile homes multi-unit housing number of manufactured housing units recreation unoccupied housing people living in group quarters land value house/land market rent percentage unoccupied housing units neighbouring structures	How does the built environment increase or reduce wildfire risk?
Structures	roof type type of shutter building age structure type ground floor number of floors number of acres in property	How do the characteristics of the structures (e.g. roof type, shutter type, number of floors) impact their susceptibility to be burned?
Wildfire risk management		

Governance	governance trust in government taxation opposition	Which agencies are responsible for managing fire risk? How are they coordinating with each other? Are there governance challenges?
Policies and plans	perceived vegetation risk disaster relief subsidies fuels management property regulation zoning/codes agency fuel reduction	What is the wildfire legislation landscape in the country/region? Are there standards, regulations or policies that pertain to fire in the region? Were those being enforced? What measures are taken to mitigate air pollution and protect human health? What are the land and fuel management practices?
Prevention	individual and community hazard preparation perceived structure risk	Does the region have a functioning early warning system/early fire detection system? Does the region have fire risk management procedures, guidelines, and contingency plans in place? What actions were implemented to mitigate risk? (e.g. bush reduction, manual removal of undergrowth, controlled burning, etc.) Have long-term changes in land-use or forest management played a role? What positive or negative coping strategies are being used at the individual and household level? How did people's risk perception support or dissuade coping behaviors?
Detection and communication	warning time length	Were there internal government and/or public warnings of the fires? If so, what do we know about who can access the information, are there any gaps and other challenges?
Protection	number of exits from fireprone areas no vehicle	What was done to facilitate occupant avoidance of and escape from the effects of fire? What response activities were conducted?
Containment & extinguishment	firefighting institutions response plans	Was it possible to extinguish the wildfires?

	water availability municipal water supply housing/transportation	What containment actions were taken? Was there international coordination involved in containment activities (e.g. shared fire fighting resources)?
Insurance	fire insurance	What is the prevalence and quality of fire insurance in the area burned?

Floods

Key Themes	Factors	Guiding questions
Hazard characteristics and impacts	depth of flood water number of floods time of occurrence ephemeral streams	What are the key hazard characteristics of the flood? (ie. timing, location, intensity) What flood-related impacts are known in the affected area? (mortality, morbidity, asset destruction, key sectoral impacts and infrastructure impacts) How do the impacts reported to date compare to similar floods experienced in the past? Do flood extent maps or flood risk maps exist? Are there any compounding or cascading impacts (e.g. on health)?
Geophysical	topography (low-lying, slope) hydrogeological characteristics of stream snowmelt areas soil characteristics river network shrinkage surface and groundwater features sea level rise siltation of channel beds riverbank erosion land subsidence	What are the topographic and hydrologic characteristics of the affected area?
Sociodemographics	gender age household composition and size household headed by female percentage of single-parent households language ethnic minorities	What is the HDI value(s) of the affected area? Who are the most vulnerable groups in the affected area? Why are they vulnerable? Has there been migration and displacement in the region that adds an additional stressor to the

	foreigners, migrants, immigrants, tourists, refugees literacy rate housing and land tenure renting personality traits swimming ability ability to self-cope wealth local social integration social cohesion poor community support well-being	region, and/or is the flood/storm a reason for migration and displacement?
Health	household member with illness disability care treatment mental state health physical condition of individuals sensory impairment evacuation ability	Were people with physiological risk factors disproportionately impacted during the floods (ex. people with mobility or sensory impairments)?
Cultural or systemic	clothing type cultural heritage beliefs and customs religion social awareness rate cultural assets cultural vision of disasters racial fragmentation of areas racial social system social inequities rural urban migration	Are there relevant cultural influences that may have exacerbated or decreased flood impacts? Are there relevant historic processes/policies/events influencing vulnerability and exposure, such as systematic exclusion, conflict, political instability, and colonialism?
Economic context, capacity and livelihoods	GDP per capita perceived adverse effect on finances profession (level of accessibility to higher-paying or more secure occupations) disruption of people's livelihoods limited access to assets asset concentration job security unemployment rate average income industries and other economic activities	How do the economic conditions of the country(ies) (e.g. GDP, unemployment rate, income) affect the ability of people to cope with the floods? What are the predominant industries and livelihoods in the affected area? Are some industries or livelihoods more or less impacted by the floods?
Spatial planning and exposure	location river confluence coastal proximity	Were any urban areas affected?

	poor natural drainage in flood-prone areas population density population growth settlement patterns overpopulation neighborhood characteristics number of dwellings located at flood prone area encroachment zones residency in temporary accommodations squatter settlements place of settlement river basin settlements floodplain development obstructed floodplains encroachment zones marginal lands location of housing human occupation of land urban and industrial expansion physical structures and infrastructure located in hazard-prone areas urban area, sprawl rapid urbanization development pressure	If yes, how is the urban planning of the affected area either exacerbating or helping to reduce flood risk, intentionally or unintentionally?
Shelter (formal and informal)	two or more stories above ground level age of construction building type building design age and quality of construction physical conditions of the building position of the building in relation to the ground level timber framed buildings construction code construction materials number of storeys presence of air-bricks vents and ducts adjacency to other buildings type of shelter (flat/bungalow/caravan) rented houses substandard housing windows on underground level mobile home or camp and car tents including settlement conditions	What types of shelter exist in the affected areas? What are the disproportionate effects by shelter type, if any? Are there informal settlements in the affected area? Do building codes adequately consider flood risks?

	land tenure basement flood mitigation technologies percentage of home rented/owned property ownership (owner) cellar ownership	
Land-use and land cover change	amount of vegetated cover agricultural encroachment coastal development low infiltration capacity land-use planning reduced retention vegetation cover and agricultural productivity land use change land degradation land reclamation land subsidence deterioration of wetland deforestation rapid socioenvironmental changes amount of vegetated cover impervious surfaces industrial facility density level of development service and commercial facility density poor spatial planning land distribution zoning regulation encroachment zones green spaces/urban green coverage	Have any land-use changes or practices increased or reduced the flood risk in the affected area (e.g. decreased natural areas, loss or encroachment of water bodies, deforestation, etc)? What types of land policy has been conducted in the region? Is there evidence of land expropriation? Have there been national or regional level land-reform policies that may exacerbate or alleviate the impacts of floods? What policies, programmes, and other initiatives are put in place to reduce and prevent negative impacts?
Critical systems and services	households without electricity households without safe water drainage network/pipelines density number of hospitals consuming public water supply road density condition of roads location of bridges age of construction construction of infrastructure quality of infrastructure exposure of critical facilities poor waste management poor sanitation management stormwater overloading	Were critical systems (e.g. water, energy, transport, infrastructure) and services built to withstand this event? Elaborate by type of system or service.

Flood risk management		
Governance	institutional coordination capacity enforcement and inspection authority and capabilities governance aspects political context public expenditure cuts social power and capacity to make decisions trust in officials Flood policy municipality planning gaps	Which agencies are responsible for managing flood risk? How are they coordinating with each other? Are there governance challenges? Does the country/region have transboundary rivers? If yes, how are those water resources managed?
Policies and plans	channel modification dike construction irrigation breaches river engineering water conservation weakness of flood reduction structures stormwater and wastewater management systems weak flood control systems knowledge-based flood management drainage facilities	What flood risk management policies exist, across spatial and temporal scales? Are they enforced? Have flood protection measures been implemented in the region (e.g. coastal defenses, dams, diversion canals, wetlands)? Are there examples of maladaptation? Are there examples of maladaptation? Are there any limits to adaptation, hard or soft?
Early warning and early action	lack of EWS and warning time hydrological forecast flood warning attitude dependency on public infrastructure precautionary measures preparedness of community public awareness of risks data availability	Does the region have a functional flood early warning system? Was the event forecasted? If so, with what lead time, accuracy, etc? Were there internal government and/or public warnings of the storm/flood? If so, what do we know about who can access the information, are there any gaps and other challenges? Were any anticipatory actions rolled out pre-onset, or before the bulk of impacts manifested?
Emergency response	reaction strategy number of shelter evacuation routes, no sign or alarms on the road response and relief (response to warning) supportive and emergency jobs warning and emergency actions distance between disaster related facilities and those in need	Did the government declare a state of emergency or equivalent? What response actions were taken by the government, city authorities or implementing partners?

	emergency committee emergency services trapped in building barricade dangerous roads poor road light vehicle use (type, occupancy)	
Individual and household coping behaviors	low level of community knowledge knowledge about flooded area direct disaster experience prolonged recovery risk perception and approach way people react and behavior (high risk behavior) Household: available time and energy Population's adaptive capacity personality traits swimming ability ability to self-cope intoxication occupant behavior experience with mobility in water walking or entering into floodwaters access to information and knowledge	What positive or negative coping strategies are being used at the individual and household level? How did people's risk perception support or dissuade coping behaviors?
Insurance and social protection	resource inaccessibility availability of fundamental amenities risk insurance flood insurance	Are there shock-responsive social protection programmes that have been scaled up or out during the event? Is flood insurance a significant factor in the recovery strategy for the affected area?

Storms

Key Themes	Factors	Guiding questions
Hazard characteristics and impacts	floods high wind zones temperature increased storm strength pre-storm depression storm surges flood penetration river discharge saltwater intrusion	What are the key hazard characteristics of the storm? (ie. timing, location, track, intensity) What wind, flood and storm surge-related impacts are known in the affected area? (mortality, morbidity, infrastructure damage, damage to public and private sector) How do the impacts reported to date compare to similar storms experienced in the past?

		Do flood extent or risk maps exist? Are there any compounding or cascading impacts (e.g. on health)? What is the cost of the damages as a proportion of GDP?
Storm surge	coastal slope sea-level rise geomorphology tectonic & land subsidence high wave-energy exposure inundation-prone areas, urban bowl topography population at risk due to sea level rise lack of natural buffers port activity	Was there a storm surge related to the event? Why or why not? If so, what factors increased or reduced the damage from the storm surge?
Sociodemographics	population growth socioeconomic inequality increased number of children in single household nationality non-English speakers race refugees life expectancy at birth low technological access displaced populations literacy gender age pregnancy single-mother households cultural heritage ideologie people living alone weak social networks dependence on public aid housing insecurity GINI index	What is the HDI value(s) of the affected area? Who are the most vulnerable groups in the affected area? Why are they vulnerable? Has there been migration and displacement in the region that adds an additional stressor to the region, and/or is the storm a reason for migration and displacement?
Health	people with chronic illness (cancer) hypertension immunocompromised prior psychiatric history respiratory illness end stage renal disease substance abuse and smoking AIDS cardiovascular disease	Were people with adverse health conditions disproportionately impacted by the storm? Why or why not? Is there potential for long-term health impacts as a result of the damage from the storm (e.g. psychosocial, as a result of contaminated drinking water or reduced healthcare system capacity)?

	education health physical/mental patients who rely on electrically powered medical equipment access to healthcare private health expenditure number of hospital beds per 10	
Economic capacity and livelihoods	agricultural dependency increased asset concentration industry local investments economic fragility resources tourist season economic standing livelihood at risk local economy low-income levels and social relations debt repayment schedules local market	What are the predominant industries and livelihoods in the affected area? Are some industries and livelihoods more or less impacted by the storm?
Spatial planning and exposure	rapid urbanization and population growth settlement in floodplains coastal urbanization and migration poor land use planning unregulated coastal development inadequate building codes inadequate infrastructure river flow regulation set-back zones (coastal development) exposure of critical assets debris-filled environments engineered frontage physical infrastructure high-value infrastructure dense infrastructure exposure	Are there relevant historic processes/policies/events influencing exposure, such as systematic exclusion? How is the spatial planning of the affected areas either exacerbating or helping to reduce flood risk, intentionally or unintentionally? What do we know about future spatial plans?
Land-use changes	land use land cover change natural protection degradation sediment supply limitations subsidence intensive agriculture/aquaculture wetland loss deforestation	Have any land-use changes and practices or environmental degradation either increased or reduced the flood/storm risk in the affected area (e.g. decreased natural areas, loss or encroachment of water bodies, deforestation, unsustainable land use etc)? What types of land policy exists in the region?

	state of conservation barrier island instability inland buffer	Have there been national or regional level land-reform policies that may exacerbate or alleviate the impacts of the storm?
Shelter	property value parcel value poor housing quality structures physical damageability	Is there information available on the types of housing and neighborhoods (e.g. housing stock, building material, size of households, location, etc.)?
Critical systems and services	exposure of critical assets contaminated water systems medical services share of the population without access to an improved water source poor health infrastructure fire stations national-security facilities police stations facilities serving government functions dependence on coastal services decrease/strain in essential service provision number of critical and essential facilities (civil-defense facilities) share of population without access to improved sanitation road networks biodiversity and habitat protection radio and television stations groundwater consumption	Were critical infrastructure and services built to withstand this storm (e.g. wind speeds, flood depth)? Elaborate by type of system or service.
Storm Risk Management		
Governance	limited institutional capacity political system slow institutional adaptation Corruption perception index share of female representatives in the National Parliament distrust of authorities	Which agencies are responsible for managing storm risk? How are they coordinating with each other? Are there governance challenges? Does the management of the shared water resources across governance boundaries influence storm risk?
Policies and plans	soft solution forest management environmental policy protection area	What policies or plans are in place to reduce and prevent negative impacts?

	unprotected building and infrastructure weak flood defenses poor drainage systems water management	Have storm protection measures been implemented in the region (e.g. coastal defenses, dams, diversion canals, wetlands)? Are there examples of maladaptation? Are policies and plans being implemented and enforced? Are there any gaps?
Early warning and early action	inadequate forecasting systems lack of early warning poor access to information	Does the region have a functional flood early warning system? Was the event forecasted? If so, with what lead time, accuracy? (break-down by sub-hazards: floods, storm surge, windspeeds) Were there internal government and/or public warnings of the storm/flood? If so, what do we know about who can access the information, and are there any gaps and other challenges?
Emergency response	limited evacuation options overcrowded shelters. evacuation failure speed of institutional set-up electrical outages basic necessities for residents limited or weak emergency response	What response was prompted by government authorities, INGOs and NGOs? Did any impacts on infrastructure influence the response, and if so how (e.g. damaged roads, disrupted communications)? Were widely accepted best-practices followed?
Individual and household coping behaviors	lack of flood memory historical memory gaps limited coping capacity	What positive or negative coping strategies are being used at the individual and household level? How did people's risk perception support or dissuade coping behaviors?
Insurance and social protection	lack of insurance coverage	Are there any insurance or financial instruments to support storm recovery for the country? (e.g. catastrophe insurance, bonds, pre-agreed credit lines etc.) Do people have access to insurance or social protection systems to reduce the impacts of the storm on households? To what extent will these instruments cover the expected impacts from the storm?