Climate and Disaster Risk Screening Report for Water Project in Vietnam: Hypothetical Water Project[1]

[1] This is the output report from applying the World Bank Group's Climate and Disaster Risk Screening Project Level Tool (Global website: climatescreeningtools.worldbank.org; World Bank users: wbclimatescreeningtools.worldbank.org). The findings, interpretations, and conclusions expressed from applying this tool are those of the individual that applied the tool and should be in no way attributed to the World Bank, to its affiliated institutions, to the Executive Directors of The World Bank or the governments they represent. The World Bank does not guarantee the accuracy of the information included in the screening and this associated output report and accepts no liability for any consequence of its use.

1. Introduction

Building resilience to climate and geophysical hazards is a vital step in the fight against poverty and for sustainable development. Screening for risks from these hazards improves the likelihood and longevity of a project's success. The project level **Climate and Disaster Risks Screening Tool** provides early stage due diligence on climate and disaster risks at the concept stage of project development. The tool uses an **exposure - sensitivity - adaptive capacity framework** to consider and characterize risks from climate and geophysical hazards, based on key components of a project and its broader development context (Annex 1).

This report summarizes the results of the screening process for the Hypothetical Water Project/Vietnam, which was applied to the following selected sub-sectors/components:

- [ ] Land Use / Watershed Management
- [x] Dams & Reservoirs
- [ ] Water Supply
- [ ] Wastewater
- [ ] Sanitation
- [ ] Riverine Flood Protection

The potential risks flagged in this report were identified through the four screening stages by connecting information on climate and geophysical hazards exposure with the user's subject matter expertise and understanding of the project components and sensitivity to rate the impacts. The tool does not provide detailed risk assessments, rather it flags risks to inform consultations, enhance dialogue with local and other experts, and define further analytical work at the project location.

This early stage due diligence can be used to strengthen the consideration of climate and disaster considerations in key components of the project design, including the physical (e.g., dams and reservoirs, wastewater treatment plants, etc.) and non-physical aspects (e.g., capacity building of water managers, water resource planning and institutional strengthening at community level, hygiene promotion and education campaigns, etc.). The broader sectoral (e.g., appropriate water policies, emergency protocols are in place that enable the water authority to respond to natural disasters, etc.) and development context conditions (e.g., strong legal enforcement of water pricing policies, climate-related early warning systems, etc.) could help modulate the risks to the delivery of the outcome/service level.

The results of the screening are presented below, with supporting narrative to guide their interpretation.

2. Climate and Disaster Risk Screening Results Summary

2.1 Project Information Summary

Table 1 below provides key project information including the location and key project development objectives. This information is provided by the task team. The activities within the components are important as their sensitivity to the climate and geophysical hazards will determine the level of potential impact from these hazards.

Table 1: Project Information

Project Information	
Title	Hypothetical Water Project
Number	Hypothetical
Region	East Asia and Pacific
Country	Vietnam
Type of Assessment	Water Projects
Purpose of Screening	Screen a Project at the Concept Stage
Current Project Phase	Concept (Identification)
Funding Source	IDA
Keywords	Water resource management, Water supply, Riverine flood protection, Dams and reservoirs
Location	To be determined during project preparation and appraisal, taking into account the results of this screening process and associated data.
Sub Sectors	Dams & Reservoirs
Outcome/ Service Delivery	The project will select rehabilitation of dams based on an a priori agreed selection criteria, including the input from this Climate and Disaster Risk Screening Tool, aimed at prioritizing those interventions that address the risks within an explicit poverty and inequality framework. Prioritization will be based on the probability and impact of failure, both in terms of population impacted and socio economic infrastructure, including structural risks, hydrological risk, downstream hazard and economic benefits. These will be categorized further according to the level of readiness, to prioritize those within the set of dams ready for rehabilitation with detailed engineering designs and those requiring rehabilitation for which detailed designs are still required. Established procedures for prioritizing interventions include those developed by International Commission on Large Dams (ICOLD), and others. The project will also deliver significant soft components (as described earlier).
Dams & Reservoirs	This project will select priority dams and reservoirs to rehabilitate, and also facilitate the associated monitoring/information networks, integrated planning, regulatory and institutional upgrades, and safety policies and procedures.

* Please note that this is based on user inputs and the coverage may not be comprehensive.

2.2 Summary of Exposure to Climate and Geophysical Hazards

Table 2 presents a summary description of exposure to climate and geophysical hazards at the project location for the Historical/Current and Future time frames[1]. Exposure to climate hazards is evaluated in two time frames, because past records are not necessarily indicative of future conditions.

The descriptions provide a summary of the key characteristics and some indication of the trends in exposure from each hazard, drawing on global, quality controlled data sets from the Climate Change Knowledge Portal (CCKP). It is useful, for example to understand the temperature range and the rate of annual or decadal increase in a region; or precipitation patterns for historical and future time frames and seasonality shifts. Understanding the trends of hazards is important as they act individually and collectively on components/sub-sectors of the project. Because geophysical hazards (such as earthquakes, tsunamis, landslides, and volcano eruptions) do not have associated future projections, exposure for those hazards is assessed only in the Historical/Current time frame.

Table 2: Summary of Exposure to Climate and Geophysical Hazards at Project Location

Hazard	Time Frame	Description of hazards for your location
Extreme Temperature	Current	Mean annual temperature has increased by 0.4°C since 1960, with the rate of increase more rapid in the dry seasons (November, December, January and February, March, April) and in the southern parts of Vietnam. The frequency of 'hot' days and nights has increased significantly since 1960 in every season, and the annual frequency of 'cold' days and nights has decreased significantly.
	Future	Mean annual temperature is projected to increase by 1 °C by 2050, with similar projected rates of warming for all seasons. Some studies indicate that similar warming is likely to occur across all regions, while others suggest that the country's southern climatic zone will experience smaller warming than the northern and north-central zones. A temperature rise of 1 °C is projected to increase the number of heatwaves by 100 to 180%, while the number of cold surges would decrease by 20 to 40%. Substantial increase is expected in the frequency of days and nights that are considered 'hot' under current climate, and decrease in the number of days and nights considered 'cold' under current climate.
Extreme Precipitation and Flooding	Current	Mean rainfall over Vietnam does not show any increase or decrease since 1960.The proportion of rainfall falling in heavy events has not changed significantly since 1960, nor has the maximum amount falling in 1-day or 5-day events. High year-to-year variation in rainfall across some regions of the country means that some areas that experience floods in rainy seasons can also experience drought in dry seasons. Intense rainfall associated with typhoons frequently causes immense destruction in heavily populated coastal areas as well as in the Red River and Mekong deltas, the country's major rice-growing areas. These deltas are also vulnerable to flooding caused by heavy monsoon rainfall.
	Future	Winter rainfall is expected to increase by 8% and summer rainfall by 1% by 2050. Autumn rainfall is projected to decline by 4% by 2050, while no change is projected for spring rainfall. The proportion of total rainfall that falls in heavy events is projected to increase by 2-14% by the 2090s, and the probability of extreme rainfall and flooding will increase, particularly in northern regions and cities such as Hanoi, with increased risk of landslides in mountainous areas. Projected increases in summer and winter rainfall, runoff, rainfall variability, and the proportion of rain falling in heavy events will have profound implications for flooding, both in coastal and deltaic areas as well as in hilly terrain, where flash floods and mudslides are a major risk. High inter-annual rainfall variability poses drought risk in many provinces at present. Projected increasing variability is likely to exacerbate drought risk.

[1]The Future time frame is based on changes projected to occur between the 1980-1999 average and a future average. This future average is most likely the 2040-2059 average (i.e., the default in the Climate Change Knowledge Portal - CCKP). Users can choose to select another time frame, or choose to use national/local data sets, but if so, this should be reflected in the notes section of the tool (and summarized in Annex 2). The CCKP draws on global, quality-controlled datasets and is continually updated as new data become available. In some cases, the CCKP is supplemented with other sources of information. For more detail on the data used in this step, please refer to the Data Annex. Climate Change Knowledge Portal (http://climateknowledgeportal.worldbank.org).

Hazard	Time Frame	Description of hazards for your location
Drought	Current	High year-to-year variation in rainfall across some regions of the country means that some areas that experience floods in rainy seasons can also experience drought in dry seasons.
	Future	High inter-annual rainfall variability poses drought risk in many provinces at present. Projected increasing variability is likely to exacerbate drought risk.
Strong Winds	Current	Exposed to strong winds associated with tropical cyclones
	Future	The maximum wind speed from tropical cyclones is expected to increase, but estimates are highly uncertain
Tsunami	Current	Coastal areas are slightly-moderately exposed to tsunamis

Insufficient Understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk

Please note that the colors shown in Table 2 are only for exposure at the project's location. Overall risk to project's outcome/service delivery, taking into account sensitivity of physical investments and adaptive capacity(non-physical components and development context), is depicted in Tables 3A and 3B.

2.3 Summary of Overall Project Risk

Tables 3A and 3B present the same results, with Table 3A highlighting the impact ratings on the project's component/subsectors, and the overall risk to the outcome/service level for both Historical/Current and Future time frames. Table 3B draws attention to how the climate impacts and risks shift from the Historical/Current to the Future time frame.

The ratings are derived on the basis of the hazard information, subject matter expertise, contextual understanding of the project, and modulated on the basis of adaptive capacity and the larger development context of the water sector and country. The results indicate what components are most at risk. The actual ratings themselves, while instructive, should inform further consultations, dialogue, and future planning processes. Keep in mind that the greatest value of the tool is that it provides a structured and systematic process for understanding climate and disaster risks.

2.3.1 Results Summary - by Component / Subsector

Table 3A provides a characterization of risks due to climate and geophysical hazard on project subsectors/components for both Historical/Current and Future time frames.

The results indicate where risks may exist within one or multiple components and where further work may be required to reduce or manage these climate and geophysical risks. An ongoing process of monitoring risks, refining climate and other information, and regular impact assessment may also be appropriate.

The potential impact on the key components/subsectors due to exposure from hazards is modulated by the project's non-physical components (enabling and capacity building activities). The right kind of capacity building measures could increase preparedness and longer-term resilience and reduced the risks. An understanding of larger sector and development context with respect to key modulating factors helps to assess the climate risks in terms of adaptive capacity. For example, in the water sector, access to water use monitoring technology and information may help reduce risks; while weak legal enforcement of water pricing policies may aggravate the risks.

Table 3A: Results Summary - by Component / Subsector

Potential Impact → Contribution of Adaptive Capacity to Impact → Project Risk

Sub-sector	Potential Impact		Non-Physical Components		Development Context: Water Sector		Development Context: Broader Context		Outcome / Service Delivery	
Time Frame	**Current**	**Future**	**Current**	**Future**	**Current**	**Future**	**Current**	**Future**	**Current**	**Future**
Dams & Reservoirs			Data gathering, monitoring, and information management systems: Slightly Reduces Impact Long-term strategic planning: Significantly Reduces Impact Capacity building, training, and outreach: Significantly Reduces Impact Overall: Significantly Reduces Impact		Slightly Reduces Impact		Prices (particularly food and energy): Significantly Reduces Impact Education: Slightly Reduces Impact Other ( ): Slightly Increases Impact Overall: Slightly Reduces Impact			

2.3.2 Results Summary by Time Frame

The results in Table 3B display the results by time frame. Potential impacts to the components are evaluated separately for the Historical/Current and Future time frames to capture changes in the exposure from climate hazards over time. For example, projections might indicate that temperature are likely to increase significantly, and the dry season may become longer. Both of these changes would affect wastewater quality concerns.

For investments with long operational lifetimes, such as physical infrastructure, considering future climate variability and change is critical to avoid "locking in" designs and features that are only suited to current climate. For example, treatment facilities can be inundated from sea level rise and storm surge or experience damage from earthquakes. Treatment plants might be more easily flooded, distribution pipes corroded and cracked, and pumping stations can fail from loss of pressure. These impacts may influence the success of the water supply investments.

Table 3B: Results Summary - by Time Frame

	Current					Future				
			Development Context					Development Context		
Subsector	**Potential Impact**	**Non-Physical Components**	**Water Sector**	**Broader Context**	**Outcome / Service Delivery**	**Potential Impact**	**Non-Physical Components**	**Water Sector**	**Broader Context**	**Outcome / Service Delivery**
Dams & Reservoirs		Data gathering, monitoring, and information management systems Slightly Reduces Impact Long-term strategic planning Significantly Reduces Impact Capacity building, training, and outreach Significantly Reduces Impact Overall Significantly Reduces Impact	Slightly Reduces Impact	Prices (particularly food and energy) Significantly Reduces Impact Education Slightly Reduces Impact Other ( ) Slightly Increases Impact Overall Slightly Reduces Impact			Data gathering, monitoring, and information management systems Slightly Reduces Impact Long-term strategic planning Significantly Reduces Impact Capacity building, training, and outreach Significantly Reduces Impact Overall Significantly Reduces Impact	Slightly Reduces Impact	Prices (particularly food and energy) Significantly Reduces Impact Education Slightly Reduces Impact Other ( ) Slightly Increases Impact Overall Slightly Reduces Impact	

Insufficient Understanding	Not Exposed No Potential Impact No Risk	Slightly Exposed Low Potential Impact Low Risk	Moderately Exposed Moderate Potential Impact Moderate Risk	Highly Exposed High Potential Impact High Risk

2.4 Key Drivers of Risks

Based on the results above, Table 4 highlights the key drivers of risk for each project component/subsector ratings, in terms of hazards that are likely to pose the greatest challenge.

The ratings for the potential impact for each component/subsector reflect the aggregate rating across multiple hazards, drawing on all of the exposure information and their own expert judgment. For example, high temperatures and drought can increase the demand for water, while greater rainfall may reduce demand from a dam or reservoir but also increase risk of flooding for downstream communities.

Specific consideration should be given to those hazards which have high ratings, or are moving from moderate to high ratings over time. For example, sea-level rise may not be a key risk driver in the Historical/Current time frame; but may emerge as a key driver across multiple sectors in the future time frame. Understanding which hazards are key drivers may help flag follow-on work to manage climate risks within the design and delivery of the project.

Table 4: Key Drivers of Risk

	Historical/Current Drivers	Future Drivers
Hazards and Location	Extreme Precipitation and Flooding Drought Strong Winds Tsunami	Extreme Temperature Strong Winds Extreme Precipitation and Flooding Drought
Physical Components	Dams & Reservoirs	Dams & Reservoirs
Outcome / Service Delivery	*	Dams & Reservoirs

Key: High Risk | Moderate Risk

* If a cell is blank it implies there is 'No high or moderate risks' identified for this aspect of the project.

- Overall, the Non-physical Components : **Significantly Reduces Impact**
- The Water Sector : **Slightly Reduces Impact**
- Overall, the Broader Development Context : **Slightly Reduces Impact**

3. Next Steps

By understanding which of your water project components is most at risk from climate change and other natural hazards on the basis of the screening, you can begin to take measures to avoid their impacts by:

- Enhancing the consideration of climate and disaster risks early in the design stage of the project.
- Using your risk screening analysis to inform follow-up feasibility studies and technical assessments.
- Encourage local stakeholder consultations and dialogues to enhance resilience measures and overall success of the project.

Table 5A provides some general guidance based on the risk ratings for the Outcome/Service Delivery, and Table 5B lists some climate risk management measures for your consideration. Visit the "Next steps" page of the tool on the website for guidance and a list of useful resources.

Note: Please recall that that this is a high-level due diligence tool, and the characterization of risks should be complemented with more detailed work.

Table 5A: General Guidance Based on Risk Ratings for Outcome/Service Delivery

Insufficient Understanding	Gather more information to improve your understanding of climate and geophysical hazards and their relationship to your project.
No Risk	If you are confident that climate and geophysical hazards pose no risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented.
Low Risk	If you are confident that climate and geophysical hazards pose low risk to the project, continue with project development. However, keep in mind that this is a high-level risk screening at an early stage of project development. Therefore, you are encouraged to monitor the level of climate and geophysical risks to the project as it is developed and implemented. You may also consider gathering additional information to increase your level of confidence in your rating.
Moderate Risk	For areas of Moderate Risk, you are encouraged to build on this screening through additional studies, consultation, and dialogue. This initial screening may be supplemented with a more detailed risk assessment to better understand the nature of the risk to the project.
High Risk	For areas of High Risk, you are strongly encouraged to conduct a more detailed risk assessment and to explore measures to manage or reduce those risks.

Table 5B: Types of Climate Risk Management Measures for typical Water Projects

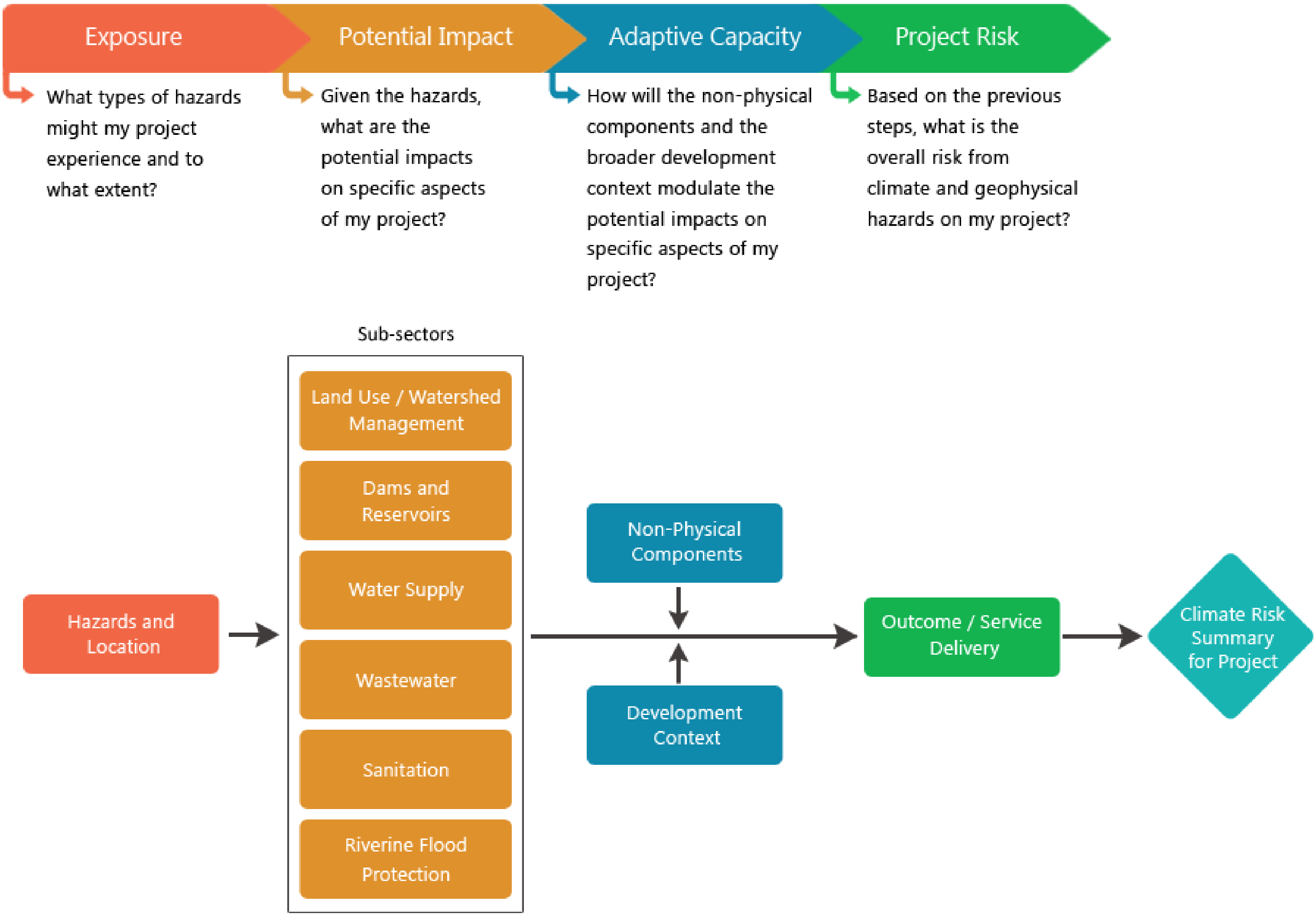
CATEGORY	PROS	CONS	EXAMPLES
Accommodate and Manage	• Flexible • Typically low-cost • Useful when risk is low, but projected to rise in the future	• Temporary solution • Can be insufficient in preventing losses	• Increasing repair and maintenance budgets • Implementing demand-side management programs
Protect and Harden	• Can be used for existing and new assets • Responds to immediate risks	• High cost • Inflexible • Effectiveness may decrease over time	• Expanding capacity of treatment plants • Building flood protection structures around key facilities
Retreat and Relocate	• Long-term solution • Responds to immediate risk	• High cost • Inflexible	• Moving infrastructure further inland

Annex 1: Tool Approach

Tool Approach

The framework below describes the approach taken to screen the project. Climate and natural hazards information used to screen the project is most likely obtained from the World Bank's Climate Change Knowledge Portal, which houses numerous global data sets with historical records and future projections as well as country-specific adaptation profiles.

Figure A1: Project Level Climate and Disaster Risk Screening Tool: Approach for Water projects



Annex 2: Notes

Table A2-1 summarizes the sub-national locations of high risk noted during the assessment, if the user entered these sub-national locations. Table A2-2 summarizes all the notes entered by user for each section while completing the assessment, if the user elected to enter notes. These notes can help shed light on specific ratings as well as considerations and limitations of the user's expertise.

Table A2-2 Summary of Comments by Section

Section		Notes
Hazards and Location	Extreme Temperature	An estimated 1-1.3 million people are estimated to be drought-affected in 9 provinces of the Mekong region of Vienam, representing 13-17% of the total population.
	Extreme Precipitation and Flooding	Given its high exposure to floods and storms, and the fact that two of its most important economic sectors – industry and agriculture – are located in coastal lowlands and deltas – Vietnam has been listed by the World Bank as one of the five countries that will be worst-affected by climate change.
Non-physical Components	Data gathering, monitoring, and information management systems	Project includes hydrological observation network and information systems
	Long-term strategic planning	It also includes the following related to planning, policy development, and safety: 1) integrated development planning and operational coordination mechanisms between irrigation and hydropower reservoirs; 2) regulatory and institutional support and strengthening on coordination mechanisms including national dam policy on registration, regulation, inspection, safety compliance and penalties; and 3) technical specifications, safety standards and regulations to internationally-accepted levels
	Capacity building, training, and outreach	The project has a significant focus on capacity enhancement, basin-wide integrated dam reservoir operation plans, emergency preparedness plan including dam break analysis, downstream flood mapping and benchmarking, awareness raising and evacuation drills for local communities living downstream; which also touches on improved emergency preparedness.
	Non-physical Components Overall	Combined, these features will reduce the anticipated potential impacts from climate change.
Social, Economic and Political Factors	Prices (particularly food and energy)	Vietnam has been ranked as one of the best-performing economies in the world over the past decade. Its economy has proven resilient to economic and other shocks; real GDP grew by an average of 7.3% per year over 1995-2005; the share of industry rose from 29% to 41% of GDP over the same period; and per capita income rose from US$ 260 in 1995 to US$ 835 in 2007.
	Education	Vietnam has made rapid progress in achieving several of the targets of the Millennium Development Goals, although poverty reduction is progressing at a slower pace for the country's ethnic minorities.
	Other ( )	Geographic concentration of assets: Given that a high proportion of the country's population and economic assets (including irrigated agriculture) are located in coastal lowlands and deltas, Vietnam has been ranked among the five countries likely to be most affected by climate change.