

The cost of climate change in Vietnam

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KEY FINDINGS

- Over the period 2007–50 climate change is predicted to cause Vietnam’s annual GDP growth rate to fall between 0.02 and 0.10 percentage points.
- While small relative to GDP, absolute loss levels due to climate change are significant at between US\$6-15\$ billion (in present value terms using a discount rate of 5 per cent), and these losses are likely to be concentrated in certain sectors and population groups.
- When considering only changes in temperature, and precipitation climate change has a fairly small impact on agriculture.
- Vietnam’s total hydropower generating capacity may only be mildly affected by changes in climatic conditions. However, estimates of the reliability of hydropower generation to meet annual demand vary considerably.
- Damage to roads caused by precipitation, temperature and flooding fall between US\$4 billion and US\$9 billion and damages due to sea level rises could amount to over US\$2 billion.
- Even relatively mild levels of sea level rise (35 centimeters) substantially increase the expected costs of a cyclone strike.
- Beyond the 2050 time horizon, Vietnam’s vulnerability is likely to increase dramatically most obviously due to the threat posed by sea level rise (combined with cyclone strike) to the concentrations of economic activity in the Mekong and Red River deltas.

Three of Vietnam’s characteristics make it particularly vulnerable to man-made climate change. First, Vietnam’s economy is highly dependent on agriculture, and climate change may negatively impact farm revenues. Second, the country is located at the end of several trans-boundary river basins, and climate change may influence river flow in undesirable ways either through changes in precipitation/runoff patterns or by altering the behavior of upstream countries. Third, Vietnam’s low lying coastline is vulnerable to rising sea levels, which when combined with increased storm-surges, may lead to further population displacement and significant infrastructure damage.

It is predicted that Vietnam’s temperature will rise 1.5 °C above a historical baseline by the 2040s and the country is expected to become slightly more arid as a result of climate change. To understand the total cost of climate change it is important to consider the cumulative effects of the different ways in which it will impact different sectors of the economy. Agriculture, transport, and hydropower generation are all likely to be affected by a change in temperature and precipitation, and, sea level rises (SLRs) and an increase in the damage caused by cyclones may have further adverse impacts on these sectors.

UNU-WIDER research project ‘[Development under Climate Change](#)’ estimates the total cost of climate change by adopting a multi-sectoral approach and considering the full range of climate projections over the period 2007–50, and compare the reasonable baseline trajectory for growth and structural change.

Agriculture

When considering only changes in temperature and precipitation climate change has a fairly small impact on agriculture. The impact is modest for two reasons. First, the projected temperature and precipitation changes to 2050 are not sufficiently large to substantially reduce yields on average. Second, and importantly, agriculture is expected to decline as a share of Vietnam’s economy regardless of any effects of climate change. As agriculture becomes less significant, so do variations or reductions in agricultural output.



Transport

In contrast to agriculture where climate variation may influence production in a given year but not necessarily over time, the impact of climate change on roads will be cumulative in nature and consequently may be relatively large. If a road is washed away, not only is the initial

investment lost, but the negative effect on infrastructure remains until the road is rebuilt, and rebuilding roads diverts money away from the construction of new roads. Therefore, climate change will reduce the rate at which new road stock is accumulated which in turn slows the rate of productivity growth. The majority of road damage estimates for the period 2007–50 fall between US\$4 billion and US\$9 billion. UNU-WIDER research indicates that it is more cost effective to adapt roads to climate change now, that is, seal unpaved roads and make them more precipitation- and flood-resistant.

Hydropower

The consequences of climate change in terms of changing rainfall patterns and higher evapotranspiration in combination with higher demand from farmers for irrigation water could reduce the flow volumes in Vietnam’s rivers. Climate change is particularly expected to reduce runoff in northern regions such as the densely populated Red River basin.

Vietnam’s hydropower generation capacity is predicted to decrease only slightly by 2041–50. After current projects are completed, Vietnam expects to have a total annual hydroelectricity capacity of about 42.76 terawatt hours, but estimates of the reliability of hydropower generation to meet this annual demand vary considerably.

Sea level rises

The impacts of SLRs shift the distribution of GDP outcomes downward across all scenarios. Between 18 and 38 centimeters of SLR are expected by 2050. The two main drivers of losses from SLR are loss of agricultural land and loss of road infrastructure. More SLR implies more losses. In particular in regions, such as the Red River delta area a significant portion of land could become permanently inundated and the economic cost of SLRs could be as high as 10.9 per cent of GDP. Over the country as a whole rising sea levels could result in losses of the equivalent of 2 per cent of Vietnam’s GDP.

Cyclones

The best available current assumption is that the frequency and intensity of cyclones will not change due to climate change, at least out to 2050. As a result, the climate change

related impact of cyclones is restricted to the interaction with SLRs. As sea level rises, the storm surge associated with cyclones will reach much further inland and be more powerful thus causing greater capital damage. A direct cyclone strike in an area of concentrated economic activity (such as the Mekong or Red River deltas) combined with the upper range of SLR (38 centimeters by 2050) could cause considerable damage, particularly if the cyclone is powerful.

The total cost of climate change

As growth is a cumulative process, the reductions in GDP levels as a result of climate change translate into small reductions in average annual GDP growth rates over the simulation period. When including all the studied effects of climate change, the average annual GDP growth rate is reduced by between 0.02 and 0.10 percentage points. In other words, if the expected average baseline growth rate without climate change is 5.4 per cent per annum, then the growth rate would be expected to be between 5.30 and 5.38 percentage points.

All else being equal Vietnam’s GDP is expected to exceed US\$500 billion by 2050, which means that the losses caused by climate change are large in absolute terms. GDP losses are grouped within the range of US\$6–15 billion in present value terms. These losses provide clear incentives for adaptation policies designed to reduce climate change damages. Moreover, the findings suggest that there is a window of opportunity for Vietnam to benefit from pre-emptive action.



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IMPLICATIONS

- Climate change is unlikely to substantially impact overall growth and development prospects for at least the next few decades.
- The findings suggest that there is a window of opportunity for Vietnam to benefit from pre-emptive action.
- Even under current climate, upgrading unpaved roads to better withstand precipitation is likely to be more cost-effective over the long-term than not upgrading roads and repairing damages as they occur. With climate change, these benefits are likely to increase.
- Carefully chosen adaptation policies in other areas such as agriculture, water resources, and urban infrastructure design are likely to provide significant benefits.
- Vietnam faces difficult choices in confronting the longer run threat posed by sea level rise to economic activity in low lying zones, particularly the river deltas.

This research brief is based on a case study spanning four papers on Vietnam undertaken as part of the UNU-WIDER research project ‘Development under Climate Change’

