DFID Department for International Development

Socio-Economic Impacts of Climate Change in Afghanistan

Executive Summary

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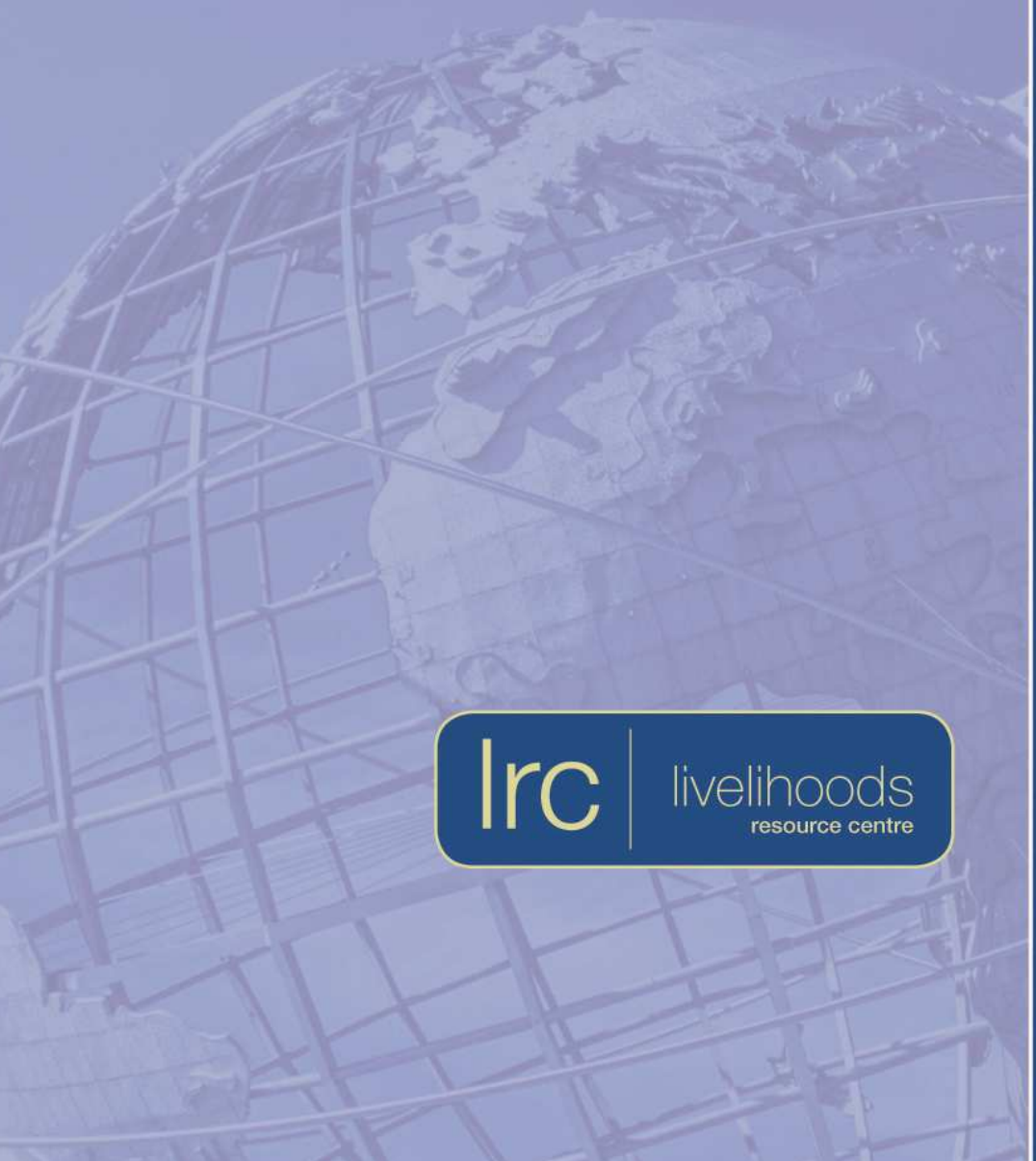

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Socio-Economic Impacts of Climate Change in Afghanistan

A Report to the Department of International Development by

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Executive Summary

Overview

- This summary provides the key findings of a DFID funded scoping study on the socio-economic impacts of climate change in Afghanistan. The report has been written to feed into the National Adaptation Programme of Action (NAPA) process managed by the Afghan National Environmental Protection Agency (NEPA) and UNEP. It presents a concise analysis for policy markers and key constituencies within Afghanistan looking to integrate climate change into development planning.
- The main body of the report sets out the results of climate modelling work recently undertaken in the UK by the University of Oxford and Tyndall Centre for DFID and UNDP. It assesses these potential climatic risks and their implications for three policy areas: Agriculture, Social Protection and Energy & Water. The report then reviews the suitability of current government policy frameworks to address such challenges in terms of mitigation and adaptation and sets out an approach to incorporate climate risk management and adaptation into development policy formulation.
- Afghanistan presents a number of specific challenges in terms of climate change assessment. Climate projections for Afghanistan require significant refinement due to the lack of availability of reliable historic meteorological records. Complex topography in Afghanistan also means that local variations in response to global warming, particularly precipitation, are likely to be large and many areas may vary from the regional trends. In addition, sporadic and poor quality socio-economic data make econometric modelling or robust cost/benefit analysis of adaptation and mitigation policy nearly impossible. Poor national security also restricts the ability to undertake structured fieldwork to assess potential mitigation and adaptation options.

Current Climatic Trends

- Afghanistan is a mountainous and very dry country located in the arid sub‐tropics at 9‐37° north of the equator. Afghanistan has an arid and semi-arid continental climate with cold winters and hot summers. The lowland plains in the south of Afghanistan experience extreme seasonal variations in temperature, with average summer (JJA)[1] temperatures exceeding 33°C and mean winter (DJF) temperatures of around 10°C. Much of the country is at very high altitude and experiences much lower temperatures all year round, with average summer temperatures not exceeding 15°C, and winter temperatures below zero in the highest regions.
- Afghanistan is currently suffering the most severe drought in living memory. The country is characterised by large areas with little to no precipitation; that which does occur falls mostly as snow on high mountains from winter storms (of Mediterranean origin) between November and April with peaks in February/March. The snow season varies considerably with elevation. The Asian summer monsoon system helps to keep rainfall low over Afghanistan. Dust storms are a significant part of the climate system associated with northerly winds in warm months.
- Despite the absence of good long term climatic records, available data and trends from neighbouring countries indicate that mean annual temperature has increased by 0.6°C since 1960, at an average rate of around 0.13°C per decade. Increases have been most pronounced during the autumn (SON), with increases at an average rate of 0.29°C per decade and a significant increase in the number of exceptionally hot days and nights.

[1] Climate modeling tends to divide the year into 4 temporal divisions. For the purposes of this report the following seasonal breakdown is used MAM – March April May (Spring); JJA – June, July, August (Summer); SON – September, October, November (Autumn); DJF – December, January, February (Winter). Climate Projections taken from modelling undertaken by the University of Oxford for UNDP and DFID in 2008.

- Changes in precipitation regimes tend to vary more between regions than temperature. Mean rainfall over Afghanistan has decreased slightly (at an average rate of 0.5mm per month (or 2 percent per decade) since 1960. This is mainly due to decreases of around 2.7mm per month (6.6 percent per decade) in spring (MAM) rainfall. The proportion of rainfall that occurs in heavy events has not changed with any consistent trend since 1960.

Climate Projections

Changes in Temperature

- Current models indicate significant warming across all regions of Afghanistan with average predicted increases in temperature of between 2C and 6.2C by 2090s dependent on global emissions scenarios. Warming is most rapid in spring/summer with this trend being marked in the north and the central plains of Afghanistan. These increases are also consistent with the broad regional observed temperature trends in Central Asia. All projections indicate substantial increases in the frequency of days and nights that are considered 'hot' in current climate, especially during summer months.
- Up to 2030s, the amount of warming is not sensitive to global emission scenarios. The mean annual temperature is projected to increase by 1.4 to 4.0°C by the 2060s, compared to 1970-1999 averages.
- By 2090, the range of projections by the 2090s under any one emissions scenario is around 1.5 to 2.5°C. The range of potential annual temperature increases is noticeably influenced by global emission scenarios.

Figure 1: Change in temperature to 2100 under 3 emissions scenarios (vs. 1970-99 average)

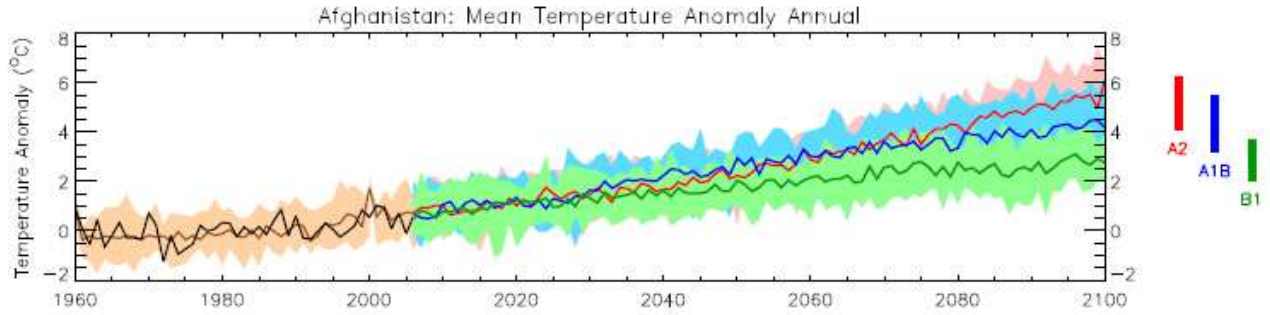
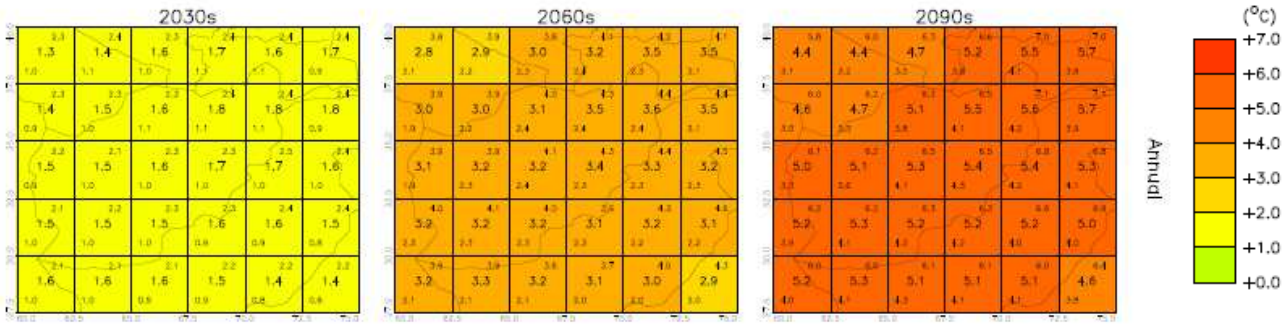


Figure 2: Spatial projections for temperature change under SRES A2 scenario (2030, 2060, 2090)



Changes in Precipitation

- In the short term, average rainfall is projected to show a small increase, although by little more than about 10-20mm. Mean annual rainfall changes in the 2090s show conditions are generally drier (-40 mm high, -20 mm medium, -10 mm low) over much of Afghanistan. Much of the drying is due to decreases in spring rainfall (MAM). Winters are expected to be significantly drier in the South. Projections of mean annual rainfall from different models are broadly consistent in indicating decreases.

Figure 3: Change in temperature to 2100 under 3 emissions scenarios (vs. 1970-99 average)

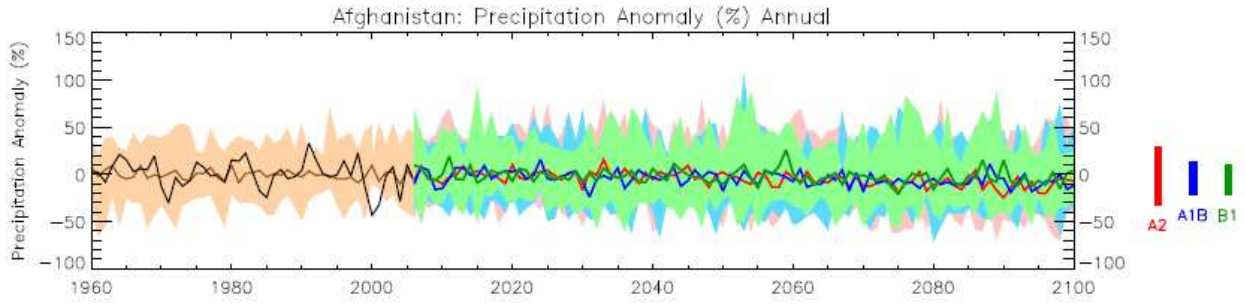
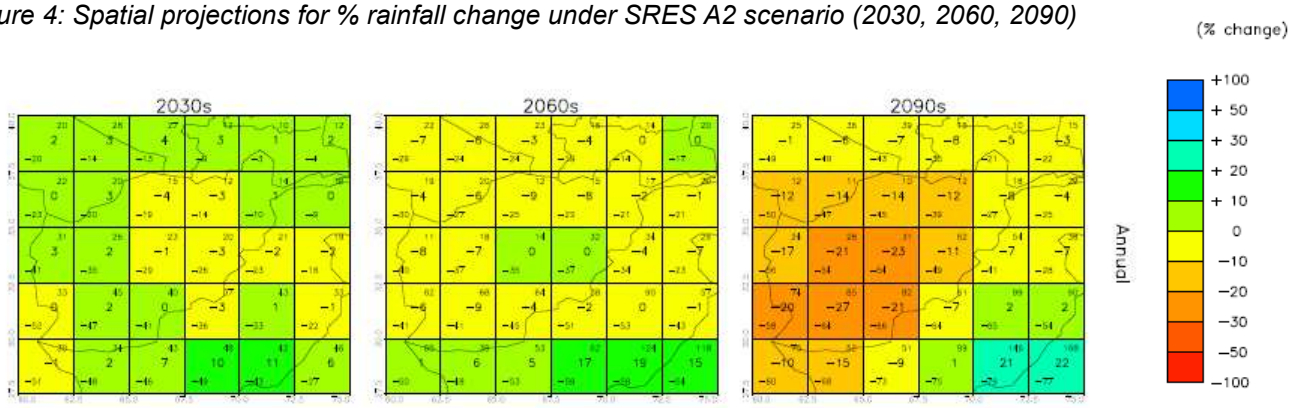


Figure 4: Spatial projections for % rainfall change under SRES A2 scenario (2030, 2060, 2090)

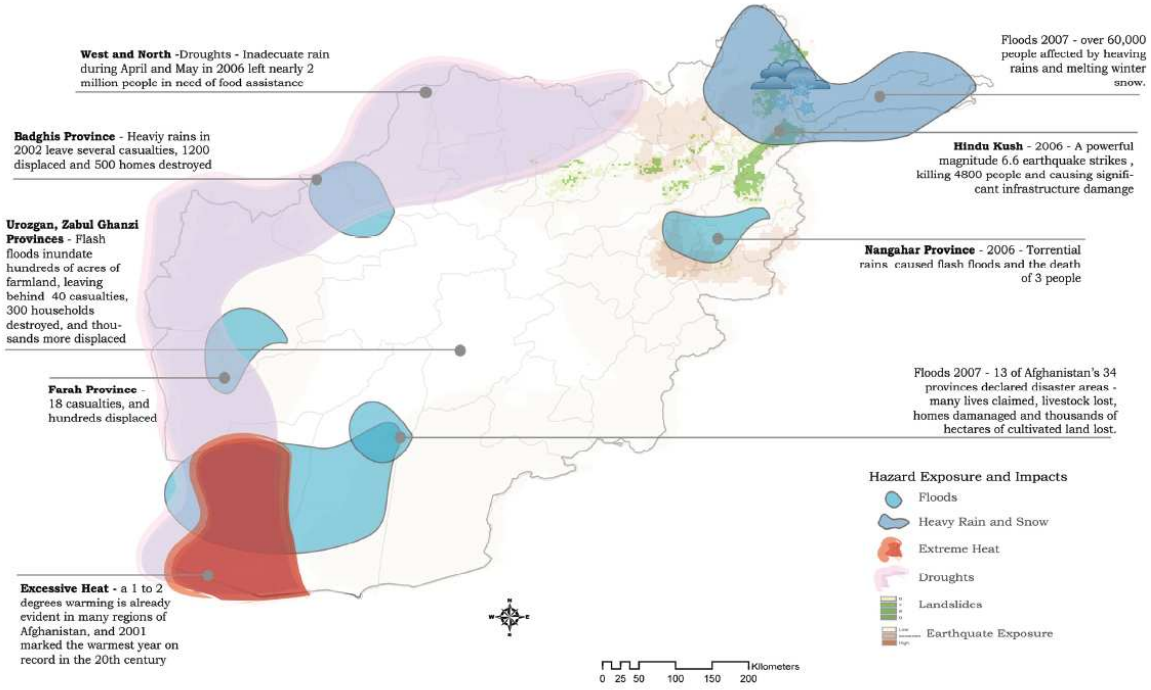


Climatic Hazards

The climate models suggest that Afghanistan will be confronted by a range of new and increased climatic hazards. The most likely adverse impacts of climate change in Afghanistan are drought related, including associated dynamics of desertification and land degradation. Drought is likely to be regarded as the norm by 2030, rather than as a temporary or cyclical event.

Floods due to untimely rainfall and a general increase in temperature are of secondary importance. However, their impacts may by amplified due to more rapid spring snow melt as a result of higher temperatures, combined with the downstream effects of land degradation, loss of vegetative cover and land mismanagement. Nearly all of Afghanistan's 34 provinces have been hit with one or more natural disasters, including flooding, landslides, drought, and extreme heat and freezing weather as shown in figure 5.

Figure 5: Recent Climatic Hazards in Afghanistan (SEI)



Sectoral Impacts of Climate Change

The worsening climatic conditions in Afghanistan will continue to impact upon socio-economic development of Afghanistan, creating stresses for specific vulnerable groups. Agriculture and water resources management are likely to be severely impacted by changes in climate.

Agriculture: The vulnerability of the agricultural sector to increased temperatures and changes in rainfall patterns and snow melt is high. Increased soil evaporation, reduced river flow from earlier snow melt, and less frequent rain during peak cultivation seasons will impact upon agricultural productivity and crop choice availability. Crop failure levels due to water shortages and the amount of potentially productive land left uncultivated will likely increase. More water intensive staple crops will become less attractive to farmers, with a likely increase in the attractiveness of those that are more drought hardy, including opium poppy. By 2060, large parts of the agricultural economy are likely to have become marginal without significant investment in water management and irrigation. The existing irrigation system is operating at a low efficiency rate of about 25 percent, which indicates that there is considerable scope for reducing wastage of water.

Social Development: The poor are most vulnerable to the effects of climate change in Afghanistan. Climate change is likely to compound existing food security issues and impact heavily upon those dependent on the agricultural economy. The distributional effects are more likely to fall upon women and children, and upon those involved in subsistence agriculture or pastoralism. A large proportion of the Afghan population live just above the poverty line, climatic shocks have the potential to tip a large percentage of population into poverty. Impacts on human health, such as increased prevalence of disease affect the amount of labour available for agriculture and other non-farm rural economic activities. The effects of environmental degradation and lower agricultural output reduce the availability of animal feed, and the funds available for livestock husbandry. Climate change will undermine Afghanistan's ability to achieve its goals in reducing malaria morbidity and mortality by 50%-80% within 5 years.

Water Resources: Uncoordinated water management policies can reduce adaptive capacity and increase vulnerability. The cumulative effects of more frequent and intense droughts on reservoirs and groundwater could threaten the water supply of entire communities in the most arid regions of Afghanistan, leading to a range of humanitarian crises, including disease, population displacement and conflict. Rises in winter and spring temperatures will lead to more rapid and earlier snow melt, creating risk of flash flooding. The impact of increasingly frequent flash floods is exacerbated by drought, which has the effect of hardening soils and reducing their permeability. The lack of water availability will

increase pressure on Afghanistan and surrounding states to claim the greatest possible share of regional water sources in the longer term. Water disputes have plagued the central Asian region for years and will likely continue if climate change increases water scarcity in the region. Efforts by Afghanistan to increase its share of water use in the region may have regional implications.

Energy: From a mitigation perspective, greenhouse gas emissions in absolute and per capita terms are extremely low in Afghanistan (0.5 tons Co2e) and mitigation is not a short term priority, especially given that a significant proportion of electricity is generated from both indigenous and imported low-carbon hydropower. Climatic impacts are most likely to be felt in hydro-electricity production, although large thermal power plant and transmission infrastructure are also susceptible to flash flooding and heat stress. Changes in precipitation, ice pack and snow melt patterns, combined with climate change-related land use change (devegetation and increased irrigation) can impact upon the variability and availability of water flow. Smaller hydropower plants (SHP) are particularly vulnerable. Monthly discharge at many lowland hydro plants is already declining, partly due to increased competition for water use from upstream irrigation. Expected impacts of climate change are likely to result in stronger flow peaks in winter (due to higher precipitation and earlier snow melt/deglaciation), and less flow in summer, due to lower precipitation, higher evaporation rates and irrigation draw off.

Suitability of Existing Policy Frameworks

At present, climate change is not a consideration into the national or sectoral plans of the Government of Afghanistan (GoA), despite it presenting a significant threat to cross sectoral development. The phrase 'climate change' is not mentioned in the 2008 version of the ANDS. There are however a number of programmatic activities that might be classified as adaptive in a climate change context.

While sectoral plans do provide for programmatic activities that address existing climate change stresses, they do not provide a strategy for dealing with their increased severity and frequency. Nowhere are these stresses analysed in the context of a larger process. It is unlikely that existing programs are sufficient in scope and scale to meet the challenges indicated by the climate scenarios.

Recommendations

Further work should be undertaken to improve the resolution and accuracy of regional climate models. In particular, work should be undertaken on cleaning and refining available historic climate data to strengthen the ability to downscale projections to Afghanistan's complex topography. To this extent, work should be undertaken through NEPA to build local modelling capacity with links established to international centres of excellence, such as the Hadley Centre in the UK.

Ministries need to improve the 'climate awareness and resilience' of their development strategies. This will require the application of risk screening within individual sectors. Improved coordination between Ministries will also be required to meet the cross-sectoral challenges of climate change, especially in terms of linkages between water, agriculture and livelihoods. This should be done through the development of a strategic plan that identifies and targets major agricultural, water, protection and rehabilitation projects both ongoing and planned and places then within a high level adaptation strategy.

While mainstream climate change in development planning is important, the adaptation challenges facing Afghanistan are very significant in scope and scale. External investment and technical support will be required if these challenges are to be met. The GoA should therefore begin to create costed adaptation investment planning scenarios as a first step towards applying to potential climate adaptation funding mechanisms currently under development by the international community.

Government experts should continue to engage with wider regional planning and development bodies to ensure that best practice climate assessments, adaptation approaches and low carbon development strategies developed elsewhere in Central and South Asia can be applied in Afghanistan.

From a mitigation perspective, encouraging low carbon growth may be a sensible in the medium term and the renewables strategy of the Ministry of Energy and Water (MoEW) is welcome, but climate change considerations should not preclude exploitation of domestic fossil fuel resources to meet demand for power access. Developmental impact should take precedence over emissions considerations in order to build adaptive capacity. The limited reach of regional grids mean that smaller scale off grid renewable energy technologies, such as small hydro, solar PV, solar thermal and wind can play a specific development role in providing access to energy.