

Afghanistan Public Policy Research Organization



Climate Change and Food Security in Afghanistan: Evidence from Balkh, Herat, and Nangarhar

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About APPRO

Afghanistan Public Policy Research Organization (APPRO) is an independent social research organization promoting social and policy learning to benefit development and reconstruction efforts in Afghanistan. APPRO is a non-profit, non-government organization, headquartered in Kabul, Afghanistan with satellite offices in Mazar-e Sharif, Jalalabad, Kandahar, and Herat. APPRO's mission is to measure development progress against strategic reconstruction objectives to provide insights on how to improve performance against the development milestones set by the Afghan government and international donors. APPRO conducts applied research, carries out evaluations, and provides training on policy analysis, research methods, Monitoring and Evaluations, advocacy, and research methods.

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Glossary

ADB	Asian Development Bank
ANDMA	Afghanistan National Disaster Management Authority
ANDS	Afghanistan National Development Strategy
APPRO	Afghanistan Public Policy Research Organization
CC	Climate Change
CDC	Community Development Council
CHA	Coordination for Humanitarian Assistance
CRS	Catholic Relief Services
CSO	Central Statistics Office
DACAAR	Danish Committee for Aid to Afghan Refugees
EC	European Commission
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FEWSNET	USAID Famine Early Warning System
FS	Food Security
GAIN	The Greening of Afghanistan Initiative
GEF	Global Environmental Facility
GMOs	Genetically Modified Organisms
HLP	Horticulture and Livestock Project
ICARDA	International Center for Agriculture Research in the Dry Areas
INGO	International Nongovernmental Organization
IPCC	Intergovernmental Panel on Climate Change
MAIL	Ministry of Agriculture, Irrigation and Livestock
MEDA	Mennonite Economic Development Associates
MoWA	Ministry of Women's Affairs
MoWE	Ministry of Water and Energy
MRRD	Ministry of Rural Rehabilitation and Development
NAPA	National Adaptation Programme of Action
NCSA	National Capacity Self-Assessment
NEPA	National Environmental Protection Agency
NERAP	National Emergency Rural Access Program
NGO	Non-governmental Organization
NRVA	National Risk and Vulnerability Assessment
NSP	National Solidarity Program
UN	United Nations
UNEP	United Nations Environment Programme
USAID	United States Agency for International Development
WB	World Bank
WFP	United Nations World Food Programme
WMO	World Meteorological Organization

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Introduction

South Asia is home to nearly 40 per cent of the world's poor population. Numerous countries in the region have been politically turbulent for a number of years while suffering from the highest prevalence of malnutrition across all age categories. These vulnerabilities are compounded by the adverse impacts of climate change, which appear to have altered generations-old modes of existence based on rain-fed and irrigated agriculture. Examples of falling water tables, persistent droughts, and heavy unseasonal rainfalls causing floods have been very common in the last 10 to 15 years. Impoverished rural households whose livelihoods depend on climate sensitive agriculture are likely to be disproportionately affected by the expected persistence of climate change. South Asian countries suffer from an exceptionally high number of natural climatic disasters, likely to intensify with climate change.¹

Afghanistan is particularly vulnerable to falling crop yields caused by glacier retreat, floods, droughts, erratic rainfall and other climate change impacts.² While the impacts of climate change will be evident everywhere around the world, the poorest countries such as Afghanistan are likely to be most adversely affected due to inadequate infrastructure, instability – disallowing national efforts in mitigation – and lack resources to mobilize against the adverse impacts of climate change on livelihoods.

This report takes stock of the main climate change and food security related issues of Afghanistan, measures taken by various national and international actors to address them, the impact of these measures on selected communities, and the challenges that remain to be addressed through new programming by the Government of Afghanistan and its international donors.

Objectives and Methodology

This study was carried out to meet the following objectives:

- Investigate the manner in which socio-economic, political, and climate change-related factors affect rural livelihoods and food security as observed through food availability, access to food, and food distribution
- Provide an overview on the main global and regional drivers of food security
- Analyze data from secondary (reports and other documents) and primary (interviews and focus group discussions) sources to generate recommendations for future programming on food security and climate change in Afghanistan

¹ World Bank (2009). Afghanistan Country Overview, The World Bank. Available at: <http://www.worldbank.org.af/WBSITE/EXTERNAL/COUNTRIES/SOUTHASIAEXT/AFGHANISTANEXTN/0,,contentMDK:20154015~menuPK:305992~pagePK:141137~piPK:141127~theSitePK:305985,00.html>

² ADB (2009) "Addressing Climate Change in the Asia and Pacific Region: Building Climate Resilience in the Agriculture Sector", available from: <http://agricoop.nic.in/Climatechange/ccr/UN,%20FAO,%20ADB%20Reports/Building-Climate-Resilience-Agriculture-Sector-ADB%20Reports.pdf>

To meet the above objectives the following tasks were undertaken:

- A review of reports and programs by national and international agencies on climate change, food security, and agricultural development
- A series of semi-formal interviews with key informants in Kabul and the sites of study (Balkh, Herat, and Nangarhar), and
- A series of focus group discussions involving rural households at the study sites.

The data from primary and secondary sources were analyzed to generate the findings and the recommendations for this report. The selection of the study sites was based on identifying particularly hard-hit rural communities in the three provinces of Balkh, Herat, and Nangarhar. Also taken into consideration in this selection were security of the sites and physical access by the researchers. (See Appendix for site profiles).

The primary data was collected from December 2009 through to February 2010, with further updates in late 2013. There were 23 semi-formal interviews with key informants in Kabul (5), Balkh (6), Herat (6), and Nangarhar (4). On each site focus group meetings were held with one male CDC, one female CDC, one randomly selected group of male farmers, and one randomly selected group of female members of farmer households.

The selection of districts in the three provinces of Balkh, Kandahar, and Nangarhar for this study was carried out using the following criteria:

1. Lack or shortage of irrigation systems and dependence of farmers on rainfall for agriculture and livestock husbandry
2. A history of being affected by climate change, e. g. more and longer droughts, loss of vegetation cover, lower groundwater table, increased number of floods and the impact of these events socially, economically, culturally, and politically
3. Potential security risks faced by the field research team

Due to the insufficiency and unreliability of the available information on individual districts in the three provinces, expert opinions were sought from three independent sources: 1) FAO's senior officials and experts, 2) senior officials from provincial directorates of the Ministry of Agriculture, Irrigation, and Livestock, and 3) APPRO's local contacts. Each of the districts was proposed by at least two out of three of the abovementioned sources whose suggestions were carefully considered in the final selection.

Limitations

This study was undertaken to take stock of the available data from secondary sources with evidence from a limited number of sites in three provinces of Afghanistan. Although the study reveals much about the mechanisms through which climate change affects rural areas, it falls short of being statistically representative despite providing a reasonably sound basis on which to make recommendations for policy and further policy-relevant research.

A major, broader, limitation for studying the impacts of climate change in Afghanistan is the lack of detailed, community-level studies and reports. The available secondary data and reports are presented as "national" studies with little or no analysis of the micro (household level) and meso (community level) dynamics of the coping mechanisms utilized in response to climate change-driven changes in food security.

Another important limiting factor in conducting this type of research in Afghanistan is unfavorable and increasingly worsening security conditions. While many villages in southern and eastern Afghanistan are insecure, an increasing number of villages in the north and west are also experiencing instability and growing conflict arising from political disagreements and criminal activity.

Food Insecurity in Afghanistan

Afghanistan's population is estimated at between 26-30 million. The average mortality age is between 42-47 years. The Gross Domestic Product of US\$11.6 billion is made up largely of the development and reconstruction funds that have been coming into the country since the fall of the Taliban in late 2001. Unemployment is estimated at around 40 percent while the total number of food insecure people has been estimated as 4.9 million people, or 19 percent of the population. With children up to the age of 5 years accounting for an estimated account for 21 percent of the population, this means that there are at least 1.5 million food insecure children with insufficient and inadequate daily protein and calorie intakes.³ There are 5.2 million food insecure people living in rural areas where 72 percent of the population resides - excluding the 5 percent Kuchi population. (Table 1).

Table 1: Food Insecurity in Afghanistan

Residence	Food-security status							
	Very severely food insecure		Severely food insecure		Moderately food insecure		Total food insecure	
	1,000s	Perc.	1,000s	Perc.	1,000s	Perc.	1,000s	Perc.
North	221	6.2	327	9.2	491	13.8	1,039	29.1
North-East	684	18.3	561	15	466	12.5	1,711	45.8
Central Highland	426	15.2	301	10.8	352	12.6	1,080	38.5
Central	305	4.6	529	8.1	752	11.5	1,587	24.2
South	40	4.1	57	5.8	135	13.8	232	23.7
East	155	5.5	209	7.4	308	11	672	23.9
West	185	6.1	213	7	326	10.7	724	23.8
South-West	135	7.2	201	10.8	264	14.1	599	32.1
National	2,152	8.5	2,397	9.5	3,095	12.2	7,645	30.1

Source: CSO (2014)⁴

In much of the water-scarce agricultural land in Afghanistan farming has always been difficult. The difference between the past and present is increased fluctuations in weather patterns as far as temperatures and rainfall as well as a general warming which has occurred in most of the last 20 to 30 years. This already critical situation has been exacerbated by social and political turmoil during the same period.

³ Food Insecure is defined as "not meeting the daily protein requirement of at least 50 grams per person per day from the available food basket." CSO (2014), Food Security (Chapter 7), Pages 58-59, available from: <http://cso.gov.af/Content/files/Chapter7%20FOOD%20SECURITY.pdf>

⁴ CSO (2014).

Daily dietary components for most rural households consist of mainly carbohydrates such as rice, potatoes, pulses, wheat, and vegetable or animal fat used with onions and garlic to prepare. When in season, this dietary base is supplemented with vegetables such as spinach, tomatoes, and eggplants. Families that raise chicken add eggs to their diet. Except for special occasions poorer families consume very little meat due to scarcity and the prohibitive cost.⁵ Poorer families often have bread and sweetened tea for most of their meals. Subsistence farming for basic foods such as wheat is dependent on rainfall or access to water. In years with inadequate access to water wheat, along with other necessities, needs to be purchased in the market. However, without income from sources other than the meager agricultural produce in good years, the foodstuffs available on the market are unaffordable for the vast majority of the poorer rural households.

Climate Change and Agriculture

There is a broad consensus that the Earth's climate patterns are changing though there are serious disagreements as to the causes of these changes. Emissions of greenhouse gases such as carbon dioxide (CO₂) are pointed to by many as the primary cause of climate change while others contend that climate change occurs independent of human activity and is due to the Earth's own climatic cycles.⁶ There is broad agreement, however, that the bulk of the changes resulting from global climate change are, and will be, adverse in nature, particularly in the global south.

Observed effects of climate change have been documented in the Intergovernmental Panel on Climate Change (IPCC) assessment reports. There are extensive examples of receding mountain glaciers and ice caps, breaking off and floating of ice shelves and continental ice sheets, reduced seasonal snow cover on land, and thawing of the tundra due to enhanced warming.⁷ These changes have resulted in shifts in plant and animal ranges pole-ward and on higher elevations, reductions and increases within population sizes of some animals and plants, changes in life cycle events such as blooming, migration and insect emergence, spread of new diseases from historically warmer zones to colder zones, and changes in species at different speeds and different directions causing a decoupling of inter-species interactions such as predator-prey relationships.

In IPCC's Fourth Assessment Report cites a number of changes in socio-economic systems as being partially related to climate change. Examples include higher instances of drought related to persistently low rainfall patterns in the Sahelian region of Africa and increased precipitation extremes and floods in North America and Europe. Remaining on the current trajectory of

⁵ The diet varies for the nomadic communities and quite possibly includes more meat and dairy products.

⁶ Lobell, D. and M. Burke (2010). *Climate Change and Food Security: Adapting Agriculture to a Warmer World*. (Springer Publishers).

⁷ Rosenzweig C., G. Casassa, D.J. Karoly, A. Imeson, C. Lie, A. Menzel, S. Rawlines, T.L. Root, B. Sequin, and P. Tryjanowski (2007). "Assessment of Observed Changes and Response in Natural and Managed Systems", in *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden, and C.E. Hanson (Eds.) (Cambridge, UK: Cambridge University Press). Pp. 79-131.

climate change, green house gas emissions could rise by 25-90 percent by 2030. In the twenty first century the Earth could warm by 3°C.⁸ Even with an increase in temperature of 1-2.5 °C, IPCC predicts serious effects such as reduced crop yields in tropical areas resulting in hunger, spread of climate sensitive diseases such as malaria, and heightened risk of extinction of 20 to 30 percent all plant and animal species. 250 million people in Africa could be exposed to greater risk of water shortages by 2020. Remaining on the current trajectory is likely to result in millions of people suffering and dying from drought, water scarcity, and floods by the year 3000.⁹

Research also shows that due to climate change the most important food crops will have reductions in their yields, particularly in South Asia. Remaining on the current trajectory is likely to result in price increases for meat, rice, wheat, maize, and soybean. By 2050, calorie availability will decline relative to 2000 levels throughout the developing world, increasing child malnutrition by 20 percent relative to a world with no climate change. Much of the improvements in child malnourishment levels in a no-climate-change scenario will also be eliminated.¹⁰

Given the prevalence of agriculture and animal husbandry as the main sources of livelihood in rural communities in many of the poorest and least developed countries such as Afghanistan, it is crucial to establish the vulnerability, adaptability, and resilience of rural communities in coping with climate change-related events as a means for informed development programming in the years to come.

Climate Change and Food Security

Food and Agriculture Organization defines food security as having, at all times, physical, social, and economic access to sufficient, safe, and nutritious food that meets dietary needs and food preferences for an active and healthy life.¹¹ Others have elaborated on this definition to identify the four key dimensions of food security as food being available, accessible, and utilized under stable conditions. Availability refers to sufficiency of food, i.e., the overall capacity and the ability of the agriculture system to meet food demand. Accessibility refers to individuals and households having adequate resources to acquire appropriate food for a nutritious diet. Utilization refers to food safety and quality aspects of nutrition and its sub-dimensions. Stability refers to conditions under which individuals and households can access the resources needed to consume adequate food. In the broader literature availability, access, and utilization are the most widely cited components of food security with stability often being implicitly assumed as a precondition.¹²

⁸ United Nations Framework Convention on Climate Change – UNFCCC (2007). Available from: <http://unfccc.int/resource/docs/publications/impacts.pdf>

⁹ Rosenzweig et al. (2007). These trends are confirmed in IPCC's Fifth Assessment Report (2013), available from http://www.climatechange2013.org/images/report/WG1AR5_ALL_FINAL.pdf

¹⁰ Nelson, J., J.J. Kwiatkowski, J. Kirkpatrick, J.M. Frost (2009), "Modeling Charge Transport in Organic Photovoltaic Materials", *Accounts of Chemical Research*, 42:1768-1778.

¹¹ Food and Agriculture Organization of the United Nations – FAO (2006), available from: <http://www.fao.org/forestry/13128-0e6f36f27e0091055bec28ebe830f46b3.pdf>.

¹² See, for example, Lobell and Burke (2010). For the additional focus on stability as a main factor in food security see Schmidhuber, J. and F. Tubiello (2007). "Global Food Security Under Climate Change." *PNAS* 104(50): 19703-19708.

In all studies of food security, availability of food is linked directly to agricultural production and consequently subject to climate change impacts. The common mechanisms through which climate change can affect agriculture are increased atmospheric carbon dioxide concentrations, which will improve crop-growing conditions in some areas but not others, likelihood of intensified pest and disease problems in some areas leading to crop losses, and drier conditions and increased water stress affecting crop yields in areas, such as South Asia, where water is already scarce and source of much conflict.¹³

The mitigating factor for addressing adverse effects of climate change is expected by some to be global food trade acting as a potential buffer to deal with crop yield shortages.¹⁴ Depending on the projected scenarios, the rise in temperatures in temperate latitudes can bring benefits to agriculture by expansion of areas potentially suitable for crops and increasing the length of the growing season, resulting in increased crop yields.¹⁵ Warming in some regions may also increase pasture productivity and reduce the need for housing and compound feeding in some humid and temperate grasslands. However, in semiarid and arid regions, reduced livestock productivity and increased livestock mortality are likely as consequences of warming. Climate models also predict increased evapotranspiration and lower soil moisture in drier areas potentially resulting in some cultivated areas becoming unsuitable for cropping and some tropical grasslands becoming increasingly arid. Higher temperatures are likely to expand the range of many agricultural pests and increase the ability of pest populations to survive the winter and attack spring crops.¹⁶

With an increase in frequency and severity of extreme weather events such as cyclones, floods, hailstorms, and droughts, global and regional weather conditions are also expected to become more variable than at the present time. This can result in greater fluctuations in crop yields and local food supplies and higher risks of landslides and erosion damage, thus adversely affecting the stability of food supplies.¹⁷ The majority of areas where such effects will likely be felt are in sub-Saharan Africa and parts of South Asia. This points to the fact that the poorest regions with highest level of chronic undernourishment will be the most exposed to the food shortages resulting from climate change.¹⁸

More broadly, others have argued that the climate change – food security nexus is best understood through the linkages between climate change and how households earn their income, the nature of household exposure to food prices, how well integrated the local food markets are with global markets, and the broader longer-term prospects for livelihood improvement.¹⁹ Climate change affects households differently depending on the household's source and security of income. Rural households in the least developed and already

¹³ See, for example, Gornall, J., R. Betts, E. Burke, R. Clard, J. Camp, K. Willett, and A. Wiltshire (2010), "Implications of climate change for agricultural productivity in the early twenty-first century", available from : <http://rstb.royalsocietypublishing.org/content/365/1554/2973.full>

¹⁴ See, for example, Lobell and Burke (2010).

¹⁵ Schmidhuber and Tubiello (2007).

¹⁶ IPCC (2007).

¹⁷ Schmidhuber and Tubiello (2007).

¹⁸ Bruinsma, J. (2003), "World Agriculture: Towards 2030/2050", FAO, Global Perspective Studies Unit (Rome), available from: http://www.fao.org/fileadmin/user_upload/esag/docs/Interim_report_AT2050web.pdf

¹⁹ See, for example, Lobell and Burke (2010).

poor countries depend on agriculture as the main source of food and income security and are thus the most at risk with changes in weather patterns.²⁰

The provision of sufficient dietary energy is a primary purpose of food security policy making. The widely used undernourishment indicators such as those of FAO rely heavily on estimates of calorie consumption in examining food security-related trends. Insufficient intake of the necessary nutrients plays a key role in the spread and persistence of localized illnesses and death from infectious diseases, for example.²¹ The consumption of necessary micronutrients can be directly affected by climate change as a result of changes in the yields of important crop sources of micronutrients, alterations in the nutritional content of a specific crop, or changes in decisions of farmers to grow crops of different nutritional value but for higher income.²² Farmers could thus potentially undermine micronutrient availability in switching crops as a means to cope with climate change impacts.²³

Climate Change in Afghanistan: Past Trends and Future Projections

Afghanistan is a mountainous country with desert or desert steppe climate classification and extremes of climate and weather. During winters the temperature drops to well below freezing point throughout the country while summers are consistently hot and dry. Rain and snowfall occur during winter and spring seasons (October-April) but vary with elevation. The average annual precipitation ranges from around 5 centimeters in desert / lowland areas to around 100 centimeters in mountainous / highland areas. The mountainous terrain provides the country with numerous sources of water, largely from snowmelt in warmer months. Because of the high temperature variations many agricultural products such as fruits and nuts are of particularly good quality. The bulk of agricultural activities have depended on seasonal precipitation as well as on snowmelt at higher elevations during the warmer summer months.

Climate change data for Afghanistan remain scarce. Moreover, large parts the historical datasets were lost during the political turmoil in the country. However, according to climatic norms used by the World Meteorological Organization (WMO), since 1960 the mean annual temperature has increased by 0.6 °C and by 0.13 °C on average per decade. During the same period, the frequency of hot days and hot night has increased throughout the year. Parallel to changes in temperature, changes in precipitation have also occurred, albeit to a lesser extent. The amount of rainfall over the country has decreased by 2 percent per decade in the past fifty years. Severe drought conditions between 1998 and 2001, believed to be partly related to *La Nina* conditions in the Pacific, were the worst in last five decades.²⁴

²⁰ Davis, R.G., C.D.L. Orme, D. Storch, V.A. Olson, G.H. Thomas, S.G. Ross, T-S. Ding, P.C. Rasmaussen, P.M. Bennett, I.F.F. Owens, T.M. Blackburn, and K.J. Gaston (2007), "Topography, energy and the global distribution of bird species richness", *Proceedings of the Royal Society B* (274): 1189-1197, available from: <http://www.cts.cuni.cz/~storch/publications/Davies,%20Orme,%20Storch%20et%20al.%202007.pdf>

²¹ Willow, R.I., and Connell, R.K. (Eds.) (2003). "Climate adaptation: Risk, uncertainty and decision-making". UKCIP Technical Report (Oxford: UKCIP), available from:

<http://www.ukcip.org.uk/wordpress/wp-content/PDFs/UKCIP-Risk-framework.pdf>

²² See, for example, Lobell and Burke (2010).

²³ See, for example, Rozenweig et al. (2007).

²⁴ Savage M., B. Dougherty, M. Hamza, R. Butterfield, and S. Eharwani (2009), "Socio-Economic Impacts of Climate Change in Afghanistan", Report DFID CNTR 08 8507 (Oxford: Stockholm Environmental Institute).

The availability of, and access to, water by farmers have been severely affected by changes in mean annual and seasonal temperatures and precipitation over the last five decades. The historical climate data suggest Afghanistan has climate cycles of around 15 years during which one would expect at least one 2-3 year period of drought. However, in recent years the drought cycle has been occurring more frequently than the model projections based on historical data. Since 1960, the country has experienced drought in 1963-64, 1966-67, 1970-72, and 1998-2006. The failure of rain-fed crops (estimated to make up to 80 percent of the cultivated land) has been widespread in the north, west, and central regions.²⁵ Severe drought conditions between 1998 and 2001 have been cited as the worst in the last five decades.²⁶

Since 1960 the mean annual temperature in Afghanistan has increased by 0.6 °C and by 0.13 °C on average per decade. During the same period, the frequency of hot days and hot night has increased in every season. There have been changes in precipitation parallel to changes in temperature, albeit to a lesser extent. The amount of rainfall over the country has decreased by 2 percent per decade in the past fifty years.²⁷

Figure 1: Temperature Change Under SRES A2 Scenario for 2030, 2060, and 2090

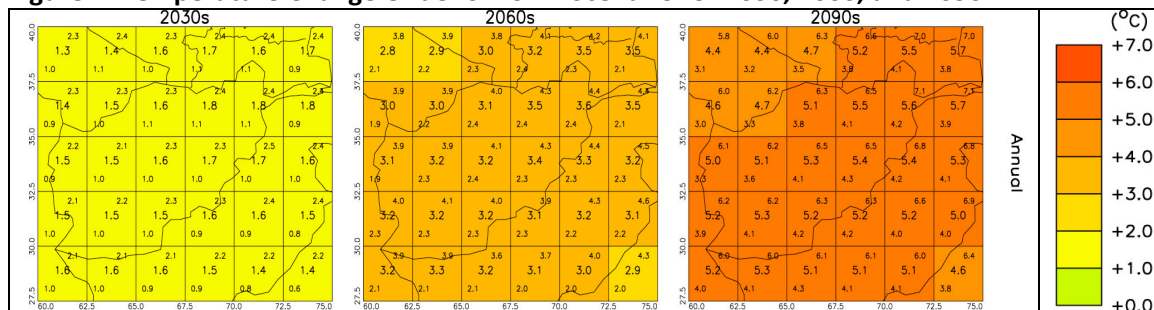
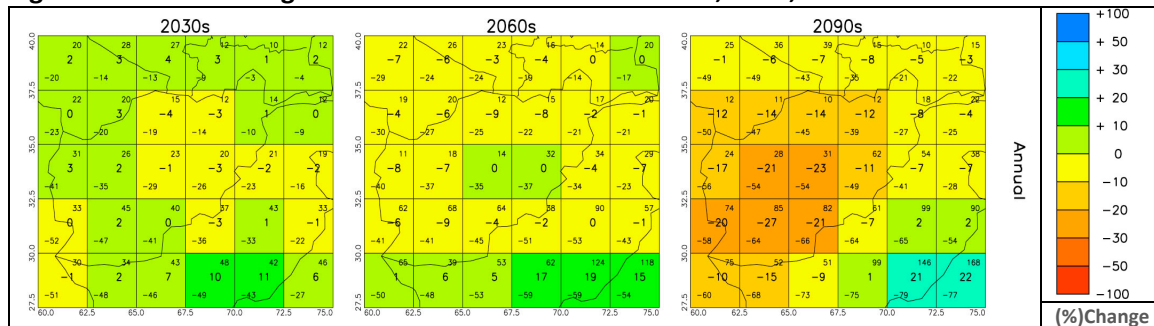


Figure 2: Rainfall Change Under SRES A2 Scenario for 2030, 2060, and 2090



Source (Figures 1 and 2): McSweeney et al. (2008)

Temperature and rainfall projections for different regions of Afghanistan for the next nine decades are shown in Figures 1 and 2. As these figures indicate, the annual temperatures in the country will rise throughout over the next few decades. The projected changes in rainfall, however, are not linear when the available data are disaggregated for the Balkh, Herat, and

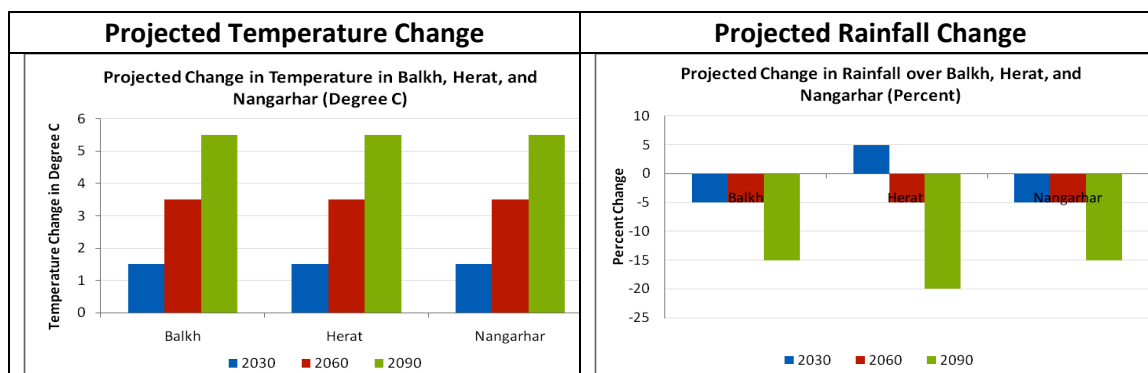
²⁵ UNEP, GEF, and Government of Afghanistan (2008), available from: http://postconflict.unep.ch/publications/afg_tech/theme_02/afg_biodiv.pdf

²⁶ Savage et al. (2009).

²⁷ McSweeney, C. M. New, and G. Lizcano (2008), "UNDP Climate Change Country Profiles: Afghanistan", UNEP, available from: <http://country-profiles.geog.ox.ac.uk>

Nangarhar provinces (Figure 3). Herat, for example, is likely to have more rainfall in 2060 than in 2030 or 2090. Adaptation- and mitigation-driven changes in agricultural strategy over the coming decades for Herat will need to be cognizant of and based on these significant fluctuations in rainfall.

Figure 3: Temperature and Rainfall Changes in Balkh, Herat, and Nangarhar Provinces



Source: Based on source data from McSweeney et al (2008)

Figure 1 shows a progressive increase in temperature of around 5.5 Celsius over a period of 80 or so years for all of Afghanistan except Badghis where the rise is slightly less. Similarly, Figure 2 shows changes in precipitation to 2090s. Interestingly, by 2030s, precipitation remains the same for central and southeast Afghanistan while the rest of the country will experience a 10 percent increase. The situation is almost reversed in 2060s with the central and southeast regions receiving 10 percent more precipitation while the rest of the country will receive 10 percent less. By 2090s all regions of the country will receive less rain with the central and southwestern regions being affected the most, receiving around 25 percent less rain than normal.

Much emphasis has been placed on integrated planning in agricultural development in recent years. An important component of integrated planning is taking account of the differing ecological features and to plan activities that best suit specific “agro-ecological zones” to provide for maximum yield, sustainable resources use, and minimal environmental impact. With the projected changes in Figures 1 and 2, it is likely that the basis for delineating the current 8 zones will also need to change.²⁸

Projections by other climate change models highlight water resources, forestry and rangeland, agricultural production, biodiversity, and health as sectors most likely to be adversely affected by climate change in Afghanistan.²⁹ Persistent drought is projected to 2030 as the norm rather than a temporary or cyclical event. Unseasonal rainfall increases the risk of floods while the general increase in temperature increases the risk of more rapid spring snowmelt. The combined impact of these two factors is likely to be land degradation, loss of vegetative cover,

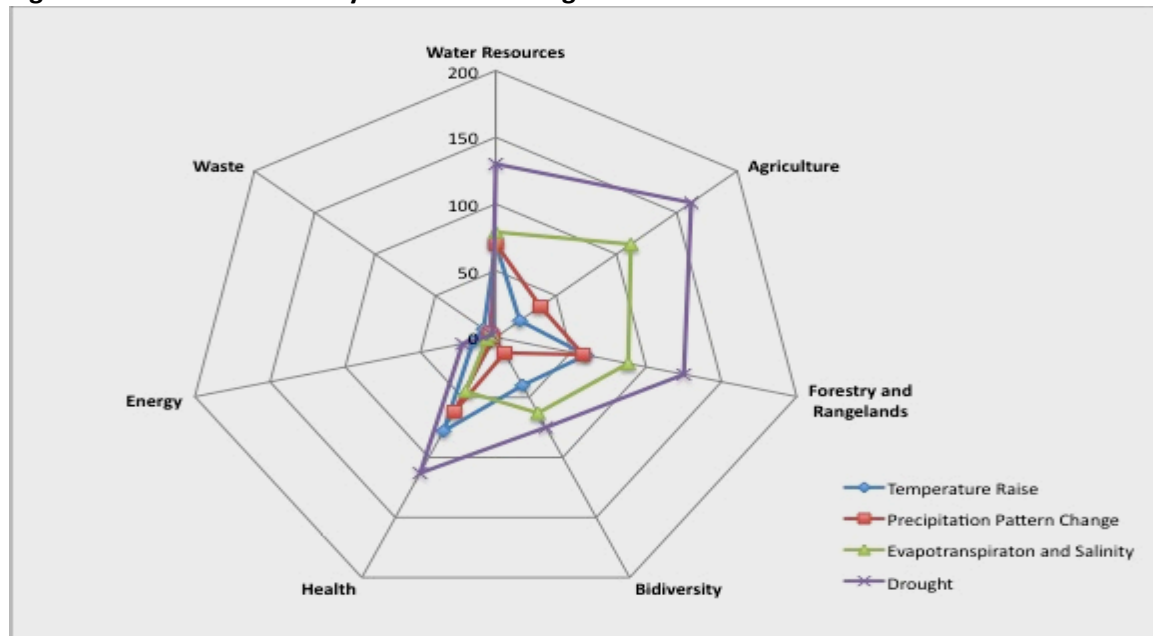
²⁸ For details on Afghanistan’s agro-ecological zones see Maletta, H. and R. Favre (2003), “Agriculture and Food Production in Post-War Afghanistan: A Report on the Winter Agriculture Survey 2002-2003”, (Kabul: MAIL and FAO), available from: ftp://ftp.fao.org/country/afghanistan/Afghanistan_Winter_Survey_1.pdf

²⁹ NCSA (2009), National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) and National Adaptation Programme of Action for Climate Change (NAPA), Final Joint Report, available from: <http://www.thegef.org/gef/sites/thegef.org/files/documents/document/ncsa-afghanistan-fr-ap.pdf>

land mismanagement, floods and landslides resulting in large-scale human loss of life as was the case in Badakhshan in spring of 2014, and damage to infrastructure.

As Figure 4 indicates, all sectors relying on water availability will face significant challenges over the coming decades as a result of climate change. Since Afghanistan's economy is highly dependent on agriculture, prolonged pressures as a result of water shortages will have substantial adverse impacts on the country in general and on the rural communities in particular.

Figure 4. Sector Vulnerability to Climate Change



Source: Based on source data from NCSA/NAPA (NEPA et al. 2009)

Despite the above background and the projections on impacts of climate change on Afghanistan, the 2008 version of the Afghanistan National Development Strategy (ANDS) does not make a reference to climate change and offers no strategic direction to prepare for drastic climate change-related shocks.

The National Capacity Self-Assessment for Global Environmental Management (NCSA 2009) offers the following objectives for addressing the impacts of climate change on Afghanistan:

1. Identify, confirm or review priority issues for action within the thematic areas of biodiversity, climate change and desertification, respectively
2. Explore related capacity needs within and across the three thematic areas
3. Catalyze targeted and coordinated action and requests for future external funding and assistance, and
4. Link country action to the broader national environmental management and sustainable development framework.

NCSA also offers an elaborate action plan for strengthening the commitment by the Government of Afghanistan to Rio Conventions on climate change, strengthening legal, policy, and enabling frameworks, raising awareness about climate change through education and public

awareness campaigns, more sustainable management of land and natural resources, research (including climate change modeling), and increasing technical and managerial capacity. NCSA calls for a simplified and direct channel of communication for information relating to the urgent and immediate adaptation needs of Afghanistan in response to climate change.³⁰

Based on the program areas identified by NCSA, profiles were developed for improving efficiency in water management and use and community based watershed management to serve as pilot projects and facilitate knowledge sharing among stakeholders at different levels. Given the infancy of these initiatives it is difficult to gauge what has been accomplished to date and what could be expected as far as achievements in the years to come. It is clear, however, that many of the current projects such as those on developing irrigation schemes, improving sustainable rural livelihood, and water resource development do not address current and future food security challenges with a specific reference to longer term impacts of climate change.

Food Security in Afghanistan

Agriculture is the largest and most important sector in Afghanistan with over half of the households owning or managing agricultural land or gardening plots. Of the 652 thousand square Kilometers of total land area, permanent pastures cover 46 percent while only an estimated 12 percent is arable.³¹ The most vulnerable groups to climate change impacts in Afghanistan will be the poorest such as small farmers and livestock keepers as they are the least able to adapt. Other groups, such as sedentary farmers and nomads are less vulnerable due to their ability to move in search for new pastures. Casual laborers and civil servants are also affected though less directly as their livelihoods are not (directly) a function of agricultural production. The accelerated process of settlement by the Kuchi populations as a result of climate change is likely to increase destabilizing pressures on small holding farmers in rural areas.

Most women in Afghanistan do not participate in paid economic activity. They are highly dependent on the men in their families for their livelihood expenses. While some women can generate some income from their own labour on land and/or in handcrafts, the overwhelming majority of the poorer women together with their children are among the most vulnerable to external shocks such as climate change related outcomes that can alter the fragile stability of poorer families. Many of the women interviewed at the study sites for this research worried that unreliable weather patterns undermining the ability of their households to produce food could force many families into literally selling their young daughters into marriages for the dowry as a source of temporary financial relief.

Wheat is by far the major staple crop produced in Afghanistan, making up to 77 percent of the total crops produced on irrigated land and 94 percent of the total crops produced on rain-fed land. Other grains include barley, maize, rice and pulses.³² Wheat accounts for around 70 percent of the total cereal consumption. The country is not normally self-sufficient in wheat and has to import supplementary amounts to meet demand. Wheat production is subject to changes

³⁰ NEPA and UNEP (2009).

³¹ CSO (2008).

³² MRRD and CSO (2009).

in climate conditions. The average imports of wheat for years 2000-2004 accounted for 33 percent of the total demand.³³

Lack of access to water is by far the most important reason to abandon land and seek other forms of livelihood (65 percent in the case of irrigated land and 37 percent of rain-fed land).³⁴ Other main reasons for not cultivating are land infertility (31 percent of rain-fed land) and lack of money or access to finance for seeds and fertilizer (around 12 percent for both types of lands). Interestingly and contrary to the common perception, security and conflict over land do not feature prominently as reasons for out migration or displacement of farming communities. According to NRVA (2005) only 2 percent abandoned land due to insecurity and 1 percent due to conflict over ownership. Arguably, however, insecurity and ownership conflicts can have a significant impact on decisions by governmental and development aid agencies and their programming in the less secure or conflicted areas of the country.

Specific predictions about changes in crop yields or impacts of livestock are not documented in the reports reviewed for this study. The data from the NCSA/NAPA's final report ranks water resources as the most vulnerable sector to changes in climate. Generally smaller land plots, water shortages due to poor irrigation systems and lack of rainwater, insufficient access to credit, minimal mechanization, insufficient outreach in agricultural and veterinary extension services, and poor accessibility to markets and other communities are the key challenges faced by the vast majority of Afghan farmers. These challenges are exacerbated by ongoing and persistent conflict in many areas of the country.

According to the National Risk and Vulnerability Assessment (NRVA) for 2007/8, only 10 percent of households engaged in agriculture received advice on agricultural production, out of which 94 percent were satisfied with the advice received. Twenty nine percent reported that they were unable to access expert opinion. Famine Early Warning Systems (FEWS) Network provides a mapping based on projections of food insecurity for Afghanistan on a regular though inconsistent and rapidly changing basis.³⁵

On average Afghan families spent 77 percent of their income on food in 2008. The figure was 56 percent in 2005. The increase of more than 20 percent over four years has pushed large segments of the previously borderline food insecure population into food insecurity.³⁶ World Food Programme's rapid assessment mission in 2008 found a significant increase in the number of food insecure households over the period between late 2006 and late 2007. There was a 10 percent reduction in the number of households within the food secure group and a 16 percent increase in the number of households that were food insecure.³⁷ The average number of meals for adults remains at three per day and four to five meals per day for children under five years

³³ MAIL (2009), cited in MRRD and CSO (2009).

³⁴ *Ibid.*

³⁵ Famine Early Warning Systems Network provides periodic maps on the state of food security in Afghanistan. Maps from the website (<http://www.fews.net/pages/country.aspx?gb=af&l=en>) have not been included in this report since the projections constantly change for the same quarter and as the quarter progresses.

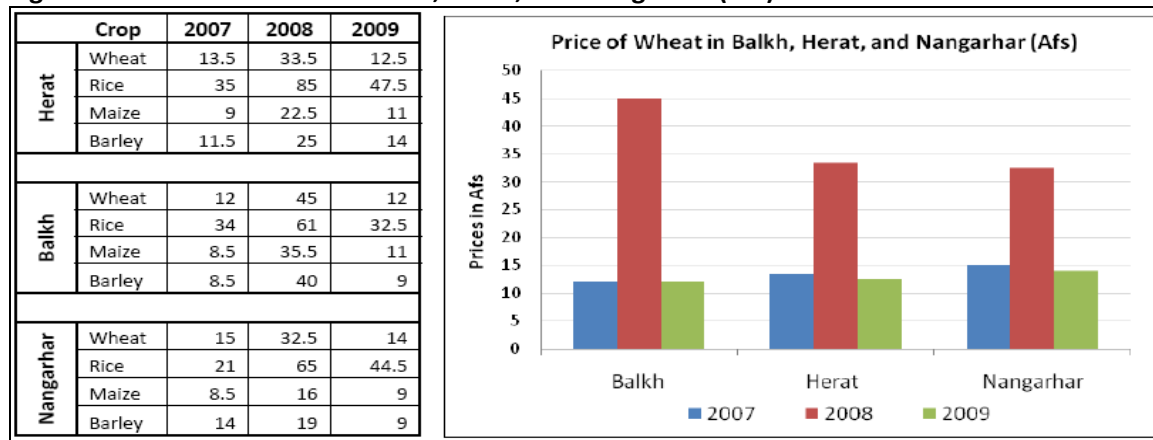
³⁶ Mojumdar, A. (2009), "Afghanistan: Food insecurity, the problem that never went away", available from Reliefweb: <http://www.reliefweb.int/rw/rwb.nsf/db900SID/RMOI-7P73GU?OpenDocument>

³⁷ World Food Programme Report (2009), available from: <http://documents.wfp.org/stellent/groups/public/documents/newsroom/wfp204445.pdf>

of age. WFP also reports significant increases across all staple food groups including cereals (including wheat), roots, and oil and fats in 2008 as compared to 2006. Wheat, the most important of all staple foods, increased in price quite drastically, by almost 90 percent, in 2008 as compared to 2007, 2009, and 2010 in all regions of the country.³⁸

Figure 5 provides the prices for staple food groups in Balkh, Herat, and Nangarhar for 2007, 2008, and 2009.³⁹ The prices for wheat are charted to illustrate the significance of price changes from 2007 to 2008. Food availability in these local markets has depended mainly on local agricultural production as well as food imports from neighbouring and other countries. Climate change may affect both sources.

Figure 5: Local Food Prices in Balkh, Herat, and Nangarhar (Afs)



Access to food is a function of household income which in most cases in rural communities is from growing crops. Failed crops result in less or no income to purchase food, with income from casual labour in neighboring towns or countries as the only option to raise an income. It has to be noted that the option of out migration in search of casual work is mostly available to families that can afford the expense and hence not an option for the ultra-poor with no access to funds to finance the costs of migration.

Programs and Projects on Agriculture and Food Security

As this section will illustrate, there is no shortage of studies on climate change, agricultural production, and food security in Afghanistan. Two broad characteristics emerge from a selective review of the key studies on food security in Afghanistan. First, the majority of the international organizations involved in issues of food production and food security have been active in Afghanistan since the 1960s, suggesting that even without the specter of climate change, food security has been a chronic problem in Afghanistan for the last few decades and predating the recent national conflicts. Second, there appears to be a lack of regional or micro studies on food security. All of the reports cited in this section have a decidedly national focus. While a national focus is necessary for determining national food aid needs, it provides little or no insight into

³⁸ *Ibid.* The hike in food prices in 2008, cited by WFP (2009), was universal, however, and not specific to Afghanistan.

³⁹ Prices are based on estimates provided by key informants and randomly selected shopkeepers at the three study sites.

localized coping mechanisms or local solutions for adapting to or mitigating climate change-related outcomes.

The World Food Programme (WFP) has been present in Afghanistan since 1963 and remains active in all the 34 provinces. In recent years WFP's focus has shifted from emergency assistance to rehabilitation and recovery. WFP aimed to feed 8.8 million people in 2009, primarily in remote, food-insecure rural areas. Under projects and programs such as School Meals, Food for Training, Food for Work, Mother and Child Health and Nutrition, Flour Fortification, Relief Operation, and Greening of Afghanistan Initiative WFP's food assistance efforts have targeted poor and vulnerable families, schoolchildren, teachers, illiterate people, tuberculosis patients and their families, returning refugees, internally displaced persons, and disabled people – with an emphasis on vulnerable women and girls.⁴⁰

Interventions by the Food and Agriculture Organization of the United Nations (FAO) in Afghanistan include short-term emergency and rehabilitation and long-term development projects. In food security, FAO's projects have focused on developing Afghanistan's seed variety and seed industry development, household food security, nutrition and livelihood, emergency and rehabilitation activities, sustainable agriculture and livelihoods in the Eastern Hazarajat, integrated pest management under the Emergency Horticultural Livestock Project (HLP), development of integrated dairy schemes, controlling transboundary animal diseases, poultry project development, marketing information and expansion, and rural infrastructure and irrigation systems development. FAO also has the "Special Programme for Food Security" under which it aims to improve the national and household food security in an economically and environmentally sustainable manner.

As one of the major donors to Afghanistan's reconstruction, the World Bank's direct and indirect contribution to improving food security and livelihoods has consisted of a number of large projects and programmes. World Bank is the largest donor to the National Solidarity Programme which has financed over 50,000 community projects in more than 22,000 villages in all 34 provinces. Development and reconstruction projects in irrigation, rural roads, electrification, and drinking water supply form about 80 percent of these projects. The National Emergency Rural Access Program (NERAP) is aimed at providing year-round access to the rural areas of Afghanistan. With some expected benefits to rural communities, more than 650, 000 current jobs are attributable to the Expanding Microfinance Outreach and Sustainability Project. The Bank reports that over 600, 000 households in all 34 provinces of the country have benefited from the rehabilitation of multiple irrigation systems through the Irrigation Rehabilitation Project.⁴¹

The Asian Development Bank's assistance to agriculture and food security in Afghanistan encompasses a wide range of projects, programmes, and technical assistance. Following the establishment of the new government in the country in 2002, some of the main projects in this area have been Rural Recovery through Community Based Irrigation Rehabilitation, Capacity Building for Agricultural Policy Reform, Western Basin's Water Resources Management and Irrigated Agriculture Development Projects, Balkh River Basin Water Resource Management, Commercial Agriculture Development, Capacity Development for Irrigation and Water Resources

⁴⁰ For details of WFP programmes, please see: <http://www.wfp.org/node/3191>

⁴¹ World Bank (2009).

Management, Afghan Rural Business Support Project, Agriculture Market Infrastructure Project, and Water Resources Development Investment Program.⁴²

USAID's initiatives have focused on improving food security, increasing agricultural productivity and rural employment, and improving family incomes and wellbeing. With its aid to agriculture sector totaling US\$490 million between 2002 and 2009, USAID's agriculture and food security projects have included watershed management and irrigation, construction of farm-to-market roads and marketplace infrastructure, business and skills training, access to credit, development of new markets, and streamlining constraints that hinder agricultural market growth.⁴³

The United Nations Environment Programme (UNEP) with funding from the Global Environmental Facility (GEF) has a mandate to assist the Government of Afghanistan to implement the National Capacity Needs Self-Assessment for Global Environmental Management (NCSA) as well as the National Adaptation Programme of Action for Climate Change (NAPA). Through this process the vulnerability of various sectors including agriculture and water resources to potential impacts of climate change and their adaptation needs were to be identified. Moreover, profiles for the two priority projects were to be developed to serve as pilot projects facilitating knowledge sharing among stakeholders at different levels. UNEP is also to provide capacity building within the relevant governmental departments.⁴⁴ (See above for additional program details on NCSA).

The European Commission (EC) has been present in Afghanistan since the fall of the Taliban in late 2001 and assisted the country's reconstruction and stabilization with over EUR 1.2 billion (to the end of 2008) in areas such as governance, public health, social protection, demining, regional cooperation, reintegration of Afghan refugees, and rural development. The Commission has supported the National Solidarity Program with over EUR 50 million since inception in 2003. Many of the community projects under this program have been aimed at poverty reduction and improving quality of life in rural areas in such areas as water sanitation, transportation, irrigation, energy, education, and livelihood. A number of the EC projects in rural development have focused on improving animal health and veterinarian practices, horticulture and seed improvement, irrigation and river basin management, environment, food insecurity, vulnerability and poverty information management, and alternative livelihoods. Aid to rural development makes up to 30 percent of the total EC aid to Afghanistan for the period 2007 – 2010.⁴⁵

At a more local level, the Danish Committee for Aid to Afghan Refugees (DACAAR) has been active in agricultural development in Afghanistan since the early 1990s, gradually expanding its activities to a number of Afghan provinces including Herat, Badghis, Farah, Balkh, Takhar, Kunar, Nangarhar, Laghman, Kabul, Parwan, and Paktia. DACAAR's activities are pro-poor in the sense

⁴² Details of the projects are available on:

<http://www.adb.org/Projects/approvals.asp?query=&browse=1&p=ctryafg&ctry=AFG&year=ALL&offset=0>

⁴³ For USAID's agricultural programme details see: <http://afghanistan.usaid.gov/en/Program.19a.aspx>

⁴⁴ NEPA and UNEP (2009), available from:

<http://www.thegef.org/gef/sites/thegef.org/files/documents/document/ncsa-afghanistan-fr-ap.pdf>

⁴⁵ For additional information see:

http://ec.europa.eu/europeaid/where/asia/country-cooperation/afghanistan/afghanistan_en.htm

<http://www.delafg.ec.europa.eu/en/cooperation/index.htm>

<http://www.delafg.ec.europa.eu/en/cooperation/rural-dev.htm>

that they primarily target some of Afghanistan's most vulnerable rural communities, including internally displaced people, refugees, landless labourers and female-headed households. A most notable achievement by DACAAR has been its collaboration with local disadvantaged farmers to introduce new crops such as saffron, particularly in the western provinces. In so doing, DACAAR has worked closely with key governmental ministries such as Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Rural Rehabilitation and Development (MRRD), Ministry of Women's Affairs (MoWA), and Ministry of Water and Energy (MoWE).⁴⁶

Oxfam Novib's programming through its Afghan counterparts has also been implemented at the local community level and includes Food Security Response, Community Based Disaster Management, Food Security Project in Faryab/Herat, and Integrated Rural Development Programme which focuses on issues of irrigation and water management, provision of agricultural inputs and extension services, veterinary services, vocational training programmes for women, community-based disaster management, and food and cash for work. Oxfam GB works in 65 villages in two provinces in Afghanistan. It helps communities to improve their means of earning a sufficient, sustainable living. Oxfam GB also works with Community Development Councils through the National Solidarity Program and provides assistance to vulnerable communities during humanitarian emergencies such as droughts.

The main governmental bodies involved in issues of food security and climate change are the Ministry of Agriculture, Irrigation and Livestock (MAIL), Ministry of Rural Rehabilitation and Development (MRRD), National Environmental Protection Agency (NEPA), and Afghanistan National Disaster Management Authority (ANDMA). Collectively, these entities implement a wide range of projects and programmes funded and technically assisted by the above and other international donors.

During the site visits the key informants and focus group participants were asked about the above initiatives and whether and how any or all of these initiatives had improved their food security. The findings from the responses are reported in the next section.⁴⁷

Food Security and Climate Change – Evidence from Study Sites

The findings reported in this section, while varying in specific details, by and large correspond to the inter-related themes of Food Security, Climate Change and Loss of Human Capital, Climate Change and Loss of Natural Capital, Food Aid Provision and Security, and Local Responses to Climate Change. Arguably, some of these themes are more directly related to climate change than others.

There is a strong correlation between changes in weather patterns due to climate change and the ability to grow crops. In many ways, climate change also appears to act as catalyst for significant other changes in households. Loss of crops or inability to grow crops due to climate change depletes food sources and triggers efforts to secure income to purchase food. Out-

⁴⁶ For additional information see: <http://www.dacaar.org>

⁴⁷ Broader assessment of the effectiveness of these programs in addressing food insecurity in general or climate change-related food insecurity was not possible due to a general lack of development program evaluations in Afghanistan or unavailability of existing evaluations.

migration for those who could afford it is one such coping strategy by many rural households. However, out-migration has the potential to create additional problems such as drug addiction which results in income loss if the migrant worker does not return or becomes an additional burden on the household on return. In both cases, the household becomes subject to additional income insecurity and hence food insecurity.

The remainder of this section provides a background on each of the selected sites of research and reports on the findings from the analysis of the data from interviews, focus group discussions, and secondary sources.

Balkh

Balkh province has a population of 1.1 million (51 percent male, 49 percent female) and is situated in the north of Afghanistan and bordering Uzbekistan to the north, Tajikistan to the northeast, Kunduz province to the east, Samangan province to the southeast, Sar-e-Pul province to the southwest and Jawsjan province to the west. Mazar-e-Sharif is the provincial capital with an estimated population of 375,000 inhabitants and one of the largest commercial and financial centers in Afghanistan due to a history of commerce with the neighboring countries to the north and having experienced a relatively lower degree of conflict during the past three decades as compared to the rest of the country. There are 14 districts in Balkh province. The two most populous districts after Mazar-e Sharif are Balkh (97,000) and Sholgare (85,000).

Basic Socioeconomic Data:

- **Main economic activities:** Production of subsistence crops such as wheat, corn, rice, maize, beans, and peas; industrial crops such as cotton, sugar extract, sugar cane, sesame, tobacco, and olives; various fruits and vegetables; herbal products; handicrafts; animal products; tourism; as well as small industries are some of the main economic activities in Balkh province. Since Balkh borders Tajikistan and Uzbekistan, trade is also a major economic activity in the province. (UNFPA 2006)
- **Main natural resources:** Balkh is not rich in mineral resources. Coal deposits in Dara-e-Suff, which are being exploited, are now falling under the administration of Samanagan. Limited perennial river water flowing from higher altitudes in the south of the province recharges the ground water in the northern plains. The ground water table is, however, fairly deep though accessible for tube well irrigation. The high quality soil and water allow for intensive double cropping in the northern plains.⁴⁸
- **Inflation:** The annual inflation rates for the year 2007-08 and 2008-09 were 21.5 percent and 0.6 percent respectively. The figures for the country in the same years were 22.5 percent and 4.9 percent (CSO 2009)
- **Poverty data:** According to the NRVA 2007/8, the poverty rate for Balkh was in the range of 55-76 percent. The national poverty rate is 36 percent.

The village of Lalmi in the District of Dawlatabad is located in the northeast of the Balkh Province. The District has an estimated population of around 80,000.⁴⁹ The highlights from the analysis of the interviews and focus group discussions are as follows.

⁴⁸ GRM International, Regional Rural Economic Regeneration Strategies, Provincial Profile - Balkh

⁴⁹ UNFPA (2006).

Food Security: “As long as I can remember there has been endemic poverty in many parts of this province” (KI-B2). The vast majority of those interviewed spoke of persistent food insecurity in rural areas for the last 10-12 years. Even in good years when there is sufficient water, most smallholders are only able to grow a portion of their food needs, having to purchase the rest from stores (FGD-B1). Affordability, rather than availability appears to be the main problem: “Food is widely available in shops but most people cannot afford the prices” (FGD-H3).

Climate Change and Loss of Human Capital: A large number of men have left the villages for Iran or larger cities in Afghanistan in search of work. Very often the migrant workers, particularly those who go to Iran, become victims of drug addiction or build new lives with the end result of failing to send remittances to their families back home. A number of focus group participants reported that some of the migrants return to their communities as drug addicts, causing further hardships for their already desperate families. “The main problem from climate change is hunger which causes the loss of our young men to other places or countries in search of work and desperation and losing hope for those that remain behind” (FGD-B1).

Climate Change and Loss of Natural Capital: In the last three decades during the drought periods, many people in rural areas have abandoned their land and moved either to other areas or other countries. On numerous occasions when the farmers have returned to their land, they have not been able to start over again because the land has been neglected, requiring much preparation and other input which most of the returnees cannot afford (KI-B2).

Food Aid Provision and Security: Security is a very serious problem for aid organizations in providing assistance to hard-hit rural communities. As one key informant put it, “...we know that IRD [International Relief and Development Inc.] has a programme to assist 150,000 farmers in the province. Naturally, IRD would prefer to go to areas that are more secure. Because of this, a lot of the people most in need are neglected because of poor security in their areas. Kunduz used to be known as ‘the bread basket’ of Afghanistan. Most of the assistance programmes there have stopped in the past 2 or 3 years because of a serious deterioration in security” (KI-B1). Because of heightened insecurity in most areas, access to such services such as microcredit have ceased to be provided in some areas or where they are being provided borrowing is difficult because of worries about the ability of the borrower to pay.

Local Responses to Climate Change: There is, particularly among the more informed officials interviewed, a sense of frustration about the different responses to climate change: “We need to be thinking about doing things differently. All over the world people are talking about the impacts of climate change and we continue to dig bigger and deeper wells as if there is no end to groundwater” (KI-B3), or, “Because there are no systems to check the incoming seeds, fertilizers, or produce from places like Pakistan we get crop diseases that we never had before, like melon fly in Helmand” (KI-B1). There have been instances of “food for work”, but not everyone in need has benefited from these programmes and the programmes have been of a limited duration. The longer term, however, “requires planning at the national level and that includes doing something about the terrible security situation” (KI-B3).

Herat

Herat province has a population of approximately 1.8 million, with equal numbers of males and females.⁵⁰ The province borders Iran to the west, Turkmenistan and Badghis province to the north, Ghor province to the east, and Farah province to the south. The city of Herat is the provincial capital with a population of almost 400,000. Herat province has fifteen districts of which the three most populated after Herat City are Enjil (225,000), Shindand (185,000), and Guzare (135,000). An estimated 77 percent of the province's population lives in the rural areas.

Basic Socioeconomic Data:

- **Main economic activities:** Agriculture, animal husbandry, trade and services, manufacturing, non-farm labor, and remittances are the key sources of income by households in Herat (MRRD and CSO 2007).
- **Main natural resources:** Deposits of oil, gold, salt, lime, Barite, Sulfur, marble, and cement have been found in Herat in economically significant quantities. Natural pistachio forests are present in the northeastern Herat. Medicinal plants such as liquorices and black cumin are also found in the province. The Hari Rud river and strong seasonal winds offer high potentials for power generation and related developments (GRM undated).
- **Inflation:** The inflation rates for the country in the years 2007/8 and 2008/9 were 22.5 percent and 4.9 percent, respectively. These figures for Herat during the same years were 22.3 percent and 15.0 percent respectively.
- **Poverty data:** According to NRVA 2007/08, the poverty rate for Herat was in the range of 31 - 43 percent. The national poverty rate is 36 percent.

The village of Chahar Olang is located in the northern part of province and has an estimated population of around 134,000.⁵¹ The highlights from the analysis of the interviews and focus group discussions are as follows.

Food Security: "We have always had hardship, only now the difference is that we have hardship more often than before" (FGD-H3). "Our problems in farming started with the Mujahedeen and soon after 1988-9 because many farmers were encouraged to plant Caraway on pastureland, which drains nutrients out of the soil and renders it useless for pasture later. This, combined with drought meant that around 70 percent of the farmers Herat had to sell off their animals and move out of farming" (KI-H4). Inability to grow food because of changes in the climate was said to create anxiety and conflict in the affected communities (KI-H1). "There have been numerous social impacts from climate change in our communities including competing for scarce resources which sets family or community members up against each other and increases inequities in wealth distribution within the affected communities" (KI-H3). These inequities were said to be the basis for increased criminal activity such as stealing and a general deterioration of security (FGD-H1). Food insecurity was underlined as the cause of poor health, conflict in the family and society, indebtedness, out-migration, and numerous other problems (FGD-H2). There are reports of many poorer families eating grasses or plant roots to survive, "... especially people from Adreskan, Fahrasi, and Kashk Kohnah" (KI-H6). Others have resorted to eating a particular

⁵⁰ CSO/UNFPA Socioeconomic and Demographic Profile cite in MRRD provincial profiles

⁵¹ UNFPA (2006)

plant to overcome hunger (KI-H4). As one focus group participant put it, “In the old days people would die of extreme winter cold. Now they die of hunger” (FGD-H1).

Climate Change and Loss of Human Capital: As with the Balkh and Nangarhar cases, a large number of young men from Herat go to Iran in search of work. They may support their families through sending remittances. As with the case of Balkh, a significant number of these men may not find work in Iran and/or fall victim to drug addiction (FGD-H2). Because of economic hardship and lack of work, “more than 95 percent of our men have left to work in other countries” (FGD-H1). Most rural families “suffer from depression, sickness, indebtedness, and loss of able-bodied family members to migration” (FGD-H3).

Climate Change and Loss of Natural Capital: Hardships caused by changes in the climate have been going on in Herat for at least 10 years (KI-H1). Impacts of climate change include a noticeable disappearance of ground cover, floods and land erosion (KI-H1, KI-H6). Climate change also meant recurring drought, unseasonal rain, reduction in agricultural yield, loss of animals, contamination of drinking water, environmental damage, spread of diseases among humans and animals, and unemployment (FGD-H3). A general lowering of the water table is observed while the number of new deep wells being dug has increased (KI-H2, FGD-H2). Because the change in weather patterns, a number of naturally growing traditional medicinal plants such as “Khak e Shir” (Mugwort seeds), “Kaseer”, and “Kangar” (*Gundelia tournefortii*) have been declining (KI-H6). Similarly, “... in the last 20 or 30 years we have lost a lot of our local animals and plants because of changes in the weather” (FGD-H1).

Food Aid Provision and Security: Except for Herat City, most of the province suffers from insecurity due to political anti-government and general criminal activity. There have been a number of initiatives to address agriculture related issues by CHA, DACAAR, CRS, and FAO. However, one key informant pointed out that without political stability the progress on most of these efforts is likely to be limited due to prevalent lawlessness (KI-H1).

Local Responses to Climate Change: “We cannot do anything for our people. We have a lot of plans to do things but we do not have the capacity to implement them” (KI-H6). The current problems with agriculture were summed up by the respondents as: Lawlessness, bad planning or no planning, ignorance of the ecosystems that support farming, poverty and illiteracy, absence of programmes to rehabilitate farmland and natural resources, droughts, persistent conflict, shortage of natural resource experts, and insufficient research (KI-H6). “If we can address all these issues simultaneously, it is not unreasonable to expect that we will reconstruct the agricultural sector in 15 years” (KI-H4). A number of respondents reported the existence of “food for work” programmes and other assistance schemes such as deeper wells for drought-stricken areas. While these projects were viewed as necessary by some respondents to alleviate hardship for a limited number of people, others argued for a more long-term vision that consisted of introducing new or modified seeds and fertilizers and investigating new crops such as Saffron as something that may be more suitable to arid areas (KI-H2, KI-H4).

Nangarhar

Located in the eastern Afghanistan, Nangarhar province borders Kunar and Laghman provinces to the north, Kabul, Logar, and Paktia provinces to the west, and Pakistan to the east and south.

The province has an estimated population of 1.34 million out of which around 87 percent lives in rural areas. The population is 51 percent male and 49 percent female. Jalalabad is the capital city with a population of just over 200,000 residents. There are 21 districts in Nangarhar the most populated of which after Jalalabad are Behsood (119,000), Khogiani (111,000), Acheen (95,000), and Surkhrud (92,000).

Basic Socioeconomic Data:

- **Main economic activities:** Agriculture, trade and services, livestock, non-farm labor, and remittances are the key sources of income in the province.
- **Main natural resources:** Nangarhar has abundant water resources and natural forests. Also, significant deposits of marble have been found in the Khogiani district.
- **Inflation:** The inflation rate in Nangarhar was 22.9 percent in for 2007/8 and 1.1 percent in 2008/9. The national figures for these years are 22.5 percent and 4.9 percent, respectively.
- **Poverty data:** According to the NRVA 2007/08, the poverty rate for Nangarhar is in the range of 31-43 percent. The national figure for poverty rate is 36 percent.

The village of Fateh Abad in the District of Surkh Rod is located in north of the Nangarhar Province and has an estimated population of around 92,000.⁵² The highlights from the analysis of the interviews and focus group discussions are as follows.

Food Security: “As long as anyone can remember, we have had problems with food shortage. Even our fathers and grandfathers tell us stories about their hardships to find enough food to feed themselves and their families” (FGD-N4). The change in climate was noted as having been the most severe in the last 10-15 years. There were numerous cases of farmers with sizable plots of land who had abandoned the land for work in Jalalabad. The relative assurance of working 2 or 3 days per week for a daily wage of just over 100 Afghanis was preferable to putting time and energy into farming with a risk of losing everything to drought or flood.

Climate Change and Loss of Human Capital: A large number of people have moved out of these communities to the neighbouring Pakistan for work. Unlike the case with the migrants to Iran from Balkh, there were no reports of addicted returnee migrants in Nangarhar, only concern about losing young able-bodied family members to hard labour abroad.

Climate Change and Loss of Natural Capital: All those interviewed reported numerous cases of desperate farmers selling off land or farm animal for a fraction of the market value so as to relieve immediate food-related needs of their families. One immediate implication has been a change in the dietary makeup of the families who no longer have access to dairy products. Also, it was reported that trees continued to be cut down by the many desperate households for winter or cooking fuel or to sell.

Food Aid Provision and Security: Focus group participants reported that in the more remote parts of Nangarhar with access to water, those who control the water do not follow orders from the Department of Agriculture to release water to drought stricken areas but use it, instead, to irrigate poppy fields with no one to deter them (FGD-N2).

⁵² UNFPA (2006)

Local Responses to Climate Change: Similar to the Balkh case, numerous focus group participants and a number of key informants complained about deep wells being dug by the richer farmers or by aid agencies without taking into account the ecological consequence of depleting groundwater resources or ensuring that water was being distributed fairly among all those who needed it. Commenting on the response to date, one key informant argued for an adaptive approach to dealing with the consequences of climate change: “Now that we know the weather patterns have changed, we have to change too. We need new seeds and different farming methods so we can continue to farm despite the changed conditions” (KI-N3). Despite the hardships caused by changes in the weather patterns, many farmers continue to produce crops, sometime in excess of their own needs. However, since there are insufficient or no facilities to store the excess crops, the crops are either sold cheaply or spoil and eventually fed to animals. A number of farmers asked for assistance in building storage or other facilities to help them make better use of their excess produce.

In addition to the issues raised above, there were concerns about the nature of aid being provided to the rural communities. According to one key informant, “... if we give every destitute person a bushel of wheat, we give people no incentive to help themselves and they very quickly come to expect handouts and aid from the international community because it is much easier than farming” (KI-H6). Mechanization and more efficient ways of planting and watering were offered as the more effective way of helping the communities to help themselves.

Also, a number of interviewees and focus group participants pointed out that availability of food was not a problem but the ability to buy was because without the ability to farm there was no reliable source of income. Some took exception to having to pay for crops in the market that they could grow themselves for a fraction of the price. Similarly, for those that continued to grow crops and keep animals, the costs of some inputs or services were prohibitively high. The few farmers with livestock complained that they could not afford the cost of pay for veterinary services, for example.

Much of the agricultural activity by smallholders utilizes primitive tools. If drought results in loss of oxen or other farm animals that could be used to till the land, the farmers do the tilling themselves and often resort to using their children for farm work at the expense of sending them to school.

The next section highlights the key findings from the data presented in this section.

Food Security and Climate Change in Afghanistan – Key Findings

Based on the review of the available literature, the interviews with key informants, and the focus group discussions, there appears to be widespread appreciation of the (potential) outcomes and consequences of climate change. On numerous occasions during the interviews and focus group discussions references were made to loss of groundcover, the early melting of the snow on mountain peaks during the warmer months, danger of floods due to unseasonal and excessive rain and/or snow melt, loss of ground cover, and a lowering of ground water resulting in digging ever deeper wells for water. More importantly, the vast majority of those engaged for this research pointed to the urgency of the situation and the need to alleviate

immediate needs while planning for the longer term. The general sentiment, however, is one of despair and lack of confidence in the existing institutional arrangements to overcome these challenges.

By far the main trigger for food insecurity is the unpredictability of weather patterns such as low or unseasonal precipitation. One cannot attribute all the fluctuations in weather patterns to climate change, however. Given the mostly arid geography of Afghanistan, living with climatic fluctuations and water scarcity is very much a central feature of existence. In the event of acute weather change, the chain of events that sets in is one of food insufficiency for domestic consumption, absence of surplus produce to generate household income and thus an inability to purchase foodstuffs which, by all accounts, are widely available though inaccessible for the cash strapped poorer rural households. If the projections about the severity or reality of climate change are true, it is very likely that that cumulative impact of climate change will undermine livelihood and food security in vast swathes of the rural population.

The main sources of income for rural households are selling excess agricultural produce, selling others' excess produce for a small margin, share cropping, making handcrafts, or undertaking casual work in larger cities or neighboring countries. The rural households at the study sites reported that they grew as much of their own food as possible. The foodstuffs needed but not grown on the farm are often obtained through bartering with other farmers or through sales in local markets, the proceeds of which are used to purchase additional food items. If the families have not had excess produce to sell or store for own consumption during the winter months, male family members often migrate for seasonal work. The only other source of income, apart from selling own produce and casual / seasonal labour is remittances sent by family members who have moved away permanently to cities nearby or to other countries. However, out-migration does not always result in additional income for the family. Also, the more permanent moves away from the farmlands almost always result in loss of on-farm productive capacity and land abandonment, sometimes beyond reclaim without external assistance.

In the event that three key features of climate change (droughts, unseasonal precipitation, and significant temperature changes accompanied with high winds) persist, there is likely to be irreversible damage to communities that rely on agriculture as the main source of food and income. Climate change-related impacts tend to set in motion processes that ultimately break down social structures:

- Forced migration of able-bodied rural household members in search of work often results in loss of human capital and potentially creates new social problems such as drug addiction, which afflicts many rural young men who go to Iran for seasonal or longer term casual labor, for example.
- Loss of natural capital such as productive land and animals and selling off household assets to purchase food ultimately displaces the affected household as all ties to land and the means to work the land are lost.
- The system of mutual aid that characterizes and binds together rural community households the world over, and acts as a deterrent to temporary hardships, is weakened and ultimately destroyed with persistent hardship, loss of land, and loss of assets and income.
- Irreversible change occurs in factors of production, particularly land which often takes up to 5 or 6 years of timely rain and non-extreme temperatures to return to full production after one year of drought.
- Indefinite dependency on international humanitarian aid as the sole source of livelihood.

In Afghanistan, as in most other places, the most stable social institution is the family. Evidence from the study sites suggests that even tightly knit families are disintegrating due to persistent changes in weather patterns, causing a breakdown of the link between livelihoods and agriculture.

Many rural communities have had to cope with persistent food insecurity for many decades beyond the last 30 or so years of conflict. The hunger-stricken rural communities are focused mostly on meeting immediate food needs. There have been, for example, a number of cases of illness due to the consumption of aid agency-provided genetically modified seeds by desperate farming households who then became ill due to the chemical composition of the seeds. These cases point to the urgency of food relief but also raise a number of concerns about the sustainability of indefinite food provision through humanitarian aid, creating aid dependency among the recipients of food aid, and potentially creating additional disruption in ancient ecosystems by introducing GMOs.

The persistent food production crisis in Afghanistan calls for a more coordinated and systematic approach to agricultural assistance and development. In plans to alleviate adverse climate change-related impacts on rural communities, there is a need to take account of the time needed for most of the new agricultural production methods to become established. To illustrate, the establishment of saffron, a traditionally recognized and ecologically suitable crop, has taken over fifteen years of tireless work by DACAAR and ICARDA to show signs of becoming established. The length of time required for the lesser-known or new crops to become established is likely to be much longer.

There is ongoing, and in many places, urgent need for humanitarian aid. However, many of the key informants pointed out that aid alone cannot provide long-term solutions and that humanitarian assistance had to be a part of a much larger and more integrated program of reconstruction.

A number of interviewees and focus group participants from the three study sites suggested that there was a need for creating industrial parks to provide income sources other than agriculture for the local populations. Regardless of whether or not this is a practical solution, the suggestion does point to a loss of confidence in farming as a means to generate a longer term livelihood.

The recommendations that follow are based on responses invited from the key informants and focus group participants.

Recommendations

- Despite the numerous challenges confronted by international development organizations in Afghanistan, there is an urgent need for longer term development programming particularly if climate change related concerns are to be a feature in development planning. This should include programs on forestry and forest expansion such as those initiated by GiZ in Paktia with longer term benefits for the communities (KI-K2).

- Programming in agriculture by international organizations should be subject to assessment for longer term biological sustainability impacts particularly given the widespread, and uncontrolled, introduction of genetically modified organisms (GMOs) by numerous development aid organizations. A national or international body needs to be set up to monitor the longer term impact of introducing GMOs in Afghanistan.
- Modern farming techniques such as row seeding and drip watering along the lines being piloted by MEDA, for example, need to be prioritized and implemented.
- Water conservation and harvesting techniques based on traditional knowledge and construction methods, rather than large investments in capital equipment and infrastructure, need to be intensified through basic technology transfer and extension work by agricultural aid agencies.
- There is room for building additional milk collection or yogurt making operations in areas where farmers continue to keep livestock. Efforts to build these facilities need to be intensified. There is also much room for additional storage spaces for excess agricultural produce to alleviate food scarcity during winter months.
- A minimum dietary requirement needs to be defined for rural communities to ensure adequate and sufficient calorie intake, particularly by the young, through future food aid projects.
- More plans need to be devised to rehabilitate forests and develop a sense of ownership / stewardship toward natural resources, reconstruct the irrigation channels, and transfer knowledge and technology to increase efficiency and output in agricultural production.
- Innovative and labor-intensive methods need to be adopted for water harvesting. The vast majority of those interviewed for this study express exasperation at how much water is lost as run-off and how useful this water could be in meeting their farming and other needs.
- Many areas with advancing deserts and sandstorms need to be managed so as to control further loss of currently productive land. Introduction of drought resistant traditional crops such as almonds and pistachios to areas suffering from persistent drought or reduced annual rainfall should be an integrated part of the more elaborate program of adaptation to climate change.
- The creation of water and land protection associations and intensified introduction of basic agricultural extension work and technology transfer have proven effective in other contexts. Similar programming in Afghanistan will need to be cognizant of the felt needs of the communities and consistent with the local (social, cultural, ecological) context.
- With increased or improved agricultural production alone, one cannot assume equitable distribution and adequate and sufficient food consumption. Integrated and systemic programming on food security will need to simultaneously tackle food production, distribution, and consumption.

- The recent international interest in climate change-related issues, regardless of whether or not climate change is a scientifically established fact, give legitimacy to provide new opportunities for innovative programming on food security and improving rural livelihoods. Such programming should be designed in full recognition of localized contexts, paying attention to the diverse needs of differentiated populations based on power relations, land ownership, and ethnic and gender issues.
- Future interventions in agriculture in Afghanistan should adopt integrative approaches to design programs capable of simultaneously addressing market issues⁵³ and the recipients' entitlements and capabilities.⁵⁴

Future Research

Comprehensive and in-depth studies on climate change impacts on livelihoods in Afghanistan and how communities cope with and adapt to the related stresses are practically non-existent. Future research, as the basis for informed programming, should attempt to address the following questions:

- How can micro-level studies, such as the one attempted for this paper, contribute to national policies and international intervention in Afghanistan?
- What are the mechanisms through which climate change inflicts damage to population groups across different geographical regions and socio-economic settings in Afghanistan?
- How should potential climate change effects be best integrated into the national and community level policies, programs and projects aimed at reducing food insecurity and livelihood vulnerabilities?
- What successful adaptive and coping strategies to climate change from other countries, which are geographically and socio-economically similar to Afghanistan, can be adapted for Afghanistan?
- How can Afghanistan benefit from globally devised climate change strategies and mechanisms, such as the Kyoto Protocol, given its chronic instability?

⁵³ This notion of "market" can be broken down further into:

- *Labour Markets*: Where individuals sell their labour and are remunerated by wages
- *Finances Markets*: Comprise a broad range of products and services offered by financial intermediaries, such as banking, credit, savings, insurance, pensions, and mortgages
- *Goods Markets*: Where production inputs and outputs are purchased and sold, and
- *Services Markets*: Encompass the delivery, purchase, or hiring-in of services that can enhance or upgrade productive activities.

⁵⁴ Entitlements can be defined as the bundle of resources that an individual or group of individuals commands for the purpose of consumption, production, or exchange. Capabilities can be defined as the individual's or group's freedom and abilities to deploy their resources. See: Gammage, S., N. Diamond, and M. Packman (2005). "Enhancing Women's Access to Markets: An Overview of Donor Programs and Best Practices" United States Agency for International Development - USAID. Available at: <http://www.oecd.org/dataoecd/36/26/38452612.pdf>

Appendix: Case Study Selection

The selection of the districts in three provinces of Balkh, Herat, and Nangarhar was carried out based the following criteria:

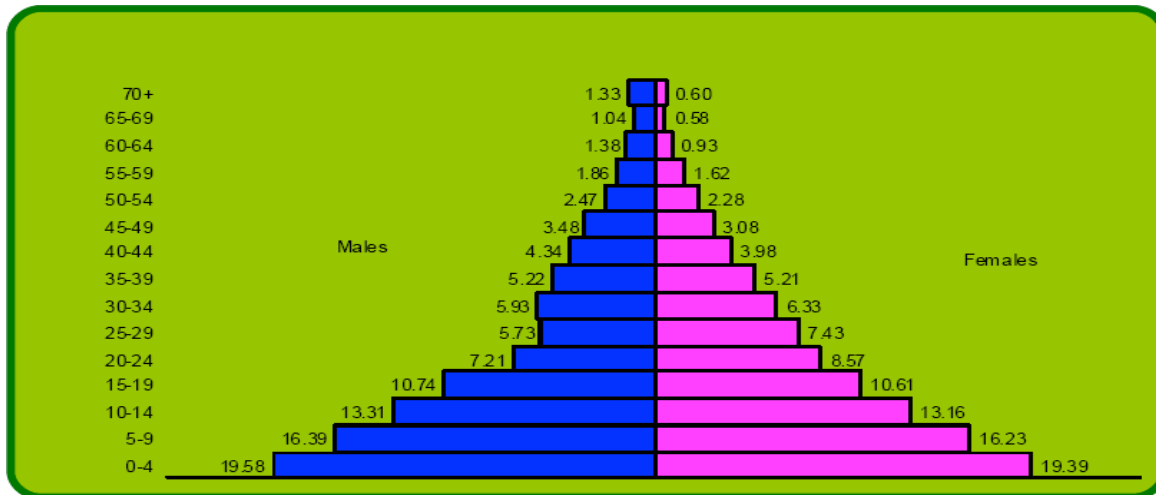
1. Lack or shortage of irrigation systems and dependence of residents on rainfall for agriculture and livestock husbandry
2. A history of being affected by climate change, e. g. more frequent and longer droughts, loss of vegetation cover, lower water table, increased number floods, and adverse changes in livelihoods and food security due climatic changes
3. Potential security risks for the field research team

Expert opinions on choice of sites were sought from three independent sources – FAO senior officials and experts, senior officials from provincial directorates of the Ministry of Agriculture, Irrigation, and Livestock, and APPRO’s local researchers familiar with the geographic areas of interest.

In the remainder of this Appendix, a general profile is provided based on UNFPA (2006) for each of the provinces where the study sites were selected.

Balkh

- Population: 1,141,700
- Languages: Pashto, Dari / Farsi, Uzbek, Turkmen
- Adjusted Age / Sex Distribution:

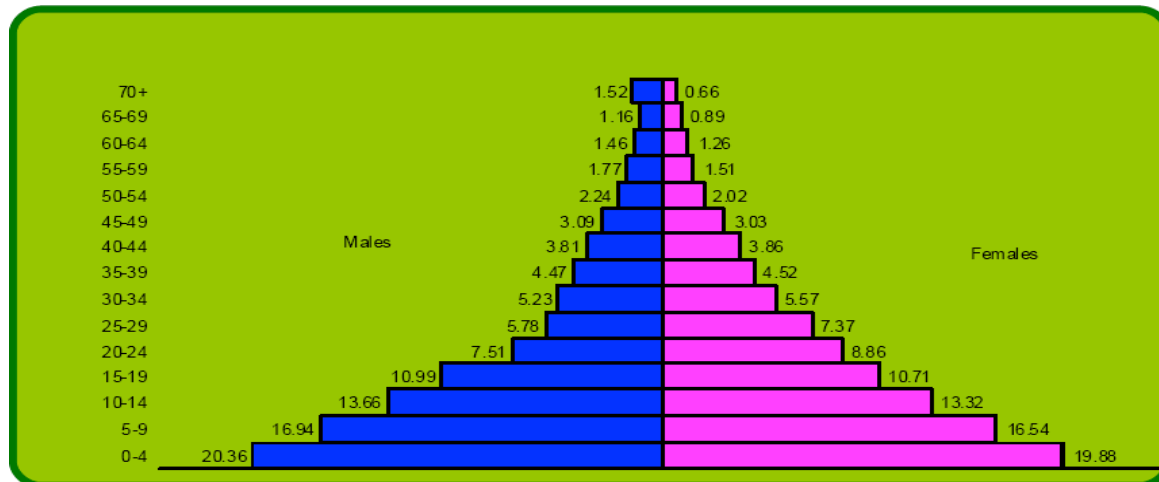


Located in northern region and bordering Uzbekistan to the north, the province has 15 Districts with Mazar e Sharif the provincial capital being home to over 33 percent of the population. Balkh City has just under 9 percent of the population while Sholqara has under 8 percent.

There are rural schools in 285 villages, primary schools in 212, secondary schools in 55, and high schools in 18 villages out of a total of 1,157 villages. Health centres and medicine dispensaries exist in 30 and 51 villages, respectively. Parts of the province, particularly around Mazar e Sharif and Balkh City, have ancient settlement and rich cultural histories with links to Uzbekistan, Tajikistan, and Iran.

Herat

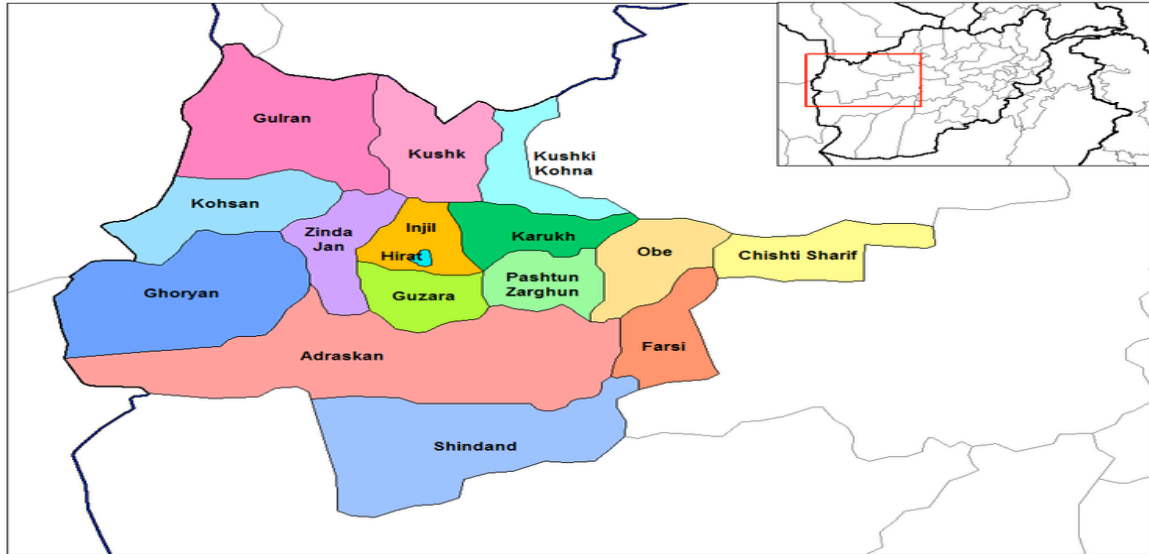
- Population: 1,183,000
- Languages: Pashto, Dari / Farsi
- Adjusted Age / Sex Distribution:



Herat is the second largest province in Afghanistan (after Helmand) in terms of land area. It is located in the western region and has borders with Turkmenistan and Iran. The province is divided between 16 Districts with Herat City being home to 23 percent of the population. The most populous districts after Herat City are Enjil (13 percent) and Shindand (11 percent). There are rural schools in 648 villages, primary schools in 411, secondary schools in 129, and high schools in 38 villages out of a total of 3,109 villages. Health centres and medicine dispensaries exist in 57 and 100 villages, respectively.

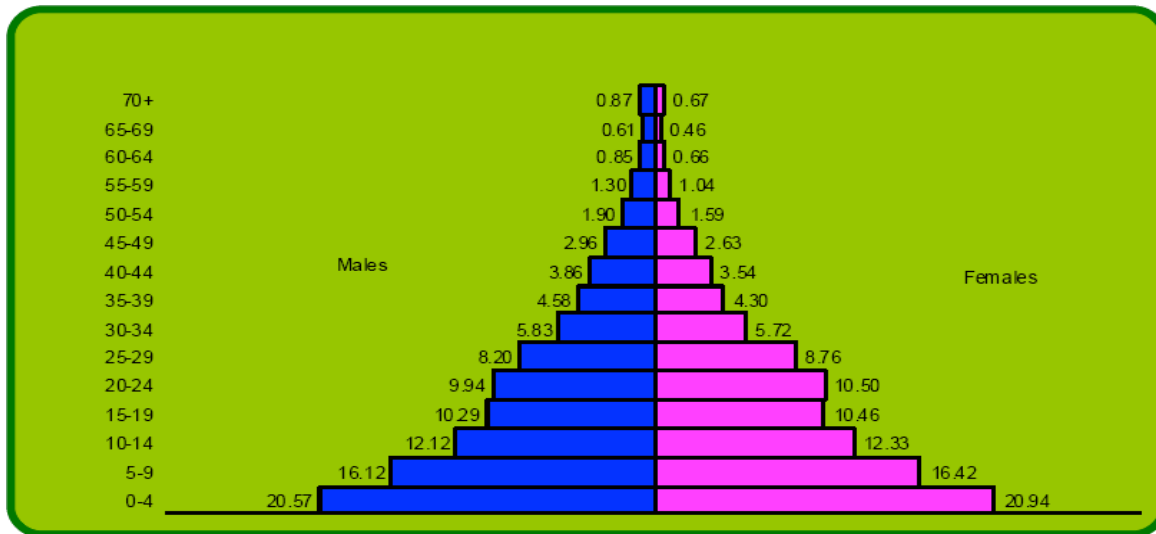
Herat's population has a level of education higher than the national average. The economy is diverse by Afghan standards with a significant element of industrialized production. Traditionally, the City of Herat has been known to have a higher than average level of participation by the general populace in civic affairs. This is manifested in a plethora of civil society organizations in the province, particularly in Herat City. In addition, the province benefits from its geographical location and relative autonomy to collect and keep customs fees on trade between Afghanistan and the neighbouring Turkmenistan and Iran.

Site Selection (Herat): Two districts in Herat were recommended by agriculture experts from the Herat Directorate of Agriculture, Irrigation and Livestock, the Faculty of Agriculture of Herat University, and APPRO's local contacts. Both Kohsan and Kushk districts met the criteria for the study based on available information at the time. APPRO's local research team chose Kushk district after collecting further information about potential villages suitable for this research



Nangarhar

- Population: 1,356,500
- Languages: Pashto
- Adjusted Age / Sex Distribution:



Nangarhar is one of the larger provinces both in terms of area and population. The province is divided between 22 Districts with the central districts of Jalalabad, Behsud, Khugyani, Achin, Surkh Rud, and Bati Kot being home to around 52 percent of the population. There are rural schools in 61 villages, primary schools in 122, secondary schools in 65, and high schools in 41 villages out of a total of 1,400 villages. Health centres and medicine dispensaries exist in 73 and 142 villages, respectively. Compared to other provinces, Nangarhar has a higher than average percentage of the population with access to schools and medical services.

Close proximity to Peshawar in Pakistan has had a positive effect on the economic and social life of the Nangarhar province as a whole. There are very strong trade and cultural links with Pakistan. Nangarhar also has a higher than average rate of literacy.

Site Selection (Nangarhar): Surkh Rod district was proposed as the best site in Nangarhar by all three sources consulted. Other districts proposed were Achin and Shinwar which are located further in the south-east and thus not as secure as Surkh Rod.

