

**Rural Community Vulnerability to Food Security Impacts of
Climate Change in Afghanistan
Evidence from Balkh, Herat, and Nangarhar Provinces**

by
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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Rozbih Mihran

Abstract

Climate change is taking its toll on Afghanistan. Warming temperatures and decreasing precipitation levels over the last fifty years have led to innumerable weather anomalies causing droughts, floods, unseasonal precipitation, falling ground water tables, desertification, and loss of biodiversity. While it is projected that further change in climatic conditions will take place over the coming decades, the impacts of these environmental stresses on the living conditions and livelihoods of Afghans have already been significant and adverse. Among all population groups, rural communities in Afghanistan are particularly vulnerable to the effects of climate change due to their strong dependence on agriculture for living.

This exploratory research used a qualitative methodology to investigate and document firsthand the vulnerability of the rural communities to climate change impacts in the context of food security in Afghanistan. To this end, three villages in Balkh, Herat, and Nangarhar provinces were studied for their exposure to climate change and the communities' adaptive capacity to cope with and avert the climate-related stresses. Additional key informant interviews were conducted to learn about similar issues in other rural regions of the country.

The study found that climate change has substantially contributed to increased food insecurity in the rural communities throughout Afghanistan over the last two decades and that the rural households are facing real challenges to generate income from agricultural activities while taking desperate measures to cope with and adapt to climatic conditions.

Acknowledgements

I am grateful to my supervisors, Saeed Parto and Jim Robinson, for their guidance and support. Without Saeed's help, this work would not have existed. During the difficult times, which were many, he accommodated me and gave excellent advice about my research as well as other matters at hand. Thank you Saeed. Jim has helped and supported me since the beginning of my studies at the University of Waterloo. I have learned a lot from working and studying with him. Thank you Jim. Thanks to Jennifer Clapp for sitting on my committee and providing valuable comments.

Many thanks go to my parents; Said Ahmad Mehran and Aziza Ahmady Mehran; my sisters, Weeda, Leeda, and Yalda; my special person, Shakeela; and my friends, Shoaib, Kais and Ali. I am very grateful to have you in my life. Your constant and generous support encourages me and keeps me going.

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I dedicate this work to my parents.

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List of Abbreviations

| | |
|----------------|--|
| 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 |
| DAI | Development Alternative Inc. |
| 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 Organism |
| HLP | Horticulture and Livestock Project |
| ICARDA | International Center for Agriculture Research in the Dry Areas |
| IFHOPE | International Foundation of Hope |
| IFPRI | International Food Policy Research Institute |
| INGO | International Nongovernmental Organization |
| IPCC | Intergovernmental Panel on Climate Change |
| IRD | International Relief and Development Inc. |
| MAIL | Ministry of Agriculture, Irrigation and Livestock |

| | |
|---------------|---|
| MEDA | Mennonite Economic Development Associates |
| MoPH | Ministry of Public Health, Afghanistan |
| MRRD | Ministry of Rural Rehabilitation and Development |
| NAPA | National Adaptation Program of Action |
| NCSA | National Capacity Self-Assessment |
| NEPA | National Environmental Protection Agency |
| NERAP | National Emergency Rural Access Program |
| NGO | Non-governmental Organization |
| NPO | Norwegian Project Office |
| NRVA | National Risk and Vulnerability Assessment |
| NSP | National Solidarity Program |
| RRAA | Rural Rehabilitation Association for Afghanistan |
| UN | United Nations |
| UNEP | United Nations Environment Program |
| UNFCCC | United Nations Framework Convention on Climate Change |
| USAID | United States Agency for International Development |
| WB | World Bank |
| WFP | United Nations World Food Program |
| WMO | World Meteorological Organization |

Introduction to the Study

Extreme weather events such as droughts, heavy rainfalls, low and unseasonal precipitations, and higher frequency of hot days and nights in Afghanistan and in the region are considered a strong indication of change in climatic conditions by climate change experts. In a press release in May 2007, the United Nations Environment Programme expressed concerns over potential climate change impacts on various sectors in Afghanistan and the need for future adaptation plans to cope with rising issues. The press release specifically mentioned the agriculture sector as vulnerable to climate change.

To this end, the present research focuses on this particularly vulnerable area and aims to better understand the mechanisms through which shifting climate patterns affect rural agriculture and livelihoods in Afghanistan. The initial work for a similar research project, funded by the Oxfam Novib, started by the author, and Saeed Parto, in mid 2009 when he was working as a researcher for the Afghanistan Public Policy Research Organization in Kabul, Afghanistan. The scope of the project, which ended in the early months of 2010, was limited to serving the Oxfam Novib with its country level food aid policies and programs. Despite the limited scope of the project, however, a sufficient amount of primary data was collected from the study sites to set a context for a broader and more theoretical work. The research in hand is an outcome of the subsequent work.

Research Purpose

This study uses qualitative research methods to explore implications of changes in global and regional climate for rural livelihoods and specifically food security in some of the most vulnerable communities in Afghanistan. It is expected that the findings from this research will help with a better understanding of vulnerabilities of rural communities' livelihoods to adverse impacts of climate change and therefore contribute to more targeted and effective policy and program options aimed at addressing such issues.

Research Questions

The main question for this research is: *How does climate change impact food security in rural Afghanistan and how do the rural communities cope with these impacts?*

Additionally, in order for the study to have a comprehensive answer for the main question, answering the following questions is essential:

- What is food security and who is food-insecure in Afghanistan?
- What are the main climate change trends and impacts experienced in Afghanistan?
- How does climate change affect food security?
- How do these communities cope with and/or adapt to impacts of climate change on their livelihoods?

Objectives

To address the above question this study was organized around the following objectives:

- A review of the literature on climate change and food security with a focus on vulnerable communities in mainly rural and agricultural areas

- Investigate the manner in which socio-economic and climate change-related factors affect rural livelihoods and food security as observed through food availability, stability, access to food, and food utilization
- Analyze data from secondary (reports and other documents) and primary (interviews and focus group discussions) sources to understand main climate change impacts on rural living and livelihoods in Afghanistan and particularly on food security in these areas.
- Generate recommendations based on findings from case studies and secondary data for future programming on food security and climate change in Afghanistan

Methodology

To meet the objectives for this study the following work was undertaken:

- A review of reports and programs by the governmental and non-governmental agencies on climate change, food security, and agricultural development in Afghanistan and globally
- A series of semi-formal interviews with key informants in Kabul and the sites of study, i.e., Balkh, Herat, and Nangarhar provinces
- A series of focus group discussions involving rural households and Community Development Councils at the study sites

The data from primary and secondary sources were analyzed to generate the findings and the recommendations for this study. 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 IV for site profiles).

The primary data was collected from December 10, 2009 through to January 19, 2010. There were 23 semi-formal interviews with key informants in Kabul (5), Balkh (6), Herat (6), and Nangarhar (4). Also, on-site focus group discussions were held with rural household members in the three provinces. On each site focus group meetings were held with one male CDC (Community Development Council), one female CDC, one randomly selected group of male farmers, and a randomly selected group of female members of farmer families. (See Appendix II and Appendix III for more details on key informants and focus group participants).

Limitations

A comprehensive study of climate change and food security requires inclusion of an enormous number of factors: social, economical, political, scientific, environmental, and many more. An attempt to thoroughly investigate and understand such aspects of the climate change and food security in Afghanistan can easily overwhelm the scope of this research. This study aims to only explore and integrate scattered available data with evidence from a limited number of places in the country. Although the study reveals much about the mechanism through which climate change affects rural areas in Afghanistan, it falls short of being sufficiently extensive and in depth in order to set premises for practical future action on the ground. It, however, helps prioritize areas where future investigations and studies should focus.

A major limitation of the study is lack of data and studies, both qualitative and quantitative, on climate change and systematic studies of food security in Afghanistan. Available secondary data is seldom reliable and often not very accurate. There are almost no peer-reviewed publications on either of these topics in the context of Afghanistan specifically.

Another important limiting factor in conducting this study is unfavorable security conditions. While many villages in southern and eastern Afghanistan are insecure, an increasing number of them in the north are also experiencing instability and growing conflict. For study site selection, all provinces and districts known to be insecure are avoided. This includes the entire southern, southwestern, most of the eastern, and most of the central regions of the country.

Literature Review and Conceptual Framework

Climate Change and Its Impacts

The Earth is warming and the serious doubts over this fact and that the human emissions of greenhouse gases such as carbon dioxide (CO₂) are the primary cause of it are disappearing in the face of mounting evidence from around the world (Lobell and Burke 2010). Global and regional shifting of climate patterns and their potential effects on the biophysical and human systems has become an important topic over the recent decades. It is widely argued by most climate scientists, a large number of academic and non-academic international institutions, as well as many well-known politicians that the bulk of the changes resulting from global climate change are, and will be, adverse in nature.

Observed effects of climate change have been documented in the IPCC assessment reports. There is extensive evidence of responses of cryosphere components; such as mountain glaciers and ice caps, floating ice shelves and continental ice sheets, seasonal snow cover on land, frozen ground, sea ice and lake and river ice; in the form of reduction of snow and ice masses in due to enhanced warming (Rosenzweig et al 2007). Biological systems have also gone through changes due to shifting climate according to Rosenzweig et al (2007). These include shifts in plant and animal ranges pole-ward and higher elevation; reductions and increases within population sizes of some animals and plants; changes in life cycle events, such as blooming, migration and insect emergence; and effects on changes in species at different speeds and different directions causing a decoupling of species interactions, for instance predator-prey relationships.

Reporting in the IPCC's Fourth Assessment Report, Rosenzweig et al (2007) also cite evidence for changes in human systems. According to their report, climate change has caused more frequent and intense extreme weather events in some regions. A number of changes in socio-economic systems are attributed partially to climate change. Examples include damages due to droughts related to persistent low rainfall in the Sahelian region of Africa and increased precipitation extremes and floods in North America.

As for the future projections of global climate trends and their potential effects, it is expected that under a business as usual scenario, green house gas emissions could rise by 25 – 90 percent by 2030 relative to 2000 and the Earth could warm by 3°C this century (UNFCCC 2007). Even with an increase in temperature of 1 – 2.5 °C, IPCC predicts, according to UNFCCC (2007), 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.

Furthermore, 250 million people in Africa could be exposed to greater risk of water stress by 2020. And, by the turn of the century, millions of people will suffer from drought, water scarcity and floods resulting from retreat and melting of the glaciers as well as sea level rise leading to inundation of coasts worldwide.

Although IPCC's reports form the base data for measuring global climate change and its impacts among most academic circles, not all scientists agree with its case of human induced climate change or the degree to which human factors are causing it.

The implications of climate change for various socio-economic sectors vary but are of significant importance. The livelihoods of rural communities in many developing countries are strongly linked to agriculture and animal husbandry. This link in turn ties the communities' socio-economic conditions to availability of natural resources and suitability of environmental conditions to use those resources. Depending on the degree of sensitivity, adaptability, coping capacity and resilience of these livelihood systems to environmental changes, the impacts of such changes can have substantial implications for the quality of life and well-being in those communities.

Nearly half – 2.5 billion – of the economically active population of the developing countries relied on agriculture for its livelihood in 2005 (Nelson et al 2008). Research shows that due to climate change most important crops will have a decline in their yields, particularly in South Asia. Additionally, it will result in price increases for rice, wheat maize, and soybeans leading to higher meat prices. By 2050, calorie availability will decline relative to 2000 levels throughout the developing world. This will increase 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 (ibid).

Climate Change and Food Security

According to the Food and Agriculture Organization, “Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 2002). Schmidhuber and Tubiello (2007) (also Stamoulis and Zezza

2003) this definition comprises four key dimensions of food supplies: availability, stability, access, and utilization. Availability refers to sufficiency of food, i.e., the overall ability of the agriculture system to meet food demand. Stability relates to individuals who are at high risk of losing, temporarily or permanently, their access to the resources needed to consume adequate food. Access by individuals to adequate resources to acquire appropriate food for a nutritious diet makes the third dimension of food security. The last dimension, utilization, encompasses all food safety and quality aspects of nutrition and its sub-dimensions. Of the listed aspects of food security, three – availability, access, and utilization – are widely accepted in the literature.

Lobell and Burke (2010) maintain that understanding the determinants of these three aspects of food security – availability, access, and utilization - and how climate change might affect each is essential to assessing the potential effects of climate change on food security. While these authors explore climate change impacts on these three pillars, Schmidhuber and Tubiello (2007) include stability in their study of impacts as well.

Food availability is strongly linked to agricultural production and subsequently subject to climate change impacts. The common mechanisms through which global warming¹ can affect agriculture are increased atmospheric carbon dioxide concentrations, which will improve crop-growing conditions in some areas, likelihood of intensified pest and disease problems leading to crop losses, and drier conditions and increased water stress affecting crop yields (Fischer et al 2002).

¹ In this research, the terms “global warming” and “climate change” are used interchangeably.

Climate change will have potentially large effects on both agricultural yields and potential cropped areas. The mitigating factor for adverse affects will be global food trade acting as a potential buffer when countries trade and when climate change shocks are not uniform across space (Lobell and Burke 2010). Depending on the projected scenarios, the rise in temperatures in temperate latitudes are expected to bring benefits predominantly to agriculture by expansion of areas potentially suitable for cropping and increasing the length of the growing season, resulting in rise in crop yields (Schmidhuber and Tubiello 2007). This 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 (IPCC 2007a). 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 grassland becoming increasingly arid. Higher temperatures are also likely to expand the range of many agricultural pests and increase the ability of pest populations to survive the winter and attack spring crops (IPCC 2001; IPCC 2007b).

With an increase in frequency and severity of the extreme 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 risk of landslides and erosion damages, therefore adversely affecting the stability of food supplies (Schmidhuber and Tubiello 2007). According to Bruinsma (2003), the majority of areas

where such effects will likely be felt is in sub-Saharan Africa and parts of South Asia. This points towards the fact that the poorest regions with highest level of chronic undernourishment will also be exposed to the highest degree of instability in food production.

Lobell and Burke (2010) argue that “determining the effects of climate change on food access for a given household therefore requires addressing the role of climate change in relation to four basic questions: how households earn their income, the nature of their exposure to food prices, how well integrated their local food markets are with global markets, and their broader longer-run prospects for livelihood improvement.” Depending on a household’s source of income, climate change may have a variable impact on its access to food. Rural households in the developing world depend on agriculture to a significant extent for their livelihoods. The poorer the family the higher this dependency is. A decline in agricultural productivity suggests adverse effects on the family income and quality of life (Davis et al 2007). Climate change is likely to play a key role in how these communities dwell over the coming decades.

Although provision of dietary energy is a primary purpose of food, and widely used undernourishment indicators such as those of FAO rely heavily on estimates of calorie consumptions to estimated food security trends, food also provides protein and various nutrients crucial for bodily functions (Lobell and Burke 2010). Insufficient intake of these nutrients plays an important role in global illness and death from infectious disease, a fact increasingly being recognized (Black 2003). The consumption of micronutrients could directly be affected by climate change in three main ways: “by changing the yields of important crop sources of micronutrients, by altering the nutritional content of a

specific crop, or by influencing decisions to grow crops of different nutritional value” (Lobell and Burke 2010). Farmers could also potentially alter planting decisions in ways that change micronutrient availability by changing crops in response to climate change impacts (Rozenweig and Binswanger 1993).

Conceptual Framework: Climate Change, Vulnerability and Food Security

All components of food security, availability, stability, access, and utilization are subject to impacts of climate change as described in the above section. The extent to which communities can be affected by, or be vulnerable to, such changes depends mainly on the community's exposure and its adaptive capacity (Smit and Pilifosoa 2003).

Many definitions for vulnerability exist in the literature (see Cutter 1996; Brooks 2003). There is, however, a broad agreement that "it refers to the susceptibility to harm in a system relative to a stimulus or stimuli (Ford and Smit 2004)." The literature on vulnerability has two major perspectives: biophysical and social (ibid).

According to Brooks (2003), the biophysical approach views vulnerability as being determined by the nature of physical events to which human system is exposed, the likelihood or frequency of occurrence of the event, the extent of human exposure and the system's sensitivity to the impacts of a particular event. In this approach people are treated as being vulnerable owing to their presence in hazardous locations.

The social perspective, on the other hand, focuses primarily on the human factors or drivers of vulnerability such as the social, political, and economic conditions that make exposure unsafe or challenging (Ford and Smit 2004). Marginalization, inequality, the presence and strength of social networks, poverty, and food entitlements are the primary factors considered in this work (Adger 2000; O'Brien and Leichenko 2000; Adger et al 2002; Pelling 2002).

Exposure is a property of a community relative to climatic conditions. Determining factors in exposure are the climatic conditions and the nature of community itself. While

“climatic characteristics include magnitude, frequency, spatial dispersion, duration, speed of onset, and temporal spacing of climatic risks, relating to temperatures, precipitation, and wind;” the nature of the community relates to its location relative to climatic risks (Ford and Smit 2004).

A community’s adaptive capacity is its potential or ability to address, plan for, or adapt to exposure (Smit and Pilifosova 2003). It relates to communities’ resilience, resistance, flexibility, and robustness (Smithers and Smit 1997). The influencing factors of adaptive capacity are economic wealth, social networks, infrastructure, social institutions, social capital, experience with previous risk, the range of technological adaptations available, and the equity of access to resources within the community, as well as other stresses affecting the decision-making environment (Adger and Kelly, 1999; Smit and Pilifosova, 2001; and Smith et al., 2003).

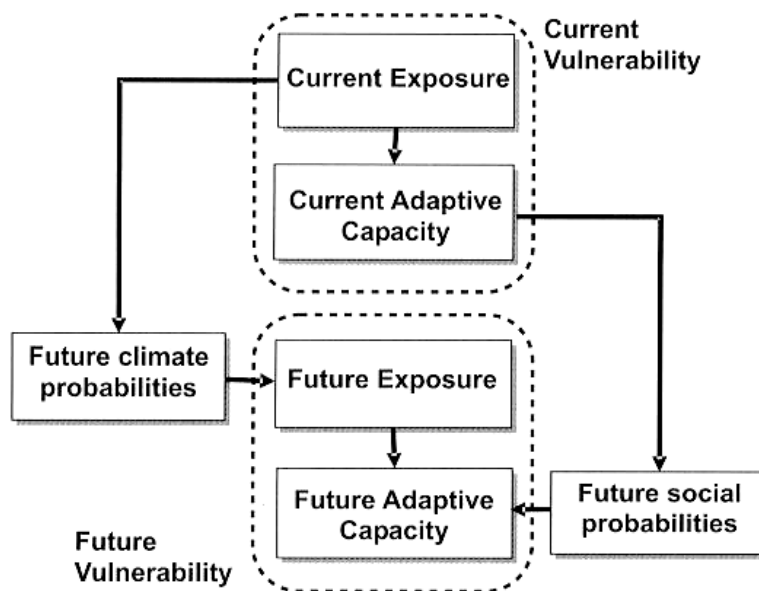
To assess the vulnerability of communities in the Canadian Arctic to risks associated with climate change, Ford and Smit (2004) proposed a framework based on assessing the current vulnerability of the community by documenting current exposures and current adaptive strategies in the first stage and following in the second stage by assessing exposure and predicting future adaptive capacity on the basis of past behavior (Figure 1).

Assessing current vulnerability requires analyzing and documenting communities’ experiences with climatic risks (current exposure) and their adaptive options and resource management strategies to address these risks (current adaptive capacity). To this end, observations, experience, and the traditional and local knowledge of community members are crucial to assessing current vulnerability. Such knowledge can be gained through focus group discussions, interviews, and participant observations. Additionally,

information from secondary sources such as government reports and media articles provide valuable insight into risk and adaptation strategies (ibid).

In the second stage, the assessment of future vulnerability is carried out by analyzing how climate change will alter the nature of climate-related risks and whether the communities' coping strategies will have the capacity to deal with these risks. To assess the future exposure, input from the climate science community is essential to estimate the likelihood of changes in climatic attributes identified by the community. Communities' ability to cope with the estimated future changes can then be determined by examining past responses to climate variability and extremes in order to identify adaptive strategies that will reduce risk (Ford and Smit 2004).

Figure 1. Analytical Framework for Vulnerability Assessment

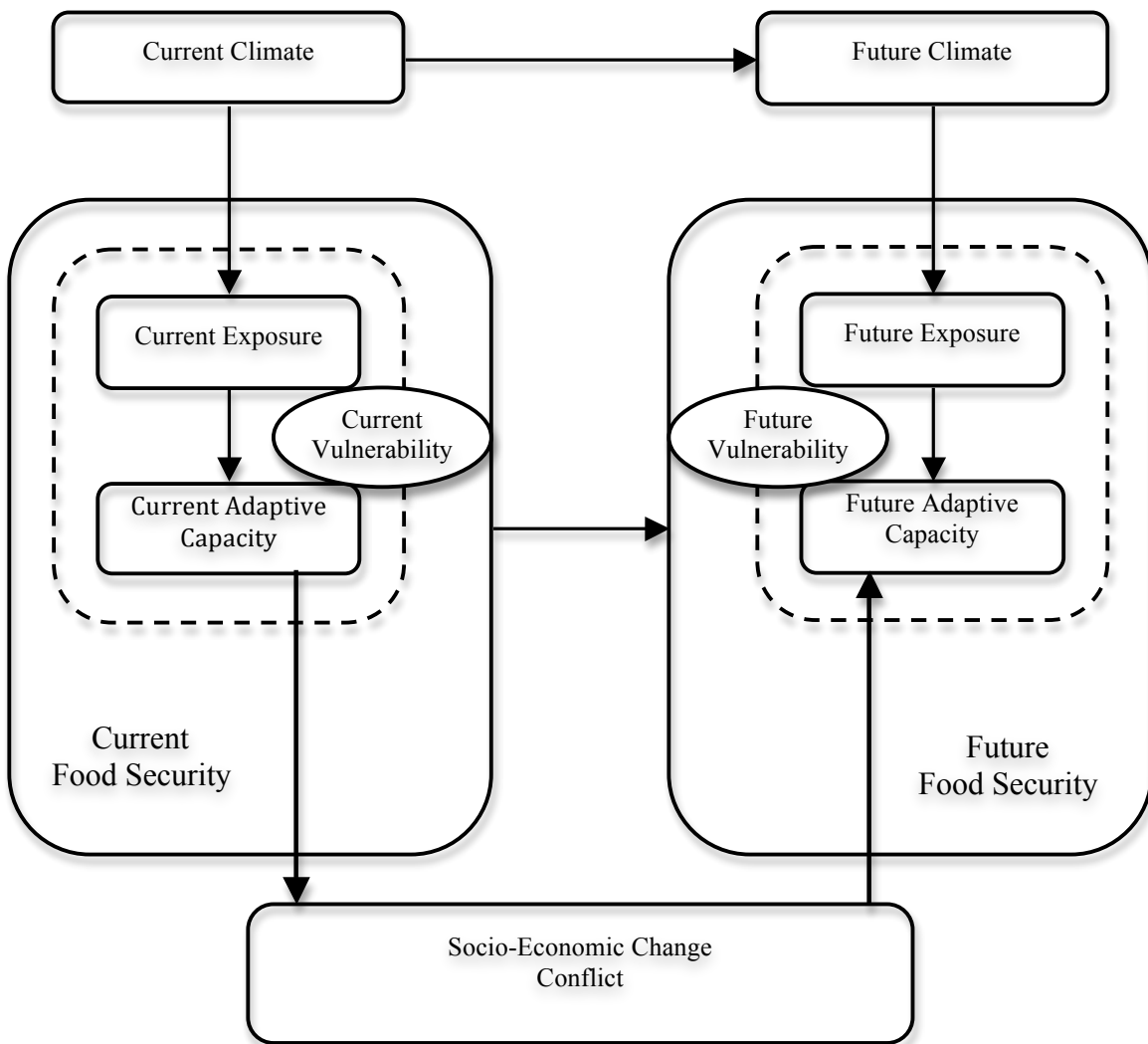


Source: Ford and Smit (2004)

Drawing from discussions in the previous sections and building on Ford and Smit’s analytical framework (2004), a conceptual framework for studying a rural community’s vulnerability to climate change in the context of food security is proposed for this research. The main components of the proposed framework are shown in Figure 2.

Given the specific context of Afghanistan, conflict is an influential factor in shaping socio-economics of communities and therefore it is combined with socio-economic change when moving from one food security state to another.

Figure 2. Proposed Conceptual Framework for Studying Vulnerability to Climate Change in the Context of Food Security



Introduction to Climate Change and Food Security in Afghanistan

South Asia is home to nearly 40 per cent of the world's undernourished population (FAO 2010). 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 20 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 (World Bank 2009a). Along with India, Nepal, and Bangladesh, Afghanistan is one of the most vulnerable countries to effects of climate change in the region in the form of falling crop yields caused by glacier retreat, floods, droughts, erratic rainfall and other climate change impacts (IFPRI 2009).

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 including 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 in the same period.

Climate Change in Afghanistan: Past Trends and Future Projections

Afghanistan is a dry mountainous country with hot summers and cold winters. This gives the country a diverse climate profile across its regions in addition to substantial water resources. Because of the high temperatures in some of its regions many of the agricultural products such as fruits and nuts are of particularly good quality. Historically, Afghanistan has been an agricultural country in which 85 percent of the population depends on this sector directly or indirectly (Savage et al 2009). This, however, is changing as the new generation of the growing rural population finds it difficult to rely on subsistence and small size commercial agriculture. Strong trends of migration to cities and to neighboring countries by younger men in search of work were reported by the communities which participated in this research. This, however, is a reality almost every Afghan knows about. Aside from the obvious factors contributing to these trends, such as prolonged war, fast population growth, and poverty, noticeable patterns of change in climatic conditions causing significant stresses on rural livelihood systems were found by this study to exacerbate the situation.

Anecdotal data suggest higher frequencies of heavy rains and snow, floods, droughts, landslides, and extreme heat events throughout the country. According to Savage et al (2009), who conducted the first study of the socio-economic impacts of climate change in Afghanistan, nearly all of the 34 provinces of the country have been hit with natural disasters such as those mentioned above.

The bulk of agricultural activities have depended on seasonal precipitation as well as on snowmelt at higher elevations during the warmer summer months. 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. Afghanistan is presently experiencing the most severe drought in the living memory (Savage et al 2009).

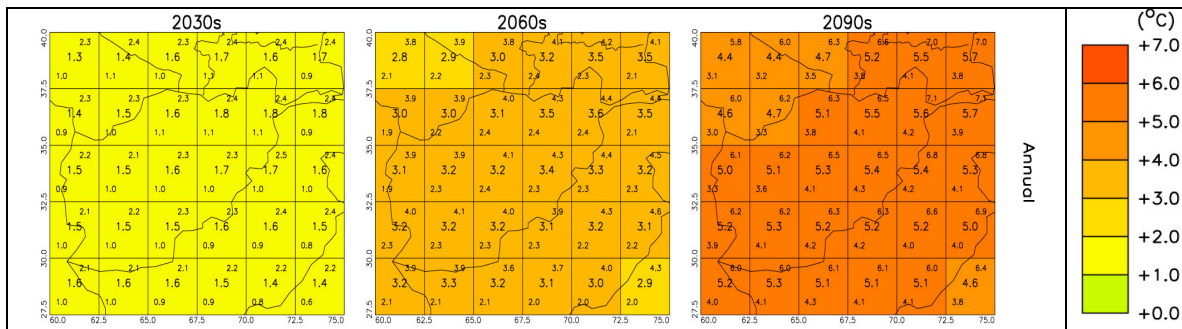
According to the European Union Emergency Humanitarian Aid Decision (European Commission 2006), based on historical observation in Afghanistan, in general regular cycles of around 15 years are observed, during which one would expect 2-3 years of drought conditions. However, in recent years this drought cycle has shown a marked tendency to occur more frequently than the model predicts. Since 1960, the country has experienced drought in 1963-64, 1966-67, 1970-72 and 1998-2006. Declining rainfall over the same period has also exacerbated this situation. The failure of rain-fed crops (estimated to make up to 80 percent of the cultivated land) was a widespread phenomenon and the livelihoods of millions of rural people, mainly in the north, west and central regions of the country, were severely affected (UNEP, GEF and Government of Afghanistan 2008). 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 (Savage et al 2009).

Climate change data for Afghanistan are scarce. Moreover, large parts of the historical datasets were lost during the political turmoil in the country. According to McSweeney et al (2008), who modeled climate change projections for Afghanistan as part of UNDP Climate Change Country Profiles, 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 in every season. 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.

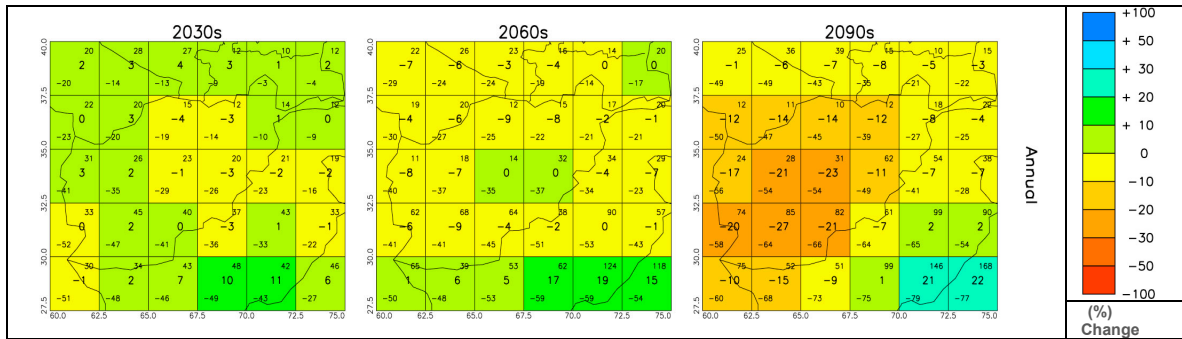
Temperature and rainfall projections for different regions of Afghanistan for the next nine decades are shown in Figures 3 and 4. As these figures indicate, the annual temperatures in the country will rise throughout over the next few decades. The projected changes in rainfall, however, are not linear (Figure 5). 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 Change Projections in Afghanistan Under SRES A2 Scenario for 2030, 2060, and 2090



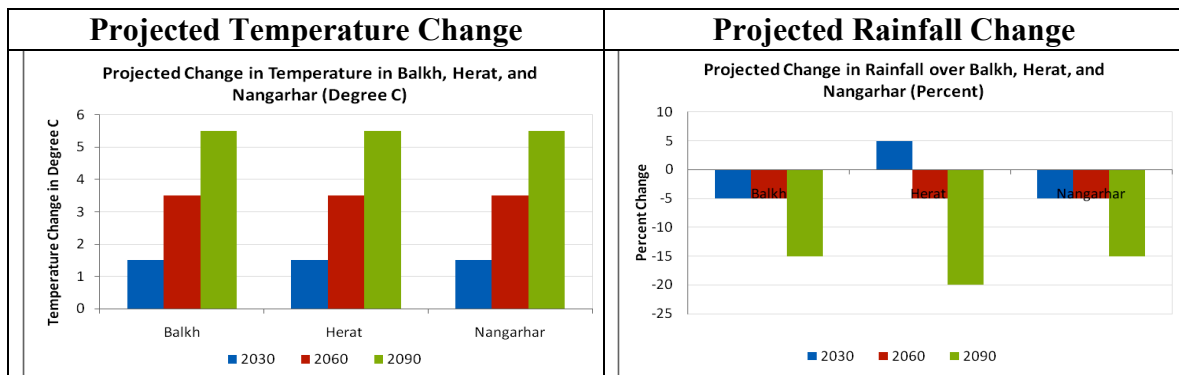
Source: McSweeney et al (2008)

Figure 4. Rainfall Change (%) Under SRES A2 Scenario for 2030, 2060, and 2090



Source: McSweeney et al (2008)

Figure 5. Projected Temperature and Rainfall Change in Balkh, Herat, and Nangarhar Provinces

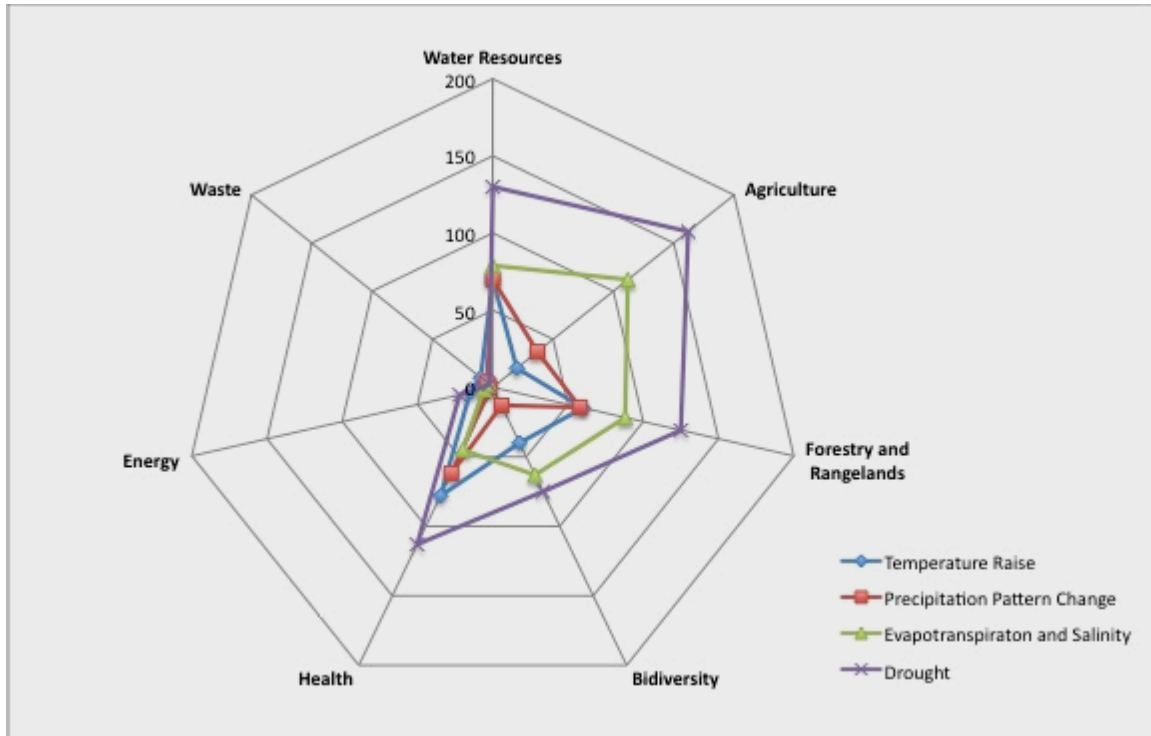


Based on source data from McSweeney et al (2008)

Similarly, a report by NEPA and UNEP (2009) outlines the potential impacts of climate change on agriculture, water resources, and forestry and rangelands as the most vulnerable sectors. Predictions by climate change models suggest drought-related challenges, including the associated dynamics of desertification and land degradation, as the most likely adverse impacts of climate change in Afghanistan. Persistent drought is forecasted to be the norm, rather than a temporary or cyclical event, by 2030. Unseasonal rainfall increases the risk of floods while the general increase in temperatures, though secondary, will increase the risk of more rapid spring snow melt. The combined impact of

these two factors is likely to be land degradation, loss of vegetative cover, and land mismanagement due largely to scarcity.

Figure 6. Sector Vulnerability to Climate Change



Source: NEPA and UNEP (2009)

As Figure 6 indicates, all sectors relying on water availability will face significant challenges over the coming decades. 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.

It is striking that the 2008 version of the Afghanistan National Development Strategy (ANDS) does not contain the phrase "climate change" (Savage et al 2009). Further, ANDS provides no specific strategic provisions for addressing climate change related outcomes. The only strategic effort that comes close to systemically addressing climate

change is the National Capacity Self-Assessment for Global Environmental Management (NCSA) and the National Adaptation Program of Action for Climate Change (NAPA). Funded by the Global Environment Facility (GEF) and prepared by the National Environmental Protection Agency (NEPA) and the United Nations Environment Program (UNEP), NCSA has the following objectives:

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

NAPA's objective is "to serve as a simplified and direct channel of communication for information relating to the urgent and immediate adaptation needs of Afghanistan to the effects of climate change" (NEPA and UNEP 2009:6). Through these programs, profiles for the two priority projects on improving efficiency in water management and use and community based watershed management were developed to serve as pilot projects to 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 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. Out of 652 thousand square Kilometers of total land area, permanent pastures cover 46 percent while only an estimated 12 percent is arable (CSO 2008).

According to Savage et al (2009), 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 capable of adapting. Other groups, such as sedentary farmers and nomads are less vulnerable due to their ability to move in search for new pastures. Casual labourers 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 prolonged and frequent droughts coupled with the prospect of increasing temperatures and lower, unseasonal rainfall is likely to increase 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 or on their own labour on their small plots for food. As such, women and children of poor families are among the most vulnerable to climate change related outcomes that undermine living off the land. A number of the women interviewed at the study sites worried that climate

change driven food shortages would force many families into literally selling their young daughters into marriages for the dowry as a source of temporary financial relief.

Table 1. Afghanistan’s Food Balance Sheet for 2009 (000 tons)

| Crop | Requirements | | | | | Domestic Production | Surplus/ Deficit |
|---------------------|--------------|------------|------------|------------|-------------|---------------------|------------------|
| | Food | Seed | Feed | Loss | Total | | |
| All wheat, of which | 4175 | 319 | 0 | 761 | 5255 | 5064 | -191 |
| Irrigated wheat | | 201 | -- | 508 | | 3387 | |
| Rain-fed wheat | | 118 | -- | 253 | | 1677 | |
| Milled rice | 444 | 21 | 0 | 33 | 498 | 469 | -29 |
| Maize | 52 | 8 | 195 | 45 | 300 | 300 | -- |
| Barley | 26 | 29 | 353 | 72 | 480 | 480 | -- |
| Total | 4697 | 377 | 548 | 911 | 6533 | 6533 | -220 |

Source: Ministry of Agriculture, Irrigation, and Livestock 2009 quoted in (MRRD and CSO 2009)

Wheat is by far the major staple crop produced in Afghanistan. Wheat makes 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. Farmers also grow several types of summer and winter vegetables and fruits such as potatoes, onions, tomatoes, okra, cauliflower, melons, watermelons, apricots, almonds, pomegranates, apples and grapes (MRRD - CSO 2009).

Table 2. Households and Livestock (%)

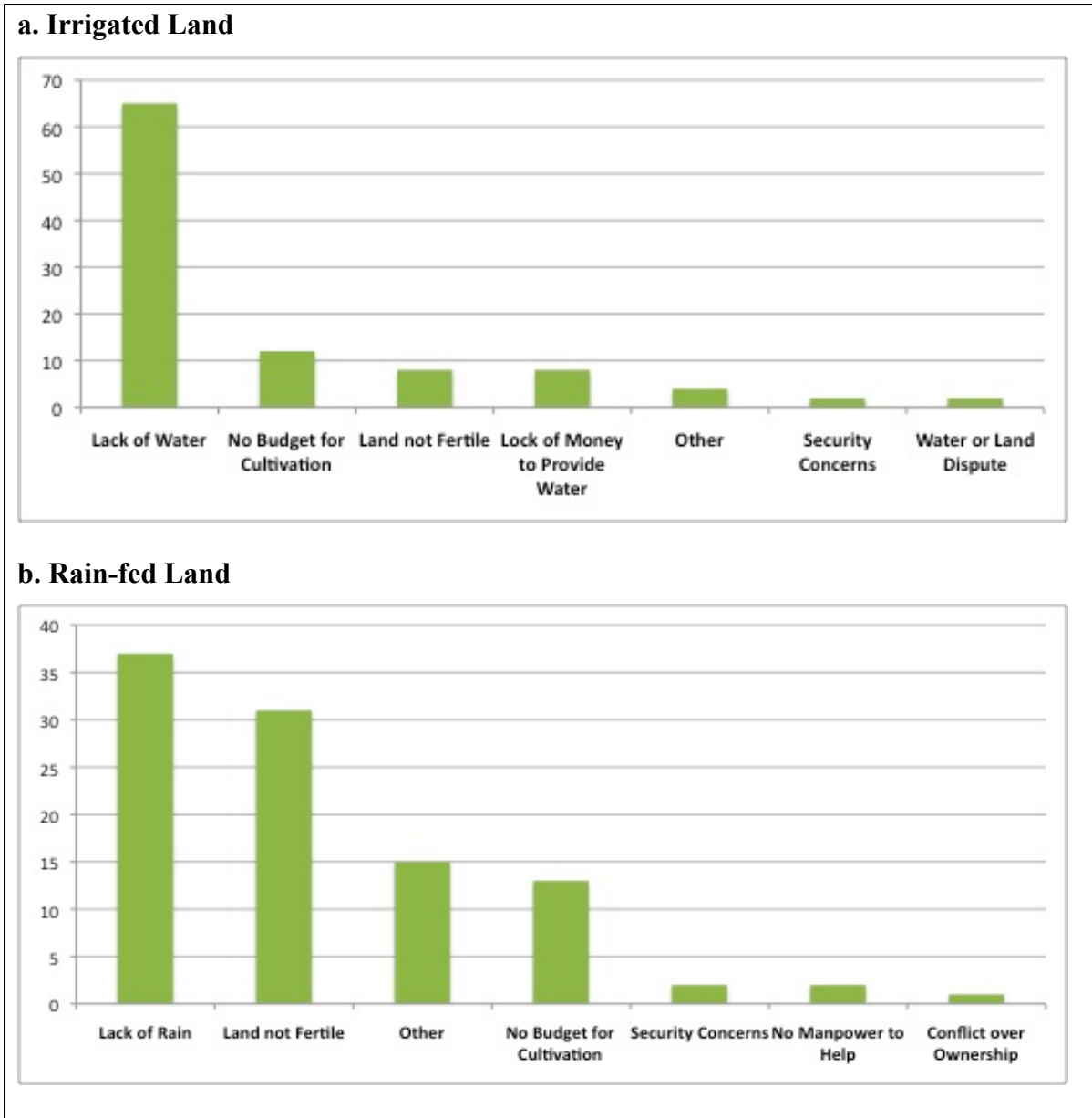
| Livestock-Owning Status, Number of Livestock | Residence | | | |
|---|------------|------------|------------|------------|
| | Urban | Rural | Kuchi | National |
| No livestock | 82 | 21 | 6 | 32 |
| Any livestock, of whom have | 18 | 79 | 94 | 68 |
| Major livestock | 48 | 94 | 99 | 92 |
| Poultry | 78 | 77 | 60 | 76 |
| Major livestock and poultry | 26 | 71 | 59 | 68 |
| Mean number of livestock | 7 | 14 | 67 | 18 |
| Median number of livestock | 4 | 10 | 45 | 10 |
| Total | 100 | 100 | 100 | 100 |
| Mean number of livestock | 1 | 11 | 63 | 12 |
| Median number of livestock | 0 | 7 | 43 | 6 |

Source: Ministry of Agriculture, Irrigation, and Livestock 2009 quoted in (MRRD and CSO 2009)

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 in climate conditions. According to the Ministry of Agriculture, Irrigation and Livestock (MAIL 2009), cited in MRRD and CSO (2009), the average imports of wheat for years 2000-2004 accounted for 33 percent of the total demand.

As Figure 7 illustrates, lack of access to water is by far the most important reason to abandon land and seek other forms of livelihood. Other main reasons for not cultivating are land infertility and lack of money or access to finance for seeds and fertilizer. Interestingly, security does not feature prominently as the reason for the land being abandoned by farmers though arguably it has a significant impact on decisions by governmental and development aid agencies and their programming for the less secure areas of the country.

Figure 7. Main Reason for Leaving Land Fallow: (a) Irrigated Land, (b) Rain-fed Land (%)



Source: MRRD and CSO 2009

Specific predictions about changes in crop yields or impacts of livestock are not documented in the reports reviewed for this study. The NCSA/NAPA final report, however, estimates the degree of vulnerability of agriculture and livestock sectors in

general and of a number of high-value crops such as wheat and rice in particular (Table 3).

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 were unable to access expert opinion. Between August 2007 and August 2008, one in seven households, or 450 thousand, participated in cash-for-work, food-for-work or food aid programs (NRVA 2007/8). Summery reports from the NRVA 2005 and 2007/8 do not include gender-disaggregated figures on food security although the source data contain gender separation among the respondents. Figure 6 provides a mapping based on projections of food insecurity for Afghanistan for 2010.

Table 3. Weighting Matrix for Prioritizing Vulnerable Sectors in Afghanistan

| Sector | Sub-sector | Socio-economic rank | Climatic & climate induced parameters | | | | Sub-sectoral vulnerability index | Vulnerability index |
|----------------------|--------------------------------|---------------------|---------------------------------------|------------------------------|---------------------------|---------|----------------------------------|---------------------|
| | | | Temperature raise | Eva-transpiration & salinity | Precipitation pattern ch. | Drought | | |
| Water resources | Hydro power generation | 6 | -3 | -4 | -1 | -7 | -90 | -338.8 |
| | Underground water | 5.6 | -1 | -2 | -7 | -7 | -95.2 | |
| | Surface water | 6.4 | -6 | -7 | -3 | -8 | -153.6 | |
| Agriculture | Wheat & rice production | 8 | 2 | -7 | -3 | -8 | -128 | -285.8 |
| | Crop production | 6.4 | 2 | -4 | -2 | -7 | -70.4 | |
| | Livestock husbandry | 6.4 | -2 | -3 | 1 | -6 | -64 | |
| | Fisheries | 2.6 | 1 | -4 | -1 | -5 | -23.4 | |
| Forestry & rangeland | Desertification & soil erosion | 4.6 | -3 | -6 | -3 | -9 | -96.6 | -323.4 |
| | Forest & wood production | 6.3 | -3 | -3 | -3 | -5 | -88.2 | |
| | Grassland & forage production | 6.3 | -4 | -7 | -3 | -8 | -138.6 | |
| Biodiversity | Lake & wetlands | 3.9 | -4 | -6 | 1 | -8 | -66.3 | -178.6 |
| | Wildlife & heritage | 4.9 | -4 | -6 | -3 | -6 | -93.1 | |
| | Migration of aquatic species | 1.6 | -2 | -3 | -1 | -6 | -19.2 | |
| Health | Incidence of tropical diseases | 5.6 | -6 | -2 | -3 | -7 | -100.8 | -284 |
| | Diseases affected by disaster | 3.6 | -4 | 1 | -2 | -7 | -43.2 | |
| | Access to fresh water | 5.6 | -5 | -6 | -6 | -8 | -140 | |
| Energy | Primary energy production | 4.3 | -1 | -1 | 0 | -1 | -12.9 | -46.5 |
| | Thermal electricity production | 3.6 | -2 | -1 | -1 | -2 | -21.6 | |
| | Domestic energy demand | 3 | -1 | -1 | 1 | -3 | -12 | |
| Waste | Liquid waste | 2.5 | -1 | 2 | -1 | 1 | 2.5 | -1.4 |
| | Solid waste | 3.9 | -2 | 1 | -1 | 1 | -3.9 | |

Source: (NEPA and UNEP 2009)

A breakdown of the food insecure households based on degree of their food insecurity and household type is indicated in Table 4.

Table 4. Ability to Satisfy Food Needs (%)

| | Kuchi | Rural | Urban | National |
|------------------------------------|-------|-------|-------|----------|
| Never | 28 | 24 | 52 | 28 |
| Rarely (1 to 3 times per month) | 31 | 28 | 20 | 27 |
| Sometimes (3 to 6 times per month) | 31 | 37 | 21 | 34 |
| Often (a few times every month) | 4 | 6 | 4 | 5 |
| Mostly (this happens a lot) | 5 | 5 | 3 | 5 |

Source: MRRD and CSO (2007)

Daily dietary components for a rural household 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, very little meat is consumed due to scarcity and the prohibitive cost. Poorer families often have bread and sweetened tea for most of their meals. Subsistence farming for these ingredients is dependent on rainfall or access to water. In years with inadequate access to water, ingredients need to be purchased. 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.

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 (Mojumdar 2009). World Food Program's rapid assessment mission in 2008 found a significant increase in the number of food insecure households. A closer look at the figure below shows a shift from food security towards borderline food insecurity as well as complete food insecurity over the period between late 2006 and late 2007 (Figure 8).

Figure 8. Food Consumption Groups in 2006 and 2008

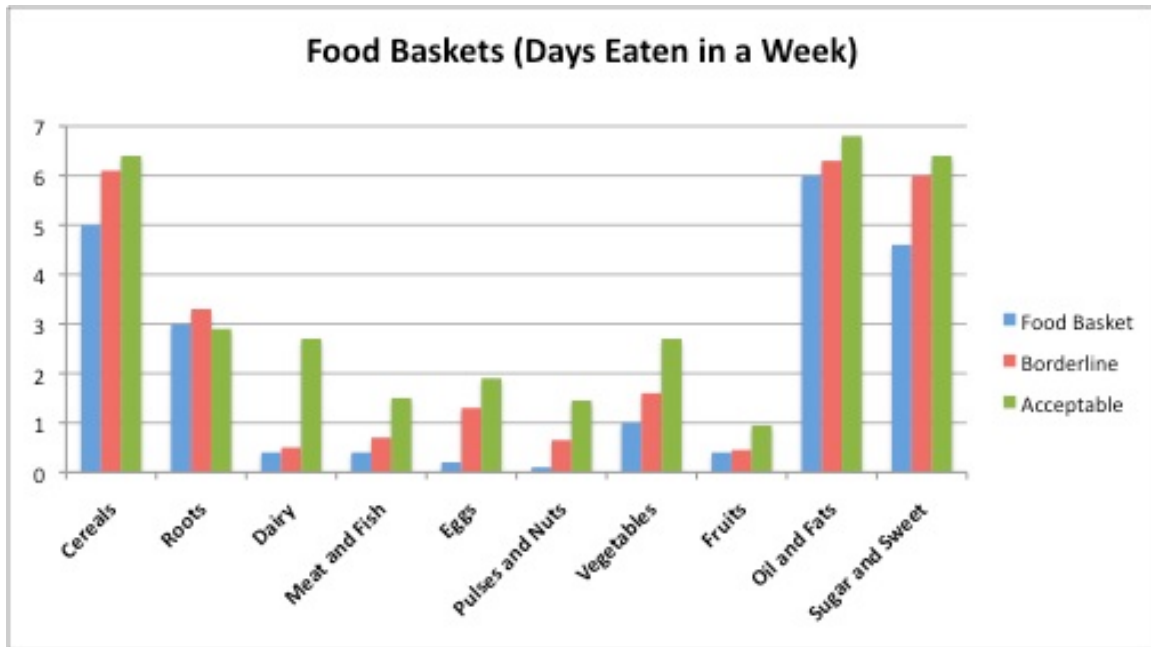


Source: WFP (2009)

The average number of meals for adults remains at three per day and four to five meals per day for children under five years of age. Figure 9 shows that the intake of protein from animal and non-animal sources for 2008 is non-existent among the poorer households. Additionally, these households also have very limited intakes of micronutrients from fruit and vegetables (WFP 2009).

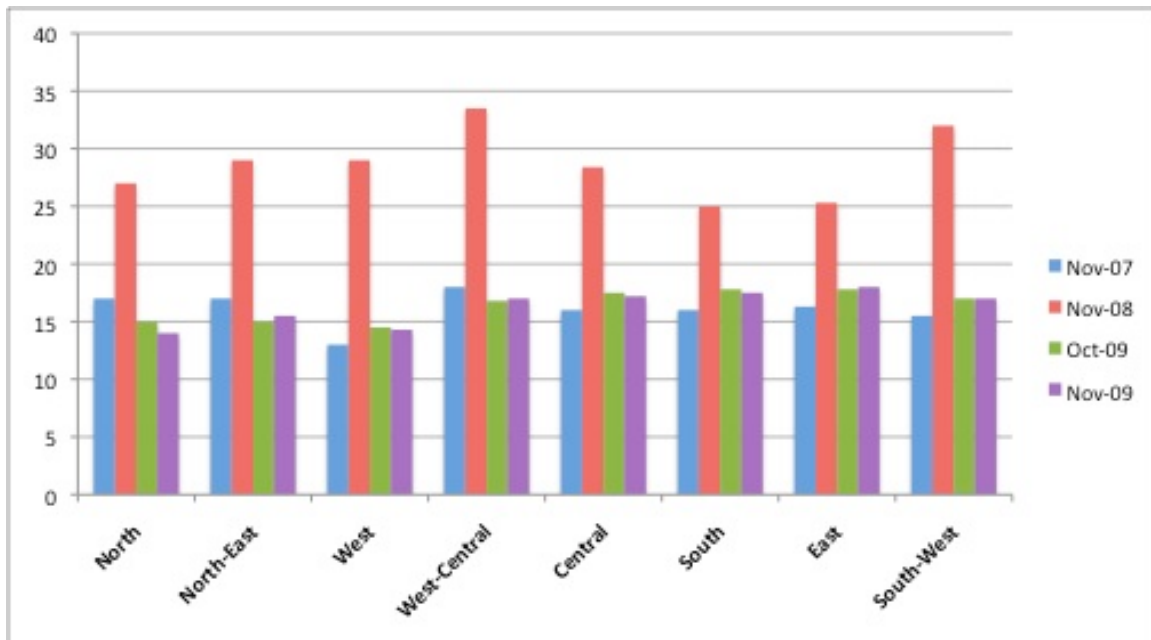
WFP (2008) also reports significant increases across all staple food groups including cereals (including wheat), roots, and oil and fats in 2008 as compared to 2006. Wheat, perhaps the most important of all staple foods, increased in price quite drastically in 2008 as compared to previous years (Figure 10). Significant increase in price of food in 2008, however, was not limited to Afghanistan. It had global dimensions resulted from a complex mechanism of interplay among a number of international economic factors (Clapp 2009).

Figure 9. Breakdown of Diet Across Different Food Consumption Groups



Source: WFP (2008)

Figure 10. Local Wheat Retail Market Prices by Region (Afs/Kg)²

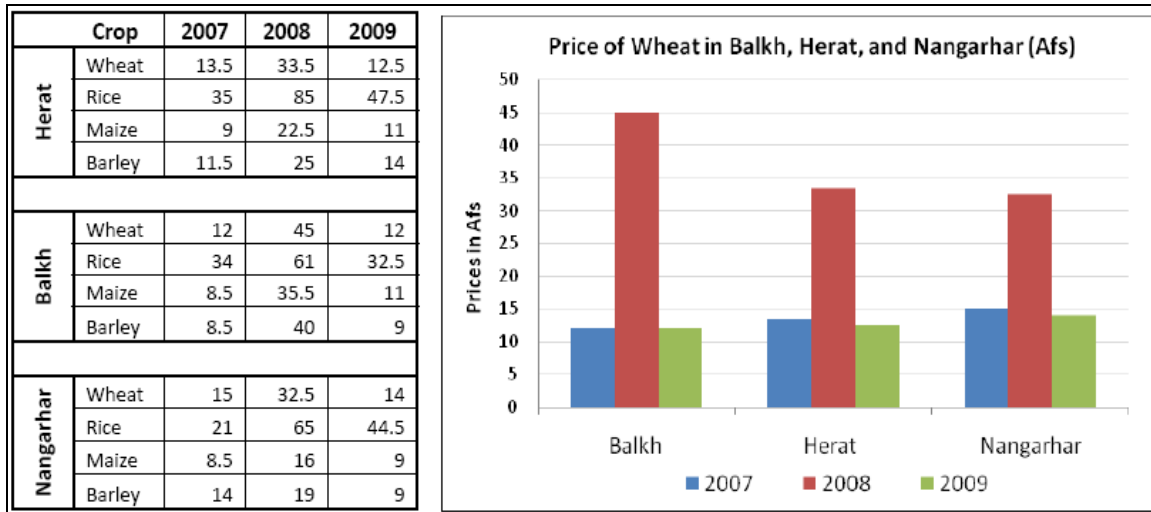


Source: WFP (2009)

² US\$1=Af50 approximately

Figure 11 provides the prices for staple food groups in Balkh, Herat, and Nangarhar for 2007, 2008, and 2009.³ The prices for wheat are charted to illustrate the significance of price changes from 2007 to 2008.

Figure 11. Local Food Prices in Balkh, Herat, and Nangarhar (Afs)



Food availability in the local and regional markets has mainly depended on local agricultural production as well as food imports from neighbouring and other countries. Climate change may affect both sources. As climate change has a global dimension, its regional impacts can produce similar effects in the neighbouring countries, such as Iran and Pakistan as the main exporters of food to Afghanistan, causing shortage of food and price hikes in Afghanistan. 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 neighbouring towns or countries as the only other option to raise income. As the evidence from the summary of

³ Prices are based on estimates provided by key informants and randomly selected shopkeepers at the three study sites.

national programs (next section) and the study sites (Findings) suggests, there are a number of food for work programs for rural Afghanistan from which affected households may benefit.

Some of the Major Programs and Projects in Agriculture and Food Security

The World Food Program (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 been targeted at 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.⁴

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

⁴ For details of WFP programs, please see: <http://www.wfp.org/node/3191>

Eastern Hazarajat, integrated pest management under the Emergency Horticultural Livestock Project (HLP), development of integrated dairy schemes, controlling transboundary animal diseases, a poultry project development, marketing information and expansion, and rural infrastructure and irrigation systems development. FAO also has the “Special Program 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 programs. The World Bank is the largest donor to the National Solidarity Program 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 (World Bank 2009)

The Asian Development Bank’s assistance to agriculture and food security in Afghanistan encompasses a wide range of projects, programs, 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 Management, Afghan Rural Business Support Project, Agriculture Market Infrastructure Project, and Water Resources Development Investment Program.⁵

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.⁶

The United Nations Environment Program (UNEP), with the 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 Program of Action for Climate

⁵ 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>

⁶ For USAID's agricultural program details see: <http://afghanistan.usaid.gov/en/Program.19a.aspx>

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 (NEPA and UNEP 2009).

Oxfam Novib's programming through its counterparts in Afghanistan includes Food Security Response, Community Based Disaster Management, Food Security Project in Faryab/Herat, and Integrated Rural Development Program which focuses on issues of irrigation and water management, provision of agricultural inputs and extension services, veterinary services, vocational training programs 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 programs 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 affected their food security. The responses are reported in the next section. A broader assessment on the effectiveness of these programs in alleviating food insecurity or in addressing climate change related food insecurity was not available for inclusion into this study.

Findings from the Interviews and Study Sites

Selection of Key Informants and Sites

To gain an in-depth understanding of climate change and food security issues at policy, program, and project levels across the country and particularly in the selected provinces, a total of 21 interviews with officials and experts from the relevant government agencies, donor agencies, and non-governmental organizations were conducted (See Appendix II). Additionally, expert advice from these key informants was also sought about case study site selection.

Three villages were selected for this study, one from each province of Balkh, Herat, and Nangarhar. The selected villages were located in the district of Kishindih with a population of 80,000 (UNFPA 2006) in the south of Balkh province, district of Kushk (also called Kushk-e-Rabatsangi) with a population of 134,000 (UNFPA 2006) in the northern part of Herat province, and Surkh Rod district with a population of 92,000 (UNFPA 2006) in Nangarhar province. The sites were selected based on the following three basic criteria:

1. Lack or greater shortage of irrigation systems and dependence of farmers on rainfall for agriculture and livestock husbandry
2. A longer 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. A lower degree of potential security risks to the field research teams

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 within the respective provinces, 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.

A total of 12 focus group discussions were conducted with four in every location and half of them with women's groups. In each selected village, there were one focus group discussion for Male CDC (Community Development Council), one for Female CDC, one for randomly selected male community members, and another for randomly selected women from the community. The number of participants in each group ranged from 6 to 8 individuals.

Findings

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 vulnerability in the form of exposure to climate change impacts, capacity and strategies to cope with and adapt to those changes. Arguably, some of these themes are more directly related to climate change than others. There appears to be a strong correlation between changes in weather patterns (climate change) and the ability to grow crops and all the issues raised by the respondents as reported in this section. In many ways, climate change appears to act as a catalyst for significant 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-migration is one such effort by many rural households to earn an income and purchase food. However, 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 additional expense for the household if the migrant worker returns which, in both cases, adds to income and hence food insecurity.

Balkh

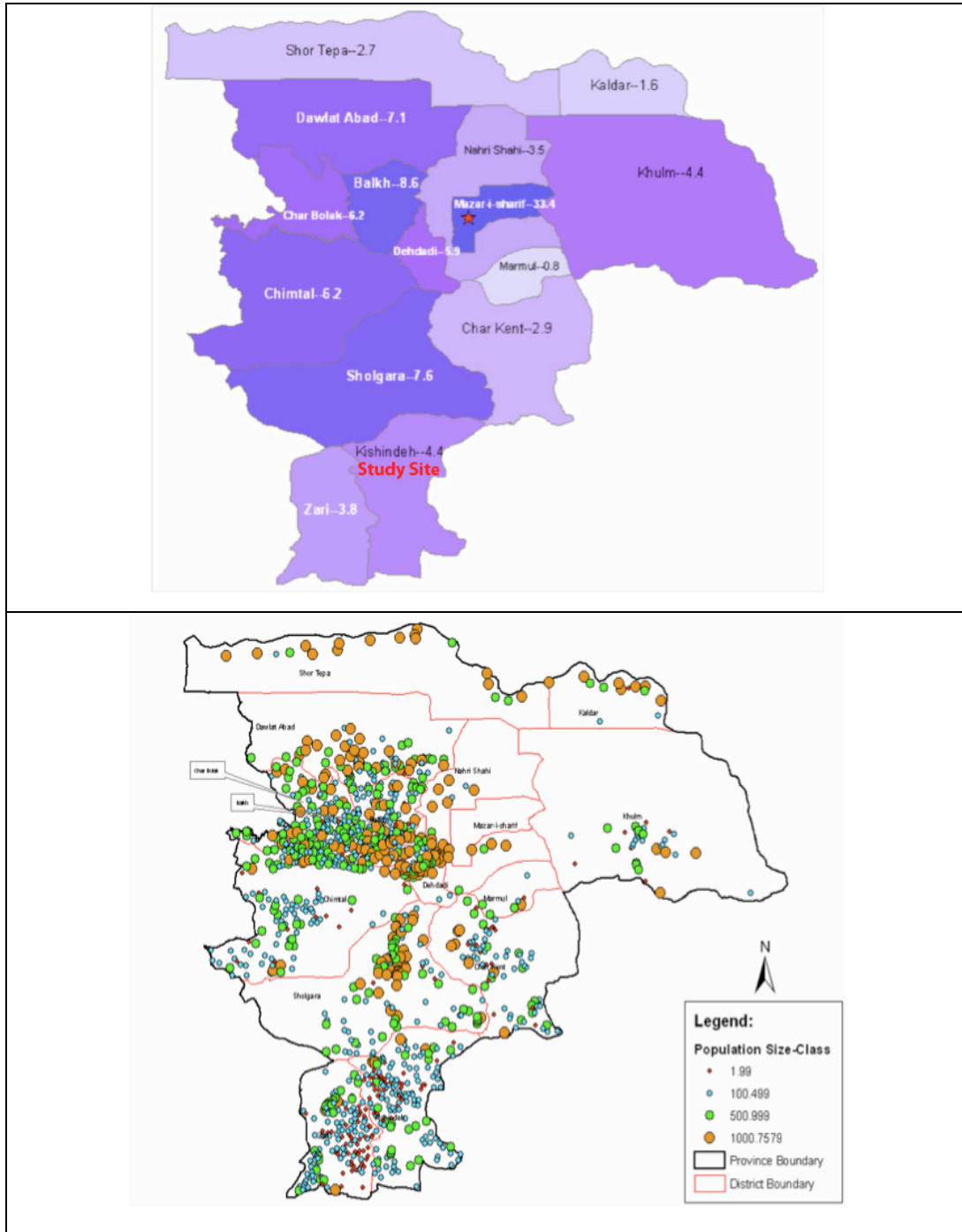
Balkh province has a population of 1.1 million (51 percent male, 49 percent female) and is situated in the north of Afghanistan and is bordering Uzbekistan to the north, Tajikistan to the northeast, the Kunduz province to the east, the Samangan province to the southeast, the Sar-e-Pul province to the southwest and the Jawzjan 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. It has 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 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)

Figure 12. Balkh Districts (top) and Rural Population Density (bottom)



Source: 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. (GRM 2009)
- **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 MRRD and CSO (2009), the poverty rate for Balkh was in the range of 55-76 percent in 2007-08. The national poverty rate was 36 percent in the same year.

In the district of Kishindih, local elders, the district governor, and the officials at the department of agriculture suggested the village of Lalmi as a qualified candidate for the study. The selection criteria applied to villages were the same as those used to select districts.

Food Security: The key informant interviews and focus group discussions revealed that farming and animal husbandry are the main source of income for the families. The findings have an overall consistency over the most common issues and their causes.

The vast majority of those interviewed spoke of persistent food insecurity in rural areas for the last 10-12 years (KI-B2, 3 and 6, FGD-B1 to 4) . “As long as I can remember there has been endemic poverty in many parts of this province” (KI-B2).

The households’ diet generally consists of wheat, potatoes, rice, beans, dairy products, cooking oil, tea, and sugar. Many of the households rely on subsistence farming. They grow wheat, potatoes, beans, and vegetables both for household consumptions as well as for purchasing tea, sugar, and for meeting other domestic needs (FGD-B1 to 4).

Food availability has been a persistent issue in the village and in the district over the past decade or so (FGD-B1-4). For a variety of reasons, such as larger population, war and insecurity, poverty, and droughts, sufficient amounts of food have not been produced in an area where livelihoods are depending on agriculture and pastures (FGD-B1-4, KI-B1,2, 3 and 6).

Stability of food supplies has also been shaky and not reliable. During the years and seasons when there is enough and timely precipitation, fewer challenges face the community in terms of food supplies. This fact is of course comparative to the general pattern of food scarcity over a long period of time but in absolute terms, food supplies are always falling short of households’ and communities’ needs (FGD-B1 to 4, KI-B4 and 6).

Affordability, rather than availability appears to be a major problem as well. Insufficient access to food is due to lower family incomes. The situation has been exacerbated by the long-lasting droughts and loss of pasture and arable land (FGD-B1 to 4, KI-B1, 3, and 4). “Food is widely available in shops but most people cannot afford the prices” (FGD-B3).

Respondents from the community reported health problems due to hunger and unhealthy food options. This issue seemed worse in the case of elderly and children (FGD-B1, 2 and 3). People have to change what they eat and most often in such cases they cannot afford to buy what they need to eat from markets, which are located in the city (KI-B1). 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. This by itself limits their choices based on the affordability of the options available (FGD-B1).

Exposure to Climate Change: All key informants and focus group participants reported changes in weather and climate patterns and their resultant impacts on the communities as well as on the households. Increased frequency of extreme precipitations causing more floods, longer and more frequent drought periods resulting in low agricultural productivity, loss of pasturelands leading to loss of herd animals, and hot seasons increasing risks of pests to the crops were some of the common examples listed by all respondents.

According to community residents, on numerous occasions in the recent years, extreme floods had washed away their homes, farmlands, and in some cases took lives of their family members (FGD-B1 to 4). Other key informants reported similar incidents in many other villages across the province (KI-B2 to 6).

Up until last year, the periodical droughts brought significant damages to the agricultural lands and pastures in northern parts of the country, including in Balkh province and Kishindih district (KI-B1, 2 and 4 to 6). “I remember a farmer from Kishindih coming to my office crying. He had lost about 1,500 of his 2,000 farm animals in a short period of time due to dried pastures (KI-B1). All focus group participants had personal experiences with persistent and periodical droughts and loss of family income in the last 15 years.

Furthermore, according to an official from the provincial agriculture directorate, shifted patterns of peak hot seasons and precipitation, which had resulted in increased pest risks and damages to agricultural produce in a number of villages, were observed (KI-B1).

While climatic conditions imposed enormous pressures on the natural and human systems within the community studied and many other villages in the province, equally important were the community characteristics that made certain communities more susceptible to natural stresses than others. These included the community’s level of dependence on agriculture, the village’s location with respect to rivers and major water streams, and its natural protective mechanisms, such as its green cover or depth of water table (FGD-B1, KI-B1, 3 and 4).

Adaptive Capacity: In the face of changing weather patterns and climate conditions and the stresses caused by them, a variety of strategies were devised and actions taken from within the community as well as from its outside, by the government and international aid organizations, for instance. These measures, however, were often temporary and of less effect.

Most of the respondents (FGD B1, 3 and 4) reported that 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, 2 and 4).

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 program 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. The neighbouring province of Knuduz used to be known as “the bread basket” of

Afghanistan. Most of the assistance programs 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 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.

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 programs and the programs 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).

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).

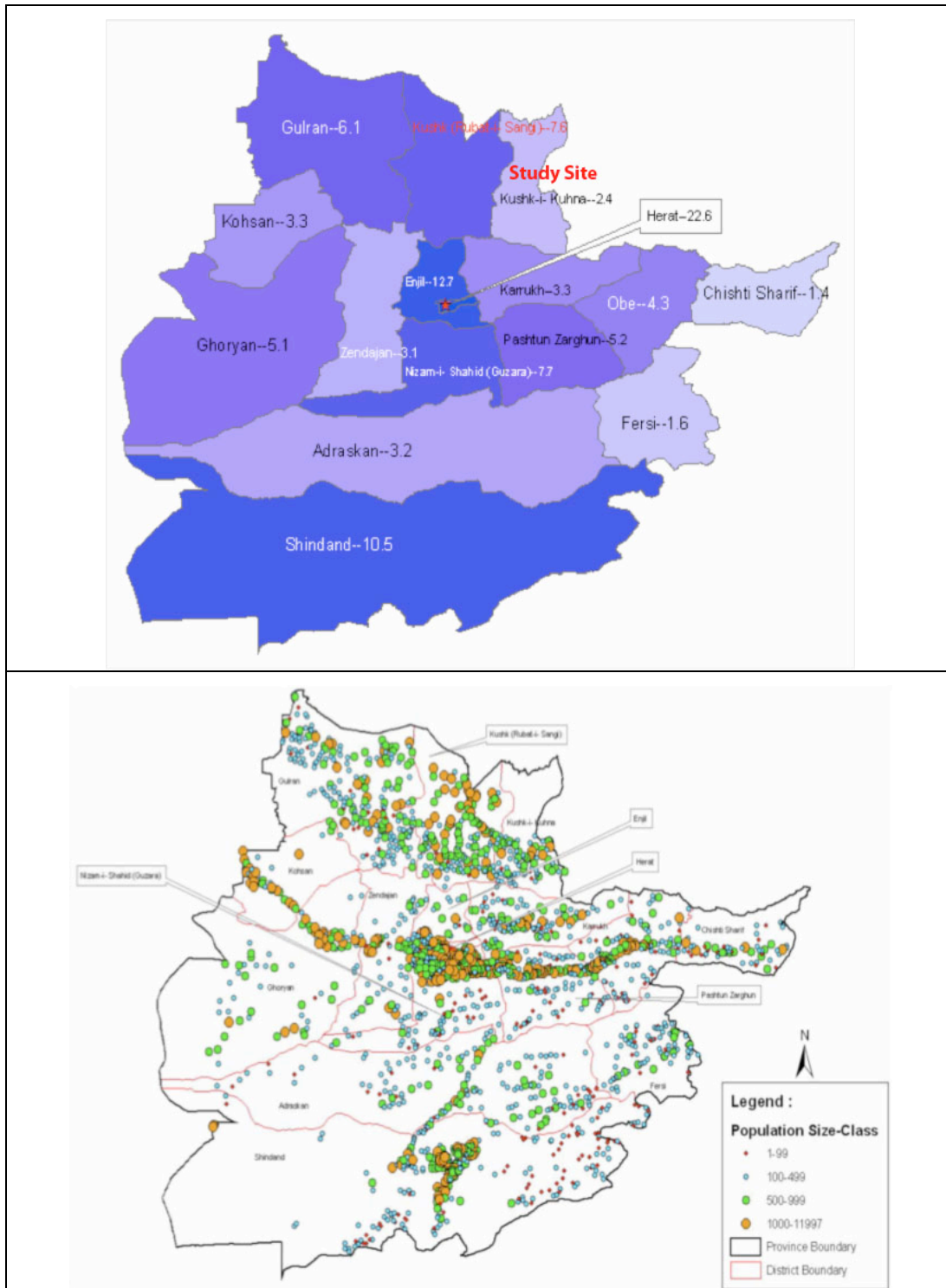
Herat

Herat province has a population of approximately 1.8 million, with equal numbers of males and females (UNFPA 2006). 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 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 (Figure 13).

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).

Figure 13. Herat Districts (top) and Rural Population Density (bottom)



Source: UNFPA (2006)

- **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 in the District of Kushk (e Rabatsangi) is located in the northern part of the Herat Province and has an estimated population of around 134,000 (UNFPA 2006).

Food Security: Food security issues in Herat province, including in the Chahar Olang village had a striking resemblance to those of Balkh province and Lalmi village respectively. Majority of the key informants as well as focus group participants experienced food insecurity in all forms.

A significant number of the households were farmers with daily diets consisting of bread, rice, peas, tea, and sugar (FGD-H1, 3 and 4). According to most respondents, food has been lacking in quantity and quality over the last decade and a half (FGD-H1 to 4, KI-H2, 3, 4 and 6). “In recent years, there have been times that some people resorted to eating grass and roots of wild plants 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). In a number of other areas across the province, people had experienced hunger to similar extents (KI-H6). “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).

As in the case of Lalmi village in Balkh province, food supplies within the community and in the households fluctuate over time depending on seasonal agricultural productivity and on the varying income levels of the families, and available food aid (FGD-H1 to 4).

Access to food is practically limited by the household’s economy. In Chahar Olang village, like most other villages in the area, people have difficulty affording food they need. In the local market, varieties of food items are available in quantities sufficing select few who can afford them (FGD-H1 to 4). All key informants reported lower

household incomes due to lack of access to sufficient nutritious food in most rural areas of the province (KI-H1 to 6).

Not surprising is the fact that insufficient food quantities and limited varieties result in poor utilization of food, as reported by some respondents (FGD-H2 to 4). Many of the families cannot afford meat or fruits on a regular basis, or at all, according to the respondents. Health issues and malnutrition were common among the community residents (FGD-H2 and 3).

Exposure to Climate Change: All key informants stressed the role of droughts in the recent decades in negatively affecting rural residents' livelihoods significantly. 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 green cover, floods and land erosion (KI-H1 and 6). Climate change also meant recurring drought, unseasonal rain, reduction in agricultural yield, loss of animals, loss of biodiversity, spread of diseases among humans and animals, and unemployment (FGD-H2 and 3). 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 of 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).

Adaptive Capacity: Most rural families “suffer from depression, sickness, indebtedness, and loss of able-bodied family members to migration” (FGD-H3).

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).

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 programs 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).

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).

“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).

A number of respondents reported the existence of “food for work” programs 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 and 4).

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).

Nangarhar

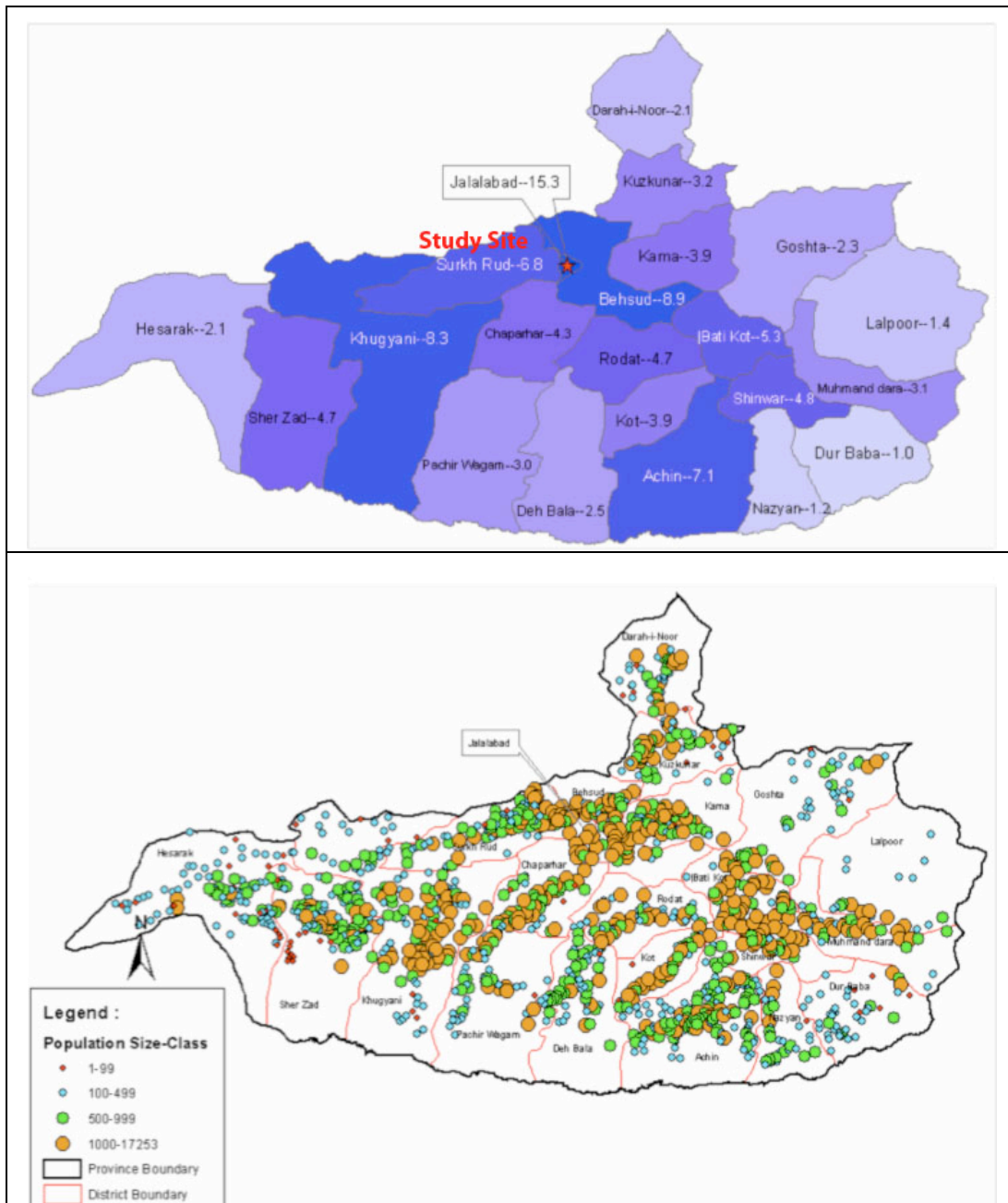
Located in the eastern Afghanistan, Nangarhar province bordering Kunar and Laghman provinces to the north, Kabul, Logar, and Paktia provinces to the west, and Pakistan to the east and south. The province has an estimated population of 1.34 million out of which around 87 percent lives in rural areas (Figure 14). 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 are Behsood (119,000), Khogiani (111,000), Acheen (95,000), and Surkh Rod (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.

Figure 14. Nangarhar Districts (top) and Rural Population Density (bottom)



Source: UNFPA (2006)

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 (UNFPA 2006).

Food Security: Food availability in Fateh Abad village of Surkh Rod district has been hampered severely by chronic poverty, loss of agricultural lands and animals, population growth, and insecurity (FGD-N1 to 4). “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 conditions are not very different in other villages throughout the province (KI-N1, 2 and 4).

To the extent most key informants and focus group participants remembered, sufficient food supply never existed in the villages. Even in the better years, they argued, people would fall short of meeting their needs. This was especially the case with those who did not own farmlands and worked as sharecroppers.

The majority of the households (80 percent) are involved in farming, and the rest work as skilled workers, teachers, daily wagers, and soldiers (FGD-N1). This tradition, however, is changing as there is less water available to grow food and provide a reliable agricultural income. All participants in the group discussions stressed the necessity to work additional jobs besides farming. A large number of men has left the village and are working low-pay jobs in Jalalabad City, Kabul, or Pakistan. The relative assurance of working 2 or 3 days per week for a daily wage of just over 100 Afghanis (\$ 2 US) was preferable to putting time and energy into farming with a risk of losing everything to drought or flood (FGD-N1 and 3). All respondents complained about the high price of

food in the local and the nearby city markets and their inability to purchase what they need.

Insufficient income and lack of diversity in domestically produced food has also forced the households to live with a narrow range of food items, such as bread, rice, some vegetables, cereals, and some dairy products. In difficult times when even these are not available or too expensive to afford, hunger, malnutrition, and other health problems have struck community members (FGD-N1 and 4, KI-N3).

Exposure to Climate Change: All respondents and key informants blamed war and more persistent droughts in the last two decades for a substantial part of the suffering in the community and in the surrounding areas. Lack of precipitation has turned arable lands, forests, and pasturelands to dry deserts (KI-N1 and 4). The biodiversity in the surrounding mountains, valleys, and deserts has significantly decreased (FGD-N1 and 4). The water table in the village has been falling consistently, a fact exacerbated by the increased number of deep wells used for irrigation in the recent years (FGD-N1 and 3). Frequent floods caused by unseasonal heavy precipitation have also made matters worse by washing away crops and rich agricultural soil, speeding up the rate at which arable land is lost to the deserts (FGD-N2 to 4). The change in climate was noted as having been the most severe in the last 10-15 years (KI-N3). There were numerous cases of farmers with sizable plots of land who had abandoned the land for work in Jalalabad and Pakistan.

The community is also located at a higher elevation with respect to nearby rivers and the only canal that used to bring water to the village in past years is not reliable any more. Upstream communities mostly consume its limited amount of water. Occasionally it is flooded but at the wrong times (FGD-N1). The majority of the respondents agreed that the surrounding mountains, which traditionally supplied their drinking and irrigation water, do not have sufficient snow in the spring and summer seasons. The respondent also agreed that their traditional livelihood system based on agriculture was not a viable option for even basic living conditions anymore (FGD-N1 to 4).

Adaptive Capacity: Poverty, war and prolonged insecurity, high population growth, lack of infrastructure, lack of expertise, weak government, and corruption were listed as underlying causes of the community's failure to effectively address its susceptibility to climate change impacts. One of the focus group participants summed up the general attitude towards solutions: "We cannot do anything about long-term solutions to our problems. Someone who is concerned with today's food for survival does not have the luxury of thinking about longer term" (FGD-N3)

A large number of people have moved out of these communities to neighboring 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 labor abroad.

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).

All those interviewed reported numerous cases of desperate farmers selling off land or farm animals 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 warmth or cooking fuel or to sell.

Similar to the Balkh case, numerous focus group participants 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 (FGD-N1 and 3). A number of participants who owned deep wells confirmed that the ground water table was falling in the village and they had to dig deeper and burn more fuel to pump water (FGD-N1).

According to key informants and focus groups, food and agricultural aid by the governmental and non-governmental organizations temporarily address some of the hardships within the communities but problems return as soon as the assistance is not delivered.

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, sometimes 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 are 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 stressed 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. A few farmers with livestock complained that they could not afford the cost of 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 not sending them to school.

Discussion

Exposure to Climate Change

Climate data on Afghanistan points towards a warming past – the last five decades – and a warming future (McSweeney et al 2008). Similar country-level, regional, and global trends are observed and projected for the future (IPCC 2007c). Precipitation patterns have also been changing and are projected to change in the coming decades, and most likely throughout this century if sufficient effective action is not taken to significantly reduce emission of greenhouse gases to atmosphere. Results of the shifting climate in Afghanistan are manifested in the form of persistent and frequent droughts, desertification, gradual reduction in glacier ice, unseasonal rain and snow, frequent floods, higher number of hot days and nights, and an overall unpredictability in weather patterns (European Commission 2006; UNEP, GEF and the Government of Afghanistan 2008; Savage et al 2009; UNEP and NEPA 2009).

While the available reports and studies are in close agreement with each other over the climate-related stresses and disasters in the country, first-hand data from communities and key informants interviewed for this research confirmed the reality of changes in climate and their impacts.

There appears to be a widespread appreciation of the (potential) outcomes and consequences of climate change among the key informants and all focus group participants. On numerous occasions during the discussions references were made to loss of groundcover, the melting of the snow on mountain peaks as a source of water during

the warmer months, dangers of flood due to unseasonal and excessive rain and loss of ground cover, and the temporariness of digging deep wells for water. Key informants who were working at the country and provincial levels confirmed similar experiences in most of other villages across the country.

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.

While going through the hardship of existing environmental challenges, communities will face further changes that are projected to be unfavorable to them in the future. All global, regional, and national estimates so far depict a picture of a warmer future climate with lower precipitation: hence, further droughts, floods, and other related stresses.

Adaptive Capacity

The adaptive capacity of a community to cope with and minimize its exposure to climate change effects is characterized by factors such as economic wealth, social networks, infrastructure, social institutions, social capital, experience with previous risk, the range of technological adaptations available, and the equity of access to resources within the community (Adger and Kelly, 1999; Smit and Pilifosova, 2001; and Smith et al., 2003). These determine the extent of vulnerability of the community, potential damages to it, and its success in addressing present and future challenges it faces. Considering the

factors listed above, present-day Afghanistan ranks poorly on the coping and adaptation to climate change.

The ongoing conflict in the country spans three decades into the past. Extreme poverty, very low literacy rates, lack of basic infrastructure and services, high rate of population growth, and lack of sound governance and institutional and social networks are part of its legacy. The severity of the challenges on the way to rebuild and develop the economy and infrastructure of the country has proved to be real and tangible to the efforts of the international community and government itself. Although substantial work has been done to this effect over the last ten years, persistent war and insecurity hamper the continuity of the fundamental efforts to develop sustainable infrastructure while letting effects of the recent achievements fade away. Against this backdrop, the fragile and primitive economies of the villages are coping with the challenge of climate change.

The main sources of income for all the families engaged for this research are selling excess agricultural produce, selling others' excess produce for a small margin, making handicrafts, or undertaking casual work in larger cities. The rural households at the study sites reported that they grow 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 markets, the proceeds of which would be used to purchase additional food items. If the families have not had excess produce to sell or store for their own consumption during the winter months, male family members often migrate for seasonal work. The only other source of income, apart from selling their own produce and casual /

seasonal labor, is remittances sent by family members who have moved permanently away from farming to cities nearby or to other countries. However, out-migration does not always result in a source of 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.

The main coping and adaptive measures taken by the households in the study sites were outmigration to nearby cities and neighboring countries; digging deeper and bigger wells for irrigation; changing and supplementing occupation by joining the military – or in some cases the insurgency, - or working as waged workers or skill workers; resorting to food aid; and switching to more high value crops, such as poppy and saffron, that require less water. Among these, however, the most common practice reported by all focus group participants in all three study sites was outmigration.

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.

Climate change related factors tend to begin with a process of breaking down of social structures such as:

- Forced migration of able-bodied rural household members in search of work, resulting in loss of human capital and potentially creating new social problems such as drug

addiction which afflicts many rural young men who go to Iran for seasonal or longer term casual labor

- Loss of natural capital such as productive land and animals and selling off household assets to purchase food
- A weakening or loss of the system of mutual aid which characterizes all rural communities the world over as a means to cope with temporary but recurring hardships
- Irreversible change to factors of production, particularly land which often takes up to 5 or 6 years of normality (timely rain and non-extreme temperatures) to return to full production after one year of drought, and
- Indefinite dependency on humanitarian aid as the sole source of livelihood

Findings from all study sites indicate development of the above-listed trends. Informed opinions from experts and officials are confirming the existence of these patterns throughout the country. 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.

Questions about the future coping and adaptation strategies of the communities rarely produced different ideas from within the communities. Most, however, were in agreement that agriculture alone was not a reliable option for supporting families given the current climate conditions.

Vulnerability and Food Insecurity

Based on the available information from secondary sources and the primary data collected during the site visits, 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 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 farmer 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 of vast swathes of the rural population.

One cannot speak only of climate change-related food security in Afghanistan. Many rural communities have had to cope with persistent food insecurity for many decades beyond the last 30 or so years of conflict. With the exception of a few comments from the key informants on the need for long term planning, the hunger-stricken rural communities are focused mostly on meeting immediate food needs. This points to the urgency of food relief but also raise a number of concerns about the sustainability of indefinite food provision through humanitarian aid and creating aid dependency among the recipients of food aid.

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 methods to become established. To illustrate, the establishment of saffron, a traditionally recognized and ecologically suitable crop, has taken over ten years tireless work by DACAAR and ICARDA to show signs of becoming established [See Parto and Mihran (2010) for details]. The length of time required for the lesser-known crops to become established is likely to be much longer.

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

Curiously, 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 livelihood and/or an expanded horizon as far as livelihood expectations.

Conclusion

The climate of Afghanistan has changed in the past fifty years and will further change over the coming decades. Records indicate a gradual warming pattern for all seasons since 1960 and an overall reduction in precipitation during the same period. Future projections are depicting an even dimmer picture. Temperatures will continue to increase while precipitation decreases throughout out the country during most decades of this century.

The results have so far included increased unpredictability of weather patterns, frequent droughts, extreme weather events such as heavy rain and snow, frequent floods, unseasonal rain and snow, shrunk glaciers and natural water reservoirs, lower ground water tables in most areas in the country, extreme desertification and loss of forests and pasturelands, and loss of biodiversity across the country. Moreover, future climate predictions indicate strong likelihood of worsening conditions in all those categories.

Throughout the country, socio-economic impacts of these events have been significant and adverse. This is especially the case with around three quarters of Afghanistan's population which live in rural areas and have traditionally depended on agriculture for income. Having been subjected to prolonged climatic stresses, they have lost a substantial part of their arable lands to droughts and floods. Falling crop yields due to lack of irrigation water and rain, in the case of rain-fed crops, has become a common reality. Low precipitation levels have also contributed to loss of green cover of the grasslands and deserts leading to loss of biodiversity and pastures. According to key informants

interviewed for this research, combinations of the above-mentioned factors coupled with long-term existing conflict, have effectively disrupted natural, social and economic systems in most villages in the country. In many areas, including those studied here, people have long been seeking alternative means of livelihoods in order to cope with and adapt to social and environmental challenges.

Findings from the three communities, which were significantly apart geographically, show that majority of the households either send a male member of the family to a major nearby city, including to those in the neighboring countries, for work, or supplement farming with at least one different income-generating activity such as joining the military, or insurgency in some cases, skill-working, daily wage working, or trade.

Some farmers who owned large plots of land and were wealthier tapped into ground water for irrigation. Although this strategy helped for a few years, they confirmed that the ground water table in the village was falling even faster than before compelling them to dig deeper. This caused further challenges to those who could not afford to invest in larger water pumps as well as the whole community's access to drinking water.

Switching to high value and more drought resistant crops was also experimented in some communities. The popular option over the last decade and a half has been poppy. This, however, had changed in the villages studied in the last few years largely due to the government's anti-drug policies. Farmers were banned from poppy cultivation without being offered alternatives in most cases. Some farmers had also managed to successfully

produce vegetables for sale in the urban markets. Nonetheless, they had to pump significant amounts of ground water for this purpose. Matters were also made worse by lack of cold storage during the warmer seasons leading to most produce perishing.

The stark exception to all unsustainable adaptation strategies observed was the case of development of saffron production and trade in Herat. Secondary data and key informants pinpointed the case as one with significant potential for positive change in a number of regions in the country. The high price of saffron combined with its adaptability to the local environment, the abundance of the local labor force, and the right interventions by a number of governmental and non-governmental organizations have made it a success story.

Communities' food security is strongly linked to the income-generating activities of the households. Those interviewed stressed the importance of level of income in how food secure their families were. Failure of agriculture to produce reliably and sufficiently for households to meet domestic consumption needs and/or surplus for meeting households' other basic needs affected their food security in all its forms.

Both secondary and primary data indicated the existence of food insecurity in the rural communities throughout the country. Reduced agricultural productivity affected food availability in the local and regional markets as well as within the subsistence-farming households. Combined with poverty and widespread unemployment, this would also mean lower family incomes and inability to afford sufficient food to meet dietary needs.

As some respondents put it, working for survival on a daily basis would put farming households on the brink and closely dependent on favorable seasonal weather. Given the past climatic trends, they were cautious about keeping their hopes high.

Most key informants as well as focus group participants agreed that relying on food aid was not the way to go considering a two-decade experience with it. Not only did it fail to effectively and efficiently address their medium-term, in some cases even the short-term, needs, but it also served as a discouraging factor towards developing sustainable local solutions. They, however, agreed that food aid was needed to help those in need to survive for the day.

Meeting all these challenges requires long-term planning and persistent efforts at all levels of social organization in the country. Sustainable solutions to climate related food insecurity can only result from long-term vision as well as extensive investment in improving existing local social and organizational structures while equipping them with proven technologies and expertise in other similar contexts and geographical regions.

Recommendations

Recommendations by this study are based on two sources: 1) informative suggestions and insights from key informants and focus group participants and 2) overall findings from the analysis and integration of secondary and primary data.

In the Policy, Program, and Project domains:

Activities in the area of climate change-related food insecurity will need to engage actors at two levels. First, there are a number of national programs that are designed to address, to varying degrees, food security and climate change issues. The effectiveness of these initiatives will need to be cognizant of and consistent with the objectives of the existing and planned national programs by other actors, particularly when there is evidence on the effectiveness of such programs. Second, at the local level efforts will need to be made to engage with formal state structures such as Community Development Councils and NGOs active in the targeted areas to maximize impact and efficiency in collective efforts.

Any future planning by the governmental and non-governmental organizations to incorporate these important issues in their programming in Afghanistan provides a unique opportunity for adopting an integrative approach as promoted by Gammage et al (2005) and Laven et al (2009). Such programs are more capable of simultaneously addressing market issues⁷ and the recipients' "entitlements and capabilities."⁸

⁷ *Labor Markets*: Where individuals sell their labor 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.

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.

Water conservation and harvesting techniques based on traditional knowledge and construction methods need to be intensified through basic technology transfer and extension work by agricultural aid agencies. 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 needs.

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. Building on the success of DACAAR and ICARDA, saffron cultivation and trade should be expanded and extended to more regions of the country. More drought-resistant high value crops, such as saffron, should be identified and tested for long-term productivity.

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.

⁸ Entitlements are defined as the bundle of resources that an individual or group of individuals commands for the purpose of consumption, production, or exchange. Capabilities are the individual's or group's freedom and abilities to deploy their resources.

Many areas with advancing deserts or sandstorms need to be managed so as to control further loss of currently productive lands. 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.

As a key informant from FAO put it, “to bring any change to the situation [in Afghanistan], we need to embark on much larger programs and projects such as the forestry and forest expansion projects the Germans implemented in Paktia decades ago and from which people still continue to benefit” (KI-K2).

In the Research Domain:

Comprehensive and in-depth studies on climate change impacts on livelihoods in Afghanistan and how communities cope with and adapt to related stresses are practically non-existent. Consequently, ongoing reconstruction and infrastructure development efforts lack the baseline data and sufficient knowledge needed to account for climate change effects.

To address this matter, future research should aim at answering questions such as:

- How can micro-level studies, such as the one at hand, contribute to the national policies and programs 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 country 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, will likely be also successful in Afghanistan?
- How can Afghanistan benefit from globally devised mechanisms, such as the Kyoto Protocol, at the present time as well as in the medium-term in order to finance programs and projects promoting environmentally and economically sustainable livelihoods in rural areas of the country?

This research has focused on environmental and biophysical causes of food insecurity and vulnerability more than some others such as poverty and conflict. However, in regions of the world, such as Afghanistan, where conflict is persistent, a comprehensive study of interactions among environmental change, social and biophysical vulnerability and food security requires the conflict dimension to be accounted for. To this end, in-depth studies of food security issues in relation to combined factors of poverty, conflict, and environment are highly encouraged.

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Appendices

Appendix I: Field research questions

All interviews were conducted in local languages of Dari and Pashto. The following is the English translation of the questions.

Questions for the households

Existent food insecurities and their impacts

1. What is your basic diet? Do you produce your own food? Where do you get your basic food? At what cost? Who is the bread-winner of the family? What are the sources of income in the family?
2. Do you have enough food for the family? Have you faced shortage of food in the past? When? For how long? How bad?
3. What is/was the impact of food shortage? Hunger? Health-related problems? Conflict? Financial debt? Migration? Other?
4. Who was affected most (and least) by the problem? Men? Women? Children? Elderly? To what extent? Why?
5. Historically, how often and for how long have you faced such challenges (symptom-related)? To what extent? Long term impacts? Patterns of change?

Causes of food insecurity

6. What are the main reasons why you cannot have enough food at home? Not available? Not affordable? Available under conditions that you cannot meet? If not accessible, please prompt on price trends.
7. Do you produce your own food? What challenges are you facing doing that? E.g., issues related to input material, labour, technology, and weather in agricultural activities or animal husbandry, etc. Details please. Do you sell any of the food you produce? What is the proportion marketed vs. Consumed? What are the issues faced in marketing? Details please. If you also purchase food, what are your main sources of cash income? How has this changed over time? Details please on constraints faced in improving cash income.

8. What are the main shocks faced by your households? And by your community as a whole? As a group, please rank 3 in order of importance? Shocks can include unfavorable climate, high food prices, insecurity, debts to reimburse, death or sickness in the household, high fuel costs, etc...
9. Historically, how often/for how long have you faced such challenges (cause-related)? To what extent? Long term impacts? Patterns of change?

Impact of climate change on food security

10. Have you observed any major changes in the climate/weather patterns in your area (village, province) over the past years or decades? E.g., in the number and intensity of extreme weather events, floods, droughts, or any positive changes. Please describe.
11. Have you observed any changes in your environment that are potentially linked to changes you mentioned above? E.g., in forest cover, pasture land, agricultural land, ground water table, wildlife, or any other change.
12. Have you made any changes to better cope with climatic risks? Including use of indigenous knowledge? Crop switching? Diversify into non-farming? Flood protection schemes? What are the obstacles you face in coping with climatic risks – e.g. forecasting information / early warning systems?
13. Have you or your community experienced any social, economical, political or cultural changes that are linked to changes in your environment? E.g., migration, change in jobs, community's sources of income, conflicts, types of work men and women do. Please give us more details.
14. Specifically, how do you think the environmental changes we discussed have impacted your livelihood? E.g., income, buying or producing food, etc. Please describe.
15. Historically, did you have any problems related to food that were caused by similar factors we talked about in the distant past – three decades ago or more? Please give us details if possible.

Measures (including past interventions) to improve food security – with a focus on Climate Change-related causes

16. How did you address food shortage and livelihood issues in the past? Working more? Changing jobs? Migrating? Receiving help from others? Borrowing? Selling assets? Other solutions? Problem not yet solved? Details please.
17. If you received assistance from others, in what form did this assistance come and how did it, if it did, help you overcome your problems? Under what conditions, if any? From whom? How much? If it did not help, why not? Details please.
18. Are the solutions long-term or short-term? Will they guarantee your access to enough affordable food in the future? For how long? How? Why? Why not?

Questions for governmental, non-governmental, and donors organizations

Existent food insecurities and their impacts

19. Have you observed/documentated any food security and livelihood problems in your line of work? Local/regional/national?
20. What are the social, economical, political, and cultural impacts the issues you listed above?
21. Which groups of people have been most, or least, affected by those livelihood problems? Women/men, children/adults, rural/urban, or different occupational groups such farmers, industrial workers, traders, businesses, etc.?
22. How long have these problems been around for? How long did they last?

Causes of food insecurity

23. How have these issues (listed in response to the previous question) come about?
Structural causes?
24. Which of these causes are local, regional, national, or global?
25. Can they be addressed at the root? How?

26. Which of these causes are climate change-related?

Impact of climate change on food security

27. What livelihood issues in here are directly or indirectly caused by climate change?

28. What aspects of climate change have impacted food security and livelihood in this area (district, province, or country)? Weather extremes? Unpredictable weather? Floods? Droughts? Others, including positive impacts? If available, could you please provide information on magnitude of losses?

29. Who has been most, or least, affected by the changing climate? Where? How?

Measures (including past interventions) to improve food security – with a focus on Climate Change-related causes

30. What are your policies/programs/projects (PPPs) to eliminate food insecurity and improve livelihood in this area? Past interventions?

31. Which of those measures are climate change-related?

32. Which interventions by you were effective in addressing the issues? Why? Why not? Who were the beneficiaries?

33. Which other organizations have worked in this field in Afghanistan? The type and extent of their work? Results?

34. What are your future programs towards eliminating food insecurity and improving livelihood, especially in relation to climate change? At the local, national, regional, and global levels?

Additional guiding questions for women – households and organizations

1. How did the livelihood problems you described – in your family and/or community - affect women's responsibilities at home and in the community? E.g. raising children, household chores, preparing food, work at home, work outside of

home, education-girls' enrolment in school, decision making power, etc. Please add details. How are the women affected in general?

2. If struggling with poverty due to the factors discussed, have you, someone in your family or someone you know experienced any kind of physical or mental health problem? E.g. lack of nutrition, addiction, depression, etc... How? Please tell us more.
3. Have you received any assistance – e.g. financial, services, or counseling – from the governmental or non-governmental organizations and/or women related to the problems you had? When? From who? What kind of assistance? Was it effective? If not, why?

Appendix II: List of Key Informant Interviews

| Key Informant Interview List - Mazar-e-Sharif City (Balkh) | | | | | | | |
|--|---------------|----------|----------------------------|-------------|------------------|----------|----------|
| No . | Key Informant | Position | Organization | Contact No. | Date Interviewed | Location | Code No. |
| 1 | xxxx | xxxx | Directorate of MAIL | xxxx | 10-Dec-09 | Mazar | KI-B1 |
| 2 | xxxx | xxxx | ANDMA | xxxx | 10-Dec-09 | Mazar | KI-B2 |
| 3 | xxxx | xxxx | NEPA | xxxx | 10-Dec-09 | Mazar | KI-B3 |
| 4 | xxxx | xxxx | MRRD | xxxx | 15-Dec-09 | Mazar | KI-B4 |
| 5 | xxxx | xxxx | MoPH | xxxx | 10-Dec-09 | Mazar | KI-B5 |
| 6 | xxxx | xxxx | Red Crescent | xxxx | 15-Dec-09 | Mazar | KI-B6 |
| Key Informant Interview List – Herat City (Herat) | | | | | | | |
| No . | Key Informant | Position | Organization | Contact No. | Date Interviewed | Location | Code No. |
| 1 | xxxx | xxxx | FAO | xxxx | 27-Dec-09 | Heart | KI-H1 |
| 2 | xxxx | xxxx | Directorate of Agriculture | xxxx | 27-Dec-09 | Heart | KI-H2 |
| 3 | xxxx | xxxx | NEPA | xxxx | 04-Jan-10 | Heart | KI-H3 |
| 4 | xxxx | xxxx | DACAAR | xxxx | 04-Jan-10 | Heart | KI-H4 |
| 5 | xxxx | xxxx | NPO/RRAA | xxxx | 06-Jan-10 | Heart | KI-H5 |
| 6 | xxxx | xxxx | ANDMA | xxxx | 06-Jan-10 | Heart | KI-H6 |

| Key Informant Interview List – Jalalabad City (Nangarhar) | | | | | | | |
|---|---------------|----------|----------------------------|-------------|------------------|-----------|----------|
| No. | Key Informant | Position | Organization | Contact No. | Date Interviewed | Location | Code No. |
| 1 | xxxx | xxxx | DAI | xxxx | 17-Jan-10 | Jalalabad | KI-N1 |
| 2 | xxxx | xxxx | Directorate of Agriculture | xxxx | 12-Jan-10 | Jalalabad | KI-N2 |
| 3 | xxxx | xxxx | FAO | xxxx | 12-Jan-10 | Jalalabad | KI-N3 |
| 4 | xxxx | xxxx | IF Hope | xxxx | 11-Jan-10 | Jalalabad | KI-N4 |
| Key Informant Interview List – Kabul City (Kabul) | | | | | | | |
| No. | xxxx | Position | Organization | Contact No. | Date Interviewed | Location | Code No. |
| 1 | xxxx | xxxx | WB | xxxx | 18-Dec-09 | Kabul | KI-K1 |
| 2 | xxxx | xxxx | FAO | xxxx | 29-Dec-09 | Kabul | KI-K2 |
| 3 | xxxx | xxxx | Oxfam Novib | xxxx | 03-Jan-10 | Kabul | KI-K3 |
| 4 | xxxx | xxxx | ADB | xxxx | 05-Jan-10 | Kabul | KI-K4 |
| 5 | xxxx | xxxx | UNEP | xxxx | 19-Jan-10 | Kabul | KI-K5 |

Appendix III: List of Focus Group Discussions Participants

| FGD - Male CDC - Lalmi Village - Kishindih District (Balkh) | | | |
|--|---------------------------|--------------------|-----------------|
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Dec-09 | FGD-B1 |
| 2 | xxxx | 13-Dec-09 | FGD-B1 |
| 3 | xxxx | 13-Dec-09 | FGD-B1 |
| 4 | xxxx | 13-Dec-09 | FGD-B1 |
| 5 | xxxx | 13-Dec-09 | FGD-B1 |
| 6 | xxxx | 13-Dec-09 | FGD-B1 |
| FGD - Female CDC - Lalmi Village - Kishindih District (Balkh) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Dec-09 | FGD-B2 |
| 2 | xxxx | 13-Dec-09 | FGD-B2 |
| 3 | xxxx | 13-Dec-09 | FGD-B2 |
| 4 | xxxx | 13-Dec-09 | FGD-B2 |
| 5 | xxxx | 13-Dec-09 | FGD-B2 |
| 6 | xxxx | 13-Dec-09 | FGD-B2 |
| FGD - Male Residents - Lalmi Village - Kishindih District (Balkh) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 11-Dec-09 | FGD-B3 |
| 2 | xxxx | 11-Dec-09 | FGD-B3 |
| 3 | xxxx | 11-Dec-09 | FGD-B3 |
| 4 | xxxx | 11-Dec-09 | FGD-B3 |
| 5 | xxxx | 11-Dec-09 | FGD-B3 |
| 6 | xxxx | 11-Dec-09 | FGD-B3 |
| FGD - Female Residents - Lalmi Village - Kishindih District (Balkh) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 11-Dec-09 | FGD-B4 |
| 2 | xxxx | 11-Dec-09 | FGD-B4 |
| 3 | xxxx | 11-Dec-09 | FGD-B4 |
| 4 | xxxx | 11-Dec-09 | FGD-B4 |
| 5 | xxxx | 11-Dec-09 | FGD-B4 |
| 6 | xxxx | 11-Dec-09 | FGD-B4 |

List of Focus Group Discussions Participants Cont'd

| FGD - Male CDC - Chahar Olang Village - Kushk-e-Rabatsangi District (Herat) | | | |
|--|---------------------------|--------------------|-----------------|
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 28-Dec-09 | FGD-H1 |
| 2 | xxxx | 28-Dec-09 | FGD-H1 |
| 3 | xxxx | 28-Dec-09 | FGD-H1 |
| 4 | xxxx | 28-Dec-09 | FGD-H1 |
| 5 | xxxx | 28-Dec-09 | FGD-H1 |
| 6 | xxxx | 28-Dec-09 | FGD-H1 |
| 7 | xxxx | 28-Dec-09 | FGD-H1 |
| 8 | xxxx | 28-Dec-09 | FGD-H1 |
| FGD - Female CDC - Chahar Olang Village - Kushk-e-Rabatsangi District (Herat) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 28-Dec-09 | FGD-H2 |
| 2 | xxxx | 28-Dec-09 | FGD-H2 |
| 3 | xxxx | 28-Dec-09 | FGD-H2 |
| 4 | xxxx | 28-Dec-09 | FGD-H2 |
| 5 | xxxx | 28-Dec-09 | FGD-H2 |
| 6 | xxxx | 28-Dec-09 | FGD-H2 |
| 7 | xxxx | 28-Dec-09 | FGD-H2 |
| FGD - Male Residents - Chahar Olang Village - Kushk-e-Rabatsangi District (Herat) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 28-Dec-09 | FGD-H3 |
| 2 | xxxx | 28-Dec-09 | FGD-H3 |
| 3 | xxxx | 28-Dec-09 | FGD-H3 |
| 4 | xxxx | 28-Dec-09 | FGD-H3 |
| 5 | xxxx | 28-Dec-09 | FGD-H3 |
| 6 | xxxx | 28-Dec-09 | FGD-H3 |
| FGD - Female Residents - Chahar Olang Village - Kushk-e-Rabatsangi District (Herat) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 28-Dec-09 | FGD-H4 |
| 2 | xxxx | 28-Dec-09 | FGD-H4 |
| 3 | xxxx | 28-Dec-09 | FGD-H4 |
| 4 | xxxx | 28-Dec-09 | FGD-H4 |
| 5 | xxxx | 28-Dec-09 | FGD-H4 |
| 6 | xxxx | 28-Dec-09 | FGD-H4 |

List of Focus Group Discussions Participants Cont'd

| FGD - Male CDC - Trena Community - Fatehabad Village – Surkh Rod District - Nangarhar | | | |
|--|---------------------------|--------------------|-----------------|
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Jan-10 | FGD-N1 |
| 2 | xxxx | 13-Jan-10 | FGD-N1 |
| 3 | xxxx | 13-Jan-10 | FGD-N1 |
| 4 | xxxx | 13-Jan-10 | FGD-N1 |
| 5 | xxxx | 13-Jan-10 | FGD-N1 |
| 6 | xxxx | 13-Jan-10 | FGD-N1 |
| 7 | xxxx | 13-Jan-10 | FGD-N1 |
| | | | |
| FGD - Female CDC - Trena Community - Fatehabad Village – Surkh Rod District (Nangarhar) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Jan-10 | FGD-N2 |
| 2 | xxxx | 13-Jan-10 | FGD-N2 |
| 3 | xxxx | 13-Jan-10 | FGD-N2 |
| 4 | xxxx | 13-Jan-10 | FGD-N2 |
| 5 | xxxx | 13-Jan-10 | FGD-N2 |
| 6 | xxxx | 13-Jan-10 | FGD-N2 |
| 7 | xxxx | 13-Jan-10 | FGD-N2 |
| | | | |
| FGD - Male Residents - Trena Community - Fatehabad Village – Surkh Rod District (Nangarhar) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Jan-10 | FGD-N3 |
| 2 | xxxx | 13-Jan-10 | FGD-N3 |
| 3 | xxxx | 13-Jan-10 | FGD-N3 |
| 4 | xxxx | 13-Jan-10 | FGD-N3 |
| 5 | xxxx | 13-Jan-10 | FGD-N3 |
| 6 | xxxx | 13-Jan-10 | FGD-N3 |
| | | | |
| FGD - Female Residents - Trena Community - Fatehabad Village – Surkh Rod District (Nangarhar) | | | |
| No. | Participant's Name | Date of FGD | Code No. |
| 1 | xxxx | 13-Jan-10 | FGD-N4 |
| 2 | xxxx | 13-Jan-10 | FGD-N4 |
| 3 | xxxx | 13-Jan-10 | FGD-N4 |
| 4 | xxxx | 13-Jan-10 | FGD-N4 |
| 5 | xxxx | 13-Jan-10 | FGD-N4 |
| 6 | xxxx | 13-Jan-10 | FGD-N4 |
| 7 | xxxx | 13-Jan-10 | FGD-N4 |
| 8 | xxxx | 13-Jan-10 | FGD-N4 |

Appendix IV: Case Study Selection

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

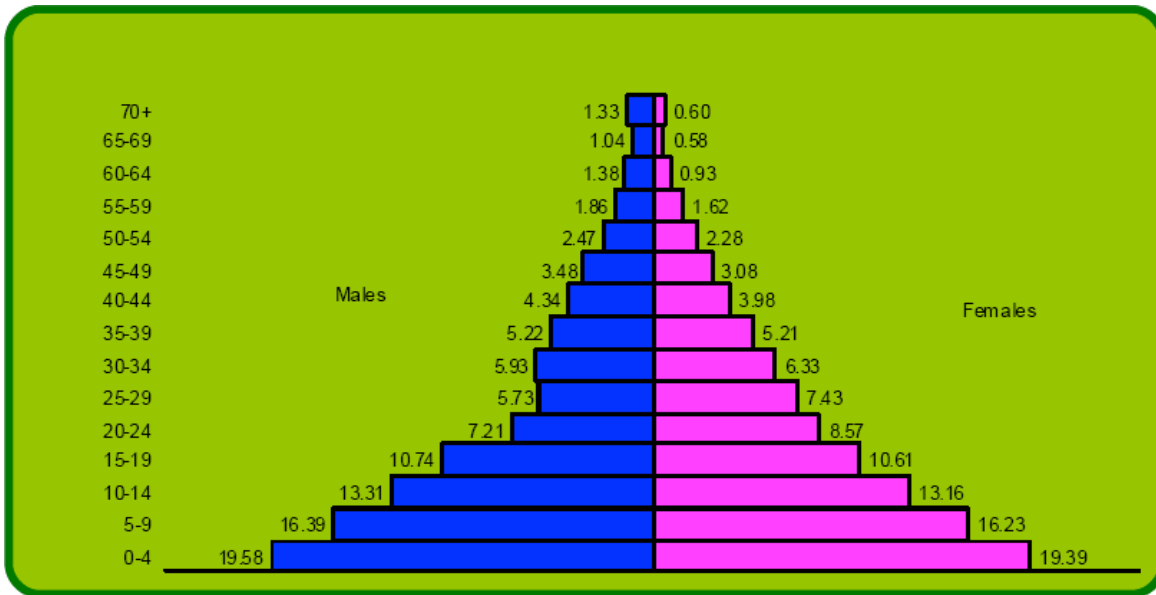
4. Lack or shortage of irrigation systems and dependence of residents on rainfall for agriculture and livestock husbandry
5. A history of being affected by climate change, e. g. more frequent and longer droughts, loss of vegetation cover, lower water table, increased number floods, and adverse changes in livelihoods and food security due climatic changes
6. 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 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

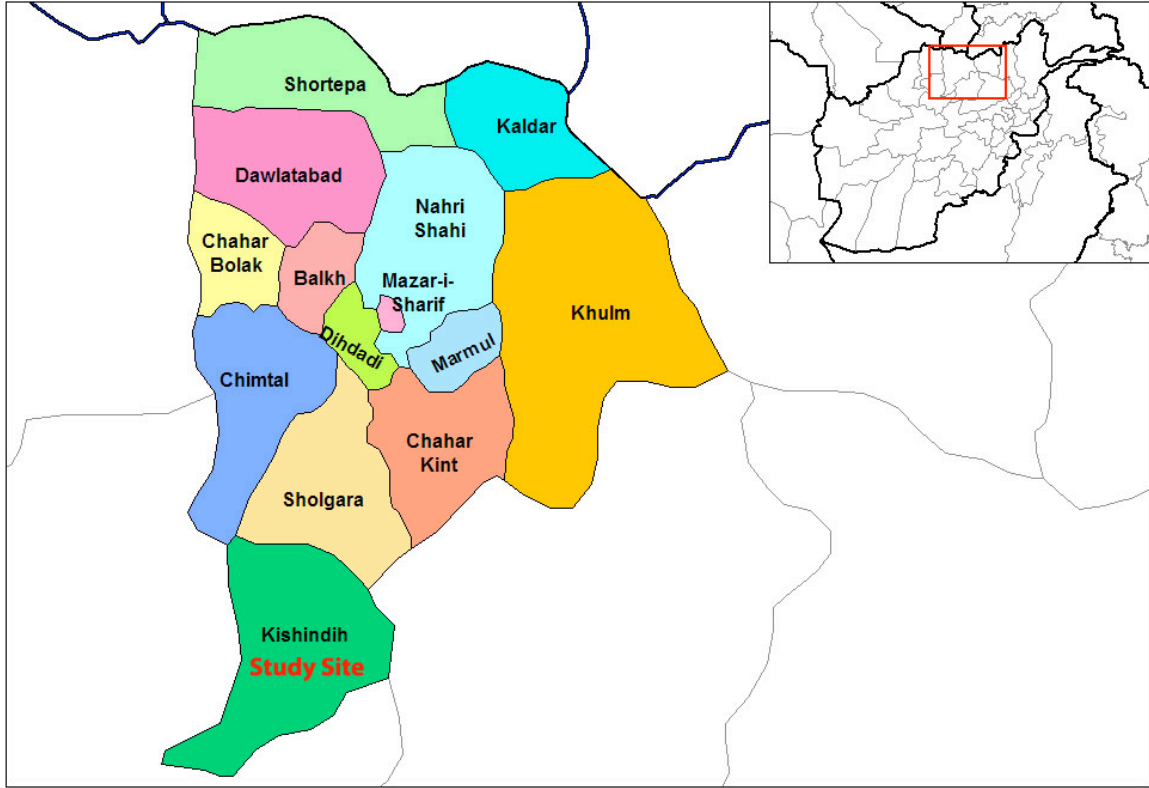
- Population: 1,141,700
- Languages: Pashto, Dari / Farsi, Uzbek, Turkmen
- Adjusted Age / Sex Distribution:



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 less than 9 percent of the population while Sholqara has less than 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.

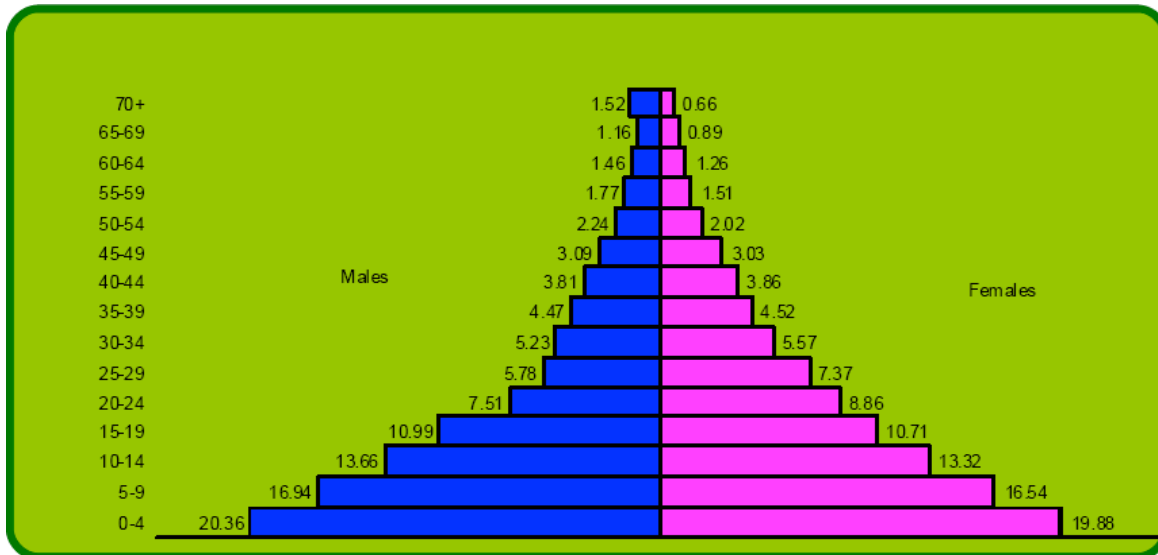
Site Selection (Balkh): While initially two districts of Dawlatabad and Kishindih were proposed by FAO senior experts as well as APPRO’s local contacts, Kishindih was selected as it best met the first and second criteria. In security, Kishindih was ranked lower than Dawlatabad but on further investigation the research team’s local contacts concluded that security was not a major concern.



Appendix IV: Case Study Selection Cont'd

Herat

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

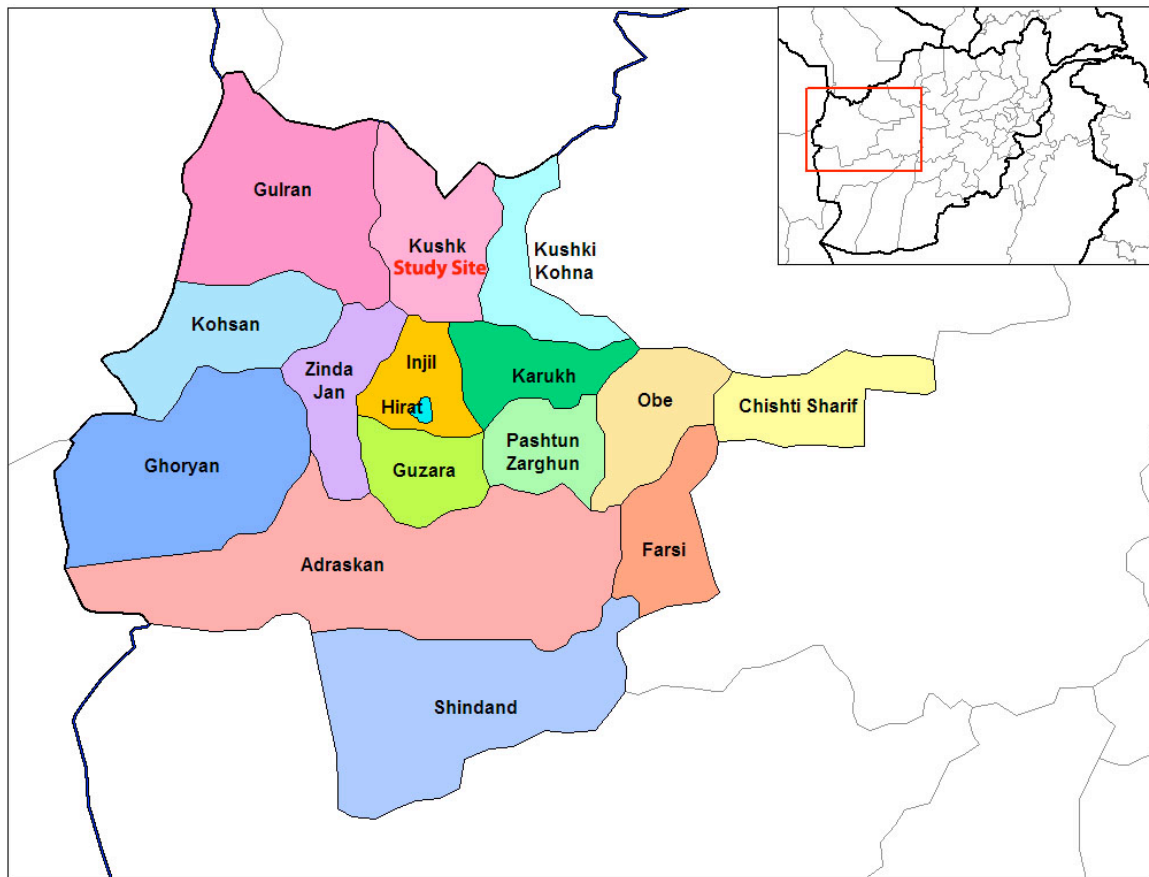


Herat is the second largest province in Afghanistan (after Helmand) in terms of land area. It is located in the western region and has borders with Turkmenistan and Iran. The province is divided between 16 Districts with Herat City being home to 23 percent of the population. The most populous districts 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 neighboring Turkmenistan and Iran.

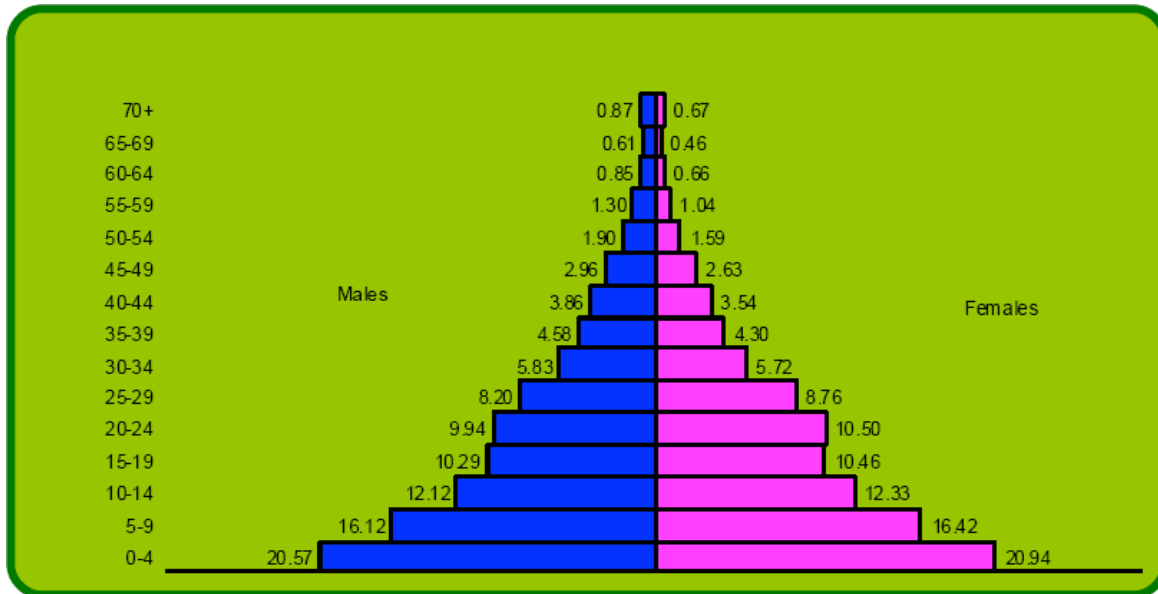
Site Selection (Herat): Two districts in Herat were recommended by agriculture experts from the Herat Directorate of Agriculture, Irrigation and Livestock, the Faculty of Agriculture of Herat University, and APPRO’s local contacts. Both Kohsan and Kushk districts met the criteria for the study based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



Appendix IV: Case Study Selection Cont'd

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 centers 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.

