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An assessment of human vulnerability to prolonged cold in the Zeravshan Valley of
Tajikistan

By
Robert Bryson Touchstone

A Thesis
Submitted to the Faculty of
Mississippi State University
in Partial Fulfillment of the Requirements
for the Degree of Master of Science
in Geosciences
in the Department of Geosciences

Mississippi State, Mississippi

December 2013

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2013

An assessment of human vulnerability to prolonged cold in the Zeravshan Valley of
Tajikistan

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The Central Asian country of Tajikistan is the poorest of the former Soviet republics; it is also prone to a plethora of natural hazards including mass wasting, flood, and extreme temperature. This thesis seeks to characterize how vulnerable rural Tajik mountain communities are to prolonged cold. The primary focus was in Navobod, in the Zeravshan Valley of Tajikistan, where semi-structured interviews were conducted with 31 households, the village leader and doctor, and school staff. The results from the interviews were compared with GIS analysis of the region.

Interviews indicated that the area is highly vulnerable to the impacts of prolonged cold. These rural residents continue to practice unsustainable land use, primarily for agricultural and biofuel resources. With unreliable sources of income, a fragile national economy, and decreased access to markets, these residents are ill-equipped to mitigate the impacts of prolonged cold weather. GIS results largely supported interview results.

DEDICATION

It is impossible to express fully those to whom I owe so much. I would like to dedicate this project, however, to a few special people. First, I would like to dedicate this work to the people of Tajikistan. Their strength and hospitality have changed me as a person forever.

I would also like to dedicate this project to my hero and the greatest man I have ever known, my grandfather, Arthur Glendon Welch. I dedicate this to my father, may he rest in peace. I dedicate this to my mother for the motivation she has given me.

To those in impoverished, war-torn, or underdeveloped parts of the world. To the child eating rice off the ground in North Korea. To the student walking miles a day to school in Africa. To the mother maintaining the household in Baghdad while her husband patrols the streets. To the father tending his summer flock in Wakhan Corridor, Afghanistan to feed his family. It is to you that I dedicate this project in part.

Lastly, and certainly not least, I dedicate this project to my world, my best friend, my favorite person in the world, my life partner, my wonderful wife, Karen Hawkins Touchstone. Without you, truly none of this would have been possible.

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I could not have done this project without the help of Dr. Stephen Cunha and Charles Kelly. They have provided insight into conditions in the country of Tajikistan, as well as providing advice on when to conduct the study and data sources.

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CHAPTER I

INTRODUCTION

Tajikistan is one of the poorest countries in the world. It is also one of the most mountainous, with 93% of its surface area covered by mountains (Cunha, 1998). Its population occupies river valley regions as well as high altitude mountain villages. Tajikistan's climates are mostly continental and subpolar in nature. The country itself is prone to a plethora of natural hazards, among which are mass wasting, extreme temperatures, dust storm, earthquake, and flooding. Many aspects of this nation's geography and climate contribute to its vulnerability to cold weather. Tajikistan is led by a totalitarian president who has had a long track record of poor policy and management, as well as endless claims of corruption (United Nations, 1996). The Soviet Union provided means to resources, as well as dictated the management of these resources. It is likely these actions have left Tajikistan more vulnerable to the impacts of extreme and prolonged cold due to the unsustainable nature of fuel and resource distribution created during the Soviet Union. Another type of vulnerability, social vulnerability, takes into account those aspects of the social fabric which contribute to, or enhance a population's vulnerability (Cutter, 1996).

There has been little research conducted in Tajikistan, either in general or specifically relating to hazards and disasters, for a number of reasons. A terrible, deadly civil war lasting over five years ensued after independence in 1991; following this, the

country came under the rule of totalitarian President Emomalii Rahmon. The country's Soviet-era infrastructure is in a continued state of disrepair, and a poor, un-kept road network leaves many villages isolated for long periods of the year.

Rural residents exhibit a continued pattern of unsustainable land use patterns (Hoeck, T., et al., 2007). With highly unreliable electricity supplies, particularly in winter, rural residents resort to often unsustainable biofuel use for heating and cooking patterns. Poorly constructed homes and a lack of sufficient heating fuel often results in heat loss and dense living arrangements, respectively. Rural residents often experience poor medical services, unsatisfactory school conditions for their children, fluctuating product prices, and isolation. It has been shown that extreme and/or prolonged cold weather can exacerbate already critical situations including natural disasters, food and fuel insecurity, and inadequate living standards. One example of this occurred in 2008 when rampant food and fuel insecurity were exacerbated by an extremely cold and prolonged winter in which temperatures remained between -8°C and -25°C (Kelly, C., 2009; United Nations, 2008).

It is the purpose of this research to determine geophysical and social factors which increase human vulnerability to prolonged cold. In order to sufficiently understand the social and geophysical factors which lead to increased vulnerability to prolonged cold in this impoverished and remote country, a mixed methods approach is necessary, whereby geophysical factors are intersected with social conditions, anthropogenic patterns, and decision and policy making to determine overall vulnerability of a place to prolonged cold. This study will focus primarily on a village in the Zeravshan River Valley named Navobod. Secondary analysis will be conducted at

four separate and geographically distinct remote mountain villages within the 7 Lakes district for comparison. Once these factors are identified, rectification of these issues will decrease the likelihood of prolonged decrease in quality of life.

In the context of other research in Tajikistan, and on prolonged cold, this project looks specifically at vulnerabilities related to prolonged cold weather. In this context, improvement in cold weather conditions for rural villages decreases the likelihood of adverse impacts on livelihood.

CHAPTER II

PERSPECTIVE

2.1 Geography; Climate

The Central Asian Republic of Tajikistan is a landlocked country, with an area of 143,100km², 2,590km² of which is water. It is 300km north to south, and 700km west to east (Cunha, 1998). Physically, the country is 93% mountainous, with elevation ranges from 300m-7495m (MSL). It is dominated by two large west-to-east mountain ranges north of Dushanbe, the Zeravshan and Fannsky Gorry ranges, respectively, with several peaks above 5,000m (MSL); and extending west from the Pamir Knot, the mighty Pamir Mountains, an extension of the Himalayan Range of Nepal, China, and Kashmir, with several peaks in excess of 7,000m (MSL) (Cunha, 1998). Tajikistan borders four countries (with corresponding border length): Afghanistan to the south (1,206km), China to the east (414km), Kyrgyzstan to the north (870km), and Uzbekistan to the west (1,161km) (CIA, 2013) (Figure 2.1).

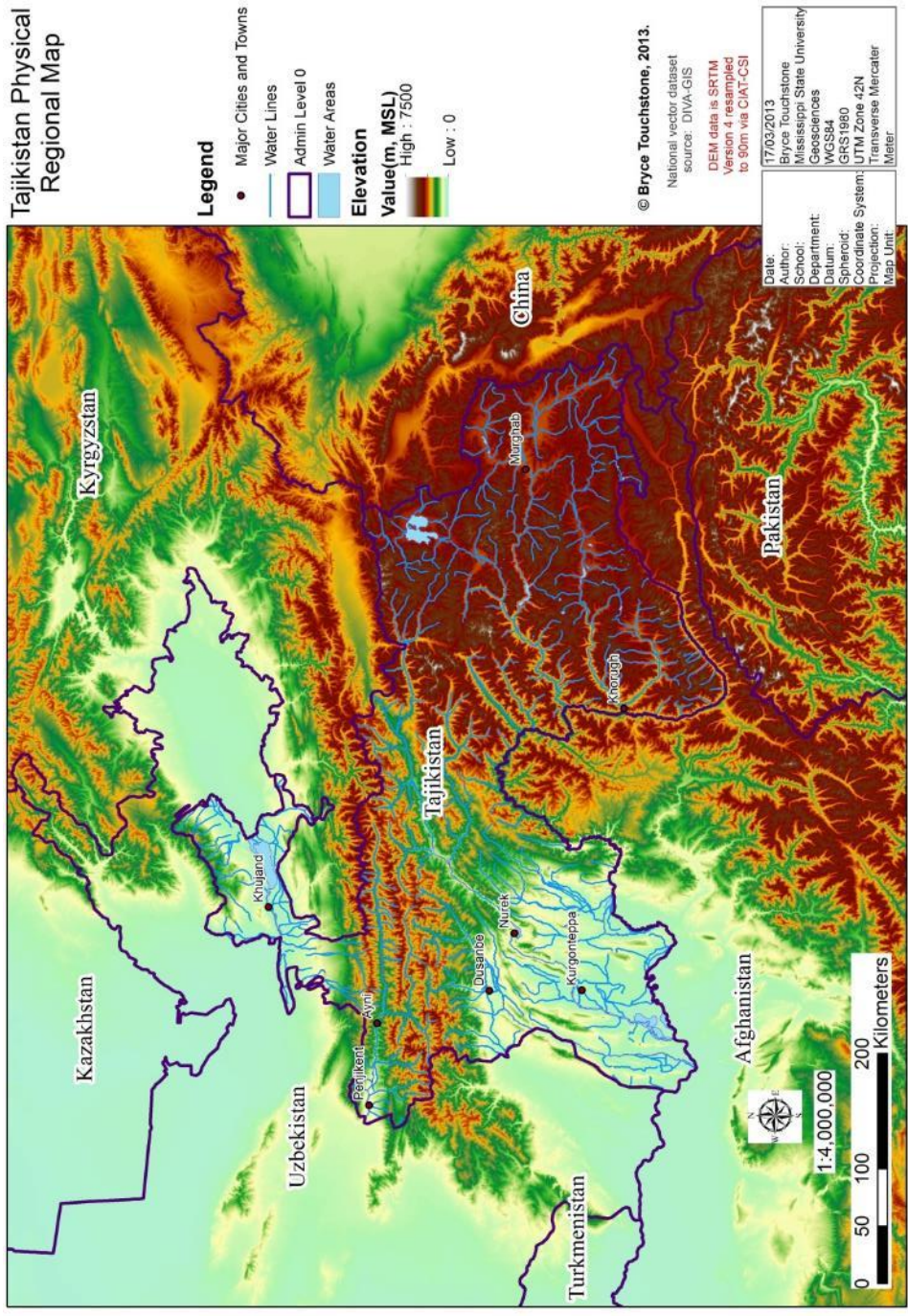


Figure 2.1 Tajikistan regional physical map

Climatically, Tajikistan is dominated by Steppe (BSk) and Continental (Dsa, Dsb, Dsc) climates in the west, and Cold Desert (BWk) and Polar (EF, ET) climates in the east, over the Pamir Mountains (Figure 2.2). Being 5500km from marine influences, Tajikistan experiences highly continental weather patterns; summertime temperatures can soar above 40°C in Dushanbe, while in the winter temperatures can plummet to -30°C in the northwestern mountains and below -50°C in the Pamirs (Cunha, 1998). There are small areas of Mediterranean climate over the northwest and southwest. Given the nature of the mountainous terrain, precipitation often increases with altitude, with its occurrence often coupled with rain shadow influences, leaving many arid sub-regions (Cunha, 1998).

2.2 Social and Demographic Characteristics

Tajikistan's population is just over 7.7 million (CIA, 2013). The capital is Dushanbe. Tajikistan joins Iran and Afghanistan as one of three Persian-speaking nations in the world. Ethnically, Tajikistan is divided amongst Tajiks (79.9%), Uzbeks (15.3%), Russians (1.1%), Kyrgyz (1.1%), and other (2.6%) ethnicities, including Turkic, Gharmi, and Pamiri peoples in the Pamir Mountains. The official language is Tajik, with Russian also widely spoken. The main religion is Islam, with Sunni (85%) and Shia (5%) comprising the vast majority. Its birth rate is 25.95/1,000, at 55th globally. Its death rate is 6.49/1,000, at 150th globally. Its maternal mortality rate is 65/1,000, at 93rd globally, and its infant mortality rate is 37.33/1,000, at 64th globally. The males and females are nearly equal with a ratio of 0.99 males/female. Its literacy is at 99.7% (CIA, 2013), though this figure can vary substantially with data source.

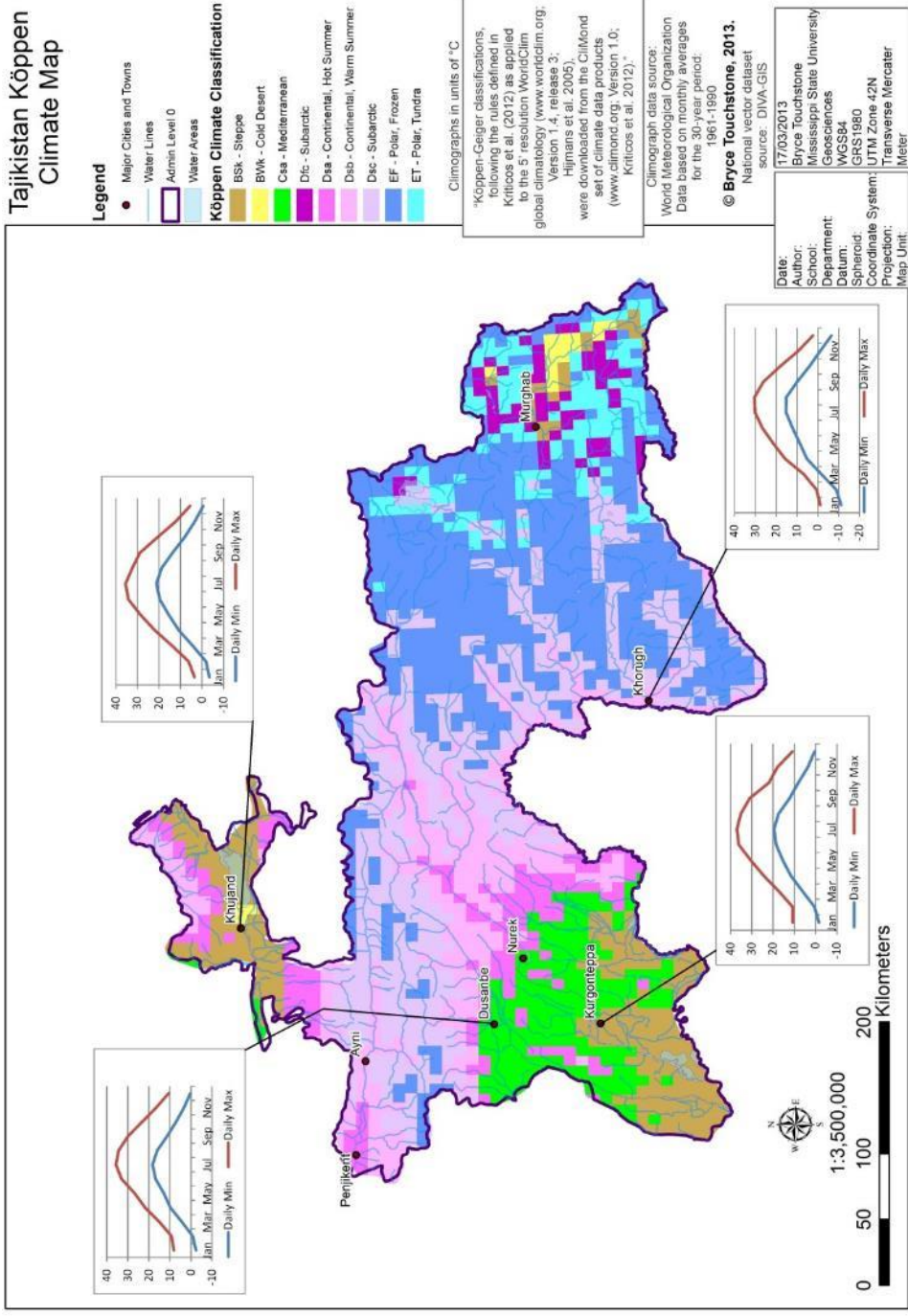


Figure 2.2 Köppen Climate Classification

2.3 Agriculture; Land Use, Cover, and Degradation

Tajikistan contains only 6.52% arable land, and half of all land in Tajikistan is at or above 3,300m above MSL (Kurtzman, 2009). Upon entry into the Soviet Union, much agricultural land was converted to cotton farming (Rowe, 2010, Rowe, 2009, Kurtzman, Jr., 2009; Feed the Future, 2012). To this day, cotton is still Tajikistan's chief export. Other crops such as fruit trees, grape vines, melons, tomatoes, and carrots are grown on private extensions of private home land, called "kitchen gardens" (Rowe, 2009; Rowe, 2010). These gardens were designed during Soviet times to allow households to supplement their diet; still they provide a means of extra income for many households. Land degradation is also a serious problem; during Soviet rule, approximately 90% of Tajikistan's forests were cleared for agriculture and energy (Hoeck, et al., 2007). The natural environment causes mass wasting from torrential flooding, seismic activity, and an arid climate for much of the year (Cunha, 1998). Humans contribute to this by intensive land degradation by way of unsustainable chopping of vegetation for fuel consumption and intensive annual agriculture (Hoeck, et al., 2007; Rowe, 2010).

2.4 Economy

Tajikistan is the poorest country in Central Asia, and the poorest of the fifteen former Soviet Socialist Republics (Open Society Institute, 1998). Its top two exports are cotton and aluminum. It has a per capita income of \$2,200, ranking it 187th in the world. Nearly half its labor force is in agriculture. Many households rely on the nearly 1 million Tajiks currently working abroad, mostly in Russia, for remittances to support them economically (CIA, 2013; Olimova & Olimov, 2007). Of Tajikistan's total population,

46.7% lived at or below the national poverty line as of 2009 (The World Bank, 2013). Many rural and mountainous regions, particularly in the east, relied on subsidies provided by the Soviet Union; these subsidies began drying out in the years leading up to the fall of the Soviet Union. They completely stopped after independence in 1991. Tajikistan has an infrastructure battered from poor upkeep, lack of investment, and years of civil war.

2.5 Administrative Regions; Government; Human Rights

Tajikistan is divided into four administrative oblasts (Admin Level 1): Sughd(Leninabad) in the northwest, Raion of Republican Subordination Tajikistan Territories in the west, Khatlon to the southwest, and Gorno-Badakhshan Autonomous Oblast in the east, covering the majority of the Pamir Mountains (Figure 2.3). Each oblast is subdivided into districts (Admin Level 2), and each district is subdivided into jamoats (Admin Level 3). Tajikistan is one of five Central Asian republics, and one of 15 former Soviet Socialist Republics. While Tajikistan and several other Central Asian states opposed removal from the Soviet Union, even after Moscow recommended the Russian SSR's withdrawal, Tajikistan declared independence in 1991 from the USSR (Gleason, 2001). Tajikistan saw itself in the midst of civil war by 1992, which resulted in more than 20,000 dead Tajiks, 100,000 forced into exile, and some 600,000 internally displaced persons. This civil war was spurred by the power vacuum created by the collapse of the Soviet Union. Conflicts among ethnic and political groups erupted, with some advocating to preserve the Communist system in place, and others wishing for reform (United Nations, 1996). Intermittent fighting continued across the country until a peace was finally brokered in 1997

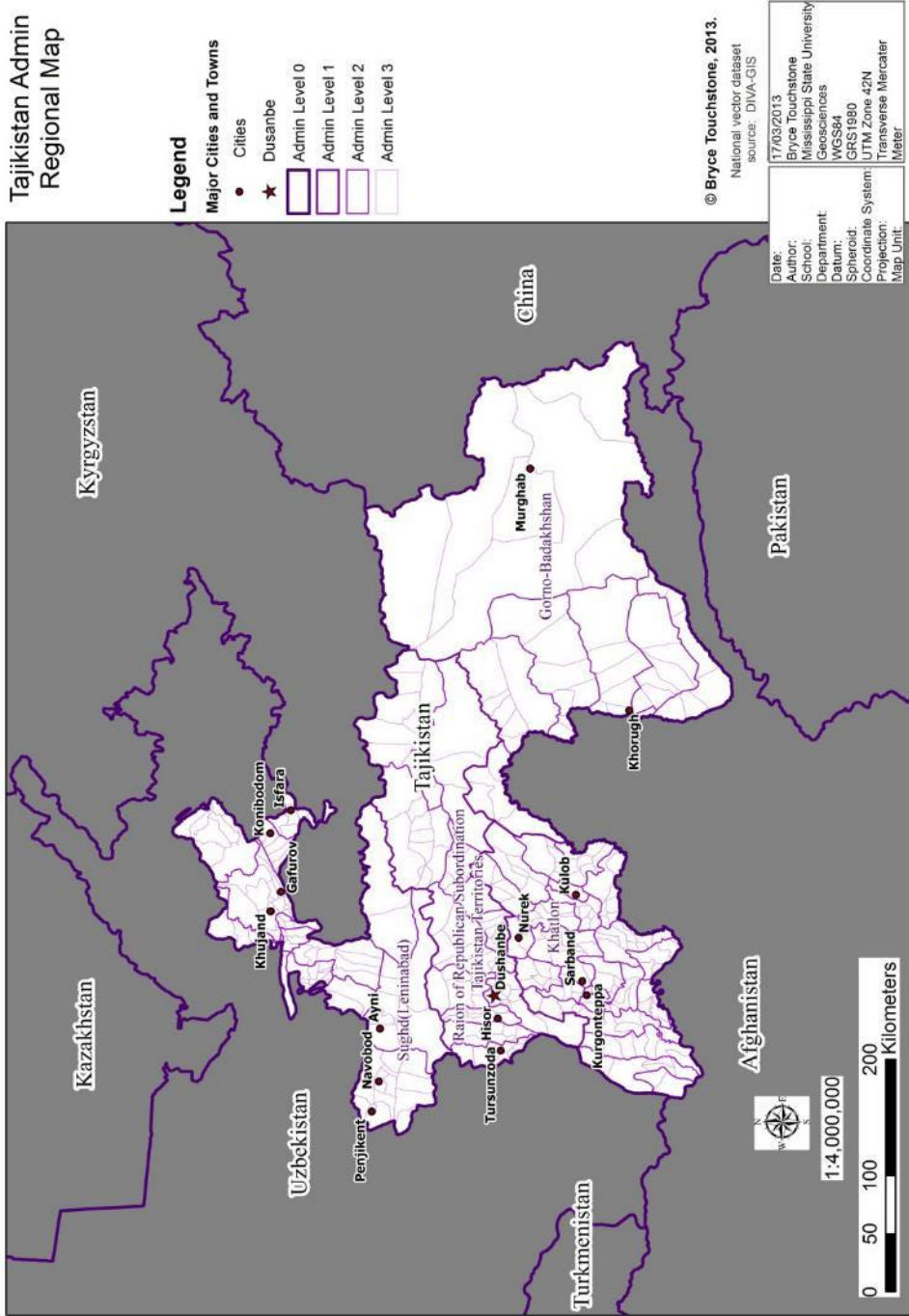


Figure 2.3 Tajikistan Regional admin map

While Tajikistan is technically a multiparty government, in practice it is ruled as an authoritarian state by President Emomali Rahmon (U.S. Dept. State, 2009). There is a long list of human rights violations associated with the current Rahmon government, including restricted freedom of speech, the press and media, harassment of international nongovernmental organizations(NGOs), difficulties with registration and visas, violence and discrimination against women, trafficking in persons, and child labor (U.S. Dept. State, 2009). The civil conflict is also still claiming victims, even after peace; in 2007 seven of 13 victims died of injuries sustained from landmines placed along the Tajik-Afghan border.

2.6 Development; NGO Actors

Post-independence development in Tajikistan began with the signing of the peace agreement between government-backed Emomali Rakhmonov and the United Tajik Opposition in June 1997, after which Tajikistan oscillated between requiring emergency aid and development. Following the peace agreement, a 26-member assembly, the Commission on National Reconciliation(CNR), outlined some of the most important and urgent aspects of development necessary in Tajikistan; among these were legislative reform, parliamentary elections, and millions of dollars to resurrect the economy, health, and education systems in Tajikistan (Open Society Institute, 1998).

Development efforts over the next decade were marginal, with the NGO presence in the country increasing. In 2008, the United Nations launched a Flash Appeal as a result of a combination of several events including increased food and fuel insecurity and prices, drought, water, heating, and electricity shortages, and an unusually cold winter (Kelly, 2009; United Nations, 2008). Projects as a result of this appeal were spearheaded

by CARE, CARITAS, FAO, Mercy Corps, OCHA, OXFAM GB, SC, UNDP, and UNFPA (United Nations, 2008). This represents a subset of all agencies currently operating in Tajikistan. In 2012, the Human Development Index(HDI) for Tajikistan was 0.622 (United Nations Development Programme, 2013).

2.7 Hazards

Tajikistan is 93% mountainous, with half of its land at or above 3,300m (MSL), with many peaks in excess of 5,000m. It is subject to a number of natural hazards, including avalanche, mass wasting, flood, drought, earthquake, epidemic, insect infestation, extreme temperature-both heat and cold, and wind storm (ADRC, 2006; Cunha, 1998). See Tables 2.1-2.4 for a summary of Tajik hazards for 1900-2013. There are also human-related hazards, including poor infrastructure, high levels of corruption and political instability, poor road networks, and a border with Afghanistan dotted with landmines (U.S. Dept. State, 2009; United Nations, 1996). Natural hazards sometimes happen in combination with one another, as well as with human-induced disasters. This can cause a relatively newly recognized type of disaster, known as a “compound disaster” (Kelly, 2009; United Nations, 2009). Table 2.2 shows that the second highest event in terms of number of people affected was an extreme temperature event in January of 2008, affecting an estimated two million people; this was the extreme and prolonged winter of 2007/2008. Table 2.3 shows this same winter event to be the most costly disaster in terms of Economic Damage on record for Tajikistan, at \$840 million.

Table 2.1 Tajikistan disasters by number of people killed, 1900-2013

Disaster	Date	Number Killed
Flood	25/05/1992	1346
Mass movement wet	13/05/1992	243
Epidemic	13/02/1997	168
Flood	6/05/2010	73
Flood	24/04/1998	51
Mass movement wet	19/11/1997	40
Flood	7/07/1999	27
Flood	7/08/2002	24
Mass movement wet	26/01/2006	21
Flood	22/07/2007	21
Total		2014

Created on: May-7-2013. - Data version: v12.07

Source: "EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium"

Table 2.2 Tajikistan disasters by number of people affected, 1900-2013

Disaster	Date	No Total Affected
Drought	May-00	3000000
Extreme temperature	Jan-08	2000000
Drought	Oct-08	800000
Flood	13/07/2004	400000
Flood	27/05/1996	180000
Mass movement wet	7/05/1993	75357
Flood	25/05/1992	63500
Flood	24/04/1998	40974
Flood	16/04/2007	17184
Epidemic	13/02/1997	15618
Total		6592633

Created on: May-7-2013. - Data version: v12.07

Source: "EM-DAT: The OFDA/CRED International Disaster Database
www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium"

Table 2.3 Tajikistan disasters by economic damage in US\$1,000, 1900-2013

Disaster	Date	Damage (000)
Extreme temperature	Jan-08	840000
Flood	25/05/1992	300000
Flood	6/05/2010	204000
Mass movement wet	7/05/1993	149000
Flood	24/04/1998	66000
Drought	May-00	57000
Flood	23/07/2005	50000
Mass movement wet	13/04/2003	41000
Mass movement wet	13/05/1992	24100
Earthquake (seismic)	29/07/2006	22000
Total		1753100

Created on: May-7-2013. - Data version: v12.07

Source: "EM-DAT: The OFDA/CRED International Disaster Database

www.em-dat.net - Université Catholique de Louvain - Brussels - Belgium"

Table 2.4 Disaster summary for Tajikistan, 1900-2013

		# of Events	Killed	Total Affected	Damage (000 US\$)
Drought	Drought	2	-	3800000	57000
	ave. per event		-	1900000	28500
Earthquake (seismic)	Earthquake (ground)	9	19	40531	23500
	ave. per event		2.1	4503.4	2611
Epidemic	Bacterial Infectious	4	171	23590	-
	ave. per event		42.8	5897.5	-
	Viral Infectious Diseases	1	21	456	-
	ave. per event		21	456	-
Extreme temperature	Extreme winter conditions	3	1	2002500	840000
	ave. per event		0.3	667500	280000
Flood	Unspecified	5	1367	67139	300000
	ave. per event		273.4	13427.8	60000
	Flash flood	4	51	192995	58990
	ave. per event		12.8	48248.8	14748
	General flood	14	170	502904	303760
	ave. per event		12.1	35921.7	21697
Insect infestation	Locust	1	-	-	-
	ave. per event		-	-	-
Mass movement dry	Avalanche	1	12	-	-
	ave. per event		12	-	-
Mass movement wet	Avalanche	5	104	2681	-
	ave. per event		20.8	536.2	-
	Landslide	6	251	94703	214700
	ave. per event		41.8	15783.8	35783
Storm	Unspecified	1	-	830	234
	ave. per event		-	830	234
	Tropical cyclone	1	-	1500	200
	ave. per event		-	1500	200

Created on: May-7-2013. - Data version: v12.07

Source: "EM-DAT: The OFDA/CRED International Disaster Database

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2.8 Regional Perspective

Since the fall of the Soviet Union, as with many former SSR's, the region of Central Asia has seen far less cohesion along ethnic and tribal lines. Civil strife between its own ethnic and tribal factions has seen Tajikistan plunge to the bottom of the former Soviet Union both socially and economically. Fear of Islamic uprisings has catapulted Russia into action, staging thousands of troops along the Tajik-Afghan border, as well as in Uzbekistan and Kyrgyzstan (Husain, 2006; Fritzsche, 2011). In addition to its ethnic

and political issues, the five countries of Central Asia create a plethora of natural resource distribution, with vast water reserves in Kyrgyzstan and Tajikistan, and oil and natural gas reserves in Kazakhstan, Uzbekistan, and Turkmenistan. During Soviet times, fossil fuels were supplied by the latter nations in exchange for timely delivery of water by the former nations (Laldjebaev, 2010). Now, however, this exchange has hit severe turmoil in both directions, with Kyrgyzstan and Tajikistan releasing less water for downstream Kazakhstan, Uzbekistan, and Turkmenistan; the three downstream countries, in turn, have seriously decreased, or cut off, supplies of oil, gas, and winter electricity (Laldjebaev, 2010; CIA, 2013).

CHAPTER III

PAST RESEARCH; VULNERABILITY; RESEARCH CHALLENGES

3.1 Vulnerability

While vulnerability can have many definitions, it is generally defined as the potential for loss (Cutter, 1996). From this, loss can be related to either life or property, and it can have both spatial and non-spatial components. Cutter (1996) describes vulnerability as a pre-existing condition, as a tempered response, and as a hazard of place; therefore, it is necessary to examine all factors likely to contribute to the vulnerability of a place or a population across time. The questions Cutter mentions as associated with vulnerability are: the human occupancy of hazard zones; how people and societies respond to environmental hazards, as well as the factors that influence their choice of adjustments; how people mitigate the risk and impact of environmental hazards; and if societies are becoming more vulnerable to environmental hazards (Cutter, 1996; Cutter, 2003).

Of all the components of vulnerability, currently the least is known about social vulnerability (Cutter, 2003). It is likely this is due to the difficulty in quantifying social vulnerabilities. Cutter postulates that social vulnerability is largely the product of social inequalities. Cutter also states that hazard potential is either moderated or enhanced by geography and social fabric of a place (Cutter, 2003; Cutter, 1996).

The factors examined for determining vulnerability in this project, mostly derived from the United Nations Flash Appeal of 2008, are weather forecast information, fuel source and use, land use and agriculture, access to medical facilities, primary and secondary education capacity, autumn preparation, food supply and storage, water, and living density. Further factors were identified after the first few interviews: road infrastructure and changes in vulnerability since the end of the USSR (United Nations, 2008).

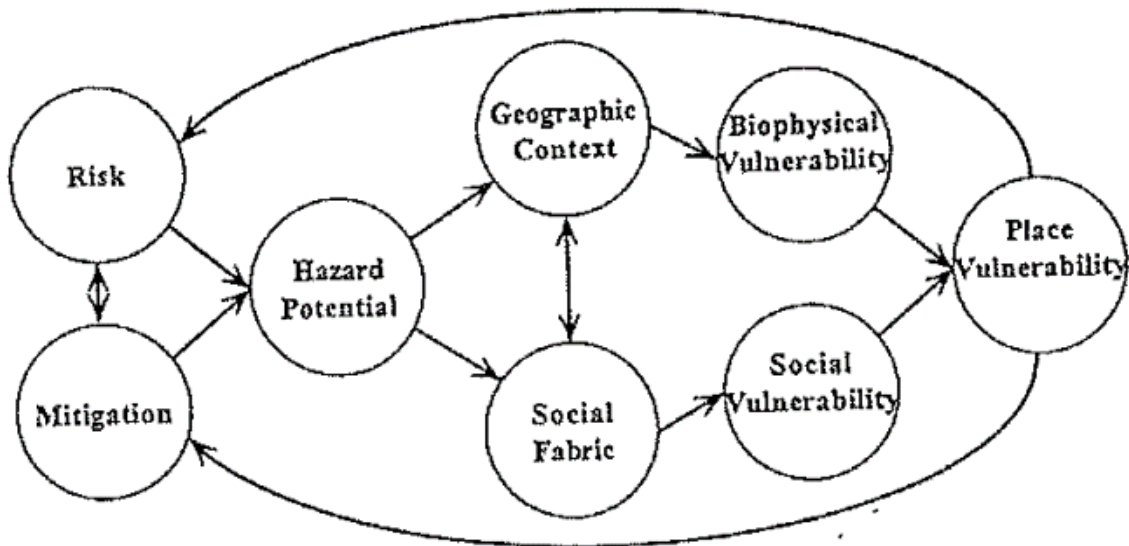


Figure 3.1 Vulnerability to environmental hazards (Cutter, 1996)

Vulnerability, as applied to this project, is defined as any action or inaction, condition, awareness or lack thereof, which acts, directly or indirectly, to reduce mitigation capacity, decrease resilience, conflict with livelihood, or avert risk readiness with regards to prolonged cold weather.

3.2 Resilience

In a study by Bayliss-Smith (1991), vulnerability was assessed using dimensions of sensitivity and resilience. High resilience and low sensitivity lead to the least vulnerability, and vice versa. Sensitivity is defined as the magnitude of a system's response to an external event, while resilience is the ease and rapidity of a system's recovery from stress (Blayliss-Smith, 1991).

Resilience was discussed in the study by Robledo et al. (2004). This study examined the resilience of hillside communities in Bolivia to the impacts of climate change. In this study, from their definition of vulnerability: "the (in)ability of people to avoid, cope with or recover from the harmful impacts of factors that disrupt their lives and that are beyond their immediate control", resilience of poor people was defined as: "their ability to withstand the impact of the trends and shocks (of vulnerability), absorbing them while maintaining function". Among factors found to reduce resilience were overreliance on agricultural products, high levels of poverty, and unsustainable land management on increasingly degraded land (Robledo et al., 2004).

3.3 Livelihood; Risk

Taken from the definition used by Ambinakudige (2011), 'livelihood' is "the command an individual, family, or other social group has over an income and/or other bundles of resources that can be used or exchanged to satisfy its needs". This was used in a study to determine the changing livelihood strategies of Adivasi communities in India due to ever-changing land use policies (Ambinakudige, 2011). Taken from this perspective, 'livelihood' for this project will specifically mean the access to, and means of control over, resources at the household level. The objective, specific to this project, is

to mitigate against the impacts of prolonged cold on humans, at the household level. The discussion will look at the ways the different parts of this model interact within the community of Navobod, and of the vulnerability at the household level within Navobod.

The livelihood strategies of rural mountainous regions in Tajikistan was examined in three regions of Tajikistan by Robinson and Guenther (2007). Among the most determining factors of poverty were less access to agricultural land, lower levels of livestock ownership, and larger families with more children. Factors contributing to higher levels of wealth included access to credit and markets, diversification of sources of income, sale of agricultural and/or livestock produce, and the presence of a migrant worker in Russia as a source of remittances. Altitude and levels of education were also mentioned as variables leading to poverty levels.(Robinson and Guenther, 2007).

Risk can serve in one of several capacities; for this project, we will look at two specifically. Firstly, risk can be defined simply as the likelihood of occurrence of some event; within this context, it can have two domains, consisting of either the potential source of risk or nature of the risk itself, as discussed within Cutter, 1996. This likelihood approach acts to form part of the ‘hazards of place model of vulnerability’, also within Cutter (1996).

Risk can also be simply defined as the ‘effect of uncertainty on objectives’. This context of risk is discussed within the ISO 31000 Risk management – Principles and guidelines International Standard document. Among its properties are management, external and internal context, assessment, identification, source, consequence, likelihood, profile, analysis, criteria, level, evaluation, treatment, and control (ISO 31000, 2009). This take on risk explicitly expresses risk as being neutral in nature, whereby it is neither

negative nor positive; it is merely the consequences which must be considered for positive or negative connotations (ISO, 2009).

3.4 Past Research

3.4.1 Agriculture; Fuel and Energy

Lack of hydroelectric capacity leads to unreliable electricity supplies, particularly in winter; these supplies are often reduced to total cut-offs to some of the most rural residents. This forces mountain and rural residents to rely heavily on biofuel as a fuel source for heating and cooking; this reliance on biofuel is often unsustainable in Tajikistan. Research on land development, resource conservation, and energy within the mountainous regions of Tajikistan has been conducted on various scales. Post-Soviet era development within Tajikistan has been slow and difficult. Breu et al. (2005) focused on the Gorno Badakhshan Autonomous Oblast (GBAO) region of Tajikistan, looking at better methods for sustainable development within the region. This study showed that there are a number of issues facing the GBAO, among which are extensive internal migration, a decrease or cessation of food, energy, and infrastructure subsidies following the Soviet collapse, civil war, high reliance on international aid and remittances from family members working abroad, and political alienation (Breu et al., 2005). The GBAO reliance on resources in the form of food, electricity, and fuels from the Soviet union decreased the region's resilience, and at the end of the Soviet era, the GBAO was left largely unable to cope. The subsequent years saw rural Tajikistan, having already lost 90% of its forests to agriculture and energy demands, rely heavily on local natural resources for energy, often resulting in severe land degradation, especially in the GBAO with 87% of its 213,000 inhabitants living in rural areas as of 2003. In 2007, an

assessment of the relationship between rural energy consumption and land degradation in the GBAO was conducted. It found that often with decreased energy supply, there was an increase in biomass energy consumption at the household level. It also concluded that as these rural mountainous regions suffer from both chronic energy scarcity and the use of local biomass as fuel at an unsustainable rate, there must be a reassessment of the energy scheme of Tajikistan (Hoeck, et al., 2007).

A research study conducted in 2007 focused on conservation issues facing the Tajik National Park in central Tajikistan. The country developed a heavy reliance on Soviet fuel sources during occupation, and after its collapse experienced artificially high population growth due to return migration. Traditional nomadic settlements reflected, to a large degree, the availability of natural resources in the form of food, pasture, land, water, and livestock. This way of life was largely abandoned during the Soviet period. This study found three primary issues facing the park: continued and intensified use of biomass as fuel sources, inappropriate pasture use, and increased pressure on wildlife, including endangered species. This research is relevant across all of Tajikistan, and reflects issues of prolonged cold weather mitigation management, as with increased cold weather will undoubtedly come an increase in the overuse of these fuel and food sources (Haslinger, et al., 2007).

Research on possible alternative fuel and food sources has also been conducted. From the onset of Tajikistan's induction into the Soviet Union, kitchen gardens consisting of both food and livestock were permitted at the household level. These were largely extensions of the home and were used to offset diet deficiencies. At the end of the USSR, surplus food from kitchen gardens constituted one third of the food sold at

local markets, and played an especially vital role in the lives of rural families (Rowe, 2009).

3.4.2 Disasters; Compound Disaster

As mentioned in the vulnerability article by (Cutter, 1996), the vulnerability of a place includes those geophysical features and components that increase the likelihood of avert living conditions. In 1911 a catastrophic earthquake-induced landslide in the Pamir Mountains blocked the Bartang Murga River valley and buried the village of Usoi, creating a natural dam, named the Usoi Landslide dam. A lake began building in behind this dam, rising rapidly for a number of years, flooding the village of Sarez. Should the Usoi landslide dam fail, it is estimated over five million people would be affected downstream as far as the Aral Sea in western Uzbekistan/Kazakhstan.

Afghanistan is another nation that is also prone to similar natural hazards as those found in Tajikistan. Seismic activity is ripe in the country, and in 1998, the region of Faizabad experienced a powerful earthquake. Adding to the difficulties for humanitarian relief of dealing with this disaster were the compound issues of poor or non-existent road networks, cross-national cooperation between Afghanistan, Tajikistan, and Pakistan, stormy and dusty weather, and remote, war-torn populations. This concept of the compounding of issues with regards to natural disasters was one that was relatively new to both the emergency management and humanitarian response communities, and one that would require further research (Barr, 1998).

A similar situation as that in Afghanistan in 1998 was experienced in Armenia during the 1988 Spitak earthquake of comparable intensity as the previously mentioned event in Afghanistan. Again, the response and recovery efforts with this disaster were

compounded by other issues, particularly extreme and prolonged cold weather. While the initial hazard was an earthquake, the extreme and prolonged cold quickly exacerbated things for both responders and victims (Kelly, 2000). The primary concern within a framework of emergency management immediately following a disaster is the immediate response, including medical treatment, food, water, and shelter. This response phase can, however, sometimes carry over into the recovery phase. For instance, one issue in dealing with disasters that occur during times of cool or very cold weather is that its onset can multiply problems for victims, particularly in terms of food and water delivery access, proper shelter, and disease prevention. Cold weather can be considered a hazard once daily temperatures prevent sleeping outside without cover (Kelly, 2000). Another very important aspect of dealing with these types of situations is that issues faced by humanitarian forces in dealing with extreme or prolonged cold must be documented, otherwise it is difficult for different humanitarian groups not in contact to learn from previous experiences, such as was the case with the humanitarian efforts in Bosnia during extreme cold weather in the 20th century (Kelly, 2000).

More research on the concept of compound disasters was conducted in the aftermath of an event in the winter of 2007-2008 in Tajikistan. Drought and subsequent decreased water supplies for hydroelectric sources, increasing fuel and food prices coupled with decreasing supplies of both, and lack of investment in infrastructure, health care, and education in Tajikistan all combined with an extremely cold and prolonged winter. Temperatures remained below freezing for well over a month in Dushanbe, which is around 900m above MSL, well below the national average, to create a disastrous situation beckon the attention of the international humanitarian community.

Collaboration with the Tajik government gaining access to government data and documents proved difficult, both because of the government's fear of the latter reflecting negatively on the government and because of the government's refusal to recognize the situation as critical (Kelly, 2009).

This type of "compound disaster" was new and as such very difficult to define by the international community. This made effective logistical and communication operations difficult, especially in western Tajikistan. Road blockage, 24-hour electricity cut-offs, poor harvests, abnormally large snowfall amounts, damaged water, health, and hygiene infrastructure, and poor hazard awareness were all issues faced by the international community in early 2008 when the United Nations launched a Flash Appeal. One of the results of this appeal was the realization that Tajikistan is one of the most vulnerable countries on earth to natural hazards; moreover, its lack of comprehensive mitigation and preparation methods for cold weather hazards, particularly in remote mountainous regions of the country, places it at even higher risk of catastrophic nationwide failure of basic services. Among these services are education and medical care, both of which suffered during this winter, as many hospitals were forced to release patients under care due to lack of facility heating, clean water, access, and resources. The same was true for most rural schools, as 90% of which were estimated to have no functioning heating system, and students and teachers were unable to sufficiently heat schools for operation, though it is not the official policy of the Tajik government to close schools due to lack of heating in winter. While rural communities in the western oblasts commonly experience full electricity outages, this situation was an example of how,

coupled with extreme and prolonged cold, high food and fuel insecurity, and scarce resources, a compound crisis can quickly develop (United Nations, 2008).

Another compound disaster was experienced during the 2005 Kashmir earthquake. In addition to the earthquake itself, relief operations were further hampered by destruction to towns and villages, difficult mountainous terrain, worsening cold weather, and damage to roads, water, and sanitation (Moszynski, 2005). A study was conducted that investigated the delivery of disaster relief and aid based on need during and after the Kashmir crisis. In this study, it was determined that while the response was disrupted by logistics, it still averted a secondary, or compound disaster from resulting (Benini, et al., 2009).

3.4.3 Hazard Warning and Response in Central Asia

To monitor the condition of the Usoi landslide dam keeping Lake Sarez from spilling downstream into the Murgab, Bartang, Panj, and Amu Darya valleys, an early detection and warning system has been developed but its effectiveness or reach is not known to date (Alford, 2000). Designed originally to support U.S. Department of Defense operations in Afghanistan and surrounding areas, an Afghanistan Weather Hazards product was created by NOAA's Climate Prediction Center, in collaboration with the United States Air Force. This product focuses on drought, flood, strong winds, blowing dust, extreme heat, and extreme cold. Further this products creation and development, its subsequent use has been to support humanitarian operations in the greater southwest Asia area (Pugh, 2005).

The lack of an early warning system was noted by Kelly (2009), in dealing with the developing and relatively new compound disaster type which afflicted Tajikistan in

the winter of 2007/2008. The agencies did not know how to deal with the new, evolving type of disaster, and relief operations were hampered by lack of communication or warning indicators (Kelly, 2009).

A rapid comparative risk assessment was carried out in the Penjikent, Mashtchohi Kohi, and Ayni districts of the Zeravshan Valley by Mission East in 2008. This project was a precursor to a larger disaster risk reduction project by the German government, based in the Zeravshan Valley. This comprised a month-and-a-half long series of field assessments carried out by three teams of geologists, vulnerability surveyors, and field managers. The results of this were compiled into a database for use in analyzing and ranking the data into a multi-risk indicator for village selection (Mission East, 2008).

3.4.4 GIS, Remote Sensing

Research pertaining to the effective utility of GIS and RS in Tajikistan is thus far limited. An examination of the potential utility of GIS and remote sensing in the context of the development of effective, comprehensive emergency management methods is examined by Cunha (1998). Again, the issue of both return migration and high environmental hazard vulnerability is discussed, specifically the occurrence of high magnitude, low frequency, and often catastrophic events in mountainous Tajikistan. The use of GIS and RS in high mountain regions will undoubtedly prove highly valuable in years to come (Cunha, 1998).

A study was conducted in 2010 using GIS-based decision support for soil conservation planning in Faizabad, Tajikistan. The study looked at ways of using factor-based approaches to differentiate between well-conserved land units and other, less-

conserved units. The importance of this is applicable in all developing mountainous areas, which are susceptible to soil erosion on sloping land (Bühlmann, 2010).

Heinimann, et al. (2003) discuss several of the issues regarding the use of GIS and RS in developing mountain communities. One of the issues is with the lack of accurate bases of spatial information in mountainous regions. There is also the issue of scale across a space, whereby mountain areas often see sharp changes in terrain slope and features across a relatively short horizontal distance; this makes distance, area, and density measurements far more difficult than in low-lying areas. There are issues with satellite imagery over mountainous regions, with difficulty in georeferencing and orthorectification requiring high-resolution digital terrain models(DTM). Also, within nations containing mountainous regions, GIS data are often kept at the national capital, and access is difficult to gain at the regional or village level. Another issue with GIS in remote developing mountainous areas is the lack of infrastructure, know-how, and capabilities to implement and maintain a GIS for informed decision-making (Heinimann, 2003).

CHAPTER IV

METHODOLOGY

The primary focus of this project is a case study based in the Zeravshan River Valley village of Navobod, in Sughd Oblast, Tajikistan, see Figure 4.1. Navobod has approximately 500 households; further demographics are not known. It is at approximately 1,137m above MSL. It is approximately two-thirds of the distance from Ayni to Penjikent, and is in the Zeravshan River Valley, see Figure 4.2. Climate was one factor considered in site selection; the study area has a Hot Summer – Continental climate (see Figure 4.3). The methodology was divided into two components, the primary component consisting of semi-structured interviews, and the secondary component consisting of using GIS to develop multiple spatial indicators relating to vulnerability to prolonged cold.

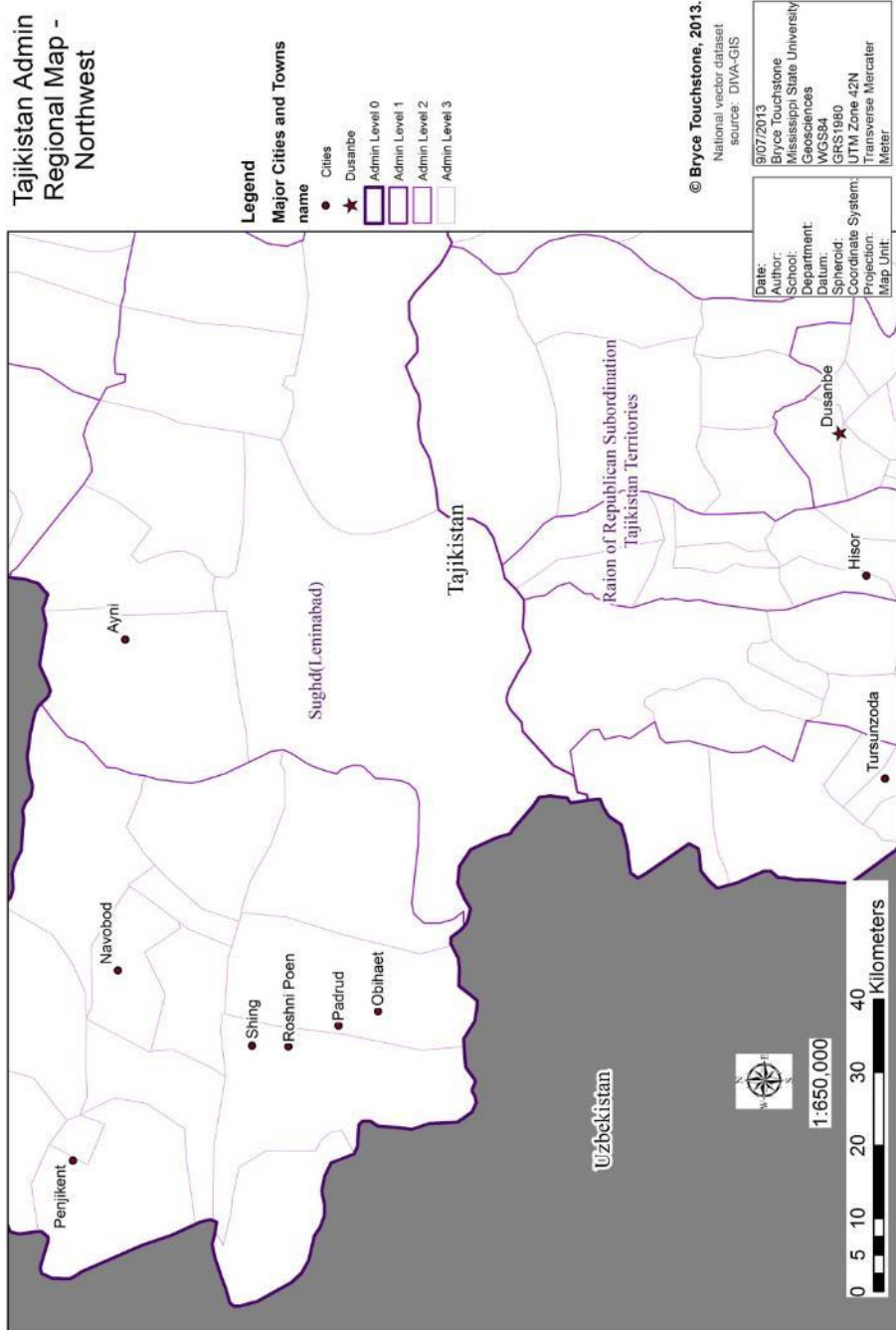


Figure 4.1 Northwest Tajikistan administrative map

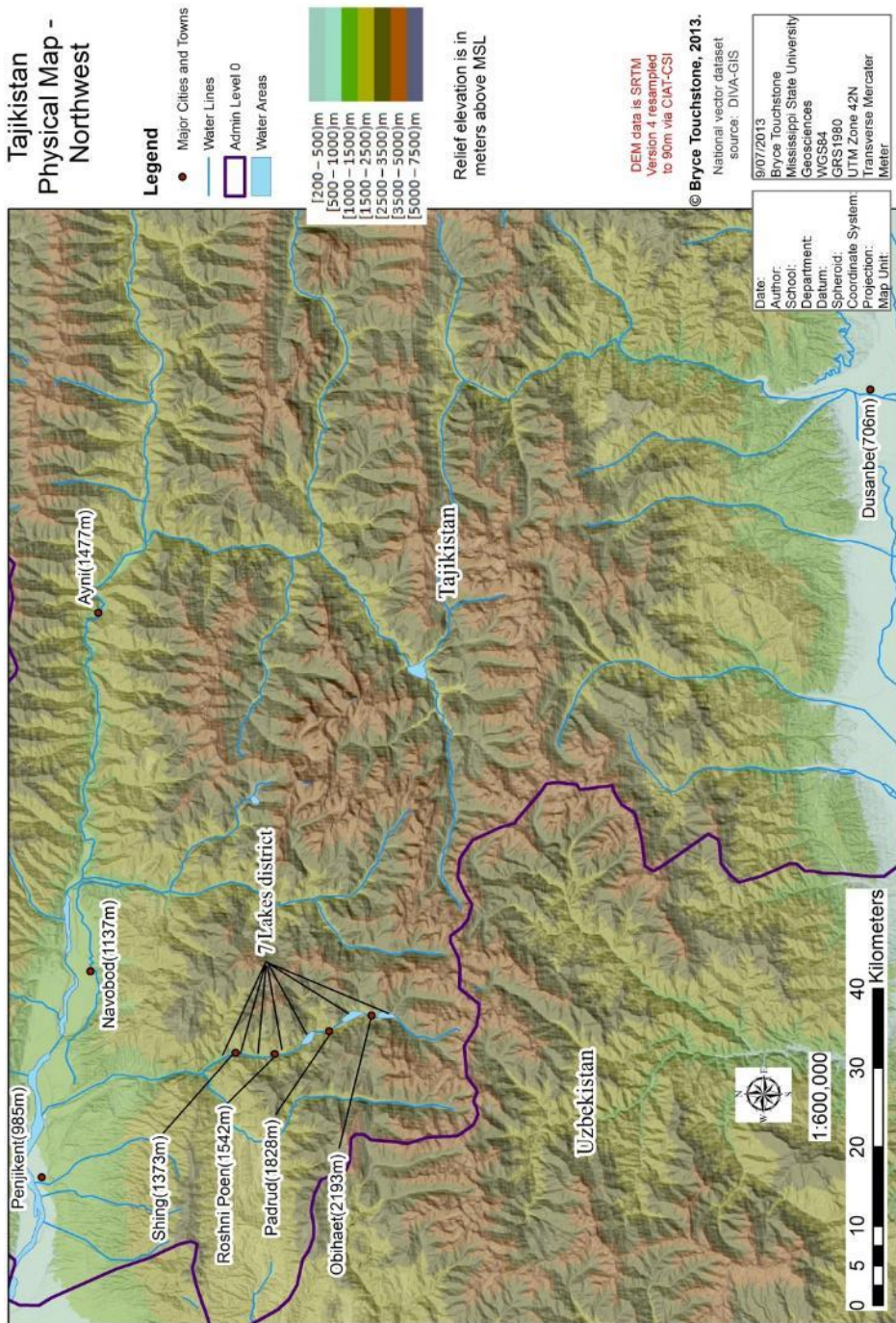


Figure 4.2 Northwest Tajikistan physical map

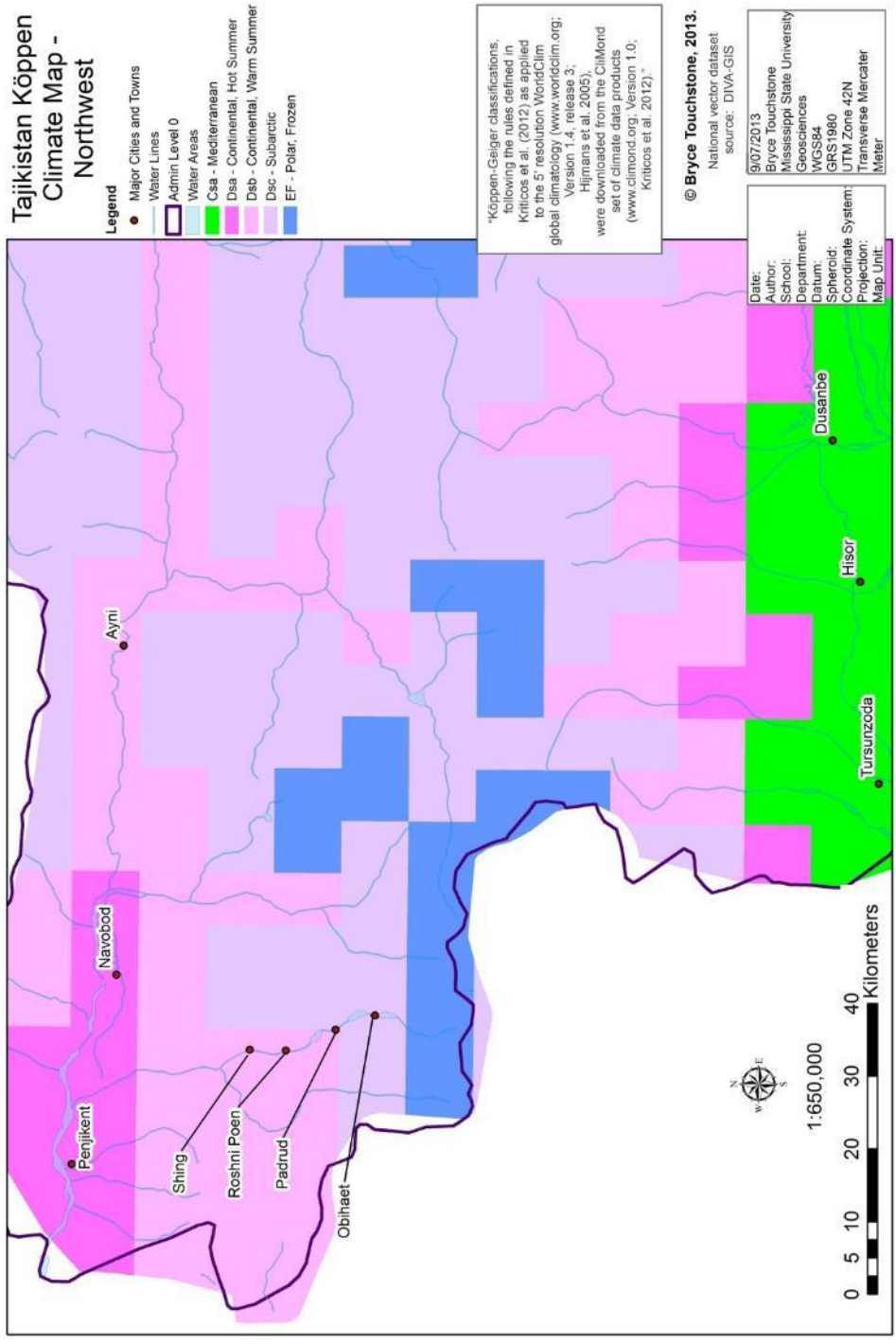


Figure 4.3 Northwest Tajikistan climate map

4.1 Primary Data Collection, Management

4.1.1 Interviews

The primary data collection was in the form of a series of in-field interviews. 31 open-ended interviews were conducted with households within the village of Navobod, in the Zeravshan River Valley. A pre-determined list of open-ended questions was developed prior to deployment to the field in September, 2012. Based upon initial responses, as well as feedback from, and discussion with my translator, who was also from the village, this list of questions was revised and added to through the first 12 interviews. Each interview ended with an open discussion of any and all matters relating to cold weather, specific to the household being interviewed. The final listing of questions for these interviews can be found in Appendix C.

Also within the village of Navobod, similar open-ended interviews were conducted with two school administrators, two school teachers, the village doctor, and the village leader. Questions asked were specific to the interviewee's relevant field, and all focused on cold weather. The final listing of questions for these interviews can be found in Appendix C.

In addition to the interviews in Navobod, I traveled by vehicle and foot to the 7 Lakes region within Sughd Province to conduct focus group interviews with the leaders of five villages at increasing depth into the Zeravshan mountain range. The final listing of questions for these interviews can be found in Appendix C.

4.1.2 Data Collection, Management, Storage, Translation

The interviews were conducted by my reading the question in English, followed by my translator translating to Tajik Persian for the interviewee. The interviewee then responded in Tajik Persian and the translator then translated the response to English for me. The entire interview was recorded with a digital sound recorder. These interviews were then transcribed and typed. The audio files were also backed up to hard drive. For purposes of anonymity, neither the audio interviews nor the transcriptions were shared.

4.2 Secondary Data Collection, Management

For the GIS component, the first step was to download 90m level 4 resampled SRTM DEM tiles from CIAT (see maps in ‘Results’ chapter for full reference). These tiles were all projected from WGS 84 to UTM Zone 42N, WGS84. The grid overlying the study area was then classified into 100-meter intervals. The DEM grid was also used to produce a slope grid, which was then classified into three intervals: (0-30)degrees, [30-45]degrees, and (45-78]degrees. The road network was acquired using a Garmin Oregon series GPS device.

All data was saved into ESRI geodatabase format, and a comprehensive data dictionary was maintained for data lineage and geoprocessing accuracy assurance. Spatial data analysis was performed using ArcGIS and QGIS platforms. A series of map products were created from the analysis on these layers, which are in the Results chapter.

4.3 Objectives; Research Questions

The objectives of this project are to create a snapshot, through narrative, of life in a rural mountainous Tajik village in winter with respect to vulnerability; to determine if

GIS supports interview responses; and to investigate ways in which day-to-day livelihood practices can be improved with respect to averting the adverse impacts of prolonged cold. It is hypothesized that exposure to multiple natural hazards, political turmoil, poverty, and unsustainable livelihood practices leave rural residents in the Zeravshan Valley of Tajikistan highly vulnerable to the impacts of prolonged cold weather.

This project sought to answer: how vulnerable are rural Tajik mountain communities to prolonged cold; how has this vulnerability changed since the winter of 2007/2008; what are the underlying factors that increase this vulnerability; and how susceptible to external shocks are these rural mountain communities. It should be noted the use of the word 'extreme' was used during the interviews; in the context of this project, the word 'extreme', when used with 'cold', 'weather', or 'temperatures' during interviews, pertains to both extremely low temperatures as well as prolonged periods of cold weather.

CHAPTER V

RESULTS

5.1 Navobod Household Interviews

The sample was selected using both snowball sampling and convenience sampling methods were used for this project. The vast majority of those sampled were men, mostly based upon the Muslim culture of the region. As with most of the population across Tajikistan, the majority of those sampled for this project worked in agriculture. All but one respondent sampled was ethnic Tajik Persian; the other was ethnic Uzbek, aged approximately 50 years.

5.1.1 Weather Forecast Information

The first questions dealt with weather forecast information sources: “Describe your sources of weather forecast information.” A quantitative assessment of the responses is detailed in Figure 5.1.

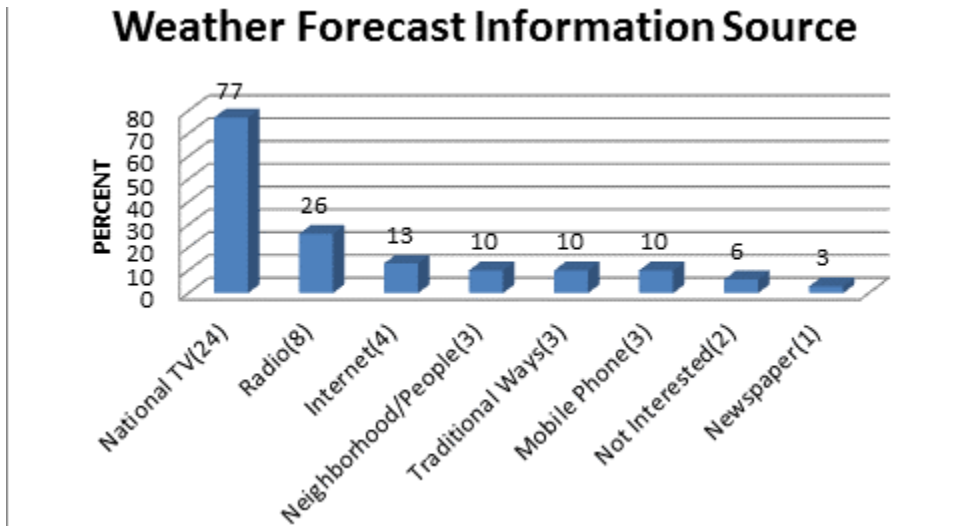


Figure 5.1 Weather forecast information source

One respondent stated that they “...do not trust whatever information is provided by the national TV, because they cannot provide the information which is specific for this district, or for a specific district.” Three respondents stated that they had neighbors or friends with internet access whom they rely on, in part or in full, for weather forecast information. Another respondent simply stated that they were not interested in the weather forecast. One respondent stated that beyond TV broadcast and radio, “There are no other resources.”

There was also mention of several traditional methods of weather and seasonal forecasting. One of these methods dealt with the height of birds leaving for tropical locations in autumn, stating that low flight indicated a cold winter, while higher flight indicated a milder winter. Another was a field worker who stated that after 15 years of working in the field, he had identified ways to use his intuition for forecast information. Among these was monitoring the activities of the ants, that when they begin closing their

anthills with dirt, it is indicative that it will be wet in the next week to two weeks. A third simply stated that “With four seasons, we know winter is cold, summer is hot, spring is raining, and autumn is cool.” One respondent also stated: “I am observing the last 10 years [the] weather condition is changing year by year.”

None of the first six respondents mentioned confidence in weather forecast information received. Beginning with interview seven, those respondents who had sources of weather forecast information were asked how much confidence they had in the information they received: “Of the weather forecast information you receive, how much confidence do you have in this information?” A quantitative assessment of the responses is detailed in Figure 5.2.

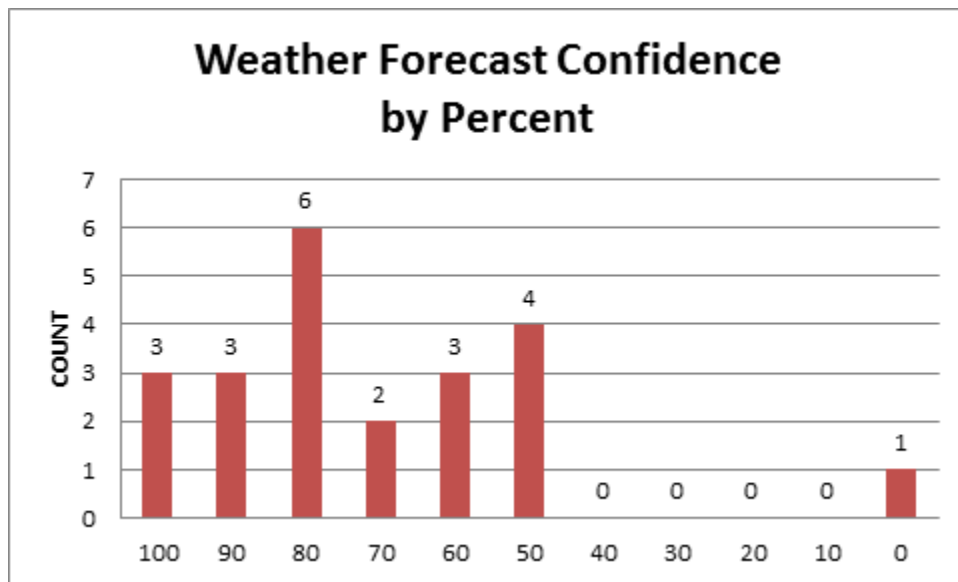


Figure 5.2 Weather forecast confidence

Of the respondents, two indicated the weather forecast information provided is not specifically relevant to their district. One even indicated that information from the

internet about Samarkand, Uzbekistan is more accurate for their district than is information provided by Tajik TV. Two other respondents also indicated that weather forecast information is more correct now than in previous years. One individual simply stated that snow had been forecast for the middle of September, the same time during which the interviews were conducted. It was over 30°C most days. One respondent stated: “Whatever is provided, only for short period, in some cases it comes true; but more than 3 days I do not trust them.”

As with the previous question, this question serves as a follow-up to the first question, and began with interview 7: “How does your access to weather forecast information change in winter?” Ten respondents stated that their receipt of weather forecast information decreases in wintertime, specifically because of electricity supply. One person stated their receipt of weather forecast information decreases from 90% to 30-40% in winter; another stated it decreases from 80% to 50% in winter. Two separate respondents mentioned only receiving weather forecast information if they “get lucky.” One person stated that in addition to being lucky, “...if there is news, we can receive it.” One person stated “There is nothing to do in wintertime, so it is not so important to receive weather forecast information”, and that “I only sleep.” For one interviewee, they stated their main source for weather information in winter is mobile phone. One respondent stated he uses a generator in winter for lighting and TV, so he received the same information in winter. One respondent stated: “Mainly there is no trust in wintertime. I’m not interested in this, because I know they do not provide correct information.”

There was also mention by three of the respondents of more traditional means of weather forecasting. One person stated that when they do not receive information due to electricity cut-off, they "...rely on intuition, approximately themselves doing forecasting how the weather is going to be." Another simply stated that "...in wintertime, mainly we rely on traditional forecasting." The third stated that "We know in wintertime it is cold and do not pay too much attention to the forecast information." Seven respondents stated there is no change in the receipt of weather forecast information in winter. One person stated "In comparison [to] previous years, now it's a bit better." One person stated "If it is necessary, we shall [get information]. If it is not, we do not use." One person simply stated "There is less information in wintertime than in other time."

5.1.2 Collective Fuel Gathering

The first six interviews consisted of a questions regarding collecting fuels with other people: "Do you collect fuels to burn with other families?" Five of the six stated they did not do this. One person stated that he collected fuels with his brother because they live very close together. Based on feedback from my interpreter, who said this was not common practice in the village, this question was discontinued after interview six.

5.1.3 Fuels Used, Fuel Source

The next question dealt with fuel collection and use during winter, as well as the source of these fuels: "What fuels do you collect for winter, and what is their source?" A quantitative assessment of the responses is detailed in Figure 5.3.

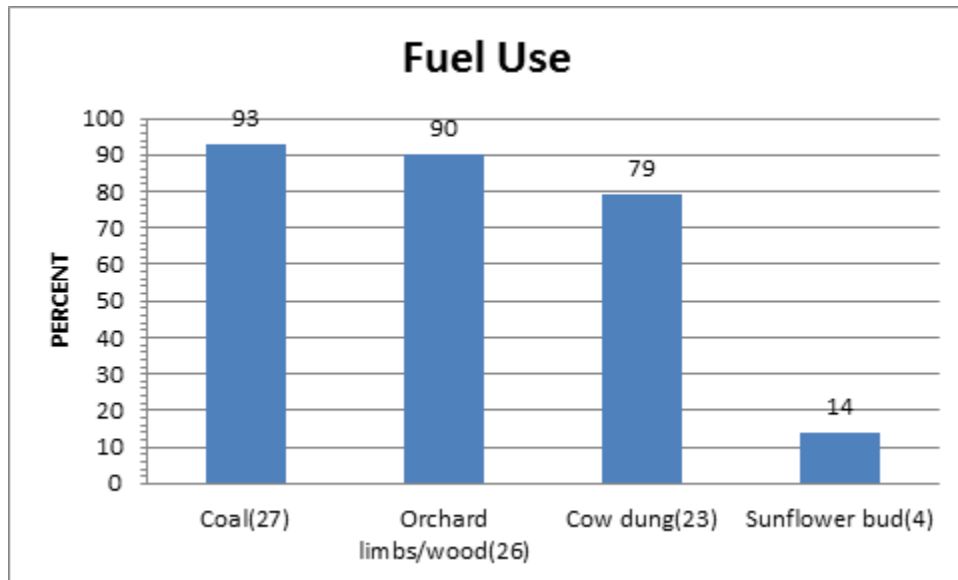


Figure 5.3 Fuel use

Of the 29 respondents, 27 stated they purchase coal, 26 stated they cut/prune tree branches or collect wood from their orchard, and 22 stated they use cow dung. Four of 29 use the buds of sunflowers. Regarding the source of these fuels, again the branches and wood are pruned and collected from the orchards owned by those being interviewed. One respondent said she received a large private orchard from her father and grandfather. Nine of the 29 mentioned the fact that they use the same resources as do others in their village. Several respondents made mention of the source of the coal they purchase, which is from entrepreneurs from Ayni. The respondents who stated that they use cow dung indicate the source for this is the animals they own. They collect this throughout the year and dry it into lumps for use as heating material. Of the four respondents indicating the use of sunflower buds as fuel, two indicate they grow these sunflowers on a plot of land yearly.

Three respondents make specific mention of the fact that at least a portion of their fuel supply is their own production. Regarding the trimming of branches and collection of wood from orchards, one respondent stated the branches were mainly used for baking bread. For wood for heating the house, they annually cut trees, and that there are now only three or four left. There are no other resources. She said “Actually for this winter, we don’t have wood for fire because we cut it down last year and in previous winters.” For another respondent, he stated that the branches which he cuts he keeps some for himself: “I know how much I need for the next year. The rest, I sell and buy coal.” One respondent complained about the price of coal which the entrepreneurs bring to the village. One respondent stated “There is no electricity in wintertime, so we should use whatever resources are available.”

5.1.4 Kitchen Garden

Interviewees were asked a question regarding their use of kitchen gardens: “Do you have a kitchen garden, and if so, what role does it play in preparing for winter?” 30 of the 31 respondents stated they did have a kitchen garden or some sort (See Figure 5.4). Of these 30, 16 stated they did store crop from this kitchen garden for winter consumption, while 14 stated they did not. See Figure 5.4 for a breakdown of this.

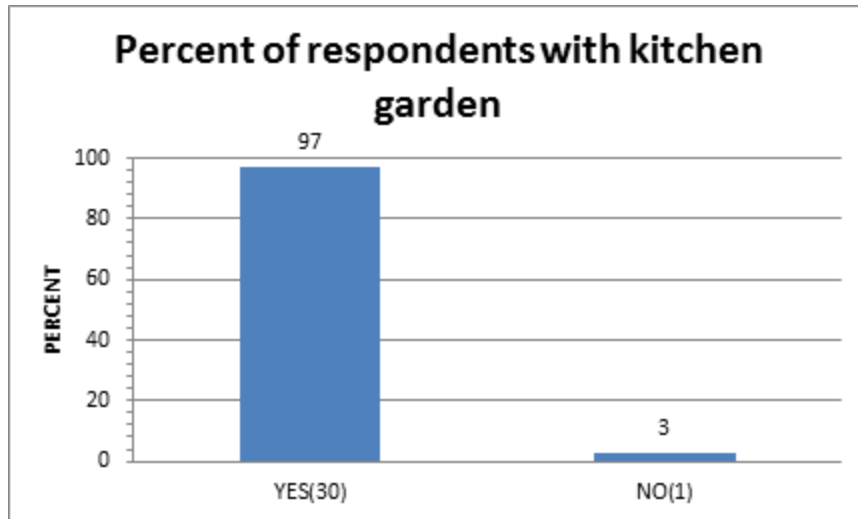


Figure 5.4 Respondents with a kitchen garden

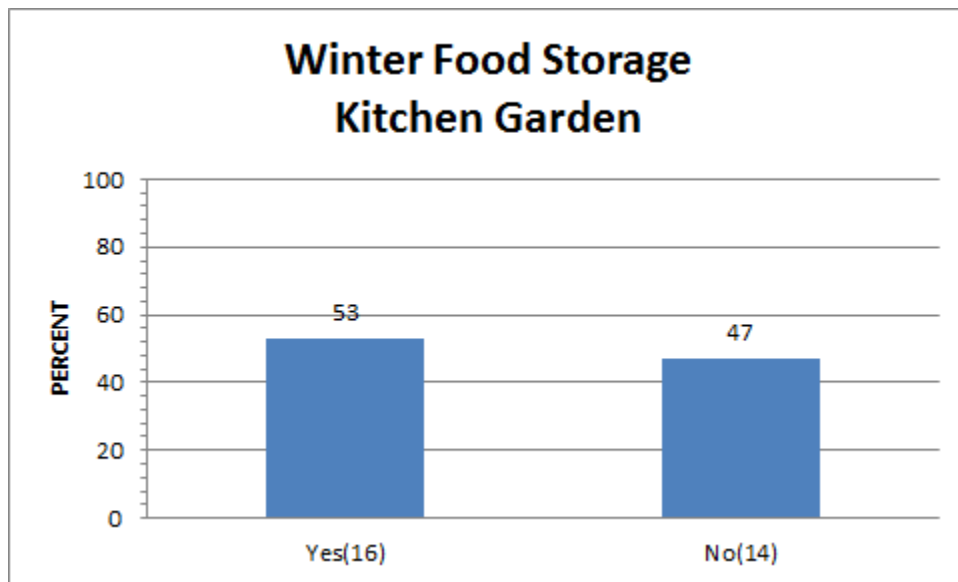


Figure 5.5 Kitchen garden crop storage for winter consumption

Of those interviewed, two stated the kitchen garden is a very important source of vegetables. One respondent stated that the kitchen garden is for his family’s consumption before the field harvest is ready. One respondent stated that his kitchen garden “...has

very big impact for winter, if you take into example potato, I do not buy potato because I store potato.” Another person stated that the crop he grows consisting of potatoes, carrots, and onions in his kitchen garden is enough for him and his family to spend winter. 3 respondents stated how the crop from their kitchen garden is insufficient for winter. Of these three, one stated that:

“Here we grow some vegetables, but it’s very few. We cannot be confident that vegetables we harvest from this plot of land is enough for winter period. It’s not so secure to rely on this crop production.”

Another stated the first daily need is vegetables, but that those grown in his kitchen garden of course aren’t enough for winter. The third stated that the potatoes he grows and stores for winter is not enough and sometimes he has to buy food. Of the 30 respondents, 10 mentioned specific vegetables stored from their kitchen garden for winter consumption. A breakdown of these vegetables is in Figure 5.6.

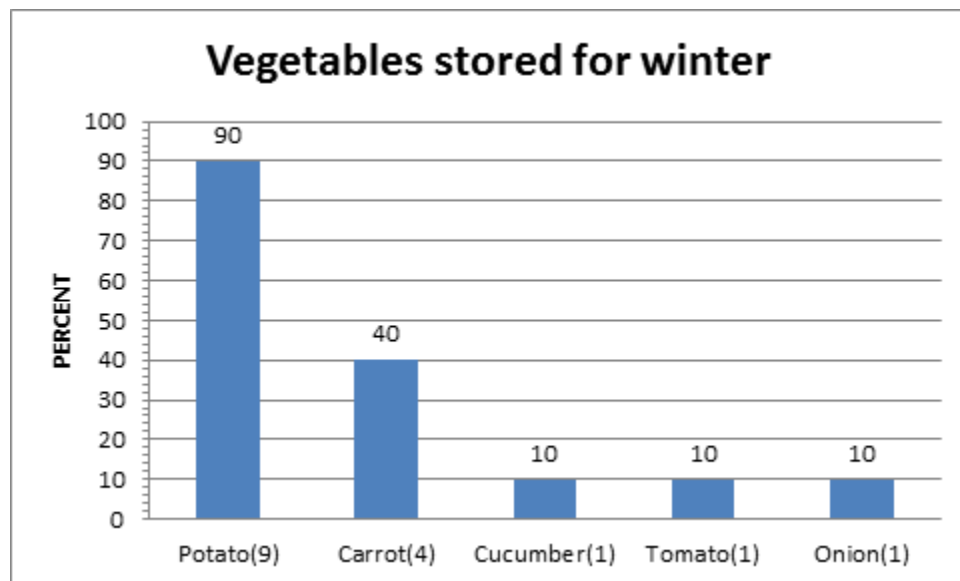


Figure 5.6 Vegetables stored for winter consumption

One respondent stated that he collects fodder from the field for animals, as well as apples from his apple trees for winter. One respondent stated that around his kitchen garden, there were trees which he trims and uses as a first resource for heating fuel. Three of the respondents who did not store kitchen garden supply for winter stated that they sow their kitchen garden late winter to early spring so it is available for crop by summer; one of these three stated that this was a way to prevent them from having to buy food from the shops. One person stated that there were mostly trees in his kitchen garden which he cuts for fuel, and that because it's shady he doesn't grow anything.

5.1.5 Access to doctor, medical facilities

The next question dealt with access to doctors and medical facilities during cold weather: "How does your access to medical facilities and/or doctors change during extremely cold weather/wintertime?" For a quantitative summary of the results, see Figure 5.7. Of the 29 interviewed, seven specifically mentioned road conditions being a hardship. One person stated:

"Even after lunchtime and the weather was sunny, the road condition was bad, was icy, and I was ill. I had to worry about my illness and at the same time I was worried about the road condition; the car was sliding all over the road."

Another stated: "If there is some serious illness, there will be a problem taking someone to a main medical center like in Khojand or Dushanbe. We have no access." A third stated:

"There were many, many cases when pregnant women were taken to [the] delivery room, and on the way, because of road condition, they get a flat tire or the car breaks, and sometimes it's 2-3AM; of course it's difficult."

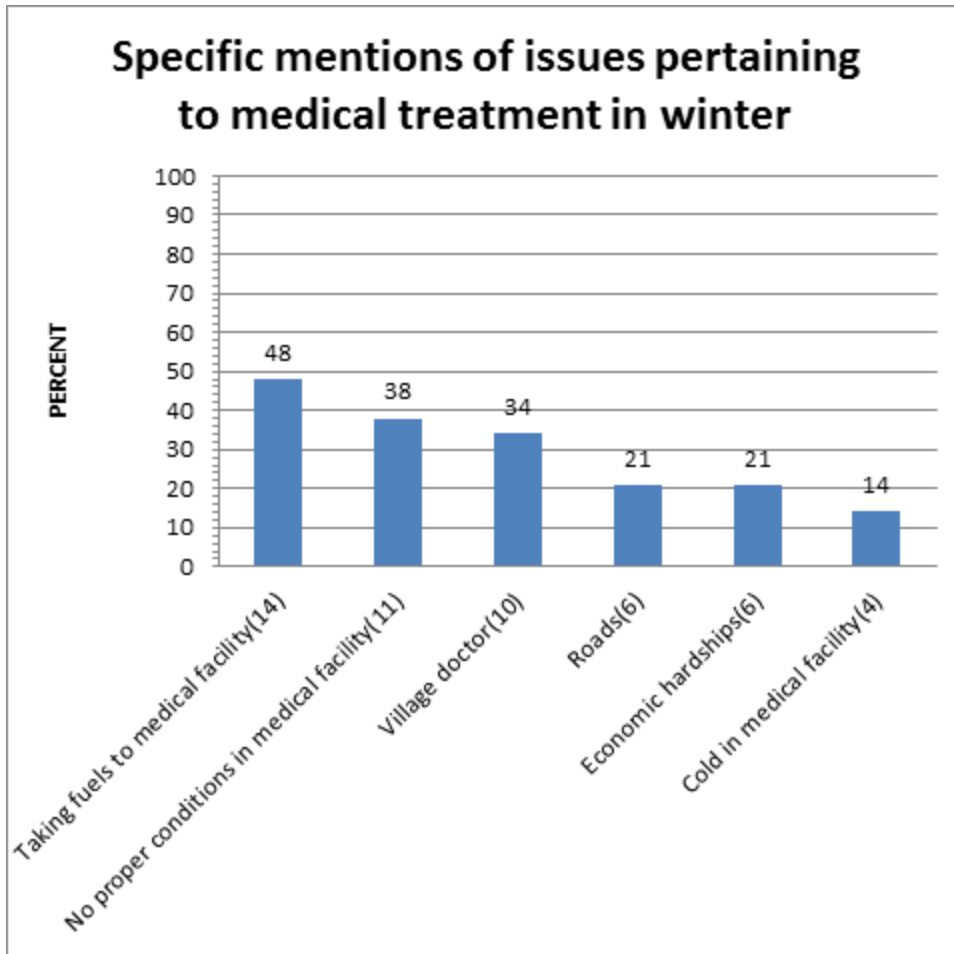


Figure 5.7 Specific mentions of issues pertaining to medical treatment in winter

14 of the 29 stated that when you go to the hospital in winter, you must bring all necessary items with you. Among necessary items mentioned were electrical heating appliances, wood for traditional ovens if available, bedding, pillows, mattress, blanket, clothes, food, and dishes. Eleven people stated there were no proper conditions in the hospital in winter. One person stated that the hospital is just an empty building, while another stated that sometimes there are 3-4 people in one room, all with their own supplies and heating materials. Four people specifically stated that it is cold in the

medical facilities, while another stated: “Of course in the winter period it is difficult, rather than in summertime.” One person stated: “In wintertime, we do not even wish our enemy to face medical condition in hospital, so it explains a lot.” Another stated: “It’s cold, actually. Because of the cold weather, this is the main problem they face.”

Regarding food, one respondent stated: “Warm food, there is no supply of food in the hospital. If you have somebody in the hospital you must supply them food three times per day.” Another stated: “There is no food supplied at the hospital, so you have to take it with you.”

Six respondents made specific mention of economic hardships associated with medical care. One respondent stated:

“And the other problem is medicine. Medicine for certain patients, if the doctor requires 4,000 Somoni for medicine, you never know if it is for your patient, you just buy and bring to the doctor, and the rest he does with the medicine. Maybe part of this medicine is not used for your patient at all, but if they ask you have to bring.”

Another stated: “Now if you have money you can take treatment; if not it’s just a waste of time, especially in winter.” A third stated:

“Everything is connected with your finances. If you can afford yourself you can provide a better place for a family member who is sick. Otherwise, if you do not, of course you will feel difficulty.”

There were several mentions of a degree of self-reliance pertaining to medical care. One respondent stated:

“If some of my family members get sick, I will get analysis and whatever treatment they apply, doctors’ advice, I will buy all of those medicines and take treatment at home because I know at home I can provide normal temperature which is required for winter period. I never get treatment in the hospital.”

Another respondent stated: “In general I don’t face any difficulties in the wintertime, mainly I try to get treatment at home, because I know I can provide basic facility in my

home.” One respondent mentioned the use of traditional methods for treating illnesses, stating:

“As I know, our Tajik people who are mainly living in villages do not pay so much attention to some illnesses. They try to treat it in some traditional ways as much as possible. In the end, then they do not have any result from the traditional or home treatment, they take them to the hospital. By then it’s too late, and they have to spend more money.”

Ten people mentioned the village doctor or the nearby village hospital. One respondent stated:

“Generally if something is easy, there are family doctors available in this village. We get into contact with them. We have a situation where we don’t have ambulance service where they can come and provide that service. If necessary, you can hire a taxi. The weakness I see, for the time being, ambulance service is not available all year, not just wintertime.”

Another stated: “If we get flu or something like that, we can invite the family doctor to our house.” A third respondent stated:

“There is a hospital in the neighboring village, 7km from here. In comparison with before, now it’s a bit better. Even if there is cut-off of electricity at [the] community level, they do not cut-off to hospital.”

Five respondents mentioned the medical facilities in Penjikent, the district capital.

One respondent stated:

“Here we get low steps of treatment in Penjikent. But if there is some serious surgery or something like this, we have to take them to Dushanbe or Khojand, which in winter period is difficult because of road conditions.”

Another respondent stated that she went to Penjikent hospital for 10 days, then finally decided to go to Dushanbe.

5.1.6 School Attendance, Conditions during wintertime

The next question assessed school attendance for children, as well as school conditions in winter: “What is your children's school attendance like in winter as

compared to the rest of the year, and what do you find to be the conditions of the school in winter?” Of the 31 interviewed, 29 had children or immediate family members attending school in the village, two did not. This left 29 respondents to analyze. For a quantitative summary of the results, see Figure 5.8. Of the 29, 18 mentioned either cold or non-heated classrooms, or poor conditions in school. One respondent stated:

“Once [the] room is cold, you cannot think of learning something, because my children are very young, it is very difficult for me to catch up. Because it is not just me, it’s all the village suffering from this.”

Another respondent stated: “As far as I know, before there was [a] heating system in the school and now it has collapsed.” A third stated:

“Conditions in [the] school are not so proper as they were in Soviet Union time, because then there was central heating in [the] school. Now there are traditional ovens in separate classrooms, and the classrooms are big, so it is not so satisfactory because there is no way to keep the classroom warm.”

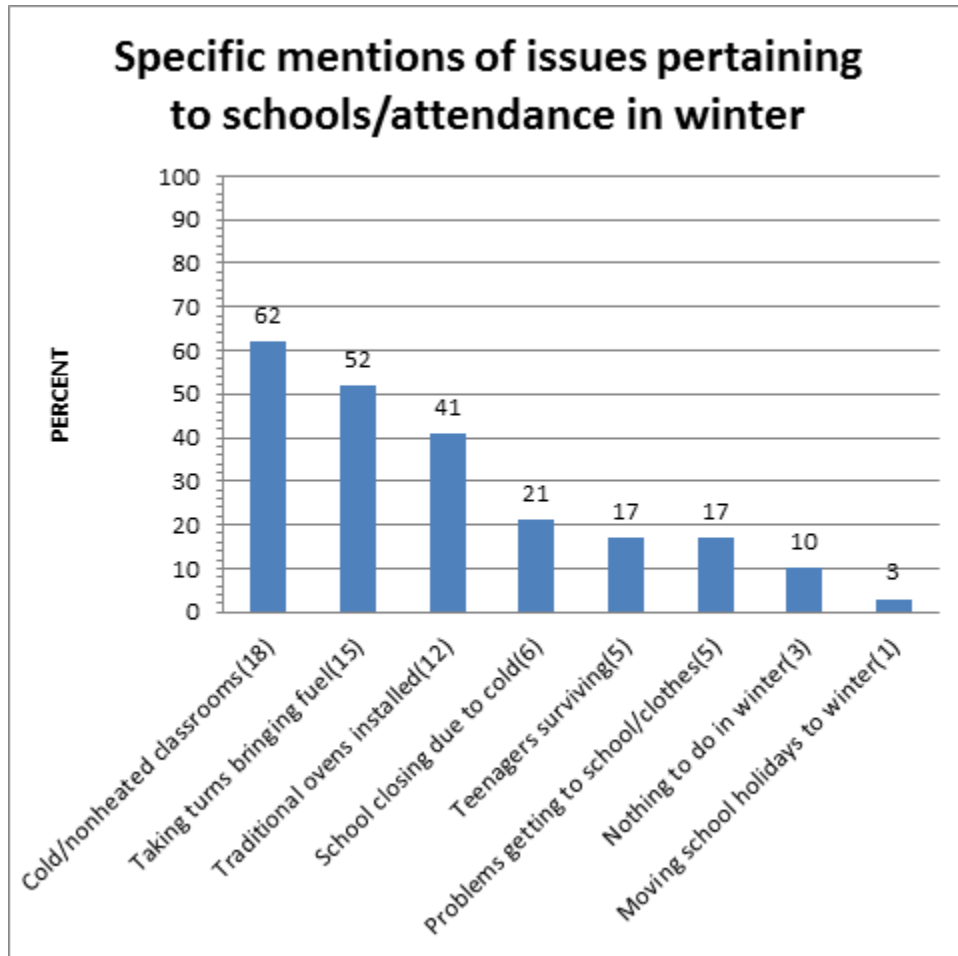


Figure 5.8 Specific mentions of issues pertaining to schools/attendance in winter

Of the 29, 12 mentioned the installation of traditional ovens in school classrooms.

One respondent stated: “Traditional ovens are installed, which is not supposed to be like this in a classroom.” Another stated:

“As far as I know last year they were asking for contribution to purchase traditional ovens for the school. My young nephew goes to school and always complains the classes are cold. The general heating system of the school is not working, and whatever warm temperature which is available is because of installed traditional oven.”

Another stated:

“It’s a little better because traditional ovens are installed. Little school children have some amount of wood with them. It’s not like when I was a kid and went to school, and there was a heating system, in comparison to Soviet Union times.”

Another stated: “Two to three years ago, they installed some traditional ovens in the school, and this attracts some children; the same with my children.” Another stated: “In comparison to 2-3 previous years, now the situation is a little bit better because the traditional ovens are installed in the school.”

Fifteen of the 29 specifically mentioned school children taking fuel materials from their home to the school in turn for heating. The fuel material mentioned was wood products. One respondent stated: “They created a turn to each kid who attends school, and by their turn they should take wood material to school for heating of the classroom.”

Another stated:

“As I know my children take wood to the school in order to heat their classes. Even though we collect wood for this, [the] maximum temperature they can get is (12-15)C in [the] classroom, which is not enough because school children go and come out and open the door with breaks. With this they cannot have satisfactory temperature in the classroom.”

A third respondent stated: “As a parent we also try to support the school with the heating materials.” When asked if this is okay, one respondent stated: “Of course it’s not good, the government should take care of this, not school children and their parents.” One respondent, who was also a teacher in the school, stated: “They have traditional ovens installed, and only coal is supplied; children have to bring with them wood.” Another respondent stated: “Last winter it was too cold, so we had to give children wood material to heat the room in the school where they sit.”

There were also two specific mentions of complications arising from the use of these traditional ovens for heating in classrooms. One respondent stated:

“I would say the condition of the school in general is not satisfactory, but in winter it is more complicated. Because in an environment where [the] young generation is supposed to receive education, it’s supposed to be completely different rather than what we have here, with the traditional oven and the smoke, and where the school children have to take wood with them, I don’t consider that as a condition. But we are in a condition where we cannot improve anything.”

Another stated:

“Because of the cold weather, they(school children) feel difficulties. Of course it’s clear for everybody that there’s no proper heating system in [the] classroom, it’s a traditional way of heating. It doesn’t meet any requirements, installing this type of oven. Because of smoke, because kids are playing in the classroom, they may fall and burn themselves. It has a lot of disadvantages, I would say. They may play with coal or fuel material; they may hit each other with poker sticks.”

Five respondents made specific mention of the fact that teenagers were better able to handle the conditions in the school in wintertime. One respondent stated: “And my children are teenagers, even though it’s a bit difficult to attend classes in winter.”

Another stated:

“My son is also a teenager, and because he’s a teenager this is not a problem. Maybe he is suffering by himself with cold classroom, but because he is a teenager, he does not see a problem.”

A third stated: “As a teenager, even if the school is cold due to extreme cold, they attend. But for youngsters, they are not allowed to go.” Another stated: “As my son is a teenager, he survives. Still, I feel uncomfortable, because I know when he goes to school, instead of paying attention to the subject, he has to heat himself.”

Five respondents mentioned the attendance of younger children. One respondent stated his children’s attendance is reduced to 30% in wintertime. Another stated: “Of course it prevents my children from going to school sometime in the winter period, just

because of the cold weather conditions.” Another stated: “Sometimes if I see that it’s too cold, I just do not let my children go to school.” Six respondents made mention of the school closing due to cold weather. One respondent stated: “If winter is extremely cold they close. Unless they have fuel material for heating, whenever it’s cold, they announce the school is closed until it gets warm.” Another stated there was a requirement that if it’s less than 12C (outside), the schools close everywhere. Another respondent stated: “And sometimes they lock the school, they stop all classes because of cold weather. It is very difficult in winter.” This same respondent stated that in winter they reduce the number of class hours for children.

Five respondents made mention of hardships for children getting to school in wintertime, and of issues with the quality of their clothes. One respondent stated:

“When he(his son) attended [the] lowest classes when he was like 10 or 11 years old, that time was difficult. He had to walk to school when it was cold and the quality of the clothes was not good.”

Another stated:

“[There are] no proper shoes for the children. All the ground is wet in winter. An example, all the products are imported from China, with low quality. Laser-made shoes for children to wear are very low quality. Even without heating in schools, maybe with high quality clothes it will make it okay.”

Another respondent mentioned getting mud to the knees when walking in village streets in winter. One respondent stated that when it is snowy the children get wet through. One respondent stated: “As the weather is cold and roads are icy, I have younger kids, they may fall on icy roads, they may get [the] flu because of colder weather.”

One respondent made mention of the school’s decision to move all school holidays to wintertime:

“They moved all holidays into [the] cold season, into winter season. I think this is wrong because for all schools there is some problem which is developed by the Minister of Education. I don’t think it’s okay to move all holidays to one month, and keep students learning for two or three months. They also have to have [a] break; I don’t think it’s acceptable.”

Three respondents mentioned students attending in wintertime due to there being nothing else to do during winter. One respondent stated that for the rest of the seasons of the year, outside winter, there is some field work that the children do. Another stated there is not too much work to do in winter, so all school children attend classes.

5.1.7 Steps taken in autumn to prepare for winter; methods for reducing fuel use

This question looked to identify steps taken in autumn to prepare for winter, as well as steps taken to reduce fuel use: “What steps do you take in autumn to prepare for winter, and do you take steps to reduce fuel use in winter?” For a quantitative summary of the results, see Figure 5.9. Of the 31 respondents questioned, 28 stated their winter preparation involved food collection and storage. Sources of food included kitchen garden, harvest, and purchase from the village shops. One respondent stated: “I am a farmer. Before winter starts, I try to harvest all my products in a proper way and store it for the winter period.” Another respondent stated:

“We have a kitchen garden. During summer and autumn time, we consume vegetables from our kitchen garden, and whatever is left, we store it for winter consumption. For example, if we see that some vegetables aren’t enough, we purchase it in autumn time because in spring the price goes up. Also, the quality is not so good in spring time. That’s why we try to purchase all of our vegetables and food in autumn time. We also conserve some fruits, besides vegetables; we prepare a couple of jugs of jam, juice, and also we make some salad, potatoes for winter. The only thing which we do not purchase in whole is wheat and oil. For example, we purchase two bags of flour and 10 liters of oil. When it’s finished, we go and purchase more because we know it is available.”

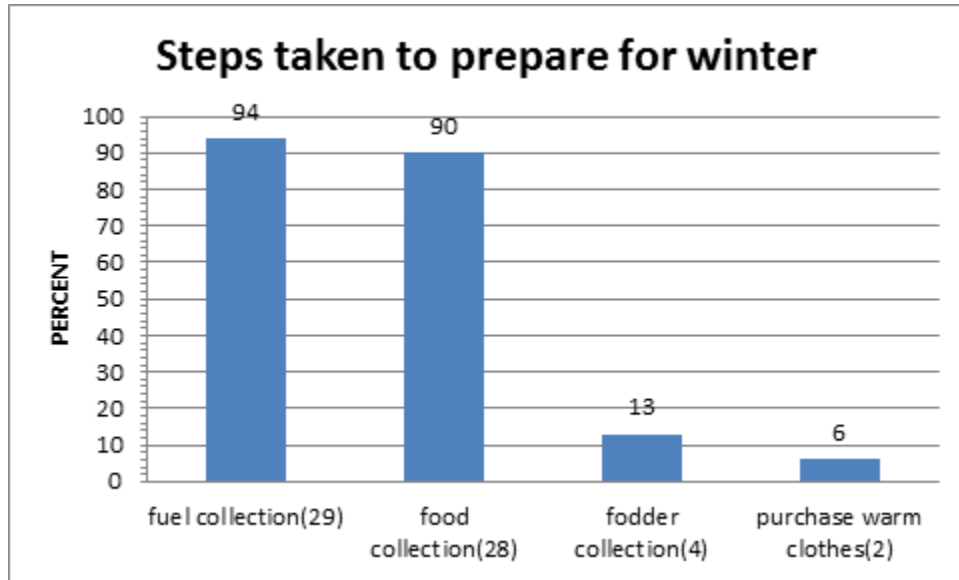


Figure 5.9 Steps taken to prepare for winter

Another respondent stated: “At minimum I will prepare food stuff for 5 months.”

Another respondent stated he purchased enough food for 2-3 months. One respondent stated: “Regarding the food, of course whatever agricultural products we have we collect.” One man stated:

“All products which I produce by myself I store them properly for winter consumption. Whatever is left, I sell it, and the only thing I purchase later is coal, because when it is cold then [the] entrepreneurs start to deliver.”

Of the 31 respondents questioned, 29 stated their winter preparation involved collection and storage of fuel material for winter heating. One respondent stated:

“If we use only cow dung and wood, all materials we collect may last for only half of winter. That’s why we purchase coal, in order to keep all those fuel materials lasting longer.”

Another respondent stated: “In my family/house we start preparing for winter starting with spring, drying cow dung and collecting wood.” One respondent stated: “So if you take only fuel material, we calculate how much wood we need and prepare properly in

order not to get into trouble in wintertime.” Another respondent stated: “For fuel material we are living in a condition where we don’t know what will happen tomorrow. Before cold weather starts, I try to get as much wood as possible.”

Of the 31 respondents questioned, four mentioned the collection of fodder for their animals’ consumption in winter. One respondent stated: “...also fodder for animals, [which] for us are very important as a source of income.” Of the 31 respondents questioned, four mentioned prices in autumn and spring. One respondent stated: “Sometimes in autumn time, the price for the food products is cheap, that’s why we collect in the autumn time.” Another respondent stated: “As coal is a bit cheaper in autumn time, first of all I purchase some amount of coal at that time.” Of the 31 respondents questioned, two mentioned that coal deliveries occur during cold times of the year, not warm, and that this was a problem. Of the 31 respondents questioned, three stated they sell excel harvest to purchase necessary items. Of the 31 respondents questioned, two stated they purchase warm clothes for their children.

The other part of the question dealt with steps taken to reduce fuel use in winter. For a quantitative summary of the results, see Figure 5.10. Of the 31 respondents questioned, 11 stated they attempt to reduce fuel consumption by some means; 6 of these 11 stated they cover windows and/or portions of their house with plastic sheets. Of the 31 respondents, two mentioned using double curtains in windows, with 1 respondent stating: “Regarding the reduction of fuel consumption, I know it’s not healthy, but I do double curtaining of windows which is so far good for winter.” Of the 31 respondents, one mentioned closing off all windows with blankets for insulation, two mentioned maintaining ovens in their house, and four mentioned recent or planned installation of

more energy-efficient ovens, with 2 stating they would install an oven which heated 2 rooms. One respondent stated the oven would double as an area to heat break or cook food. One respondent stated that when it is sunny in winter, he tries to make less fire in his oven.

Of the 31 respondents questioned, four stated they did not take measures to reduce fuel use in winter. Of these, three stated the reason was there is no electricity. One respondent stated:

“I do not do any work to reduce fuel consumption because weather is cold and we have small kids, so temperatures in [the] room have to be warm... As we have small children, at least one room has to be heated always.”

1 respondent simply stated he never thought about reducing fuel consumption.

Of the 31 respondents, two made specific mention of the role of women in this preparation process. One woman also stated she was alone as her husband was sick, and that the preparation is up to her. The roles of women mentioned were sealing windows with plastic sheets and drying cow dung. One respondent stated: “As other households do, of course it’s getting ready for winter, for cold weather.” Another respondent stated: “Winter is a season where you have to be ready at all times.” Another respondent stated: “All 6, 7 months starting from spring, from spring, from last snow, we are all busy with the collecting and thinking of how to spend winter.” One respondent stated that as there is no work in winter period, preparation and collection is done in autumn.

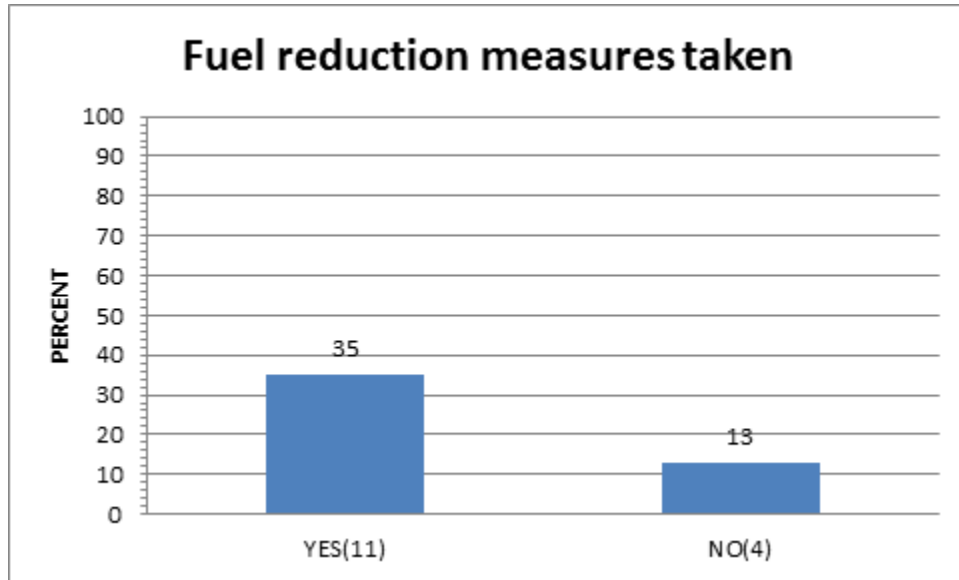


Figure 5.10 Reduction of fuel use

5.1.8 Food Supply in Winter

The next two questions dealt with food supply in wintertime. The first question was asked from interview 12 onwards : “Do you have a food storage facility?” Of the 19 respondents interviewed, 17 stated they did have a food storage facility. Two stated they did not. Of those that did, 7 use a basement, 2 dig a pit outside, and 1 uses a basin in the kitchen. See Figures 5.11 and 5.12 for a quantitative summary of the results.

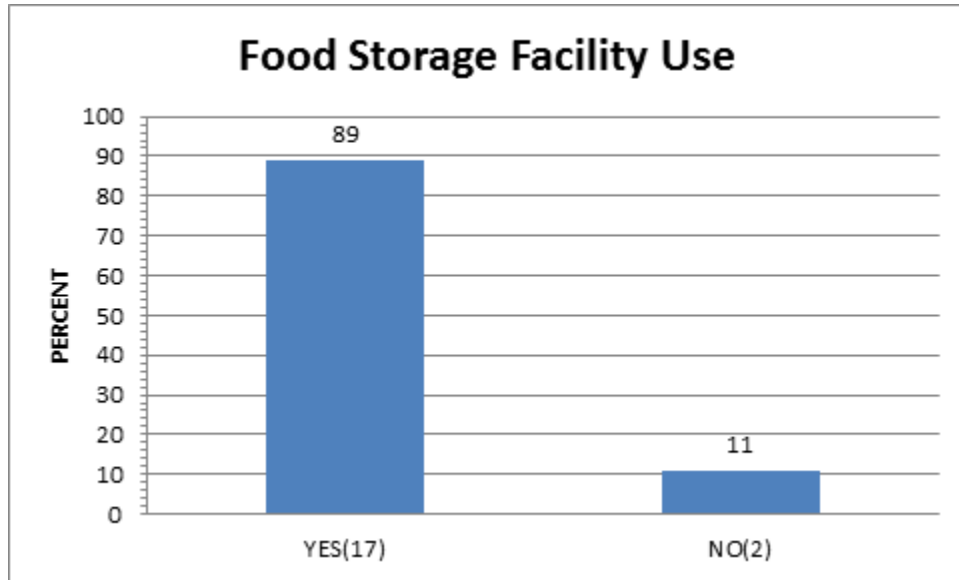


Figure 5.11 Food storage facility use

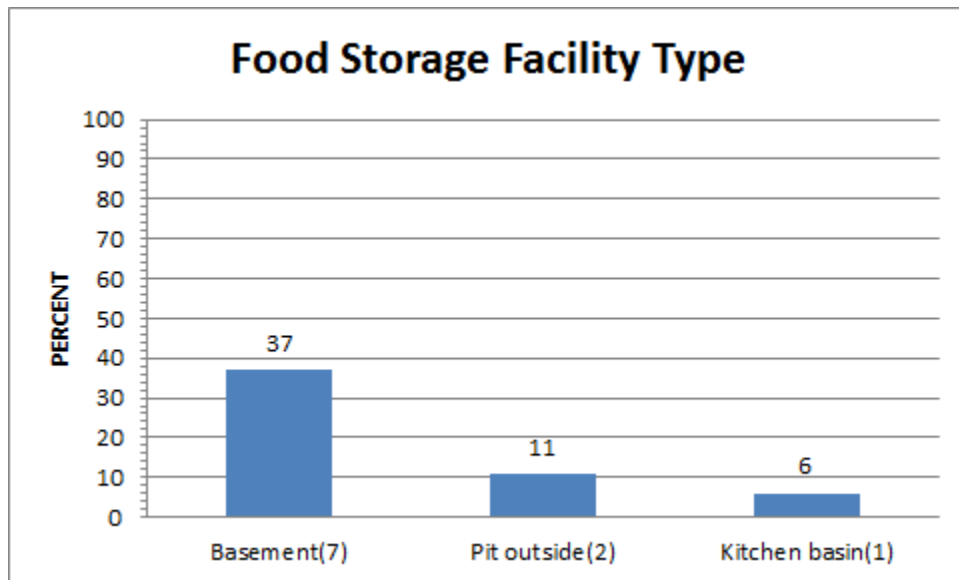


Figure 5.12 Food storage facility type

The next questions dealt with whether or not respondents run out of food in wintertime: “Do you run out of food in winter, and if so, what is the source of getting

food?” One respondent was not interviewed due to time constraints. Of the 30 respondents, 25 stated they do run out of food, either directly or indirectly by mentioning steps taken once they do run out of food. 2 stated they do not run out of food. 3 did not state either way in their response. See Figure 5.13 for a quantitative summary of these results.

Of the two who stated they did not run out of food in winter, both stated it was because in autumn they collect enough food; one respondent stated: “No. In autumn time, we collect enough food because we know the consumption. We don’t know how long the winter is going to last, but we get ready for 6 months.”

Of the 25 who stated they do run out of food in winter, four stated they take debt from the village food shop. One respondent stated:

“If there will be some shortcoming of food, we get some debt from shops. We live in [a] small village, so we know each other. We go to shops, get debt and items we need, and whenever we have money we pay back.”

Another respondent stated he took debt until the following harvest.

Twelve of the 25 mentioned that they rely on the sale of animals as a source of getting food in winter when stocks exhaust. One respondent stated:

“The only thing I know is if I run out of food, we have to survive somehow. Actually, to the left here, I have some cows, animals to sell. This is the option which I [use to] get rid of the problem; actually it’s not solving the problem, it’s just to survive until the next spring, the next harvest season.”

One respondent stated: “When coming to spring, I feel shortage of food; so I sell like 1, 2, or 3 animals annually.”

Seven of the 25 stated they rely on remittances from family members working as labor migration in Russia. One respondent stated:

“My son is working in Russia, in labor migration, so this is some extra income for my family. If we run out of food, we ask him to support us, so he sends us some money, some remittances.”

Another respondent stated: “If we do not receive remittances, from harvest which we have here, we cannot even pass through winter.” A third respondent stated: “As my son works in Russia, there is always some savings on [the] family level.”

Seven of the 25 stated they try to collect enough food or harvest to avoid running out of food in winter. One respondent stated:

“We try to collect enough food for [the] winter period, but no one is secure, and run out of food because it depends on harvest. If you have a low harvest, you know for sure you will run out of food.”

Another respondent stated: “I get ready for the winter better, but nobody is secure.”

Four of the 25 respondents mentioned ‘thanks to God’ or a reliance on God for hardships related to food shortages in the winter period, with one respondent stating: “First of all we try not to run out, even if we do, we just hope to receive something from God.”

Five of the 25 mentioned looking for some work or self-production in order to help with surviving winter, with one respondent stating: “Until the winter starts, I go to start some job; it doesn’t matter what kind of job, construction, in order to make some cash. In this way I can secure some cash for my family.” Three of the 25 respondents stated they keep some savings for the winter period.

One respondent stated: “There are no fruits available in [the] winter period, only food.” Another respondent stated: “In general, nobody takes care if you have enough food for yourself.” A third respondent stated: “As you know, there is no huge industry

here in Tajikistan. Where people could get involved and get some job.” A fourth respondent stated:

“Of course we run out (of food), because we sow carrot, but we don’t know what variety this is, i.e., is this sustainable to the cold winter or not. [It is the] same with potato and other vegetables. Sometimes we do not know if certain products are adapted to our climate or not, or if we will lose the harvest. In this case, we have to buy (food).”

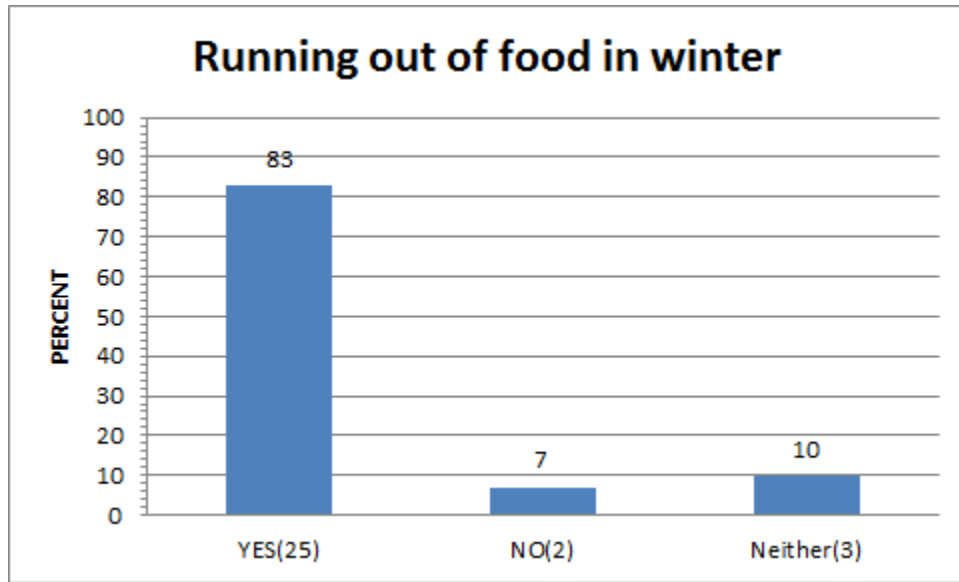


Figure 5.13 Running out of food in winter

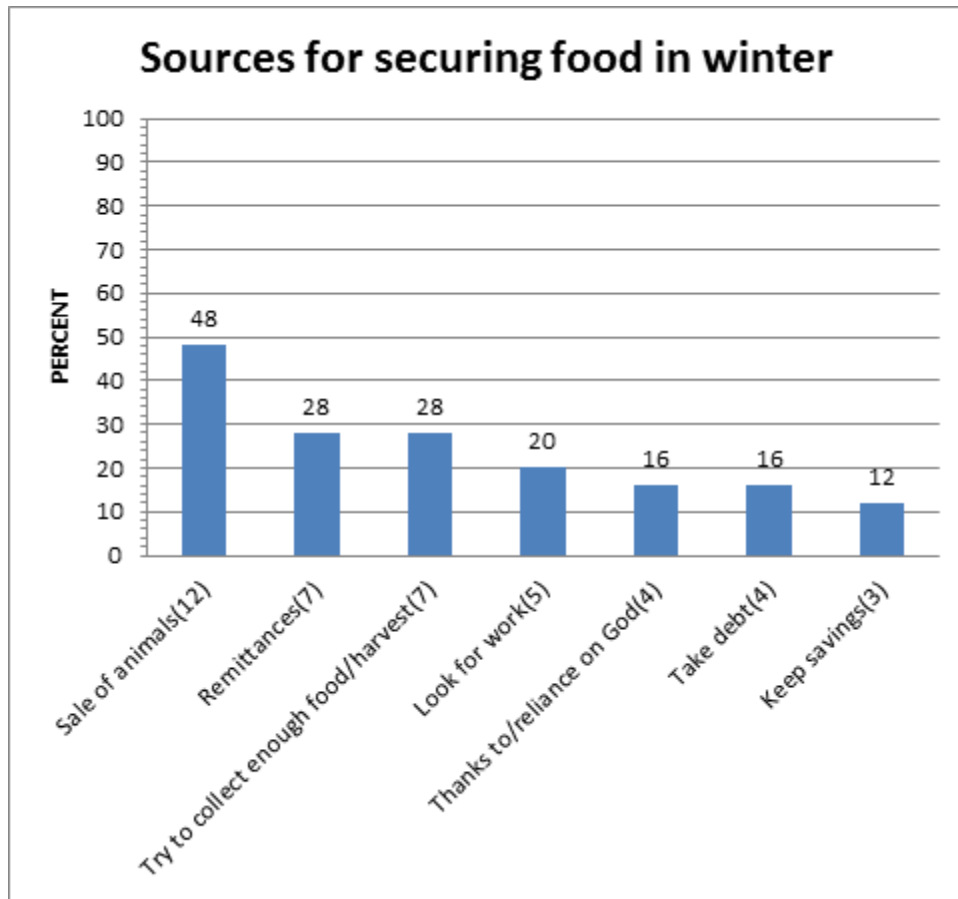


Figure 5.14 Sources for securing food in winter

5.1.9 Ovens installed, maintained properly

The next question dealt with oven installation and maintenance for winter: “Do you install and maintain your ovens properly for winter?” Twenty-four of the 24 respondents stated they maintain and clean their ovens and chimneys, with many stating this is an annual activity. See Figure 5.15.

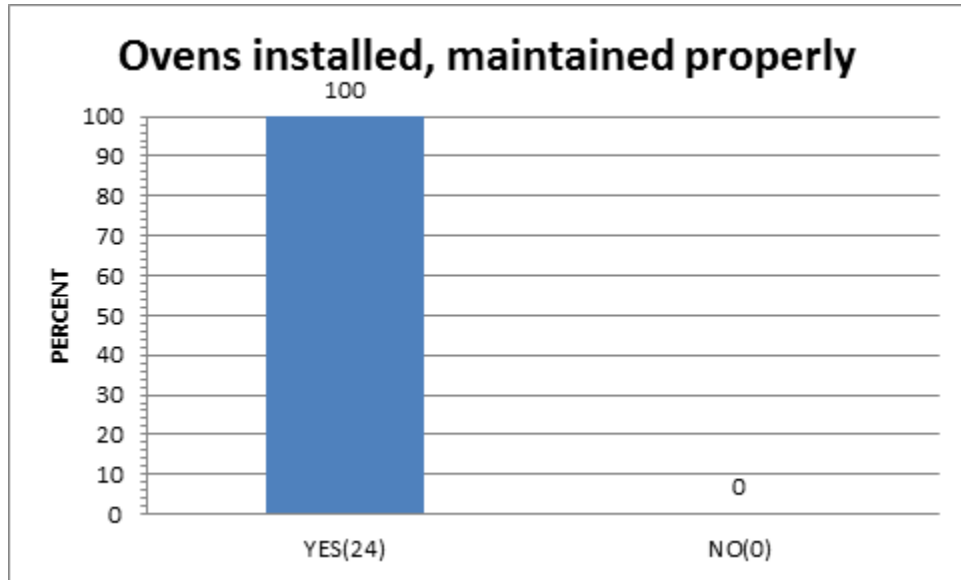


Figure 5.15 Oven installation, maintenance

5.1.10 Rooms present, heated at household level

The next question related to rooms present and rooms heated per household: “How many rooms do you have in your house, and how many rooms do you heat in winter?” Of the 29 respondents, some did not state how many rooms they had in their household. For those that did, a breakdown is in Figure 5.16. Nine of the 29 respondents heat 1 room, 15 of the 29 heat 2 rooms, 4 of the 29 heat 3 rooms, and 1 of the 29 heat 4 rooms. Also, 9 of the 29 stated they heat 2 rooms with 1 oven . 1 respondent stated some families heat 3 rooms with 1 oven. See Figure 5.17 for a quantitative summary of the results from all households.

	1	2	3	4	Heated
1	0	0	0	0	
2	1	0	0	0	
3	1	2	0	0	
4	3	2	2	0	
5	1	3	0	0	
6	2	0	1	0	
7	0	1	0	0	
8	0	0	0	1	
Rooms					

Figure 5.16 Breakdown of rooms present against rooms heated

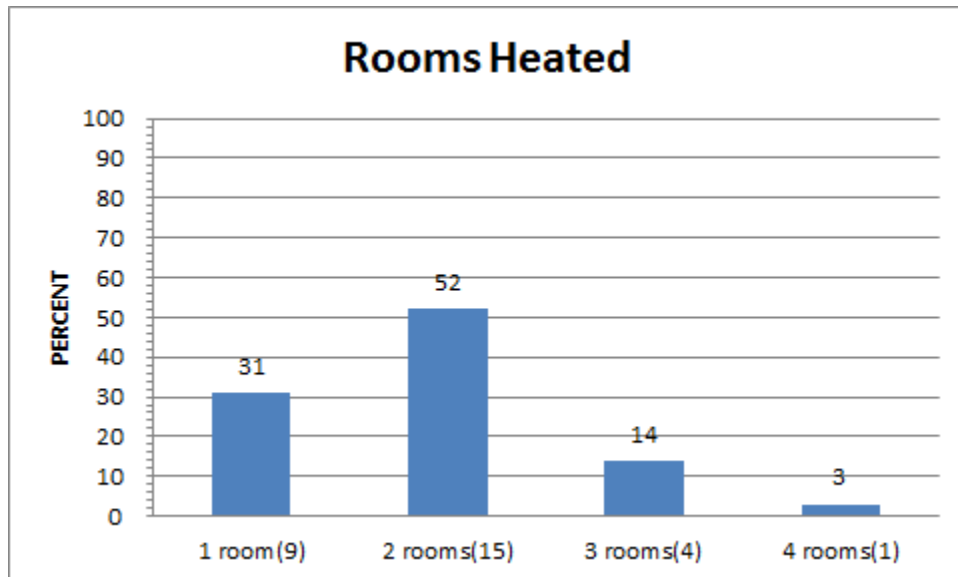


Figure 5.17 Rooms heated

5.1.11 Road effects in winter

The next question dealt with the effects of the road network on the respondents in winter: “In wintertime, how do the roads affect you personally?” See Figure 5.18 for a quantitative summary of the results. Nineteen of the 24 respondents mentioned increased

product prices as a result of roads being blocked. Products mentioned were food, fuel, and other products. One respondent stated:

“Of course it definitely will affect the prices. Once the price is high, we cannot afford it; once we cannot afford it, we cannot buy it, and then there is difficulty.” Another respondent stated: “The consequences for the road closure is that the prices for the products go up, even for the fuel material.” Another respondent stated: “In general, if the roads are blocked, it immediately affects the prices.”

Four of the 24 mentioned a lack of products in local shops as a consequence of roads being blocked. One respondent stated:

“Of course it has negative impact for all people living in this district and Zeravshan valley, because we are mainly dependent on the road. We cannot produce all products for consumption for ourselves; many of the products are imported from the other districts. If the road is closed, first it will affect the prices, and if it is closed for more than 2 weeks, you cannot find food in the shops.”

Two of the 24 respondents mentioned the road to Uzbekistan. Samarkand, Uzbekistan provides a large market for the sale of agricultural produce, as well as an alternate route of access for Dushanbe. One respondent stated:

“Everybody will be affected if [the] road is closed. Because border with Uzbekistan is closed, when road is blocked by avalanche, we are stuck because we cannot go to Uzbekistan. We are in the middle of nowhere, and the price of everything goes back up.”

Another respondent stated:

“It’s very difficult, especially with the road to Uzbekistan. If you take for example, if this April the road to Uzbekistan were open, even a kilogram of apple wouldn’t lie on the ground, so we take them all to Uzbekistan. In wintertime, we know there will be [a] problem with [the] road, with passes, we even do not store at the house. So now we collect all these apples, and for a miserable price we sell them, because we know for sure if we store them in the wintertime we are going to have problems with the passes and things. There is no need to store them.

That’s why the product which we are working on is not marketed, because roads are closed.”

Of the 24 respondents, three stated that road closures affect everyone. Two of the 24 mentioned avalanches on roads, with one respondent stating:

“I am a trader; I deliver products from other parts to this village. I keep [a] small shop, and I make [a] great risk because of a lot of avalanches. In this cold weather I have to wear snow chains on tires and things like this, so I make [a] great risk, especially in wintertime.”

Of the 24 respondents, two mentioned issues with the mountain passes, with one respondent stating: “There is snowing and raining on the pass.” One respondent simply stated: “In general, it’s having a negative impact.” One respondent stated: “This year we hope the tunnel will be open to Khujand; in that case it will affect us less.” One respondent stated:

“It has a lot of consequences for me personally, as head of household. There is no airplane flight. If you take simply things like delivery of the weekly newspaper, there will be no connection with the administrative center of [the] country. So if something happens, we don’t know.”

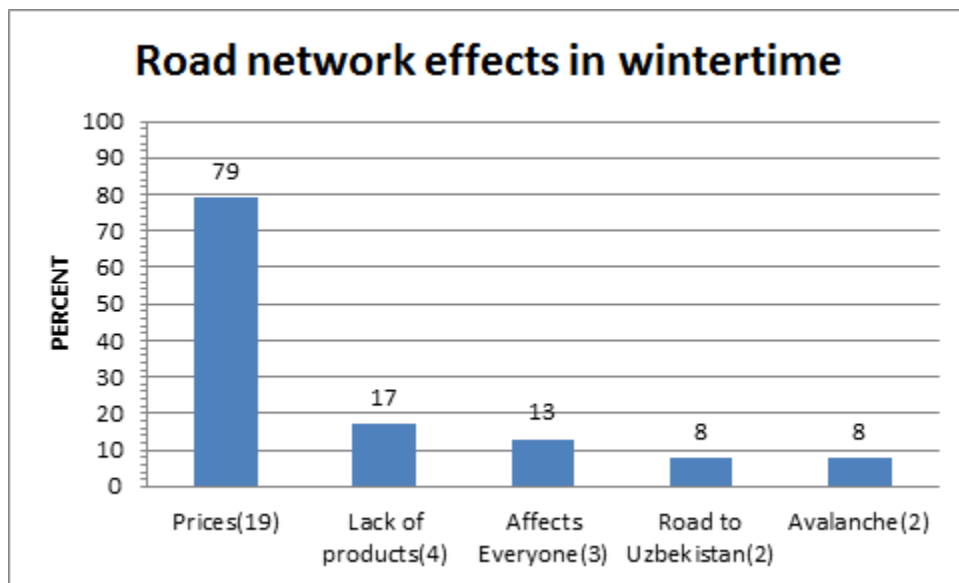


Figure 5.18 Road network effects in winter

5.1.12 Changes during winter since end of USSR

The next questions dealt with changes during winter since the end of the Soviet Union: “How have things changed at home during winter since the end of the Soviet Union?” Twenty-three respondents were asked this question. See Figure 5.19 for a quantitative summary of the results. Seven of the 23 respondents stated that in Soviet Union times, everything was supplied. One respondent stated: “[It is a] huge difference. In Soviet times everything was supplied, and we had money to buy it.” Another respondent stated: “Everything was supplied on time, and with good quality.” A third respondent stated:

“I think that now it’s better in comparison to Soviet Union times, because in the Soviet Union everything was supplied; you would never get [a] shortage of food or fuel material, and I think that made people lazy.”

Eighteen of the 23 respondents mentioned salaries or prices as being a difference between Soviet and post-Soviet times, with one respondent stating: “The prices, there was a war that started, and then poverty, and then only after I sent our son to Russia to work, only after this we started living better.” Several people stated that you could afford all the food and heating fuel you needed with the salaries received in Soviet times, with one respondent stating:

“In Soviet times, if you received salary, you knew for sure you can use some amount for food, and you could have some savings from salary. If I calculate now, the salary I receive now is not even enough for me to buy clothing for me, my wife, and my family.”

Several respondents also stated that salaries were consistently given, and on time.

One respondent stated:

“In Soviet Union times, there were no problems with financing. You knew with your salary, there was a certain amount; for example, if you saw you would run

out of wood in wintertime, you knew by [a] certain date you would receive your salary.”

One respondent mentioned a bonus received at the end of the harvest season. Several respondents stated that prices in the Soviet Union were fixed, and that now they vary greatly, and with season. One respondent stated: “When it was the Soviet Union, you knew you would get [a] salary, and even in extreme cold the prices were fixed.” One respondent stated:

“So concerning finding money, now it’s better. We have more priority to find money. The only problem is the salary of teachers is very low. In Soviet times the teacher was like a professor, and received [a] salary.”

Fourteen of the 23 respondents mentioned differences pertaining to food and fuel products. One respondent stated:

“With food security, there is a problem. In the Soviet Union, people were secure with food things. Now food security problem is that many resource problems remain; not only for me, but all over the village.”

Another respondent stated:

“All the shops were full, so you could purchase all products which you needed, all daily things. Now there are more shops and more products available, but there is no money to buy.”

Another respondent stated: “In Soviet times I never thought about collecting wood because I knew it was always available.” Another respondent stated: “In general, if we take into consideration the logistical issues of fuels, it is difficult now.” Another respondent stated the coal now used is of less quality.

Five of the 23 respondents mentioned electricity cut-offs starting with independence. One respondent stated:

“In general, it’s gotten worse because before in wintertime there was electricity supplied; there was no need to collect much wood because we could also heat

rooms with electronic devices. Now in the winter period when there is no electricity, it makes us to cut trees.”

This respondent also stated the effect he notices the cutting of trees is having on the environment:

“Once we cut a big amount of trees, it is [a] kind of natural catastrophe because the environment gets weak; year by year, little by little I’m observing that our environment is getting weak just because there is no electricity and we need to cut trees.”

Another respondent stated: “There are a lot of things which disappeared after [the] end of the Soviet Union. The first is electricity.” One respondent mentioned electricity and water: “There is no electricity, even sometimes [the] water pipeline gets frozen. Before there were no problems like this.”

Five of the 23 respondents made mention of orchards, farms, or agricultural products, and how things have changed since Soviet time in relation to them. One respondent stated:

“In [the] Soviet Union period, we had big orchards, and it was like a collective farm. They would provide you with say 10 trees, you would do trimming and you would take wood home. Now there are orchards and land available, but there is [a] lack of finance.”

Another respondent stated that in the USSR, he knew his job would be one thing. For him, he was a farmer, and grew only one thing. He said now he has to make a lot of labor contribution, and that they have to multitask to keep their families running now, such as growing an orchard and vegetables. Another respondent stated:

“In general, [there are] a lot of changes. For example, if you take agricultural products, before in the Soviet Union there was no waste of any kind of products, and all were marketed properly.”

Another respondent stated:

“On one hand it was good in Soviet times; on the other hand it’s good now. In Soviet times we couldn’t trim our orchard whenever we wanted, because there were agricultural specialists who advised us how and when to trim, and in what volume. Now we are the owner of our orchards. If we see we need wood, we cut more branches. Before, if [the] agricultural specialist allowed you to trim a tree you could; otherwise you couldn’t.”

Two of the 23 respondents made mention of the border with Uzbekistan, with one respondent stating:

“Before the border was opened, and everything was supplied. So you could drive 1.5 hours to Samarkand to get whatever you wanted, both with the fuel material, with coal, and with food material.”

The other respondent stated: “You know if the pass is closed, exactly the prices will go up extremely. You know that for [the] winter period Uzbekistan cuts off its gas.”

Among other issues mentioned when comparing Soviet and post-Soviet times were taxes, communication, supplying of necessary goods for day-to-day living, accessibility to goods and markets, quality of clothing, and standard of building construction, all of which were better in the Soviet Union. Not all respondents believed things are worse after the collapse of the USSR, however. One respondent stated that in the Soviet Union he did not think about where to find food or fuel material. He said now everyone has to think about this, and that each household knows its own limitation. One respondent stated that now life requires more contribution and productivity. He also stated that “now it’s much better because life requires people to be more and more productive.” One respondent stated that now he feels better because democracy has developed. He said you can have as many businesses as you like and can handle, that it’s up to you. He said it was not so in the USSR. Changes during winter time since end of the Soviet Union. One married couple interviewed together actually disagreed, with the

husband stating it is better now, and the wife saying it was better in the Soviet Union. Overall, 18 of 23 respondents, or 78% stated conditions had worsened since the end of the Soviet Union, 3 of 23 respondents, or 13% stated conditions had improved, and 2 of 23 respondents, or 9% either exhibited disagreement between spousal respondents or individually expressed considerations both positive and negative.

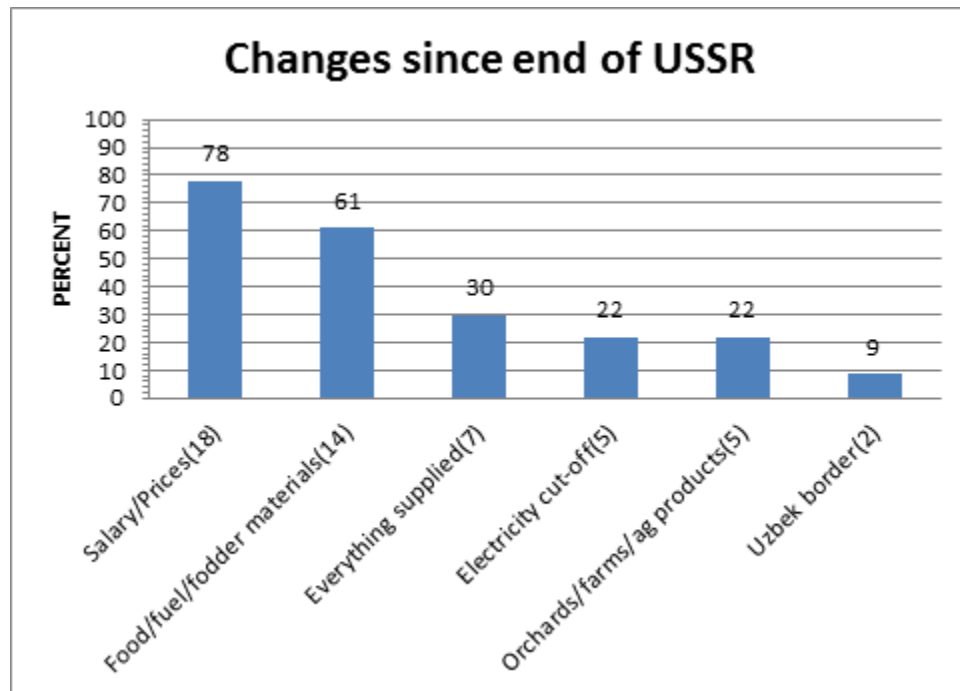


Figure 5.19 Changes during wintertime since end of Soviet Union

5.1.13 Open Discussion

Each interview concluded with an open discussion: “Let’s have an open discussion now, where you can tell me about anything you want to with regards to spending winter, issues faced, etc.” With the open discussion, 30 respondents were sampled; one did not respond to the open discussion due to field work. See Figure 5.20

for a quantitative summary of the results. 13 of the 30 respondents mentioned electricity cut-off as being an issue, with 1 respondent stating:

“From my point of view, the first problem is that we cannot provide separate rooms for my children. The other problem is electricity cut-off. These are the two things which we face. I can say for sure that at least if electricity is supplied 24/7, then we can heat all of our house; we wouldn’t live in a dense situation, the kids could sleep in their rooms, we could sleep in our rooms, and there would be no need to live dense. So if electricity is supplied, our hard job would be reduced up to 90% in winter period, I would say. I mean, if it’s supplied, it would be much easier for us.”

Another respondent stated: “You know there will be no electricity, so you have to take care to purchase candles and lighting facilities.” One respondent stated: “Generally in wintertime, it is a lack of electricity. If there is no electricity, first of all you have to waste your time, then your fuel material to boil like 10 liters of water.” One respondent stated: “The other problem is the electricity cut-off. We only pray that when this hydroelectric plant will be constructed, we will have electricity all the time.”

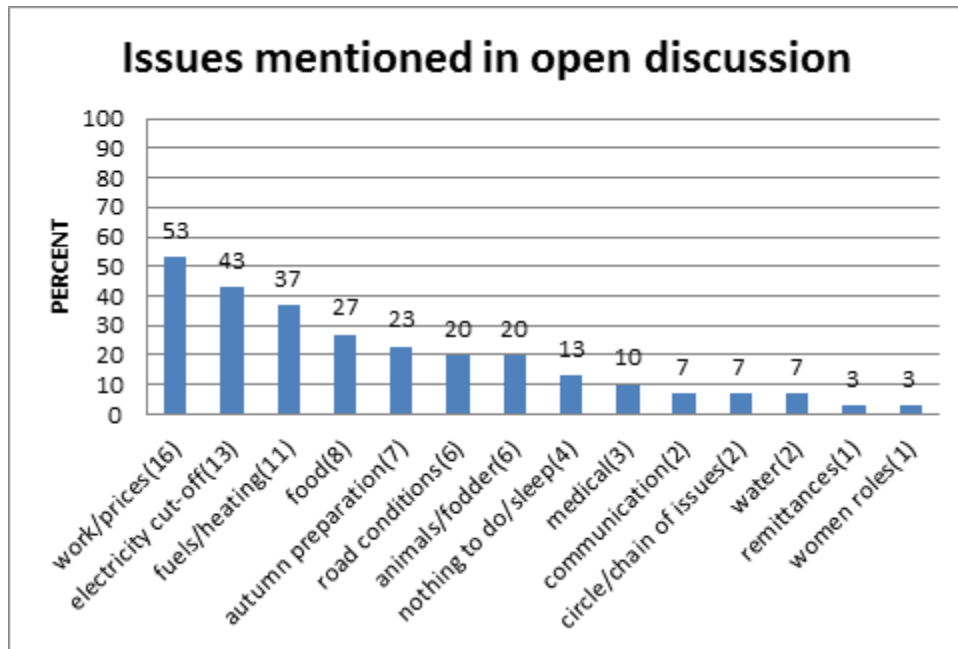


Figure 5.20 Open Discussion Mentions

One respondent stated:

“Just because of electricity cut-off, I have 2-3 hours per day, which is not good at all. ... I’m also feeling it on my family level. In wintertime there is no reason to reduce fuel consumption; if there was electricity we could use [an] appliance which would have less negative impact, both to [the] environment and cities because if all people plug in their ovens to the transformers, it could handle it. The main problem for me, as head of household, is electricity cut-off, which I know I cannot control.”

Another respondent mentioned the selective sale of electricity, stating:

“The main difficulty in winter period is electricity cut-off. Originally, it’s provided maybe 3-4 hours, but people who are working over there, distributing electricity, they sell it. They sell it and announce [the] limitation is allowed only to provide 2 hours, but maybe it’s supplied 4-5 hours. Taking this into consideration, they use the moment, and instead of providing us 5 hours, they provide less. The rest they sell to the people who make money using electricity. I am much dependent on electricity because I work as a welder, and in winter period, because there is only 2 hours [of] electricity supplied, I cannot do anything.”

Seven of the 30 respondents mentioned autumn preparation for winter. One respondent stated:

“If you do enough labor in summertime and autumn time, you won’t have any problem in the wintertime. For example, in the autumn time, sometimes we do not take enough coal. When the coal is over, and the pass is closed, there will be no delivery, because of the road condition. In this case, we suffer. Sometimes, for 10-15 days the roads will be blocked, and the coal will not be available. The same is with the food stuff, when the pass is covered by avalanche, by snow, the food won’t be available in the shop.”

Another respondent stated: “We try to collect as much fuel material as possible. If [we] run out of fuel material, what will I do? I will follow other people, what they do.” One respondent stated that while they prepare properly, but in many cases when spring arrives, almost all households in Navobod will run out of food, and all the products which are stored.

Eight of the 30 respondents mentioned issues related to food supply/conservation in winter. Most issues dealt with a lack of products available from road closures, or trying to conserve enough food for winter. Sixteen of the 30 respondents mentioned issues related to finding work or the price of items. One respondent stated:

“The other problem that I see is there is no job in the winter period, even with low income. There is nothing in winter. In summer, there is some field work.” One respondent stated:

“You never know what will be your expenditure. If you spend more, you know you will have a shortage on financing because you have already planned beforehand for everything. This is a question of time first of all, and then, somehow, even if you face difficulties, it doesn’t mean you have to give up everything. You should somehow keep moving.”

Three of the 30 respondents mentioned medical issues, with one respondent stating: “If we try to consume less, it has consequences to our health.” Six of the 30

respondents mentioned the road conditions as being issues during the winter period, with one respondent stating:

“Once it’s cold, there is not too much transport available. If I have to go to Penjikent, it will be difficult because of road conditions. The roads will be icy, not too much transport [is] available to go there.”

Two of the 30 respondents also made mention of issues related to communication, both related to road conditions. One respondent stated:

“The only problem I see, and I think others feel, is bad communication, with [the] administration center of [the] country and province. If [the] road is open we don’t face any difficulties because we know at certain dates certain types of products will come and we can buy it.”

The other respondent stated: “The difficulties I face and think of is the communication issue, like to get administration center of [the] province or country; it’s a big problem because of [the] road condition.”

Eleven of the 30 respondents mentioned fuels or heating as issues in wintertime. One respondent stated: “If you take into consideration the heating, the difficulty we face is the coal is not available all the time.” Another respondent stated: “The heating in [the] winter period requires a lot of contribution.” Six of the 30 respondents mentioned animals or fodder, with 1 respondent stating:

“Personally, sometimes I face difficulties with fuel materials, and fodder crop for my animal. In this case I have to sell some of them in order to decrease [the] volume of fodder required. If winter is longer, sometimes we even run out of food. Your plans for spending winter will collapse. If you plan for 4 months and winter lasts for 6 months, it requires more contribution.”

Another respondent stated:

“If there is [a] problem, as head of household I try to solve it. Even if my cows do not help me, the debt is the only way to get rid of the problem. In general, now it is very difficult to live because everything requires more and more contribution. It’s difficult to catch up with all those issues.”

Two of the 30 respondents mentioned the problems in winter were like a cycle, or circle, related to one another. One of the 30 respondents mentioned remittances, stating:

“The other problem is lack of financing, not only for me, but for all people living in this village. The good, positive thing is we have remittances from Russia. For many families living in this village, the remittances they receive from Russia is the main resource I would say, in order to get ready for winter, to get rid of issues which are arising during the winter period in this village.”

Two of the 30 respondents mentioned water. One respondent stated:

“Then water, drinking water, so it’s supplied less than usual. For example, for now with irrigation the water is available. Now animals can use irrigation water, but in winter the irrigation is closed, so they have to use drinking water. That’s why usage rates will be increased by double, maybe more because in households they have animals.”

Another respondent stated that the main, basic things necessary are water, bread, food, material is available so far. One respondent mentioned the role of women, stating:

“Of course we don’t have [a] problem, but we have to make lots of labor contributions, and for females, regarding harvesting and collecting in all activities women are involved. With this we have [a] problem, both in winter and summer, it doesn’t matter.”

Four of the 30 respondents stated there is nothing to do in wintertime except sleep.

Two respondents stated that problems in winter are not avoidable. One respondent stated:

“In general, when the winter season [is] coming closer, all problems will start rising. ... In general, once you know that winter is waiting for you, you should take care about yourself in order not to get stuck, not to face difficulty. Even if we try to avoid all problems, in our living conditions, even if you get 100% ready, the problems will arise anyway. You never can foresee all problems in [the] winter period.”

One respondent stated: “I mean, in general, once that [it is] winter, it’s a time when you may face any difficulties.” One respondent stated: “Especially in [the] winter period,

problems are becoming double. ... So all issues are doubling, but as [a] man, as head of household, I always try to find a solution.”

One respondent stated: “In winter period, it is very difficult to live here in general.” Another respondent stated: “If I evaluate in general, it’s very difficult to live right now.” One respondent stated: “This is the main season which I have problems. Even if I try to avoid it, this is something which I cannot avoid. That’s why we just survive until the next harvesting season.” One respondent stated they cannot control problems in winter.

5.2 Village Education Staff

Two school administrators, one for primary school and one for secondary school, were interviewed. Two school teachers were also interviewed.

For the first question, school staff were asked: “At school, what are your sources of fuel?” The first school teacher responded: “You see what we (have). Coal, trees(dry trees), and from animals – dung.” The second school teacher stated:

“Coal is provided by the education department of the district. Regarding the wood, all the trees which are around the school we cut and also we do some trimming. Also some parents of the school children who can afford, they provide us some wood material.”

The first school administrator stated:

“Around the school there is a garden; they cut trees from this. Also, there is a government budget from Dept. of Education of the district, of roughly 1,000 Somoni per year. This is not enough for the winter, as it only purchases 2 ton of coal. Garden around school is main resource.”

The second school administrator stated:

“The coal is provided by the dept. of education of the district, but wood, around the school we have trees. If it is necessary, we will make a statement, for example for lack of wood, we have to cut the trees, in order to submit to the

education dept. Otherwise in this village there are agricultural farms. If they need to remove all trees, they remove them and provide for us some certain amount of wood, and to the tax dept. they submit a report, for example for this school they provided 10-15 cubic meter of wood, the main sources are from the farm and trees around the school.”

For the second question, school staff were asked: “At school, what is electricity like in winter?” The first school teacher stated: “It is better, in other seasons, than other seasons. In winter, we have 2, 3, 4 hours electricity in winter. In other seasons, it’s very good.” The second school teacher was not asked due to time constraints. The first school administrator stated: “It has limitations, cut-off, which is same as that for the community. School has no advantage of extra time with electricity.” The second school administrator stated:

“There is no advantage of school in order to receive more hours of electricity in this village. For example, if they start cutoff, if they supply 2 hours for village, it’s the same for school, it’s no advantage. They have a computer classroom. If the weather condition in winter is more or less warmer, there is electricity supplied from 7-8 AM, so if it’s not too cold the teacher will advise all students to come early to practice the computer from 7-8. The rest of the time they do not have any generator to keep the computer class running, so starting from October they do not have this class. Also they were intending to connect computer classroom to internet access, but he knows for sure in winter there is no electricity, so there is no use for internet.”

The third question asked was: “How often do schools close in winter because of cold weather?” The first school teacher stated:

“In winter, the schools did not close, only last winter we changed the holiday, the winter holiday. Our autumn holiday was from 1st November til 7th November. Two years ago we didn’t have holiday in autumn. We had holiday in January, from 1st til the 1st of February. One month we had holiday because it was very cold. Then we continue the school.”

The second school teacher stated: “Like last 3 years, we moved all the holidays to the coldest months of the year, in January, the school is completely closed.” The first school administrator stated:

“Initially, all holidays will be moved to the month of January. In 2-3 months of cold weather, sometimes the school closes a maximum of 7-10 days, and this sometimes happens 2-3 times per year. For primary school, according to program, it has 4 semesters. Usually after each term, they take rest (5-10 days). Now semesters are compressed. They do not take rest after first semester, this rest is moved to wintertime.”

The second school administrator stated:

“I remember 2-3 years ago there was extreme cold. At that time they had to close the school. There is 3 semesters, and between each there is 10 days holiday. They decided to move all holidays to the coldest time of year, January. Just because we have just traditional oven installed in the classroom, of course we know the temperature provided by traditional oven is not satisfactory, but still it is not a reason we can close the school because of the cold. Sometimes, it happens for the youngest classes, children after 11-12 years, due to the clothes we ask them not to come to the school for 2-3 days. But for the teenagers besides the 1 month of holiday, the rest days they come to school.”

The next question was: “What do you do in autumn to prepare for winter at the school?” The first school teacher stated: “Nothing. Education dept., they will prepare for winter. They bring us coal.” The second school teacher stated:

“In the school we mainly conduct awareness meeting, for example to keep windows closed, keep doors closed when not necessary. This is an event that happens. Also we ask them to wear warm clothes for winter.”

The first school administrator stated:

“The heating system constructed in the school is now not working. In each classroom, a traditional heater with chimney has been installed. In July they begin buying wood for heaters with gov’t. budget.”

The second school administrator stated:

“Actually it’s an order of minister of education, that after the academic year is finished, starting in June/July, we already started for the preparation for winter. We collect wood, we purchase coal, for the time-being we have all our fuel materials ready, but still to be on the safe side there are a couple of more things to do like collect wood to split to prepare for winter period. For the insulation things, when the heating season starts, we conduct meeting within the school, for example to keep door all the time clothes, to not let wind come into the rooms. Also we close the windows with a plastic sheet, so we do all this kind of things before the winter starts.”

The next question was: “At the school, do you know of a community gathering center?” The first school teacher stated: “We have only one club, did you see?. It’s at the mosque only, this kind of informal center.” The second school teacher stated:

“We have a club within this school, and if there are some issues, we conduct the general meeting in order to make solution for certain problems, we have some discussion, mainly in a democratic manner we will solve the problem. Also if there are some arguments between two families which affects the rest of the people living in this village, if there is some urgent case, it’s also solved in this kind of general meeting of the leaders of the village.”

The first school administrator stated:

“In an example of school, there is a community of parents. In winter, if they feel difficulty with fuel material, in village parent community will invite village development committee (village divided into 6 parts), and then tell them they have problem with fuel. Then up to community leaders to solve problem. They will likely go to private foundations here in community for some funds for buying fuels. This committee is really informal. Annually the parent committee conduct 4 meetings, and during these meetings, they arise all issues, and try to find solutions. Besides this, in one classroom there are 20 students. If some problem, ie., broken window or blackboard, in each classroom there is an informal parent committee, to whom it is up to for finding solutions to classroom problem.”

The second school administrator stated:

“In our school level, we have a community of parents. During 2-3 months there will be a list of issues. So once in 2-3 months we invite the community of parents to come together, they have their members and head of committee, and during that meeting we rise up all those issues and for each we try to find a solution. So this informal structure, I would say, is existing in the school in order to solve problem.”

The next question was: “How many of your students experience an interruption of education due to cold weather?” The first school teacher stated: “No, we have not.

They all continue to come.” The second school teacher stated: “If you take into the percentage, maybe it will be reduced by 5-10%.” The first school administrator stated:

“Generally in autumn the attendance is weak because of field work. In wintertime, because there is nothing to do, the children do attend. Also there are indoor sports program like volleyball which attract students.”

The second school administrator stated:

“We don’t have problem with this issues, but only in case when they are ill or have (the) Flu, this is a reason. But just because of the cold weather we don’t have this problem with this, because they have a person who is responsible for the heating of the room, starting from 7 o’clock he puts fire on all the ovens, by the time the classes start their rooms are warm so they can come. This warm temperature keeps to about lunch time. They have classes 2 times, one is from 8-12, one is from 1-4. He says actually if you have the ability to support us to keep our heating system running it will be very effective for us. For example, if we have to fire 15 ovens within the school, and if we collect all the fuel material we use for that and put it into one, maybe we can use it for like 2 days. With these ovens, we consume more fuel materials. Without any reason, just because of the cold weather, there is not students who do not come to school. If they have something to do, they come to the school administration to get permission to miss the lesson, the classes.”

The next question was: “How have things changed at your school in wintertime since the winter of 2007/2008?” The first school teacher stated: “After 2007 they installed, only after this extreme cold, only after that they installed ovens in the school.”

The second school teacher stated: “The only thing which has changed is that in all classrooms we have installed traditional ovens.” The first school administrator stated:

“It was a good lesson learned for us, the winter of 2007/2008. By that time they had no idea that the weather could be cold like this. So at that time they didn’t have the traditional ovens like now installed in schools. After that, they immediately started about installing traditional ovens in each classroom, and collecting wood. Usually all heating now installed in school has come up as a result of this winter event. He says that after that cold winter, there was an order from Minister of the Dept. of Education that before end of July all schools must be supplied with fuel material. This is applied in all school across Tajikistan.”

The second school administrator stated:

“The heating season starts from November 15, but this winter was a good lesson for us, because by that time we didn’t have any ovens installed, and we didn’t collect any fuel. So after that we have a responsible person who is taking care of the heating systems and heating issues within the school. For example, if heating season starts November 15, by that time in all the classrooms the ovens are installed, all the necessary fuel is collected, and we have a responsible person who is responsible with preparing all the ovens, with changing the old chimneys to all new ones. So with the heating, the lessons we have learned, that before

November 15, all the heating systems must be ready, and the responsible person must have it ready.”

The next question was: “How have things changed at the school during wintertime since the end of the Soviet Union?” The first school teacher stated: “During the Soviet Union, it was very well. The heating system worked, now it doesn’t work. Now they installed in each classroom traditional ovens.” The second school teacher stated:

“As I’m working as a teacher in this school, first thing I have observed is that the central heating system is not working anymore. I’m not sure when it might get working again. We had central water system supply which has collapsed and is not working at all. Also the school building, from day to day, it is getting into shamble condition, but as a teacher, as person working here, at beginning of each academic year, we try to maintain it as we can afford.”

The first school administrator stated:

“After [the]Soviet Union, different things like water, fuel, coal, they were not available from time to time, from year to year. So here annually they purchase about 30 ton of coal, they heated this big oven and with circulation (into all classrooms). Starting from 2000 as he became the director of the school, the conditions became like this.”

The second school administrator stated:

“This school was established in 1992. But still when it was constructed it was said it would have separate heating system which you saw, it was actually running for 2 or 3 years after the opening of the school. Then due to the civil war, and all the issues, that affect everybody, and other social objects have been destroyed due to lack of finance.”

An open discussion was conducted only with the two school administrators. For the open discussion, the first school administrator stated:

“Initially, from my point of view, the main problem which we face is lack of coal, fuel material. The other problem is electricity cut-off. If during day you have electricity, no need to buy coal to collect for winter period. There are small radiators available everywhere. If we have electricity available, we can just plug in those radiators, and there is no need for coal. So, he is providing his own examples. During night time, when electricity is provided, he goes to his office to

turn on radiator in his office and then it is still warm in morning. He cannot do in all classes for safety reasons.”

The second school administrator stated:

“The education dept. provides some sort of documents with which they can receive coal. The problem is that, for example, for the coal I have to go almost to Dushanbe to get coal. Sometimes I hire a car, I go over there, (and) it’s too crowded. There are people who will buy (coal) with cash. The attitude of the people who are supposed to provide (us) with the coal is no good because I will take (funds) from the government. The coal mine have agreement with the budget structure they have to provide coal for free. When they go with (a) document from the education dept. over there they are not so happy because they are selling to others for cash. Sometimes I have to wait for 3-4 days to get 3-4 tons of coal. This is one of the issues. The other one is the heating system; always I am calculating if the heating system worked properly there will be no need to use big amounts of fuel material. As you know, almost annually some farmer is removing all trees and all bushes from trees. If you find out somebody is doing this, you go directly to them to provide some cubic meters of wood. Based on drafting proper documentation, if no farmer removes all trees, it is difficult; we need to focus on our area, on the trees here for the heating material. This is a major problem which we are facing. During winter time we are requesting for the possibility to support us, to keep running the heating system in the school.”

5.3 Village Doctor

For the village doctor, eight questions were asked, along with an open discussion at the end. The responses will be presented below. The doctor was asked whether or not he brings any fuels with him for heating when he makes house visits. He stated: “They heat their own home.” The doctor was asked how his access to medical supplies changes in winter; he stated: “Because of the road condition it gets a bit difficult. When [the] road gets blocked and I need something urgently, this is difficult.” The doctor was asked what steps he takes in autumn to prepare for winter. He stated:

“As a family doctor, I always try to preserve some amount of medicines in autumn because I know for sure that in many cases when [the] road is blocked, I don’t have certain medicines available.”

The doctor was asked how things have changed since the end of the Soviet Union. He stated: “If you take into consideration, the technology improvement, there are a lot of improvements, such as computer machine, dialysis equipment are now available. For example, [the] availability of vehicles, transportation; in Soviet times not so many people could buy these. If [the] household has [a] car, if [the] wife is pregnant, [she] urgently needs to go to [the] delivery hospital.” The doctor was then asked if he had any other problems during winter months. He stated:

“As a person who is working with the community, I observe that people have lots of difficulty with purchasing fuel material in winter. Also with access to the hospital, for example, in Penjikent and in the neighboring village there is a hospital, but they cannot treat all illnesses. So sometimes the family must go to Dushanbe which is very difficult. Also is the electricity cut-off.”

The doctor was then asked about how access to getting patients to Penjikent changes in winter, and also what the condition of the hospital is in winter. He stated:

“As a doctor, with patients I always try that there will be no necessity to take them to Penjikent. I do as much contribution as I can not to take them to Penjikent. When all my resources are over, they must go to Penjikent. Sometimes because of bad road conditions, an ill person may also get hurt because of shaking. Regarding the hospitals, they are, of course, too old. It’s bad, floors, ceilings, are not meeting the requirements of being a medical facility.”

The doctor was then asked to provide an open discussion regarding his role as village doctor in winter, as well as how winter affects his role. He stated:

“In wintertime, as a specialist of health of the community, I can say for example, in wintertime there is no electricity. At 1 or 2 in the morning I receive a call that someone is ill. If I receive a call they are not in a condition to come and pick me up, so I have to go by myself. It’s cold, there are dogs around, [the] roads are icy. First of all I know it’s my duty to take care of this. If not me, there is no one else. So that person waits until [the] last moment to call me, so if he calls me he is planning that I am coming. I come, there is no electricity. Some of them can find small generators, just to make light so I can see how the person is. But generally it is very difficult in winter period, especially because there is no electricity. So for example, in nighttime before people go to sleep they fill the oven with coal and wood, so when [the] fire is over the room is cold. When I go at 3 o’clock, the

room is already cold. So if [a] baby boy is ill, I have to open his clothes. When room is cold I cannot take [his] clothes off because he will get cold, he is a baby. If there is electricity, they can leave some electric appliance on that will keep the room a normal temperature.”

5.4 Village Leader

The village leader was asked what his sources of weather forecast information were. He stated: “Sometimes I receive it from television.” He was then asked how much confidence he has in this information. He stated: “Sometimes the information they provide for this area is about 50/50.” He was asked how his access to this information changes in winter. He stated: “I have a small generator to run in wintertime, so there is no change.”

He was then asked what the primary sources of fuel used in Navobod were. He responded:

“Mainly coal is provided from Ayni District, from near Anzob pass. And wood, mainly around this village they have orchards, so they do trimming. Also, they do cow dung. Also, the sunflower bud, the bud is also used to heat.”

He was asked what the electricity supply is like in winter compared to the rest of the year. He stated: “Sometimes they provide for six hours, sometimes they provide three hours, sometimes they do not provide at all in the winter time.”

He was asked how frequently the basic facilities and services such as hospitals, schools, water, and electricity interrupted due to extreme cold. He stated:

“Annually, in the winter season, once or twice the drinking water system gets frozen. Whenever this freezes, we try to invite people to remove ice from the pipeline in order to get water supply. Regarding the school, even it’s cold, the classes are not too much interrupted because all the holidays are moved to the coldest months, and also traditional ovens are installed in the school which attracts the little schoolchildren to go to school. Regarding the hospital there is

electricity supplied 24 hours, but still there is no proper heating system. But they do not interrupt the electricity.”

He was then asked: ‘Is there any communication between other villages in this area, in the Zeravshan River Valley, during winter or extreme cold outbreaks, and if so what are the forms of communication?’ He stated:

“Due to the severe cold, we don’t have breaks in the communication between villages. Cars are available in almost all villages, and if I see it’s too cold, I see we can get in touch by phone if there are some urgent things to do.”

He was asked if there was a community gathering center or decision-making center for the village, and if so, where it was. He stated:

“For the time-being we have a room in the building of the village association of farms. All the issues related with the leaders, they are supposed to discuss it. All the leaders come together always there, because it was the office of our (The translation for this word could not be understood) in Soviet Union times. But we are not so satisfied with that place, and as the head of this village I’m trying to find a small office for the committee of this village, but for the time-being a couple of times I made an address to the leader of Penjikent in order to receive a small building as an office for the committee, but still I’m not lucky with this.”

He was asked how much support he received from Dushanbe to deal with extreme cold, and in what forms this support was. He stated: “For this village, actually besides coal for schools, we do not receive any support for cold winter.” He was asked how things have changed with dealing with extremely cold weather since the winter of 2007/2008 in this village. He stated:

“By that time people, I would say, didn’t pay too much attention to preparation for winter season. After that cold winter, they almost prepare 80% of all necessary items which is required for the winter period, both required for fodder crop, food, vegetables, everything. Now they know that the weather can be cold like that, and they always prepare all necessary things for the winter period.”

He was asked how things have changed in the village during winter and very cold weather since the end of the Soviet Union. He stated:

“Before there were not too many problems, for example, for wood and fuel material for winter period. There were no problems with the fuel material, because it was supplied from Samarkand, and you could get there in two hours and buy as much as coal and wood as you want. Now, people are mainly out [on] their own. They know if they do not prepare for winter, nobody will take care of them.”

He was then asked to provide an open discussion, regarding his role as village leader, and also with things they think they do well, things they think they could do better. He stated:

“Mainly, as the head of this village, I can say we face two difficulties mainly in the winter time. The first is the electricity cut-off, which we know we cannot avoid, and the second is the water system, if the drinking water system gets frozen, this is also a big problem for us. I mean, the pipeline remains in a trench and covered in plastic, in almost a meter and a half of ground. If it gets frozen, it’s very difficult to identify the place where it’s frozen or has a hole. In the wintertime, everyday it’s frozen, even if we find the spot where the pipeline has a hole, it’s very difficult to dig it because the water flows up and it’s frozen everywhere. We mobilize people as much as we need, and so far we get rid of this. Until the time where we find the place where it has hole or some problem, it might take like 3 or 4 days, and during this time there is no drinking water for the people to drink. Regarding the food preparation, people know if they do not prepare properly, the roads, the passes might be closed so they will face difficulties. The winter of 2007/2008 was a very good lesson learned, and now people, even if they know there might be no problem in winter time, but they pay no attention to that. They know that they have to prepare all in advance in winter time. This makes things easier really, if people get ready in autumn time.”

He was asked, of all the issues the villages faces, where extreme cold weather ranks. He stated:

“It’s somewhere in between, because we cannot say it has much risk, but we also cannot say there is no risk from the extreme cold winter. This issue is evaluated in between all other issues.”

As a follow-up, the village leader was then asked what types of infrastructure and resources he has for dealing with extreme cold weather. He was specifically asked about salt for roads, bulldozers, and other big machinery for road clearing. He stated:

“I am actually on a voluntary basis, as the head of this village. Sometimes when it’s too icy, these roads are all served by the Department of Roads, to the Ministry of Transport. In all these streets, they have people who will take care of it, who will clean it. Sometimes when they do not have enough resources, when it’s too icy, we collect from people some money to clean the roads, if it’s necessary, until the ice is gone. Recently, as you know the head of the province has visited. As I am responsible for this village, I collect some money and bought some asphalt to put on the main road which passes through the village.”

5.5 7-Lakes Focus Group Interviews

The village leaders were asked what their sources of weather forecast information were. The Obihaet village leaders stated: “We do not receive any kind.” The Padrud village leaders stated: “TV and radio broadcasting.” The Roshni Poen village leaders stated: “From TV and radio broadcast.” The Singh village leaders stated: “Mainly TV, radio broadcast, and sometimes from internet.”

For the lower three villages, they were asked about their confidence in the weather forecast information they received. The Padrud village leaders stated:

“Sometimes it comes true, the information they provide. Sometimes it does not. For example, sometimes they provide forecast information about Penjikent city itself, but not about our places.”

The Roshni Poen village leaders stated: “Sometimes it’s true, sometimes it’s not.” The Singh village leaders stated: “About 95% is true.” The lower three villages were also asked how their access to this information changes in winter. The Padrud village leaders stated: “Whenever the electricity is supplied, we watch TV and receive this information in wintertime as well. As we are in the mountainous place, the winter is part of here. The information is not so satisfactory.” The Roshni Poen village leaders stated: “If electricity is supplied, we receive (it).” The Singh village leaders stated: “We receive the same (information) in winter.”

They were then asked what fuels they collect for winter, as well as what their sources were. The Obihaet village leaders stated: “We collect wood from the mountains. There is a coal mine up at these mountains. We take our donkeys to go to dig coal. There are no road facilities.” As a follow-up, they were asked where they got the wood from. They stated: “We walk about 20km from this village up to collect wood. Also (we use) cow dung.” As another follow-up, they were asked if they had any orchards to trim or clip. They stated they did not. The Padrud village leaders stated:

“We collect wood, mainly from the mountains. Up the mountain, there is a coal mine. We buy it from the people who dig coal from this mine. Also, from Penjikent some people deliver coal.”

The Roshni Poen village leaders stated: “We collect a very low quantity of wood, we purchase coal from the village up the mountains, and we do cow dung.” The Singh village leaders stated:

“Coal is mainly imported, and wood and cow dung we use for heating material. Wood is from the forests. The coal is from entrepreneurs, delivered from the village up the mountains. In general, we do not face difficulty with fuel material.”

They were then asked if they had kitchen gardens, and if so, what role that played in their winter preparation. The Obihaet village leaders stated: “No, no kind of kitchen garden is available here. We can grow here, but there is no proper planning of housing here, it is dense construction.” The Padrud village leaders stated:

“Here there are living almost 80 households. In general, 1.7 hectare of land is available. The land which is available is not distributed among all households here. Some people have very little, some have none at all. It is not distributed fairly. We do not have gardens.”

The Roshni Poen village leaders stated they did not. The Singh village leaders stated:

“Almost 45% of the population has kitchen gardens; they mainly grow vegetables there.

They mainly store vegetables for winter consumption.”

They were asked what their access to doctors and hospitals were like in winter, as well as what the conditions of the hospital was in winter. The Obihaet village leaders stated:

“There is a hospital, medical point in Singh Village about 16km down from this village. There is no road available in winter period. We have to walk in almost half a meter of snow. There is no condition at all. Because there is some family doctor, they check the patient and advise to take to Penjikent or Khojand or Dushanbe. There is no ability to get treatment there, they only advise who provides it.”

The Padrud village leaders stated:

“To start with the charge of taxi, in order to get from here to Penjikent it’s nearly 30 liters of fuel, and one liter of fuel is 6 Somoni. If someone is sick from family, we have to take them to Penjikent definitely. In winter period of course road condition is not so satisfactory, is difficult, and also dangerous. You spend a lot of money and time. Of course once we get a sick person to the hospital there is no way to turn back because he or she needs to take the treatment. In general if you have financing you can (get) treated. You pay and they provide you all necessary things. If you pay you can get treatment.”

The Roshni Poen village leaders stated:

“There is only one family doctor in this village. If somebody is ill, it’s probably a better idea to get them to Penjikent. Because of the road conditions, sometimes if someone gets ill in the night time, all family members have to wait until it’s light so they can put some dirt on the icy road. If you have money you will get proper treatment; otherwise (you will) not.”

The Singh village leaders stated:

“In this village we have a central hospital which provides services for the other villages around. It is newly constructed, so the conditions are okay. It has a delivery room and here the patient can get some treatment. So this is a completely new hospital; it started (operating) in March. We had an old hospital which has been removed by mudflow. With the community contributions we

constructed a new one, which consists of two floors. Even now patients are getting treatment.”

They were asked about the children’s school attendance in winter. The Obihaet village leaders stated: “So, if there is not too much snow, they go to school. The condition of the school in wintertime is also not so satisfactory.” The Padrud village leaders stated:

“There is no proper condition for children to get education. First of all the school building was constructed in 1960. There are no educated teachers, they are all young; whoever has higher education, they go to other places where the conditions are better. Just imagine if the school was constructed in 1960 with a stove. Children have to take a piece of wood with them every morning to heat the rooms. Generally, the quality of education is very, very low over here.”

The Roshni Poen village leaders stated:

“In general, some amount of fuel materials is supplied for the school, which is not enough. That’s why children have to take wood to school. There is no proper heating in the school. They regularly attend. The school is constructed by the water, so there is too much moisture.”

The Singh village leaders stated:

“There is no problem with participation of children in school because there are traditional ovens installed in the school. The children bring wood to school for (the) traditional ovens. They have had the traditional ovens in the school for three years.”

They were then asked what steps they take in autumn to prepare for winter, and whether they took steps to reduce fuel use in winter. The Obihaet village leaders stated:

“Actually we don’t have too much income here. In autumn time, mainly we first of all collect wood, coal, cow dung, and then food material. We are a distance of 60km from Penjikent. We have to pay 35-40Somoni in order for one person to ride to Penjikent. Living conditions not so satisfactory. In autumn period we mainly prepare fuel material and food. It’s almost -25- -30C here, so we do not conduct any activities to reduce fuel consumption. If we do, it has consequences on family members. We might even die from the cold if we do not heat.”

The Padrud village leaders stated:

“About 30% of people living in this village have some animals. Before winter starts, they try to get some fodder for them. As there is no proper land, you don’t know where you can collect fodder for animals. As others living in this village, we try to collect some wood, some fuel material for winter period. Also (we store) some food for our own consumption for winter period.”

The Roshni Poen village leaders stated:

“We don’t have too much income. Besides the water, everything we have to buy. Of course, as you know in the mountainous area it’s difficult to spend winter. We mainly concentrate on collecting wood, fuel material in autumn time.”

The Singh village leaders stated:

“We have agricultural lands in another place, and now people are mainly collecting their harvest. Autumn time is when they have to collect fodder for animals and all other agricultural products from the field.”

The three lower villages were then asked if they had any food storage facilities.

The Padrud village leaders stated: “Some families have on the household level, but I wouldn’t consider this as a proper storage facility.” The Roshni Poen village leaders stated: “Not all the households do. There are many houses with (a) maximum of two rooms. In one room it’s used as a kitchen and sleeping room. This is the condition we live in.” The Singh village leaders stated: “In some houses you find this.”

They were then asked if they run out of food in winter, as well as their source of food if they did run out. The Obihaet village leaders stated:

“In general we are trying to survive in the winter period. When the food is finished, we take our donkeys and step down to the place where cars are coming. We know they deliver some food, we buy from there. If we run out of money, we take goats or sheep with us, go down and sell them to someone. With that money we buy some food.”

The Padrud village leaders stated:

“We buy it generally from (the) market, from Penjikent. There is not enough land to grow vegetables at the household, so all products we have to buy. We have a water mill, we buy wheat and do flour over here.”

The Roshni Poen village leaders stated: “We store food for a maximum of two weeks.

For more, we cannot afford. If we run out of food, we sell animals. If animals do not help, we have to take out a debt.” The Singh village leaders stated:

“People mainly get properly prepared for wintertime. Even if they do (run out), they have some cows and sheep to sell. All products are available in the shop. If they run out of everything, they can take a debt from the shops.”

They were then asked if their ovens were installed properly. The Obihaet village leaders stated: “Yes, all these things are done.” The Padrud village leaders stated: “Yes. All chimneys are removed completely and re-installed.” The Roshni Poen village leaders stated: “We do not remove ovens, even in summer. Before heating season starts, we clean properly.” The Singh village leaders stated: “Yes, it’s all done.”

They were then asked how many rooms in their homes they heat during winter. The Obihaet village leaders stated: “(We heat a) maximum of 2 rooms. If our house is bigger, consisting of 2-3 families, we heat maximum of 2 rooms. If not, then only one room.” The Padrud village leaders stated: “(They have a) maximum of 3 rooms, and only heat one room.” The Roshni Poen village leaders stated: “The majority of people have only one room, and they heat that one.” The Singh village leaders stated: “It depends on the family. For some families they have a sub-family in their home. In this case they heat three rooms. In some homes where their sons are not married, they heat only one room.”

They were then asked how the roads affect them in winter. The Obihaet village leaders stated:

“Before there was not too much population, it was easy to supply people with horses, donkeys. Now population increases, it’s impossible to supply food in winter times, especially when road is blocked. When road is blocked, we try at least to send some people down to get some food. Bad parts of road we clean by hand.”

The Padrud village leaders stated:

“There is a democratic structure. The hesitation of prices, you can see everywhere. Of course you can see when the main roads are closed, like passes from Khojand to Dushanbe, of course it affects the prices. All road conditions from Penjikent to here, this road was constructed on a geological expedition to here in 1950’s. After that time there was no maintenance, no proper planning for how the road should be. In winter period the roads are all icy and very dangerous; in some turns you cannot turn. In general, you face a lot of difficulties with roads, because nobody cleans the roads. Only once when the president visited to the 7 lakes, they tried to maintain the roads. Even then the bulldozer came, they didn’t maintain it properly, just for visibility. If there is a mudflow or whatever on the road, we all collect some money and hire a bulldozer in order to clean it. If we see we can do it manually, then we do it ourselves.”

The Roshni Poen village leaders stated: “The first impact is that the prices go up for everything, starting with diesel material, and up to food and everything.” The Singh village leaders stated: “Of course when it’s snowing and the roads are icy, things are difficult. Just to go to (the) administrative center, you face a lot of problems. Generally it’s dangerous to walk.”

They were then asked how things have changed during winter since the end of the Soviet Union. The Obihaet village leaders stated:

“In general, in all aspects of life the difficulties arise after the end of the Soviet Union. If you take an example for the school, the quality of school. When I graduated school here in this village I could read and write, but the schoolchildren graduating now cannot even write their names. Before the border with Uzbekistan was open and it was easy for us, but now the border is blocked.”

The Padrud village leaders stated:

“There is actually nothing that has improved. It was better in Soviet Union times. When it was Soviet times, all food and fodder were supplied here. Now for a bag of flour we have to go to Penjikent, hire taxi, pay for the stuff. Sometimes even if it’s necessary for 1 kg of sugar we have to go to Penjikent. It’s a lot. As a taxi driver, usual public transport which costs like 2 Somoni, when it’s urgent, the household should hire an entire car to go to Penjikent. There is no other way, it must be done. Of course it was better in (the) Soviet Union, but somehow it gets destroyed now, the things. Sometimes the roads are destroyed from mudflow and we have to walk.”

The Padrud village leaders were then asked, as a follow-up question, how these other hazards affect them in winter. They stated:

“We are actually located in a (hazard-) prone zone, whatever raining, snowing, we know that we will wait for some natural disaster like mudflow or avalanche. We try to avoid some damage as much as we can, but this is a natural disaster, and this is very difficult to manage. Up from this village, there are places where at the top of the house there are some big stones located. Year by year they are slowly coming down. If there would be any possibility to support us, to at least get rid of those stones, it would be very good of you. Even if you want, you can go up there and see it.”

The Roshni Poen village leaders stated:

“Before in Soviet times the border with Uzbekistan was open, and we could receive everything from there. Even wood material was supplied from Russia to Samarkand, and we could receive it there. I mean coal, wood, everything we could receive; there were no problems.”

The Singh village leaders stated:

“With the coal, before it was supplied. We could receive it without any problems. Now, even if it’s available, not many families can afford to buy as much as they need. With the support of some foreign organizations, they taught people to install energy-efficient ovens to reduce consumption. With the fuel, coal, it’s not supplied as it was supplied in the Soviet Union time.”

Finally, they held an open discussion. The Obihaet village leaders stated:

“In general, if you take as an example the wood material, before all these mountains around were covered by forest. We had construction material like wood and beams were supplied by Russia. There was no need to cut trees. After USSR collapsed, we started cutting trees. As a consequence, now we have to go

20-25km to find some wood. In general, there is no paid job. With animal, it is a problem. If you have more animals you have to collect more fodder which is not available. It is very complicated over here. Basic things we cannot afford ourselves, because we are located in a place where there is not too much potential. Generally, we are all living in the same lifestyle, the same condition. Another example, from the top of this village big stones are slowly moving down. Last year a big stone 12mx7m came down and removed a house. The owner of that house didn't receive any remittances or support. Around here a lot of hazards are available which we cannot get rid of ourselves. There is no machinery available for digging of coal, so we do it manually."

They were then asked, as a follow-up, if these other hazards make things difficult in wintertime. They stated: "Sometimes in wintertime we have avalanches, which we cannot foresee or prevent. There is also rockfall."

The Padrud village leaders stated:

"People over here get adapted so far. Before the winter starts, I know that for my family, in order to spend the winter, we need about 5 bags of flour. Starting from the good weather, the good season, I start looking for an opportunity to have those 5 bags of flour or whatever is necessary. In general, in the entire spring, summer, and autumn we try to collect all we need for winter period. Compared to the villages which are up there, our conditions are a little bit better. We pray for things to get more and better."

The Roshni Poen village leaders stated:

"As the head of household, first of all I have a lack of food in winter period. I plan that I will keep the family running in the winter period from animals which I have. The other problem is to feed those animals, to find fodder for them. As you know there is no proper land available here where we can grow food to feed animals. These are the main problems we are facing. We also purchase food, fodder for animals. Another problem is electricity cut-off. All around there is only stones, there is no proper land to use for agriculture. In winter, we receive maximum 1.5-2 hours of electricity a day. As compared to Penjikent we are considered a more vulnerable village because we do not have any acreage of land available to use for agricultural purposes. Another problem is land available for construction; I have four sons, and they are already married. There is no place where I could construct the house for them to live, and now we are living in a very dense situation."

The Singh village leaders' responded:

“Mainly people know it’s difficult to find something in wintertime. They get ready for winter in advance. Starting from summer, they know how much food they need for winter, how much fodder they need for their animals. Generally, we have an advanced thinking of how things are going to be, and we collect all necessary things for spending winter. If the harvest is low, of course this is a problem. If the fodder crop is not enough, this is a problem. In general, we think in advance of how to get rid of problems.”

5.6 GIS

The GIS analysis for this project was primarily associated with the road network, between Dushanbe and Penjikent, as well as from Penjikent to Obihaet village, within the 7 Lakes District. The road was acquired via Garmin Oregon, non-differential GPS device. This GPX trackfile was then exported and saved as a shapefile in QGIS open-source GIS. This shapefile was then projected to UTM 42N and imported into an ESRI personal geodatabase for further analysis. During the acquisition of the road network, points of interest(POI) were also acquired, to ascertain several categories: bridge, specific POI, toll point, tunnel entrance/exit, and village. See Figure 5.21 for a map detailing POI’s acquired between Dushanbe and Penjikent, and between Penjikent and Obihaet village, as well as the road network.

There were fifty-six bridges marked between Dushanbe and Obihaet in the 7 Lakes District. Bridges were marked as significant due to their tendency to freeze faster than the road during cold weather. Two POI’s were marked, one pertaining to a military checkpoint prior to entering the 7 Lakes District, and the other to mark the seventh, and highest lake in the same district. The entrance and exits to twenty-three tunnels were marked across an approximate distance of 28 kilometers. These tunnels are bore into the

sides of mountains, allowing transport through mountainous areas throughout the year. The longest of these tunnels is the Anzob Tunnel at five kilometers long, and was constructed so road traffic could avoid the Anzob Pass. This tunnel has been called the ‘Tunnel of Death’, noted for its exposed cabling, meter-deep holes, freezing temperatures, and pollution combined with lack of oxygen. The locations of several villages were marked: Varzob, Hushyori, Takfon, Ayni, Dardar, Penjikent, Padrud, Roshni Poen, Shing, Obihaet, and Navobod.

The road network was acquired over a distance 303.7km. SRTM resampled 90m DEM tiles were downloaded, projected to UTM 42N, classified into 100 meter-increments of elevation, and polygonized. The DEM tiles were also used to create an output slope grid, classified to three categories: [0-30)degrees, [30-45]degrees, and (45-78)degrees. These grids were then polygonized. The two polygonized grids were then both intersected with the road network, producing a road polyline displayable by elevation or slope. The road network was also categorized and classified based on: travel frequency of route, physical condition of road, and proximity to hazardous zone. A polygon layer was created to represent each category, from one to five, with one representing the best and five representing the worst. See Appendix D for a detailed summary of the road categorization and classification rule set. The polygon layer was then intersected with the road network, allowing the road network to also be displayed by road category, in addition to elevation and slope. See Appendix E.2 for images of each road category and classification.

Each road segment was analyzed for its elevation, slope, and road category. Elevation is important due to the effect of freezing and ice on road conditions. Slope is

important due to likelihood of avalanche or other mass wasting events in proximity to the road. Road category is important due to the nature of the road infrastructure condition. Elevation units are henceforth in meters above MSL. For elevation, the majority of the road network is at between (1000-1500)m, with substantial amounts through to 2000 meters; see Figure 5.21 for a summary of the length of each elevation segment. For slope, nearly 30km of the 303.7km, or 9.85% of the total road network was in direct proximity to slopes between 30 and 45 degrees; see Figure 5.22 for a summary of the length of each slope segment. For road category, the majority of road category lengths were categories 3 and 2, followed by 1, 4, and 5; see Figure 5.23 for a summary of the length of each road category. See Figures 5.24 – 5.28 for map products of the resulting GIS analysis.

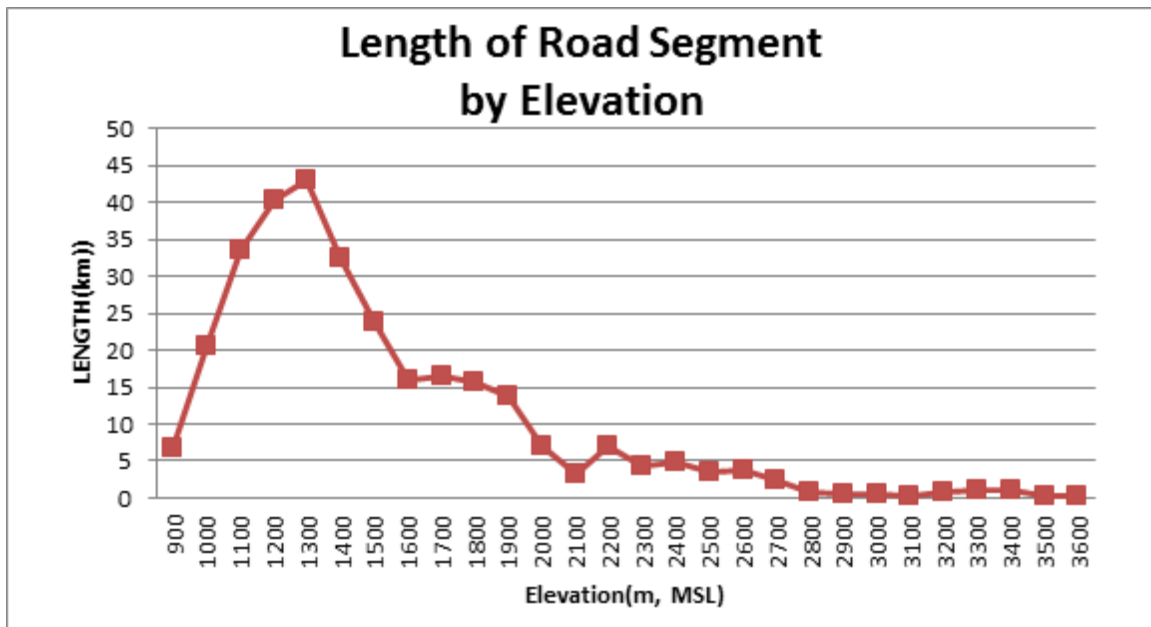


Figure 5.21 Length of road segment by elevation

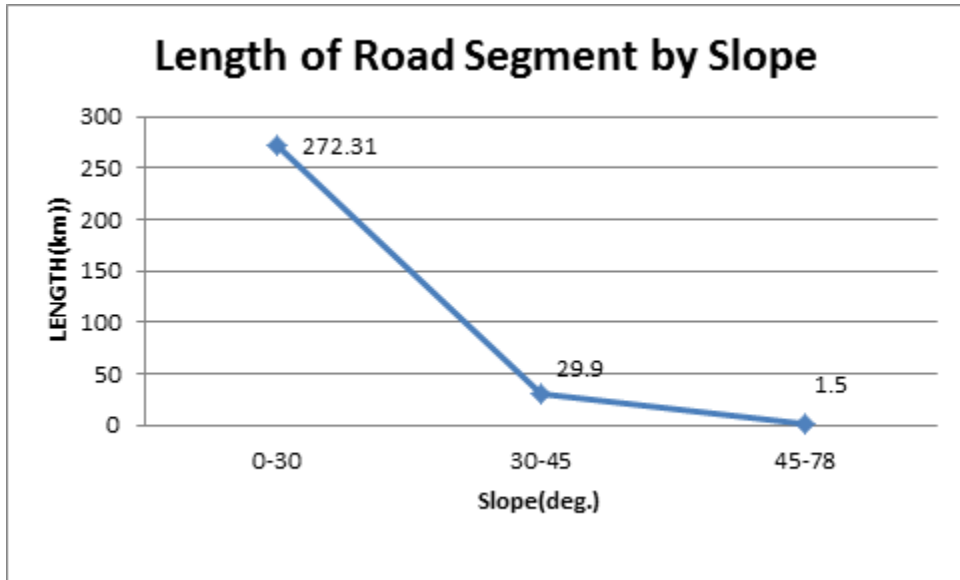


Figure 5.22 Length of road segment by slope

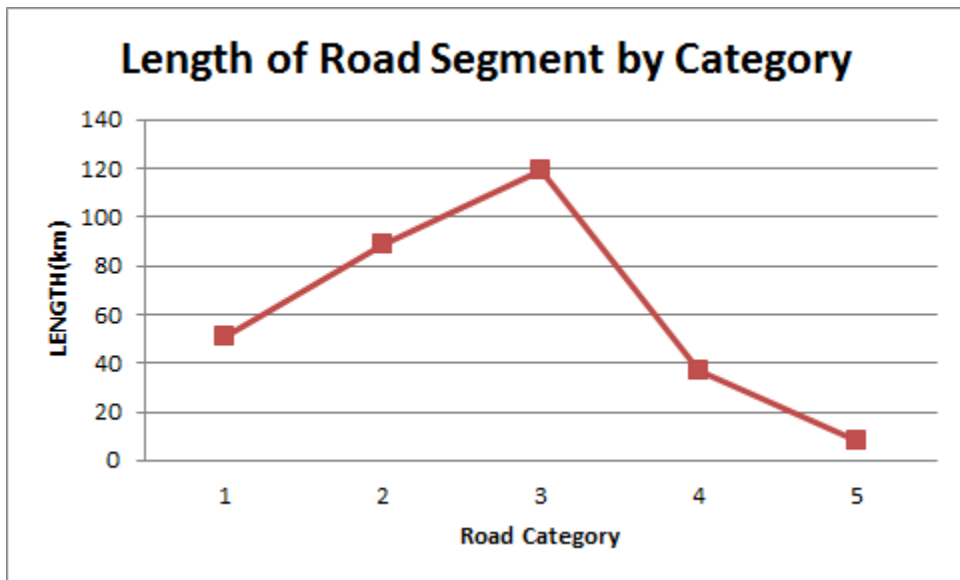


Figure 5.23 Length of Road Segment by Category

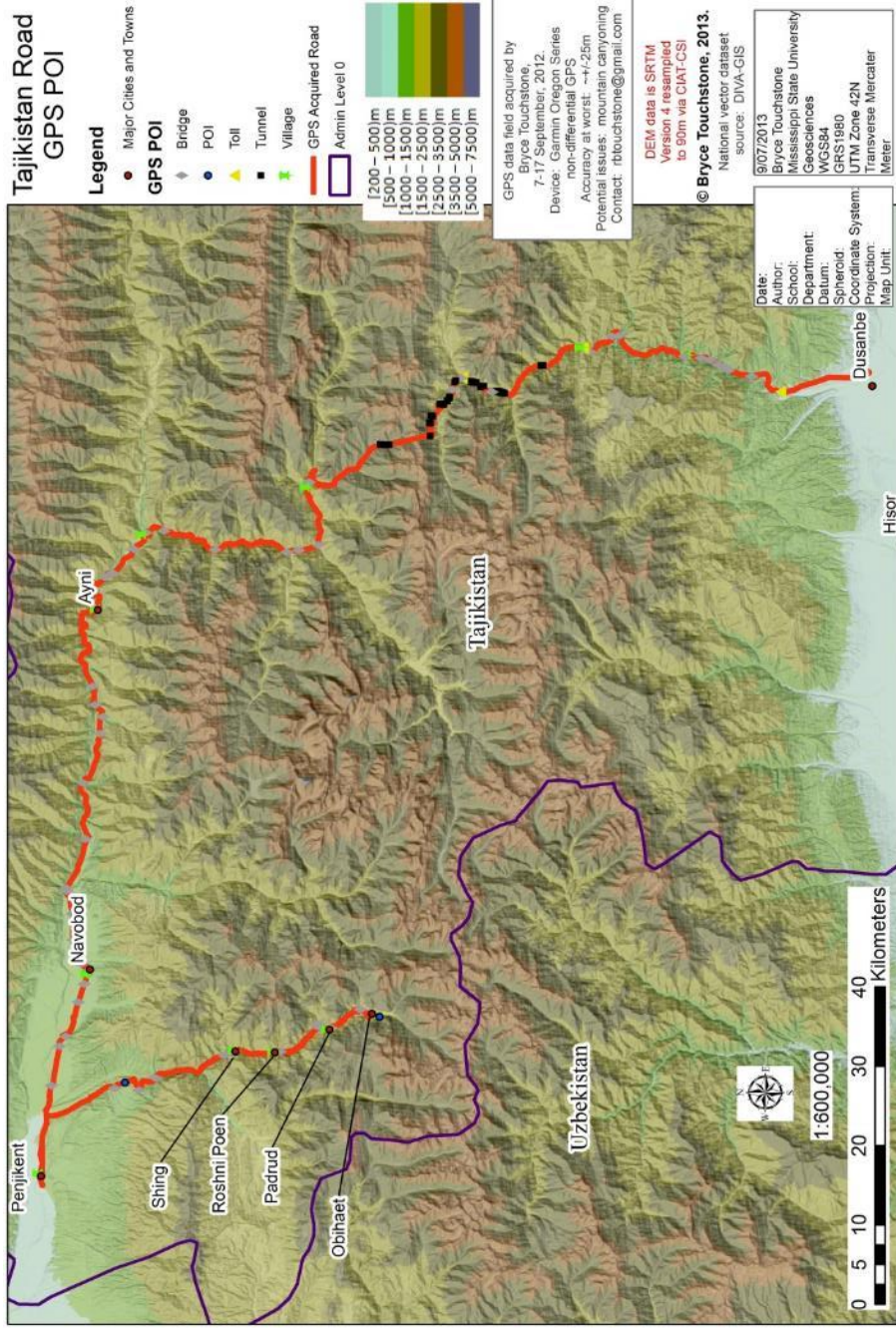


Figure 5.24 Road POI

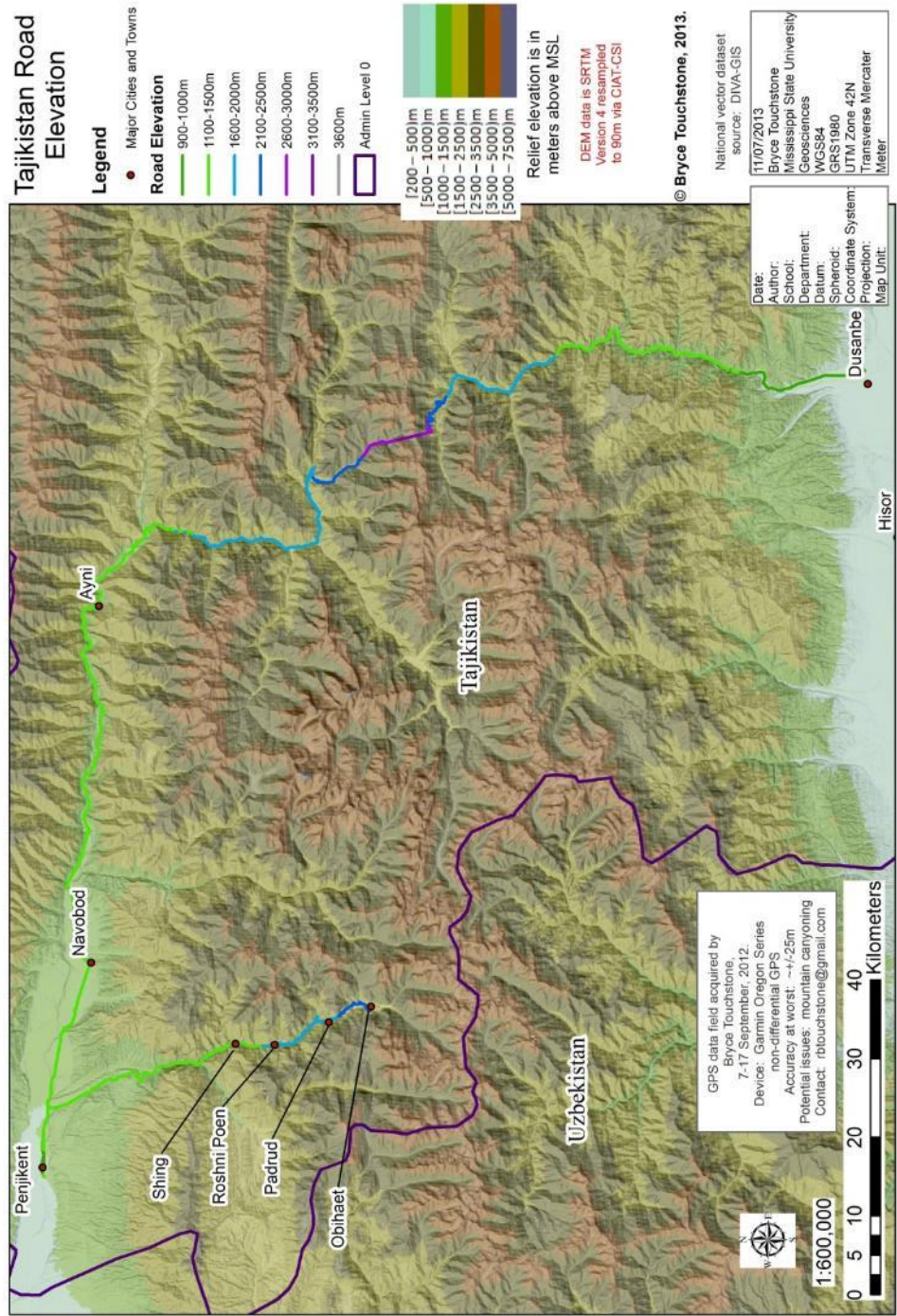


Figure 5.25 Road network by elevation

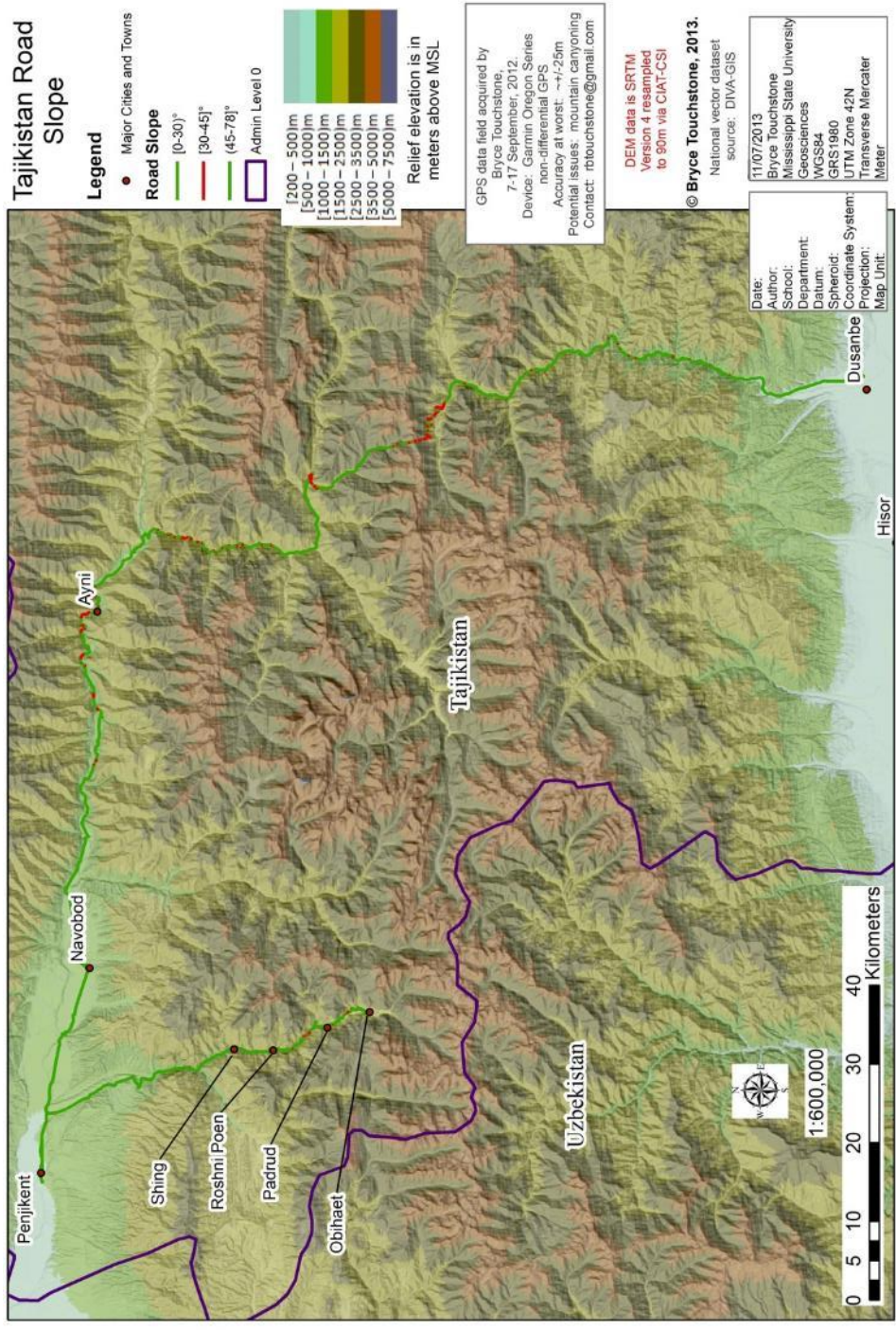


Figure 5.26 Road network by slope

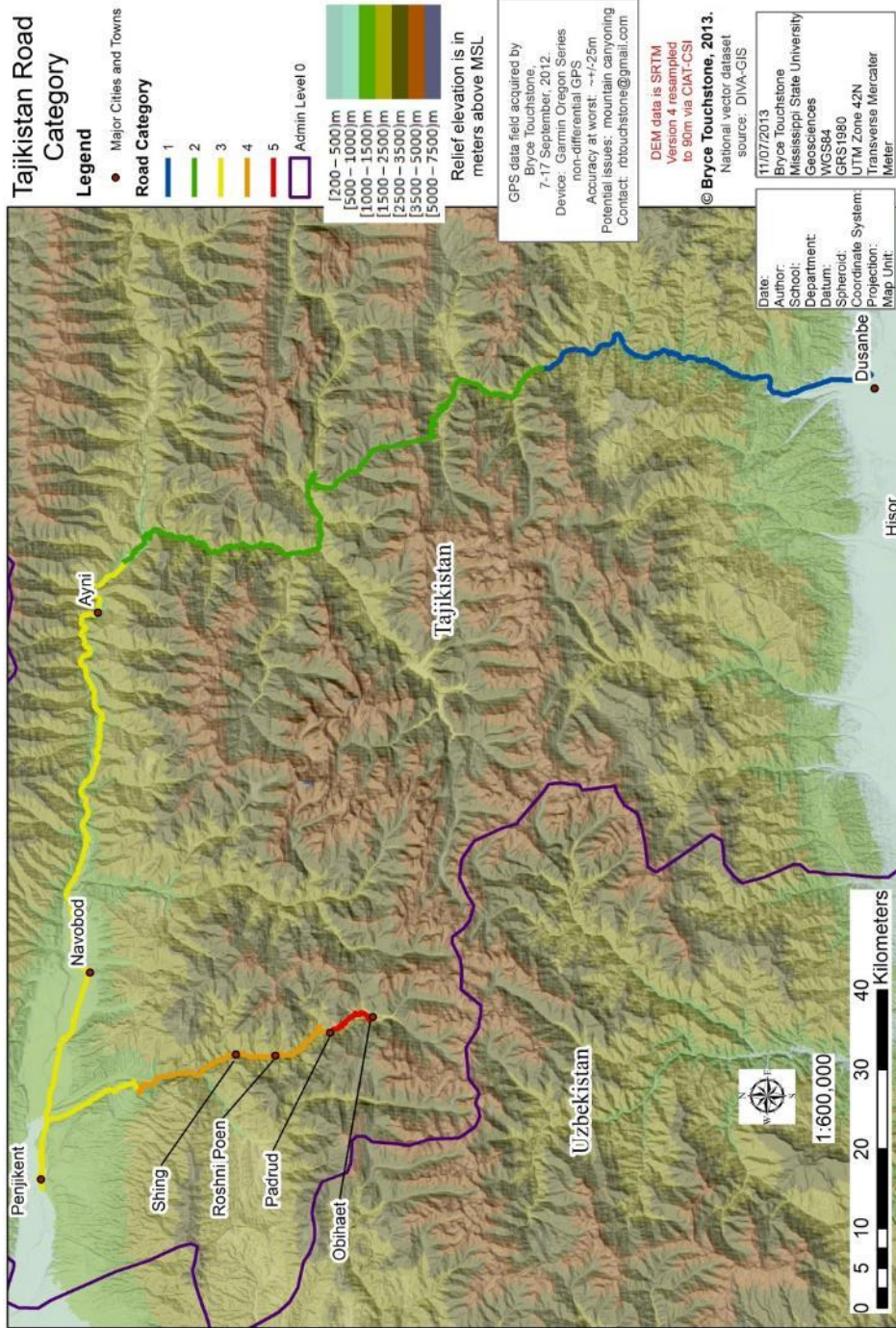


Figure 5.27 Road network by category

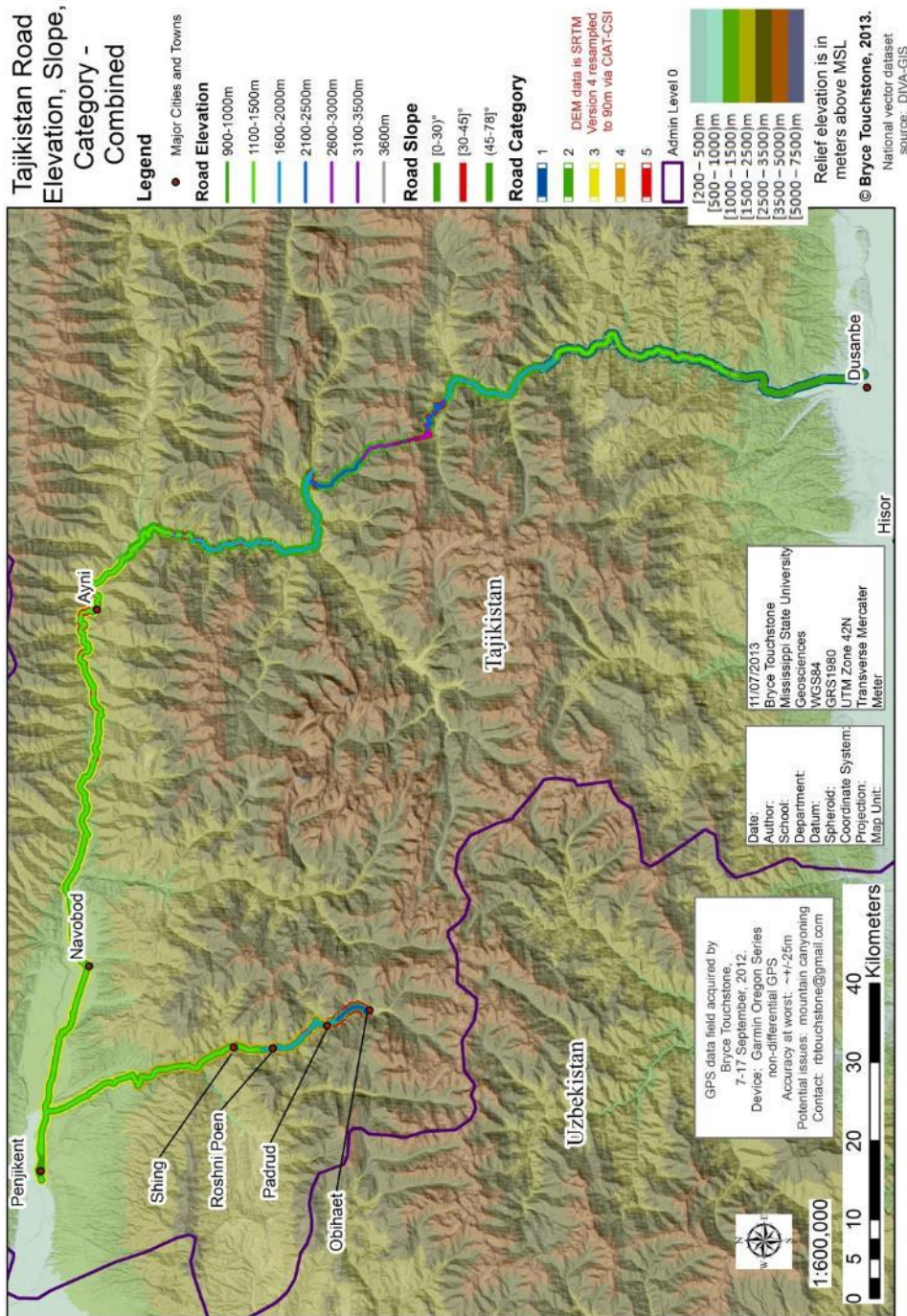


Figure 5.28 Road network by elevation, slope, category; combination map

CHAPTER VI

DISCUSSION

There is a high reliance on national television for weather forecast information. There are many people who either do not trust the information they receive, or do not feel the forecast information is sufficient for their particular district. Confidence in weather forecast information received is fairly well spread between 100 and 40 percent. There is also a trend in less receipt of weather forecast information in wintertime, primarily due to electricity cut-off. This creates a situation whereby the population is unable to take preparation actions prior to the onset of cold weather. The lack of weather awareness decreases the social fabric through which disaster potential is filtered, thereby increasing vulnerability to prolonged cold.

There is an overwhelming reliance on coal and trimmed orchard limbs for heating fuel, followed closely by cow dung. As was mentioned by numerous respondents, coal deliveries are subject to a number of constraints, among which are road closure, price set by the entrepreneur, and availability. This decreased control over a resource used for fuel decreases livelihood, and thereby vulnerability to prolonged cold. The heavy reliance on orchard limbs also reduces vulnerability by decreasing livelihood in the form of unsustainable crop management, which was evident both with the data and with the explicit response by several respondents during several of the questioning phases

(Robledo et al., 2004). It must be said, however, that the diversity in fuel sources likely increases resilience to electricity cut-off.

There is evidence of a pattern of unsustainable land use and disaster management practices among a large percentage of rural residents of Tajikistan. Several respondents made mention of environmental impacts from both the overworking of land for agriculture, as well as the constant cutting of vegetation for biofuel, with a couple stating this would lead to an environmental catastrophe (Harden, 2001).

Most of the people in the village seem to maintain a kitchen garden at the household level, though only around half seem to store food products from this kitchen garden for winter consumption. The staple crop stored for winter is potato, followed by carrot. While there were single mentions of three other crops, this tends towards a heavy reliance on few food sources for winter storage, thereby likely decreasing resilience to food shortages, as well as decreasing social fabric in the form of lessening diet diversity (Gurung et al., 2002; Rowe, 2009; United Nations, 2008).

With regards to medical treatment, many people mentioned having to take fuels with them when going to the hospital, there not being any proper hospital conditions, and the village doctor. Having no proper conditions in the medical facility decreases resilience and increases the risk of illness, both of which will act to increase vulnerability to prolonged cold. Cold temperatures in the medical facility and economic hardships also both act to decrease resilience by increasing likelihood of health complications, as well as decreasing means to deal with health issues, respectively. The road network was mentioned by several respondents. Roads make it hazardous for patients getting to the

hospital, particularly in winter, increasing the risk of the unknown; they also cause problems for residents on a number of scales, later to be discussed.

Regarding school attendance by children, there seems to be some degree of discrepancy between the perception of student attendance by school staff and several of the household-level parent respondents; while the school administration seems to believe almost all children attend school in winter the same as the rest of the year, many respondents stated they do not let their children attend in winter when it is extremely cold or the roads are bad. It is clear, from the responses of both parents and school administration staff, that the school holidays have been moved to the coldest months of the year since the winter of 2007/2008; while this might not specifically increase or decrease vulnerability to prolonged cold, this is certainly far from ideal for the students. Also, the lack of fuel provided by the school and/or department of education forces students to bring fuels from home to heat the classroom; this decreases the home fuel supply, thereby placing further strain on the land and the household, affecting mitigation and planning strategies, impacting negatively on livelihood, and decreasing resilience. All of these act to increase vulnerability to prolonged cold.

Steps taken in autumn to prepare for winter relates almost exclusively to the mitigation component of the vulnerability model. With almost all respondents stating they collect fuel and food for winter consumption, this indicates a high degree of mitigation activities aimed at averting the effects of cold weather during winter. Few respondents stated they take measures to reduce fuel use in winter, and this could have a long-term impact on the livelihood of resources in and around the village of Navobod. Unsustainable practices can lead to the depletion of natural resources, particularly in a

country that is already heavily deforested as a result of Soviet re-designation of land use for cotton production (Fritzsche, 2011; Bayliss-Smith, 1991).

The overwhelming presence of food storage facilities for respondents at the household level is indicative of mitigation and planning efforts aimed at averting the effects of cold weather, and thus decreasing vulnerability to prolonged cold. While the majority of food storage facilities appear to be basements inside the home, there are still facilities in the form of outside pits; this increases vulnerability to prolonged cold, whereby the winter of 2007/2008 saw many stored food products stored outside lost to cold weather (United Nations, 2008). The majority of people stated they do run out of food during winter. This decreases resilience and increases risk to cold weather by having a direct negative impact on health and well-being. It has been stated many times that as road passes close in winter, the price for food increases, and sometimes food products become unavailable altogether. This decreased resilience results in an increase in vulnerability.

Nearly half of respondents stated they rely on the sale of animals to purchase food when they run out. This presents a negative impact to livelihood, as well as increasing risk of the unknown regarding spring buy-back prices for livestock. Remittances from Russia were also mentioned by several people, and this will be discussed in more detail shortly. For residents who rely on savings to secure winter food supplies, this depletes their means to secure other necessary living products, thus increasing risk of the unknown, and increasing vulnerability. There is also a sizeable portion of the population who either does not know where they will get work, or who rely on God to provide for them; this presents a high degree of uncertainty about the security of their well-being, and

must act to increase vulnerability to prolonged cold. All respondents stated they properly install and maintain their ovens annually, thus decreasing vulnerability through good mitigation practice.

There were mentions by several respondents of disruptions to the potable water supply as a result of cold weather. Responses by the village leader, coupled with field observations, indicate the potable water infrastructure of Navobod to be in severe disrepair, and highly prone to the effects of prolonged cold weather in the form of frequent freezing of water pipes. This is of particular concern in areas of pipe exposure. Another issue facing the water supply is the irregularity of the electricity. With daily electricity cut-offs in the winter period, the variable nature of water pressure causes damage to water pipes, further making this vital piece of infrastructure prone to failure (Negi and Joshi, 2002).

Most respondents heat fewer rooms in their home than they have, while almost all heat two rooms or less. This presents a higher risk of infectious disease or virus transmission, and acts to increase vulnerability to prolonged cold. Disease outbreak attributable to crowding for heating purposes was noted by Kelly, 2009 and the United Nations, 2008, in regards to the winter of 2007/2008 (Kelly 2009; United Nations, 2008). Health problems associated with prolonged cold were also noted with the 2005 Kashmir earthquake, whereby degraded infrastructure and prolonged exposure to cold temperatures compounded the already catastrophic disaster (Moszynski, 2005). Transmission of communicable disease was also noted with the 1990 earthquake in Roodbar, Iran, and with the 2004 Bam earthquake. Here, large numbers of people placed into temporary, crowded shelter conditions, coupled with inadequate sanitation and waste

systems, created a situation whereby communicable disease transmission became rampant (Jafari, 2007). This presents a high increase in vulnerability, not only when the spread of infectious, communicable disease is considered by itself, but also when coupled with the degraded state of health and medical infrastructure in place.

The road infrastructure is a topic which arose not only when asked about exclusively, but also independently with the asking of several other questions. The overwhelming majority of respondents hold the opinion that road blockage in wintertime has a profound impact on food prices, with lack of products also mentioned. This greatly increases vulnerability to prolonged cold by degrading both the social fabric as well as livelihood at the household level (Kelly, 2013). This also introduces a large component of risk of the unknown, whereby it is often unknown the degree or duration of road blockage in winter. The already degraded state of the road infrastructure is mentioned throughout many pieces of literature specific to Tajikistan (Open Society Institute, 1998; United Nations, 1996). There are many mountain communities near Navobod which are not accessible during winter, and Navobod itself can be cut-off for weeks at a time (Gleason, 2001; Bravo, 2002; Vajda et al., 2012). The road network is a continuous source of access issues, and is a continuous cycle of infrastructure degradation following the end of the Soviet Union (Moszynski, 2005). This is confirmed by the GIS analysis discussed shortly. The border to Uzbekistan is oftentimes closed, furthering Navobod's winter isolation, as well as its economic isolation in the form of a lack of means to sell products for cash. This has been cited in literature, as well as with several respondents, as being a continuous cycle of events (Laldjebaev, 2010). This not only decreases resilience and livelihood means, it degrades social fabric and increases risk of the

unknown; all of these factors increase Navobod's vulnerability to prolonged cold (Bravo, 2002). The reliance on remittances from migrant workers, almost all of which in Russia, is a source of risk, as well as decreased resilience. This presents a situation whereby many households are basing their mitigation and livelihood strategies around a migrant worker situation which is neither reliable nor sufficient to meet the needs of an impoverished Tajikistan (Olimova, 2007; Kumo, 2011).

Insofar as changes since the end of the Soviet Union are concerned, there are a number of ways in which Navobod is more vulnerable to prolonged cold now. There is a clear trend in stating the prices for products are no longer fixed, as well as the fact that salaries are no longer fixed, stable, or reliable. This presents a substantial degree of uncertainty, as well as having drastic effects on both social fabric and livelihood. Food, fuel, and fodder materials were supplied during Soviet times, though now these items are very scarce and require much more contribution by the general population. Electricity cut-offs were all but non-existent in the Soviet Union, but now they are a fact of life, with some cut-offs being total in rural areas when winter conditions are extreme (United Nations, 2008; Laldjebaev, 2010). Although Tajikistan had, at one point, the highest per-capita rate of hydroelectricity generation in the world, poor management and policies have meant that Tajikistan is still hydroelectrically deficient, and the water supply for hydroelectricity could continue to dwindle with global climate change expected to increase temperatures across Central Asia (Gleason, 2001; Fritzsche, 2011).

The social science data for the 7 Lakes district villages, while far less than that for Navobod, preliminarily indicates increased vulnerability to extreme cold with increasing elevation and distance from Penjikent. The more rural and remote, higher elevation

villages seem to receive no weather forecast information. There is very little arable land for agriculture. Biofuel acquisition has left the hillside land heavily degraded from overuse. Access to medical and school facilities is far more difficult for these villages than for residents of Navobod. The road infrastructure is in extremely poor condition, making vehicle travel dangerous, particularly in winter. Further research is required for more conclusive information about livelihood and vulnerability in these communities.

The model of vulnerability discussed by Cutter (1996) discusses the intersection and interaction of social and geographic components (Cutter, 1996). Geographically, Navobod is at over 1,000m above MSL. This increases likelihood of experiencing extremely cold temperatures during winter, for prolonged periods. Navobod itself is serviced by a road that is designated as Category 3, Classification 3 – mixed gravel and broken pavement, although it is accessed through Category 2 roads from Dushanbe which are in direct proximity to hazardous zones, being prone to both avalanche and ice conditions due to elevations above 2,500m in some places. This confirms what many respondents state about avalanche- and ice-induced road closures during winter.

Slopes of between 30 and 45 degrees are known to be most prone to avalanche formation (Smith, 2009). Ten percent of the road network between Dushanbe and Penjikent, through to the 7-Lakes District is prone to avalanche under the conditions of rule-setting and GIS analysis utilized here; this percent would be far higher if considering only the road segment between Dushanbe and Navobod. This increases the hazard risk, as well as degrades the geographic space through which several other non-spatial components are filtered, thereby increasing Navobod's vulnerability to prolonged cold.

CHAPTER VII

CONCLUSION

There can be little doubt that Navobod, as with many rural mountainous communities like it across Tajikistan, is highly vulnerable to the effects of prolonged cold on the human body. The international community must ask itself, however, two questions. First, what are the true sources of this vulnerability? Second, what is the best approach to decrease vulnerability moving forward? While many Tajiks, as well as international observers, might think at face value that the Soviet Union provided sustainable, highly resilient means for coping with prolonged cold, it likely caused catastrophic, unforeseen consequences relating to vulnerability.

Vulnerability is too often thought of as a static, immobile box. In reality, the scientific community must embrace a more temporally-aware model of vulnerability, whereby many, if not all, socially-driven components have temporal scales, thereby allowing vulnerability to act more as a “moving window”. To consider the impact of the Soviet Union during Soviet times, as well as its implications post-USSR, the Soviet system provided for virtually all of its population, forced massive amounts of inner-migration within Tajikistan, and redeveloped land use policies across the country. By providing all necessary materials for the population, the Soviet system likely decreased resilience on a national scale by denying Tajiks the knowledge, skills, and means to provide for themselves. By adopting the “do-for” mentality, whereby Russian

agricultural specialists were sent to Tajikistan to dictate land use, rather than engaging and empowering the population with the indigenous technical knowledge and skills necessary to self-manage land in a sustainable manner, the Soviet Union has left a population in Tajikistan that now has neither the means nor the knowledge to care for itself in a responsible, sustainable manner (Bayliss-Smith, 1991; Sen et al., 2002).

The residents of Navobod are largely without sufficient weather forecast information in which they rely. They widely exhibit a pattern of unsustainable biofuel collection and use, which is likely causing severe to catastrophic land degradation. While kitchen gardens are widely used, only half of those surveyed stated they store food for winter consumption. The medical infrastructure, resources, and services available to the residents of this village are lackluster by western standards, and access to even these primitive services is further restricted during wintertime. Cold weather clearly has a detriment on the educational experience of school children. The school itself is not equipped to provide sufficient heating during winter, and while school administration staff state there is no interruption of student attendance due to cold weather, the responses of several households indicates otherwise.

For the most part, primary steps taken in autumn to prepare for winter include gathering of harvest, food and fodder products for household consumption, as well as fuel material for winter use. In fact, for many households preparation for winter almost occupies, to an extent, the remaining three seasons of the year. Most of the respondents stated they do, at times, run out of food in winter. A heavy reliance on remittances from family members working in Russia, an unstable and unsure income source, decreases the

resilience of these households to the impacts of cold weather. There is also a pattern of debt accumulation for the purchase of food.

It seems households take care to ensure all ovens and chimneys are properly installed and cleaned prior to each winter. There is a pattern of families living in dense conditions, due largely to their reduced capacity to heat their entire home. This is a favorable condition for the transmission of communicable viruses and diseases. The roads are a source of many problems for households in winter, among which are increased product prices, lack of access to basic health services and schools, and isolation of mountain villages. While responses did vary, it would seem many rural residents in Navobod feel as though things have gotten far worse since the end of the Soviet Union.

By diverting natural river pathways for mass cotton production, catastrophic-scale environmental catastrophe was seen in western Uzbekistan with the case of the Aral Sea. This also displaced hundreds of thousands, if not millions, of Tajiks from their homelands, creating regional and local tensions which were released upon independence from the USSR in 1991. Tajikistan's infrastructure became vastly integrated into the Soviet platform (Gleason, 2001). Tajikistan today sees its infrastructure continue to deteriorate, both in the form of buildings and hydroelectric dams, as well as roads. Tajikistan today is ever-reliant on loans and remittances for its economic survival, as well as its military forces to provide protection along the border with Afghanistan (Gleason, 2001).

Since the winter of 2007/08, it seems a number of livelihood practices have changed, as well as policy changes at the schools taking effect. First, the Tajik Department of Education has moved all school holidays to the coldest part of the winter.

The primary and secondary schools in Navobod have also installed traditional ovens in each classroom; this practice, however, is likely having a negative impact on fuel supplies at the household level. Several respondents stated that winter supply collection, primarily in the form of food and biofuel, have changed since the winter of 2007/08. Medical facilities are now installing traditional ovens to provide heating, though patients still appear largely responsible for providing their own fuel.

In terms of underlying factors that increase vulnerability to prolonged cold in the Zeravshan Valley, it is appropriate to first look to food and biofuel supply, along with land use practices. There is largely an unsustainable practice of land use, particularly with the constant trimming of orchard and wild vegetation for use as biofuel without any comprehensive, village-level reforestation policy or practice. The road infrastructure is causing problems, both in terms of prices, as well as with access. There is a high reliance on remittances from workers in Russia, which is a highly unreliable source of income. The continued pattern of dense living presents an ongoing likelihood of communicable disease transfer.

The GIS largely supports interview responses related to road closures and road condition. Large segments of the road from Dushanbe to Penjikent are either prone to avalanche, likely experience prolonged winter icing conditions, or are in poor structural shape. Often two or more of these factors occur in conjunction with one another.

The way forward, providing Tajikistan and other rural, impoverished mountainous regions like it, with the knowledge, means, and infrastructure to look after itself will not be an easy one, nor will it be a strictly one-discipline approach. It will require a multi-disciplinary approach, utilizing geographers, geologists, economists,

horticulturalists, and many other disciplinary practitioners to actively engage the local population, so as to empower them to become more self-sustaining, on a sustainable basis.

CHAPTER VIII

PROJECT LIMITATIONS; RECOMMENDATIONS

8.1 Project Limitations

Demographics were considered for sample selection, however due to the lack of demographic data for Navobod, a random sample was not attainable. The sampling method was mostly in the form of convenience sampling, as well as snowball sampling. This does not allow for a random sample, and thus excludes many available statistical tests.

One of the most substantial limitations to this research project was that females were heavily underrepresented in the sample. This was mostly due to the conservative Islamic culture of the remote mountainous communities in Tajikistan. Another factor leading to this was the fact that the field data collection was performed during the harvest season.

The road acquisition method for this project was with the use of a Garmin handheld NDGPS device. The primary issue with this is that small portions of the road network were potentially prone to the effects of mountain canyoning, whereby high mountains on either side of the road could potentially cause loss of signal for satellites low on the horizon. However, it is unlikely this had a substantial impact on the overall GIS component.

With the slope GIS analysis, only gridded slope values between [30-45] degrees were intersected with the road network. No buffering was conducted, therefore it is possible, albeit likely, that even a greater percentage of the road network servicing Navobod and Penjikent from Dushanbe is prone to avalanche formation that what the analysis in this project shows.

8.2 Recommendations

Rural mountainous communities in Tajikistan need the capacity to build livelihood strategies more independent of the national government, incorporating more local knowledge, and using more sustainable methods (Sen et al., 2002; Pandey and Misnikov, 2001). As Tajikistan continues to improve its human development situation, policies at both the national and local levels must be based around local knowledge and sustainable land use practices, as well as empowerment for citizens regarding means of livelihood and improved human development (Pirta and Singh, 2001); Pandey and Misnikov, 2001).

Tajikistan must begin to make better use of its vast water resources by way of hydropower as a means for sustainable, dependable nationwide energy (Pokharel, 2001). Regular interruptions to the supply of electricity, particularly during winter, greatly increases the vulnerability to prolonged periods of cold weather for rural mountainous communities across Tajikistan, as well as causing serious damage to water pipeline infrastructure.

Likely the most important recommendation as a result of this project is for the empowerment of women in Tajikistan. With steady emigration of Tajik men to join a migrant labor workforce of over a million men in Russia, increasing levels of pressure are

being placed on women at the household level; yet, they are not being given the capacity to fulfill their increasing responsibilities. They require skills enhancement and training. They need to have better access to land ownership, markets, and positions within their communities (Bravo, 2002). Improvement of the road network and infrastructure is another vital component of improved livelihoods of rural Tajik communities. Improved roads increases market access, as well as access to medical facilities and education for Tajik's most vulnerable - children, elderly, and women (Bravo, 2002; Pandey and Misnikov, 2001).

Further research is needed to determine whether primary causes of high infant and maternal mortality rates in Tajikistan are due to extreme cold weather. Research is needed in more remote mountain villages in Tajikistan to determine vulnerability in these villages. Further GIS analysis is needed across Tajikistan, and across Central Asia, to identify more determinants of vulnerability for these impoverished people.

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APPENDIX A
INTERVIEW QUESTIONS

A.1 Household

1. What are your sources of weather forecast information?
2. How much confidence do you have in this information?
3. How does your access to this information change in wintertime?
4. What fuels do you collect for winter, and what is their source?
5. Do you have a kitchen garden, and if so what role does this play in winter preparation?
6. How does your access to hospitals and doctors change during winter or extreme cold, and what's the condition of the hospital in wintertime?
7. What is your children's school attendance like in winter compared to the rest of the year, and what are the conditions of the school in wintertime?
8. What steps do you take in autumn to prepare for winter ,and what activities do you take to reduce fuel use?
9. Do you have a food storage facility?
10. Do you run out of food in wintertime, and if so where do you buy food from?
11. Do you install your oven(s) properly and clean the chimney(s)?
12. How many rooms do you have in your house, and how many rooms do you heat?
13. In wintertime, how do the roads personally affect you?
14. How have things changed at home during winter since the end of Soviet Union?
15. [Open Discussion]

A.2 School

1. What are the sources of weather forecast information at school?
2. How much confidence do you have in this information?
3. How does the access to this information change in wintertime?
4. What sources of fuel are used at the school for heating in winter?
5. How often does the school close due to cold weather?
6. At school, what is done to prepare for winter, and is anything done to reduce fuel use?
7. Is there a community gathering center for decision making, and if so where is it?
8. How many of your students experience interruption of education because of cold weather?
9. How have things changed at the school during wintertime since the winter of 2007-2008?
10. How have things changed at the school during wintertime since the end of the Soviet Union?
11. [Open Discussion]

A.3 Doctor

1. As the village doctor, do you bring any fuels with you for heating, or does the household always provide that?
2. How does your access to medical supplies change during winter?
3. As a doctor, what steps do you take in autumn to prepare for winter?
4. As a doctor, how have things changed during winter since the end of the Soviet Union?
5. Are there any other problems you have during winter months?
6. When you must take patients to Penjikent for treatment, how does access to getting them to Penjikent change during winter; also, what is the condition of the hospital there?
7. [Open Discussion]

A.4 Village Leader

1. What are your sources of weather forecast information?
2. How much confidence do you have in this information?
3. How does your access to this information change in winter?
4. What are the primary sources of fuel used in Navobod?
5. What are electricity supplies in the winter compared to the rest of the year?
6. How frequently are the basic services and facilities such as hospitals, schools, water, and electricity interrupted due to extreme cold?
7. Is there communication between other villages around this area, in the Zeravshan River Valley, during wintertime or extreme cold outbreaks, and if so in what forms are these communications?
8. Is there a community gathering center or decision making center for the village, and if so where is it?
9. How much support do you receive from Dushanbe for dealing with extreme cold weather ,and in what form(s) is it?
10. How have things changed with regards to dealing with extremely cold weather in this village since the winter of 2007-2008?
11. How have things changed in this village during wintertime and during very cold weather since the end of the Soviet Union?
12. What types of infrastructure, resources, etc. do you have in place for very cold weather, and what type of budget is available for this?
13. With all issues in this village, where does extreme cold rank among all others?
14. [Open Discussion]

APPENDIX B
ROAD CATEGORY/CLASSIFICATION RULESET

The road categories and classifications are based upon a rule set, which has properties relating to, in specific priority:

1. Travel frequency of route
2. Physical condition of road
3. Proximity to hazardous zone

Road Categories are as follows:

Category 1: 2- or 4-lane highway. Very frequently travelled route. Fully paved, fully marked, primary route, well navigable by western standards. Not in direct proximity to hazardous zone.

Category 2: Same as Category 1, except with slightly less travel frequency, and in direct proximity to hazardous zone.

Category 3: 1- or 2-lane road. Travel frequency reduced from Category 2. Proximity to hazardous zone can vary. Physical road condition can vary, and Category 2 roads can be one of several classifications:

Category 3 Classification 1: Broken Pavement

Category 3 Classification 2: Gravel

Category 3 Classification 3: Intermittent Gravel and Broken Pavement

Category 4: 1-lane road. Travel frequency greatly reduced from Category 3. Almost permanently within direct proximity to hazardous zone. Physical road condition poor by western standards, navigable by 4WD, dangerous in icy conditions.

Category 5: 1-lane road. Travel frequency by vehicle nearly negligible. Physical condition of road severe, capable of causing catastrophic damage to vehicle,

with exposed rock within road bed; highly susceptible to rock fall, avalanche, other forms of mass movement; navigation by foot poses potential danger; poses serious threat of isolation in event of vehicle breakdown, and consequences of sliding off of road potentially deadly. Contained almost entirely within highly hazardous zone.

APPENDIX C
FIELD PHOTOGRAPHS

C.1 Fuels



Figure C.1 Stacked branches



Figure C.2 Stacked wood



Figure C.3 Sunflower buds



Figure C.4 Trimmed branches



Figure C.5 Drying cow dung



Figure C.6 Drying sunflower buds

C.2 School Heating Systems



Figure C.7 Secondary school Soviet heating system in disrepair



Figure C.8 Secondary school Soviet heating system dysfunctional



Figure C.9 Secondary school Soviet heating system broken



Figure C.10 Secondary school Soviet heating system broken



Figure C.11 Building housing secondary school heating system, in disrepair



Figure C.12 Building housing primary school heating system, in disrepair



Figure C.13 Primary school Soviet heating system in disrepair



Figure C.14 Primary school Soviet heating system in disrepair

C.3 Road Category/Classification



Figure C.15 Category 1 – 4-Lane Highway



Figure C.16 Category 1 – 2-Lane Highway



Figure C.17 Category 2 – Direct Proximity to Hazard Zone



Figure C.18 Category 3 Classification 1 – Broken Pavement



Figure C.19 Category 3 Classification 2 – Gravel



Figure C.20 Category 3 Classification 3 – Intermittent Gravel and Broken Pavement



Figure C.21 Category 4 – 1-Lane Road; Travel frequency greatly reduced from Category 3



Figure C.22 Category 4 – 1-Lane road; Travel frequency greatly reduced from Category 3



Figure C.23 Category 5 – 1-Lane road; Travel by vehicle nearly negligible



Figure C.24 Category 5 – 1-Lane road; Travel by vehicle nearly negligible



Figure C.25 Category 5 – 1-Lane road; Travel by vehicle nearly negligible



Figure C.26 Category 5 – 1-Lane road; Travel by vehicle nearly negligible

C.4 Field Photos



Figure C.27 Private land plot



Figure C.28 Drying fruit harvest on roof



Figure C.29 Orchard, with Zeravshan Mountains in backdrop



Figure C.30 Orchard harvest

C.5 Private House Photos



Figure C.31 External view of house built to high standards in Navobod



Figure C.32 Oven for cooking bread



Figure C.33 Kitchen garden



Figure C.34 Home oven



Figure C.35 Oven for heating two rooms



Figure C.36 Livestock at home

C.6 7-Lakes Housing



Figure C.37 7-Lakes District housing



Figure C.38 7-Lakes District housing

APPENDIX D
IRB APPROVAL FORM

The country of Tajikistan is under rule of a totalitarian 'President'. In order to further protect the identity of I will obtain oral consent rather than signature consent. I will read out the following statement, and provide the following information, and have it also translated to them in Tajik Persian:

{{

{ My name is Bryce Touchstone. My translator's name is Mustakim Akhmedov. We are conducting social science research related to vulnerabilities to, and management methods for extreme cold in rural villages in the Zeravshan River Valley of Tajikistan. If you participate in this research, you will be asked a short series of questions, such as "Describe your sources of weather/forecast information.". Once you answer these questions, we will hold an open-ended discussion about emergency management methods, in which you may take as much or as little time discussing this topic as you like. }

Questions

If you have any questions about this research project, please feel free to contact Bryce Touchstone at +61 0419 142 562.

My faculty advisor is Dr. Kathleen Sherman-Morris; +1 662 325 1032(x242)

Voluntary Participation

Please understand that your participation is voluntary. Your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation at any time without penalty or loss of benefits. Your identity will remain, at all times, completely confidential. Your identity will, in no circumstance, for no reason, be disclosed to anybody aside from myself.

Please take all the time you need to think about this and decide whether you would like to participate in this research study. Your verbal agreement to participate in this study will be kept completely confidential.

If, at any time after this research is concluded, you do not wish to be included in the results of this research, you may contact me or my advisor.

Myself: Bryce Touchstone; rbb52@msstate.edu

Advisor: Dr. Kathleen Sherman-Morris; kms5@geosci.msstate.edu

If you decide to participate, your completion of the interviews indicates your consent.

}}

Their responses will be recorded digitally, and all records deleted upon completion of my project. I lived in this country for months. My wife and I actually spent a short period of time in this very part of the country as well. My first priority is the protection of their identities. Should their identities be found out, I realize it is primarily them who would have to deal with the potential consequences long after I am gone, so I will take this very seriously.

MSU IRB
Approved: 8/24/12
Expires: -/-/-

Households

Describe your sources of weather/forecast information.

Маълумоти обу ҳаво ва пешгӯӣ ҳаво аз кучо дарёфт мекунед? Манобеъи чуvin маълумотро шарҳ диҳед.

Do you collect fuels with other families?

Сӯзишворӣ бо хонводаҳои дигар чамъоварӣ мекунед?

Do you share fuels and supplies with other families?

Сӯзишворӣ ва хӯрокворӣ бо хонводаҳои дигар ба таври муштарак истифода мекунед?

Do you have a kitchen garden? If so, what role does it play before and during winter?

Шумо боғи сабзавоткорӣ доред? Агар доред, ни боғи сабзавоткорӣ қабл аз ва дар фасли зимистон чӣ нақш мебозад?

How does your access to medical facilities change during extremely cold weather?

Ҳавои хеле сард дар зимистон чӣ таъсироте бар дастрасӣ ба хадамоти тиббӣ мегузорад?

Describe your childrens' school attendance in winter.

ба мактаб рафтани фарзандони шумо дар зимистонро шарҳ диҳед.

What steps do you take in autumn to prepare for winter?

Барои омодагӣ ба зимистон чӣ чораҳои дар фасли тирамоҳ мекунед?

How often do you run out of food in winter?

Дар фасли зимистон, чанд бор аз камбудӣ озӯқаворӣ рӯ ба рӯ мешавед?

Is there crowding in homes during significant events? If so, typically how many families?

Хонаҳо ҳангоми рӯйдодҳои муҳим пуропур мешаванд? Агар ин ҳел аст, маъмулан чанд хонавода чамъ мешаванд?

Is there venting for interior heating? If so, in what form and in how many rooms?

Хонаи шумо бо қубурҳои гармдиҳӣ орошта ҳаст? Агар ҳаст, дар чӣ шакл аст ва дар чанд хуҷра аст?

Do you have "one warm room" in your home?

Дар хонатон "як хуҷраи гарм" доред?

Hospitals

Describe your sources of weather/forecast information.

Маълумоти обу ҳаво ва пешгӯӣ ҳаво аз кучо дарёфт мекунед? Манобеъи чуvin маълумотро шарҳ диҳед.

What sources of fuel do you use?

Аз чӣ манбаъҳои сӯзишворӣ истифода мекунед?

How does electricity supply change during extremely cold weather?

Таъминоти барқ дар сармои шадид чӣ гуна иваз мешавад?

How frequently do you close during extremely cold weather in winter?

Беморхонаро дар патячая сармои шадид чанд бор мекунед?

What steps do you take in autumn to prepare for winter?

Барои омодагӣ ба зимистон чӣ чораҳои дар фасли тирамоҳ мекунед?

MSU IRB
Approved: 8/24/12

Is there a community gathering center? If so where?

Маркази умумӣ барои гирд омадани мардум вучуд дорад? Агар дорад, кучост?

How many of your patients experience interruption of medical care due to extreme cold?

Аз сабаби сармои шадид, чанд аз беморони шумо бо қатъи нигоҳубинии тибби рӯ ба рӯ мешаванд?

How have things changed in regards to dealing with extreme cold since the winter of 2007/08?

Баъд аз зимистони соли 2007/08, чӣ тағйироте дар вазъияти омодагӣ ба сармои шадид шудааст?

Schools

Describe your sources of weather/forecast information.

Маълумоти обу ҳаво ва пешгӯӣ ҳаво аз кучо дарёфт мекунед? Манобеъи чунин маълумотро шарҳ диҳед.

What sources of fuel do you use?

Аз чӣ манбаъҳои сӯзишворӣ истифода мекунед?

What is your electricity supply like in winter compared to the rest of the year?

Дар муқоиса бо фаслҳои дигар, таъминоти барқ дар зимистон чӣ гуна мешавад?

How frequently must you close due to cold weather?

Мақтабро дар натиҷаи сармои шадид дар зимистон чанд бор мебандед?

What steps do you take in autumn to prepare for winter?

Барои омодагӣ ба зимистон чӣ чораҳои дар фасли тирамоҳ мебинед?

Is there a community gathering center? If so where?

Маркази умумӣ барои гирд омадани мардум вучуд дорад? Агар дорад, кучост?

How many of your students experience interruption of education due to extreme cold?

Чанд аз шогирдони шумо аз сабаби сармои шадид дар зимистон ба мактаб намеоянд?

How have things changed in regards to dealing with extreme cold since the winter of 2007/08?

Баъд аз зимистони соли 2007/08, чӣ тағйироте дар вазъияти омодагӣ ба сармои шадид шудааст?

Village Elders/Community Leaders

Describe your sources of weather/forecast information.

Маълумоти обу ҳаво ва пешгӯӣ ҳаво аз кучо дарёфт мекунед? Манобеъи чунин маълумотро шарҳ диҳед.

What are the primary sources of fuel used in Khorog?

Дар Хуруг, аз чӣ манбаъҳои сӯзишворӣ истифода мешавад?

What are electricity supplies like in winter compared to the rest of the year?

Дар муқоиса бо фаслҳои дигар, таъминоти барқ дар зимистон чӣ гуна мешавад?

How frequently are basic facilities/services (hospitals, schools, water, electricity) interrupted due to extreme cold?

Дар натиҷаи сармои шадид дар зимистон, чанд бор ҳадамоти асосӣ (беморхонаҳо, макотиб, об, барқ) қатъ мешавад?