WATER MANAGEMENT, LIVESTOCK AND THE OPIUM ECONOMY

Natural Resources Management, Farming Systems and Rural Livelihoods

Alan Roe

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About the Author

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About the Afghanistan Research and Evaluation Unit (AREU)

The Afghanistan Research and Evaluation Unit (AREU) is an independent research organisation headquartered in Kabul. AREU’s mission is to conduct high-quality research that informs and influences policy and practice. AREU also actively promotes a culture of research and learning by strengthening analytical capacity in Afghanistan and facilitating reflection and debate. Fundamental to AREU’s vision is that its work should improve Afghan lives.

AREU was established in 2002 by the assistance community working in Afghanistan. Its board of directors includes representatives from donors, the UN and other multilateral agencies, and NGOs. AREU has recently received funding from: the European Commission; the governments of Denmark (DANIDA), the United Kingdom (DFID), Switzerland (SDC), Norway and Sweden (SIDA); the United Nations High Commissioner for Refugees (UNHCR); the Government of Afghanistan’s Ministry of Agriculture, Irrigation and Livestock; the World Bank; UNICEF; the Aga Khan Foundation; and the United Nations Development Fund for Women (UNIFEM).
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Acronyms

ADB   Asian Development Bank
AREU  Afghanistan Research and Evaluation Unit
CDC   Community Development Council
CGIAR Consultative Group on International Agricultural Research
CSO   Central Statistics Office
EC    European Commission
FAO   Food and Agricultural Organisation of the UN
GAA   German Agro-Action
GOA   Government of Afghanistan
IWRM  Integrated Water Resources Management
KRBP  Kunduz River Basin Program
MAIL  Ministry of Agriculture, Irrigation and Livestock
MCN   Ministry of Counter Narcotics
MEW   Ministry of Energy and Water
MRRD  Ministry of Rural Rehabilitation and Development
NDF   National Development Framework
NGO   non-governmental organisation
NRVA  National Risk and Vulnerability Assessment
NSP   National Solidarity Programme
RBA   River Basin Authority
UN    United Nations
UNEP  United Nations Environmental Program
<table>
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<tr>
<td>UNDOC</td>
<td>United Nations Office for Drugs and Crime</td>
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<td>USAID</td>
<td>United States of Agency for International Development</td>
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<tr>
<td>WB</td>
<td>World Bank</td>
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<tr>
<td>WFP</td>
<td>World Food Program</td>
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<td>WOL</td>
<td>Applied Thematic Research into Water Management, Livestock and the Opium Economy</td>
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Glossary

abi  irrigated land
arbab  village or community leader
band  dam
chakbashi  subordinate water master (see also kokbashi)
darya  river
gerawi  a type of mortgage that works as a pawn agreement
hashar  irrigation maintenance labour obligation
hawz  traditional accumulation and storage pool
jirga  convened meeting of elders or traditional leaders
juftgaw  a unit of irrigated land determined by the area a pair of oxen ploughing a day
karez  traditional underground canal system tapping subterranean water sources before surfacing to provide water for drinking or irrigation
khel  a Pashtun tribal division
kokbashi  subordinate water master (see also chakbashi)
Kuchi  Afghan nomadic pastoralist
lalmi  rainfed land
maraha  commonly owned village pasture
mirab  water bailiff
mirabbashi  senior water master (see also wakil)
paw-ab-daqiqa  local measure describing water allocation per minute
paikal  local unit for allocating irrigation water
shab-wa-roz  literally “night and day,” the traditional system of irrigation
**mardi kar** rotation based upon allocations out of a 24 hour flow

**shafa** a Shari’a requirement creating rights of first refusal to land, held first by relatives and then by neighbours

**shaftal** a species of vetch, reported in Ghazni

**shamlit** believed to be Fenugreek

**shura** local council or traditional assembly of elders

**talkhak** unidentified drought-tolerant crop

**wakil** senior water master (see also mirabbashi)

**Technical Terms, Abbreviations and Units**

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<th>Term</th>
<th>Definition</th>
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<tr>
<td>ANOVA</td>
<td>Analysis Of Variance</td>
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<tr>
<td>FSR</td>
<td>Farming Systems Research</td>
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<tr>
<td>GDP</td>
<td>gross domestic product</td>
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<tr>
<td>ha</td>
<td>hectare</td>
</tr>
<tr>
<td>Mt</td>
<td>metric tonne</td>
</tr>
<tr>
<td>PPS</td>
<td>Probability Proportional to Size</td>
</tr>
<tr>
<td>TA</td>
<td>technical assistance</td>
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<tr>
<td>VFU</td>
<td>Veterinary Field Unit</td>
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Executive Summary

This paper synthesises the preliminary findings, conclusions and recommendations emerging from the first year of AREU’s study, “Applied Thematic Research into Water Management, Livestock and the Opium Economy” (abbreviated to WOL). Funding for the project was provided by the European Commission.

Agriculture has traditionally occupied a central position in the Afghan economy, and a high proportion of rural Afghans have historically depended on agriculture for their livelihoods. After years of disruption due to intermittent conflict, drought and population movements, there were high expectations that agriculture would return to its former primacy following the establishment of the Transitional Islamic State of Afghanistan in 2001.

Continuing problems with agriculture (and rural society and economy, more widely) have been associated with a rapid growth of the illicit opium economy. By 2005 this was estimated to account for 46 percent of GDP and engage 12 percent of the rural population. The large scale of the problem has made the search for alternative livelihoods an integral component of rural planning and policy formulation. Key directions for agricultural policy have been set out in the Agriculture Master Plan. The plan emphasises liberalisation of the agricultural economy and seeks to promote growth in the sector through the creation of value chains. The Master Plan links food and livelihood security to thriving agro-industries and rural employment markets.

Against this background of strategising by the Government of Afghanistan and its international partners, AREU has carried out research investigating farmers’ decision-making processes and farming systems in rural Afghanistan. Specifically, the research focuses upon farmer access to key natural resources and how this access shapes both agricultural production and livelihood decision-making. This research will generate clear, evidence-based recommendations for determining systems and identifying opportunities for – and constraints upon – agricultural development.

WOL research conceptualises farming systems and rural livelihoods holistically within a wider context of agro-ecological conditions, access to natural resources, and the function of markets and other rural institutions. WOL further recognises that farmers may make tradeoffs among multiple and complex farming objectives. To capture some of the diversity inherent in Afghan farming systems, the first year of WOL research was undertaken in eight provinces at the household level of diverse communities, including sedentary cultivators, agropastoralists, nomadic pastoralists, sharecroppers and agricultural labourers. Key first-year thematic findings of the WOL project are detailed below.

Land access and tenure

Few, if any, farmers in Afghanistan hold official titles to the land they occupy. Consequently, nearly all transactions and adjudications occur within the customary local system, and farmers access land under diverse forms of tenure that have different associated terms and levels of risk. WOL research indicates between a quarter and a third of all cultivated land at research sites is managed under some form of temporary use agreement (subordinate land rights).

Fragmentation of private land holdings and growing pressure on land resources everywhere means markets for land are largely stiﬂed. However, significant differences in mean land holdings exist under different systems of production. At some research sites, per capita land holdings are clearly insufficient to sustain livelihoods under licit cropping without supplementary incomes.

Common property land resources are of particular value to the resource poor. While disputes over these resources are less common than those over private land, they more frequently involve actors “external” to customary management systems.
Consequently, such disputes are not so easily addressed by informal institutions.

**Irrigation water management**

Although surface water is usually managed as a common property resource, groundwater from wells and karez is more commonly managed as private property, beyond community sanctions. This can lead to unregulated extraction at the expense of other irrigators and water users and may exacerbate socioeconomic inequalities.

The effectiveness of surface water irrigation is related to three major factors besides source. These are: the hydraulic performance and structural attributes of the conveyance system; the location of the farm site; and how water allocation is being managed locally through institutional arrangements.

While the general principles of water management are similar across Afghanistan, there exists considerable regional variation in practices, reflecting specific cultures and resources conditions. Large and complex lower-catchment irrigation systems appear most susceptible to structural and social inequalities in water allocation. The mirab water management system, found widely in these lower catchments, is not always sufficiently resourced to redress inequities; it may indeed simply institutionalise local power relations.

The supply of irrigation water appears to directly impact on-farm diversification, food security, entry into agricultural markets and prospects for sustainable licit livelihoods. Furthermore, inequitable irrigation management places excessive labour demands on the most vulnerable.

**Livestock management**

Livestock can perform a range of different functions within farming systems and livelihoods, depending upon farmers’ choices, available resources and production conditions. Small numbers of animals can be effectively integrated into irrigated cropping systems, bringing the benefits of diversification. Under high-risk rainfed conditions, the herding of sheep and goats forms a complementary and potentially value-adding activity.

The management of sheep and goats for market supply seems dependent on access to natural pastures and rangelands. This is particularly true for nomadic pastoralism, although all systems of production ultimately depend on access to cultivated or purchased winter fodder.

It was found that, overwhelmingly, farmers attempt to minimise livestock production costs and thus animals rarely achieve full productive potential. The entry costs and risks of investing in livestock for income generation and capital growth restrict this activity to wealthier farmers or specialised herders. Furthermore, livestock extension and healthcare services seem to be concentrated in locations where animals are usually managed for subsistence rather than market values. Management for market supply is usually practiced in rangeland communities where livestock support services appear under-represented.

**Opium Cultivation**

Opium represents a profitable high-value crop for a small number of wealthy landowners. But, for many households afflicted by severe resource scarcity, it constitutes the only crop that can sustain a farm-based livelihood given available resources. Movement into and out of opium cultivation can therefore involve a spectrum of “push” and “pull” factors. Indeed, there is no single reason or set of conditions that leads farmers to choose to cultivate a poppy crop. Farmers make their choices within a complex and changing management environment, and therefore it seems unlikely that any “one size fits all” strategy could reduce cultivation. Furthermore, patterns of cultivation are highly dynamic: not only may farmers shift into and out of the crop on an almost annual basis but also, when prevented in one area, opium cultivation may spread to another.

Findings further confirm that opium production is deeply embedded in the rural economy. Poppy commands preferential access to land, water credit and other resources, and opium production...
has a strong “multiplier” effect in terms of creating employment and off-farm opportunities.

Households with secure access to adequate agricultural resources, markets and off-farm incomes are best positioned to make a sustainable transition to licit livelihoods. By contrast, isolated communities facing resource scarcity and lacking access to markets or licit sources of off-farm income may not have credible options for constructing alternative livelihoods. Accordingly, enforced reductions in opium cultivation have disproportionately severe impact upon these poorest and most vulnerable.

Farming livelihoods

Afghan farmers appear to be dynamic and innovative in their farming choices and livelihood strategies. Households are constantly seeking new ways and better combinations of activities to achieve livelihood goals, mitigate risks and take advantage of available opportunities. WOL provides evidence that, as economic and production conditions and opportunities change, farmers change cropping and production strategies between one year and the next or that they move out of agriculture into waged employed (and vice versa). These diverse and dynamic strategies call into question the assumption that all rural Afghans are farmers and that strengthening agriculture should remain the principal conduit for building the rural economy.

The data indicates a strong subsistence orientation in irrigated farming, reflecting an aversion to risk in a high-risk production environment. Farmers commonly prioritise cultivating food crops sufficient to meet their household requirements and so achieve a degree of independence from markets. However, few households command the resources to achieve subsistence. Accordingly, it is usually necessary for them to generate cash incomes for additional purchases, either through the supplementary cultivation of a high-value crop, sale of livestock products, or off-farm waged labour. Most Afghan farmers practice a diversified composite strategy of this type.

Specialised production for market supply is uncommon among farmers involved in the study and is normally associated with high risks. It is sometimes practiced by wealthy farmers with sufficient resources, (natural, financial and social) to survive the failure of the crop itself or the collapse of markets. Only under these conditions do farmers appear confident to practice classical economic “maximising” behaviour. However, at the other extreme, households under conditions of severe resource scarcity may be “pushed” to produce high-value products for market if their resources cannot supply sufficient food to meet their requirements.

Finally, WOL data suggests that while spectrums of livelihood security and vulnerability exist across all forms of agricultural production, those dependent on rainfed agriculture are the most vulnerable of the categorised groups investigated. This was due to their remote locations, poor access to off-farm employment, low-crop diversity and high-risk agricultural practices. Nonetheless, findings suggest that nearly all the rural households studied face dietary deficiencies.

Key recommendations

Take measures to promote greater equity in natural resources access

There is a need to promote greater equity in access to natural and agricultural resources to help the resource poor participate in markets. There are important steps that the Government and other implementers can take to help facilitate this: foremost, existing legislation governing resource use should be enforced (e.g. prohibition of unlicensed extraction of groundwater as well as illegal seizure and cultivation of common lands). The governance capacity and accountability of informal institutions overseeing resource access should also be strengthened through training and empowerment of stakeholders. Project implementers should further try to ensure that interventions provide benefits to all stakeholders in a resource system, not only those with preferential access.
Recognise heterogeneity in planning with “smarter” programme interventions

WOL studies have described a diversity of opportunities and constraints related to agricultural production around the country. This reinforces the need for greater sensitivity to local conditions when planning interventions: planning needs to be better targeted and the nuances of agricultural and livelihood conditions at specific locations need to be better understood. For example, to help offset some of the risks faced by the resource poor, programmes aiming to stimulate production for market supply might consider offering them preferential access to key agricultural inputs (e.g. credit or fertilisers) or access to markets (including for off-farm labour).

Start building “value chains” where production already exists for market supply

Owing to the general unfamiliarity with (and lack of confidence in) markets, a strong recommendation arising from the research is to sequence the development of markets commencing with subsectors and locations where production is already predominantly for market supply. It may be difficult to foster confidence in markets for newly introduced products or ones which have not traditionally been marketed.

Recognise the values of non-market agricultural production

Policy emphasising production for market supply risks over looking some of the important functions of non-monetarised production. Particularly in remote locations and with poor access to markets, farm products can make important contributions to household well-being and the functions of the farming system. This is true in the long term, but also through shorter periods of crisis or for special needs. These functions can include bridging periods of cash scarcity, non-monetary transfers to service social networks, and maintaining livestock as stores of value.

Extend development initiatives into marginal, outlying districts

At present the main focus of infrastructural and rural development programmes is on the more accessible river valleys and lower catchments, where the majority of the rural population lives. However, WOL studies have demonstrated that outlying districts are often resource poor; so, it is possible that expanding programmes to these areas may have a proportionately higher impact. WOL research demonstrates that some types of initiatives (such as those concerning commercial livestock production) may actually be misdirected if restricted to the populous river valleys.

Provide for integrated rural development

These preliminary research findings indicate that sustainable licit agricultural livelihoods are most likely to emerge under conditions of secure tenure and access to natural resources, diversified agriculture with production for strong rural markets, and opportunities for ancillary off-farm labour. Local security, economic prosperity and good governance have all been demonstrated to contribute to this enabling environment. Accordingly, agricultural development policies will be most effective if implemented within a multisectoral convergence of interventions to foster thriving rural communities. This recommendation signals a need for continuing and improved coordination among line ministries, particularly at provincial level.

Standardise data collection

There is currently no standardised mechanism for the collection of data on which to base agricultural policy. Data that is collected comes unsystematically from diverse locations and different NGO and institutional sources; they derive from different measures and standards that hinder integration and comparison. The Government should take the lead to establish a systematic framework for data gathering, around which all institutions can then build their own data collection. The results of all future studies could then be integrated in a central database.
1. Introduction

This paper synthesises the main findings and conclusions emerging from the first year of AREU’s study, “Applied Thematic Research into Water Management, Livestock and the Opium Economy” (abbreviated to WOL). Funding for the project was provided by the European Commission.

The major objective of the WOL project is to enhance the sustainability of Afghan rural livelihoods and reduce dependency upon illicit crops by providing policymakers with clear and accurate information on the use, management and role of natural resources (with specific focus upon land, water, livestock and opium cultivated within the agricultural economy). The project is expected to generate evidence-based recommendations for improving the effectiveness of agricultural policy and rural programming.

The research adopts an integrated approach, viewing decisions about the use of individual resources and farming strategies as closely linked to the availability and management of other resources. This approach further recognises that farming (and rural livelihood) systems are embedded within complex and dynamic bio-physical, political and economic landscapes.

In order to sufficiently capture this complexity and achieve ambitious project objectives, very extensive (both longitudinally and spatially) data collection and fieldwork is being undertaken. Research will be ongoing for three years across several provinces. To facilitate this, AREU is working in direct cooperation with two NGO partner organisations,1 and in close collaboration with key Afghan stakeholder institutions including the Ministry of Agriculture, Irrigation and Livestock (MAIL), the Ministry of Rural Rehabilitation and Development (MRRD), the Ministry of Energy and Water (MEW), the Ministry of Counter Narcotics (MCN) and the Research Centre of Kabul University.2

This paper is structured in eight chapters that present the preliminary findings of WOL research clearly and sequentially. The first chapter begins with a background of the agricultural and natural resources sectors and highlights the institutional context from which this study arose. The second chapter introduces the theoretic approach and methodology used for the study. The subsequent four chapters present the principal research findings on land, water, livestock and opium, respectively. In the seventh chapter, the evidence of the previous chapters is drawn together to examine how rural livelihoods are constructed. The final chapter summarises the findings of the study and sets out preliminary recommendations for policymakers.

1 The WOL project consortium, led by AREU, also includes DACAAR (Danish Committee for Assistance to Afghan Refugees) and GAA (German Agro Action) as facilitating partners.

2 Project progress is overseen by a Review Committee that convenes quarterly. All Afghan institutional stakeholders are represented on this Committee.
2. Context and Objectives for Study

This chapter of the study begins by presenting a summary overview of the agricultural and natural resources sector at the time when the WOL project was conceptualised and initiated. This helps to set out the major issues and challenges which underlay the formulation of the project, its objectives and the approach taken in its implementation.

2.1 Sector background

Afghanistan is a rugged and mountainous country of about 65 million hectares (ha), of which only about 12 percent (8 million ha) is under cultivation. Just under half of all agricultural land is irrigated (Abi) and the remaining portion is rainfed (Lalmi), although these proportions fluctuate annually. However, owing to comparatively poor yields from un-irrigated lands, it is the irrigated portion that occupies the larger part of the rural population and accounts for almost 80% of total crop output. The most intensively settled and cultivated areas are therefore located on alluvial plains and in river valleys. Irrigation water supply in these valleys is seasonally linked to mountain snow melt (Afghanistan receives the majority of its precipitation as snow at higher elevations). Where conditions allow (in the warmer river valleys with sufficient irrigation water), biannual cropping is possible. A large diversity of crop types is cultivated in Afghanistan, both for market supply and domestic consumption.

Small areas of mountain forest remain in the highlands of eastern and south-eastern Afghanistan and approximately 45 percent of the national land area is categorised as “rangeland,” which supports the extensive production of livestock by both sedentary and nomadic herders. Historically, migratory pastoralists were the main producers of small ruminants and their products.

Traditionally, the agricultural sector has been the largest of the Afghan economy, with sales of dried fruits and nuts contributing some 40 percent of total export earnings in the late 1970s. Livestock and their products also made important contributions to national earnings at the same time. In 1978 Afghanistan was not only self sufficient in food but also a considerable exporter of agricultural products. However, episodic conflict and political instability following the Soviet invasion resulted in disruption to long-established natural resources management and agricultural systems. The impact of conflict and the extent of subsequent resource degradation continue to be debated, although it seems clear

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Table 1: Economically important crops in Afghanistan

<table>
<thead>
<tr>
<th>Cereal Crops</th>
<th>irrigated and rainfed wheat, maize, rainfed barley and rice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticultural Crops</td>
<td>apples, pomegranates, grapes, almonds, apricots, nuts and citrus</td>
</tr>
<tr>
<td>Pulses</td>
<td>mung bean, peas and peanuts</td>
</tr>
<tr>
<td>Forage</td>
<td>clover and alfalfa</td>
</tr>
<tr>
<td>Industrial Crops</td>
<td>cotton, sugar, beet, flax and Poppy</td>
</tr>
<tr>
<td>Vegetables</td>
<td>potato, carrot, onion, tomato and melon</td>
</tr>
</tbody>
</table>

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6 Sheep and goats, for the purposes of this paper.

7 ADB, “Natural Resources.”

8 FAO, “Afghanistan Agricultural Strategy.”
that a major contributing factor was the effective “collapse” of local and national mechanisms for environmental governance.\(^9\) Changes in natural resources management, agriculture and rural livelihoods during this period were complex, but it is apparent that rural communities demonstrated great resilience and adaptability.\(^10\)

Just as Afghanistan was emerging from this period of chronic instability under the newly installed Transitional Government, rural areas in the south and west of the country were stricken by severe drought that led to widespread drying of springs and wells, failure of crops and further abandonment of land. In vulnerable southern provinces, groundwater levels fell by 8-10 metres and only about a quarter of agricultural land could be cultivated.\(^11\) The livestock sector, heavily dependent upon pastures and natural rangelands for extensive livestock production, was hit particularly hard by these conditions. A schematic of the major elements in these changes is given in Figure 1.

While reports and assessments tend to simplify the combined impact of conflict and drought as “disastrous” for rural Afghanistan, an examination of existing data\(^12\) reveals a more nuanced picture.


\(^10\) For discussion of rural livelihoods responding to conditions of chronic conflict and instability in Afghanistan, see Pain and Lautze, “Addressing Livelihoods in Afghanistan” (Kabul: AREU, 2002).


\(^12\) There is very little accurate data available describing agriculture, livestock or human populations during the 1980's and 1990's. The CSO figures presented here should be regarded as indicative only.

\(^13\) FAO, “Afghanistan Agricultural Strategy.”

Data indicate that the area of irrigated cropping fell from over three million hectares in the mid-1970s to under two million by the mid 1990s. This has been attributed to the widespread exodus of farmers from their villages in some provinces during the Soviet occupation.\(^13\) By 2003, the area under irrigated cultivation had again increased, despite the drought conditions prevalent in some parts of the country, and was larger than it had been during the 1970s. Subsequently, irrigated cultivation has again decreased and currently stands at about three-quarters of the pre-conflict cultivated area.

Taking cereals (wheat, rice, barley and maize) as a broad indicator for food crops, data suggest that national cereal production has been relatively resilient through the period of conflict, generally maintaining production of over 3 million tonnes annually (about 75 percent of 1970s production) until the late 1990s. However, cereal production appears to have been very sensitive to the impact of the drought (1998-2002) and production fell by almost 50 percent. Following good seasonal rains an excellent harvest occurred in many parts of the country in 2005.

Sheep and goat populations have been more elastic. During the early years of conflict, small ruminant populations diminished by about a third. However, despite continuing conflict, over the next ten years they were able to recover close to their pre-war population. But during the years of drought that followed, sheep and goat numbers again fell precipitously. At last estimates, sheep and goat populations in Afghanistan are increasing but still have not regained their pre-war numbers. Also, lower-value goats (managed for domestic supply)
now constitute a much higher proportion of the national flock than formerly.14

By contrast, data suggest that, while the national cattle population fell sharply during the early years of conflict, it gradually re-established itself through the 1990s. This process of restocking was much less sensitive to the impact of drought than small ruminant or cereals production. The latest information (in figure 3) suggests that nationally, cattle numbers have now returned to about 75 percent of the pre-conflict population.

Overall the data, though unreliable, indicate complexity in how different parts of the agricultural economy have responded to the periods of localised and episodic conflict, drought and population displacement. While the area of cereals cultivated has only recently returned to pre-conflict levels, improvements in yield means that overall cereal production can now considerably exceed pre-conflict production. But neither the overall area of irrigated cultivation nor small ruminant production has yet recovered to pre-war levels. The same is also evident of some high-value horticultural crops such as almonds, walnuts and apricots and figs,15 with the consequence that important export-oriented products and the market chains which they historically supplied have been weakened.16

Indicative trends in the use of natural resources and agricultural productivity through recent decades need to be placed in the context of the population that these resources are supporting. Estimates suggest that since the later 1970s, the Afghan population has risen from 13 million to somewhere within the range of 24.5-29.5 million17 in 2007. It may therefore be conservatively assumed that over the last 30 years the internal Afghan population

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16 However, dried fruit and nut exports have increased considerably since 2001 and now constitute 22.5 percent of total export earnings (Central Statistics Office, “Afghanistan Statistical Yearbook.”).

has increased by some 70 percent. Against this background, trends within the agricultural sector are suggestive of important changes occurring in the rural economy.

First, there is growing evidence for the diversification of rural livelihoods away from dependence upon purely agricultural production, occurring either as coping strategies for the poor or accumulation strategies for the wealthy. Recent research has indicated that more than half of rural households studied were not grain self-sufficient, and a high proportion of the same group depended upon non-farm labour as their primary income source.18

Second, Afghanistan has become increasingly food deficient. Even in a good agricultural year such as 2005, the country still faced a 10 percent cereals deficit.19 As local production falls behind growing consumer demand, there are clear trends toward increasing imports of many domestically produced food types.

However, while some types of high-value agricultural production (e.g. vegetable cropping) have been adversely affected by years of political turmoil, institutional weakness, insecurity, and disruption of market chains, the illicit cultivation and marketing of opium poppy has thrived under these conditions.

Opium poppy has a long history of cultivation in Afghanistan20 and there is evidence of commercial production dating to the late nineteenth century.21 However, the systematic collection of data on poppy cultivation only commenced in the mid-1980s and these data indicate a steady increase in cultivation through the years of civil disturbance and conflict. By 2006, production of opium in Afghanistan had risen to an estimated 6,100 metric tonnes, accounting for 92 percent

| Table 2: Food imports to Afghanistan 2000-2005 ('000 $US dollars) |
|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                      | 2000                 | 2001                 | 2002                 | 2003                 | 2004                 | 2005                 |
| Wheat                | 5,533                | 17,700               | 96,008               | 47,529               | 49,119               | 8,5539               |
| Rice                 | 0                    | 0                    | 0                    | 17,480               | 18,005               | 29,096               |
| Beef                 | 0                    | 0                    | 0                    | 20                   | 2,023                | 5,049                |
| Milk powder          | 80                   | 482                  | 4,132                | 3,004                | 3,823                | 9,149                |

Source: Central Statistics Office

18 Jo Grace and Adam Pain, Rethinking Rural Livelihoods in Afghanistan (Kabul: AREU, 2004). This study encapsulated 390 households in 21 villages through 7 provinces.

See also Raphy Favre, “Agriculture in Afghanistan: Discussion of some key aspects of the rural economy and staple food production in Afghanistan” (FAO, 2002).

19 Food and Agriculture Organization of the United Nations, “Afghanistan’s Agricultural Prospects for the Year Ahead” (Kabul: MAIL, 2006).


of global illicit opium production. While the farming of opium poppy only accounts for about 3.5 percent of cultivated land area in Afghanistan, its economic impact is much higher. Opium exports to neighboring countries contribute 46 percent of total GDP. Furthermore, estimates suggest that over 12 percent of the Afghan population may now be in some way involved with opium cultivation.

At the time the WOL project commenced in 2005, the return of displaced people after years of conflict and drought was placing considerable strain on the use and management of limited agricultural land resources and exacerbating inequities. The erosion of customary land rights and breakdown of state mechanisms for land administration has meant that land tenure insecurity has become a seriously divisive issue in some rural communities. Collectively these problems have been associated with rural vulnerability and exploitative land relations, together with under-productivity. Data suggest that in many areas, farm plots alone may be too small to generate adequate household incomes.

With the last inventory of irrigated areas dating back to 1967, there was little clear information available on irrigation at the outset of the WOL project. While much of the pre-war irrigation infrastructure (both traditional and modern) has survived the intermittent periods of turmoil, most has been subject to periods of neglect and abandonment, and therefore its performance has been impaired. Perhaps more significantly, there is evidence that shifting rural power relations may have affected the operation of traditional water management institutions, impacting how water is distributed.

Evidence suggests that in 2005, despite some progress toward rehabilitation, irrigation efficiency was running at about 50 percent of its potential. Significantly, according to a 2003 national survey, lack of irrigation water constituted the greatest constraint on farming.

Review of available data on natural resources management (NRM), agricultural production, and rural livelihoods in the years since 2001 suggests

<table>
<thead>
<tr>
<th>Household Wealth Status</th>
<th>Mean Area of cultivated land (ha) per household</th>
<th>Mean distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Medium</td>
<td>Poor</td>
</tr>
<tr>
<td>Tenure Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>Leased</td>
<td>Max</td>
<td>Min</td>
</tr>
<tr>
<td>Total</td>
<td>Max</td>
<td>Min</td>
</tr>
</tbody>
</table>

Table 3: National patterns of landownership and access by wealth group

Source: NRVA 2003


23 UNODC, “Opium Survey.”

24 UNODC, “Opium Survey.”


28 National Surveillance System and Vulnerability Analysis Unit, National Risk and Vulnerability Assessment (Kabul: MRRD, 2003.) Almost a third of farmers (31 percent) cited lack of irrigation water as their principal constraint on productivity.
that problems may exist with the available data itself, making it difficult to accurately assess conditions nationally.

Nevertheless, while the exact parameters of change may remain unclear, the weight of evidence indicates that agricultural productivity has suffered from the combined impacts of conflict, drought and chronic institutional weakness in Afghanistan. When related to population growth over the same period, the relative decline of the agricultural sector raises issues for food security, labour markets and economic recovery. The rehabilitation of the agricultural and natural resources management sectors – historically the dominant economic sectors in Afghanistan\(^\text{29}\) and employing over half the workforce\(^\text{30}\) – has been identified as a major priority for the Afghan government in the interim Afghanistan National Development Strategy.\(^\text{31}\)

### 2.2 Institutional and policy background

The years of intermittent strife and struggle for political control in Afghanistan left state institutions severely weakened after the overthrow of the Taliban.\(^\text{32}\) With the signing of the Bonn Agreement in 2001, the Transitional Islamic State of Afghanistan was established. Thereafter, the international community committed to support the emergence of new government structures through its National Development Framework (NDF). Key institutions to be strengthened included the sector line Ministries: Ministry of Irrigation, Water Resources and the Environment (now MEW), the Ministry of Rural Rehabilitation and Development (MRRD), and the Ministry of Agriculture and Animal Husbandry (once MAAH, later renamed MAIL).

However, chronic weakness at both national and provincial levels meant that for the first years after the Bonn agreement, sector ministries were unable to respond effectively to the major challenges of the period, namely the planning and coordination of reconstruction and emergency drought relief.

During the first years of post-Taliban government, support to the natural resources and agricultural sector was primarily offered through diverse NGOs and international (UN) institutions. These responded to localised needs and emergencies through disparate and largely uncoordinated short-term project interventions\(^\text{33}\) (e.g. distributing seeds\(^\text{34}\)). During the same period, the line ministries, supported by consultants and international institutions, made some progress toward institutional reform and planning. After the completion of the NDF in 2002, the centre of gravity for sector coordination began to slowly shift back toward government. Priorities at the time the WOL project was established can be illustrated with reference to the 2004 NRM sector development budget, which had set out a strategy for funding nine national sub-programmes (see Table 4).

Given the prevailing political culture in Afghanistan and strong centralising tendency of government, donors and technical assistance (TA) missions pressed line ministries to move toward more cost-effective and efficient support services for agriculture and a decentralised institutional environment as set out in the NDF. In particular, drawing upon international experience, the NDF emphasised a “new public management” involving private sector leadership, civil society and community-based initiatives, to support the rehabilitation of the agricultural economy. Under this model, the government changes

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\(^{29}\) In 2005 licit agriculture was estimated to account for the largest share of GDP at 38 percent “CIA Factbook,” https://www.cia.gov/cia/publications/factbook/geos/af.html

\(^{30}\) FAO, “Afghanistan’s Agricultural Prospects.”


\(^{32}\) It has been argued that “crisis narratives” suggesting the Afghan state had “collapsed” in 2001 should be received with caution. Early attempts to impose institutional reform in the agricultural sector encountered stiff resistance in the form of institutional inertia and favouring well established structures and practices. Ian Christoplos, Out of Step? Agricultural Policy and Afghan Livelihood (Kabul: AREU, 2004).

\(^{33}\) The example from Water Resources Management is given by Nicolas Riviere, “Lesson Learning from the Transition between Relief and Development in Afghanistan” (Group URD, 2005).

\(^{34}\) For an examination of “emergency response” seed distribution and its impact, see Christoplos, “Out of Step?”
roles from implementer to facilitator. However, TA missions ran into considerable resistance as they sought to impose these approaches. Resistance came not only from government institutions, but also from many agricultural stakeholders who did not share the same confidence in the private sector to deliver, and expected a strong paternalistic state to provide for their needs.35

Post-2001, planning for the NRM sector has emphasised the need to clearly define the mandates and responsibilities of line ministries. However, with planners and advisors now promoting more integrated approaches to NRM, institutional reform has necessarily spanned ministerial portfolios. New coordination structures in the fields of agriculture, NRM and rural development have challenged ministries to find new and innovative ways of cooperating. An early product of cooperation was the drafting of the “Policy and Strategy Framework for the Rehabilitation and Development of Agriculture and Natural Resource Sector in Afghanistan” (2004), which was overseen by an inter-ministerial working group with representation from MAAH, MIWRE and MRRD. However, at the time the WOL project commenced in 2005, some of these experiments were meeting with mixed results.36

The most ambitious of the institutional reforms in the NRM sector was the establishment of Integrated Water Resources Management (IWRM) through the creation of River Basin Agencies (RBAs). While this strategy is rooted in the Strategic Policy Framework for the Water Sector,37 the concept calls for integrated planning for socio-economic development at the river basin scale for optimal and sustainable water and land resources. It is anticipated that a wide range of responsibilities for coordination, oversight and planning will be delegated to these RBAs once they are fully operational. The River Basin Approach was planned for implementation in the five main river basins of the country, namely the Kunduz river basin, the Balkh river basin, the Hari-Rud basin, the Helmand basin and Kabul river basin. Of these, in 2005 substantive actions had only commenced in Kunduz under the auspices of the EC funded Kunduz River Basin Programme (KRBP). However feasibility studies and preliminary actions had

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35 Further discussion of agricultural reform and policy issues at that time is provided by Christoplos, “Out of Step?”

36 The first inter-Ministerial Land Commission, drawing on membership from the Ministry of Agriculture, Ministry of Justice, Ministry of Finance and other departments was established in 2004, as a peak body to oversee the development of land policy. However, this institution was never wholly effective and fell into redundancy within a year.


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Table 4: NRM sector development sub-programmes (2004)

<table>
<thead>
<tr>
<th>Programme</th>
<th>Major Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Institutional Strengthening and Capacity Building</td>
<td>WB, EC, ADB</td>
</tr>
<tr>
<td>2. National River Basin Management</td>
<td>EC, ADB</td>
</tr>
<tr>
<td>3. National Emergency Irrigation Rehabilitation</td>
<td>ADB, USAID, EC, WB</td>
</tr>
<tr>
<td>4. National Long Term Irrigation and Power</td>
<td>WB, ADB</td>
</tr>
<tr>
<td>5. Environmental Preservation and Regeneration</td>
<td>UNEP, ADB</td>
</tr>
<tr>
<td>6. Enhanced Performance in Food and cash crops</td>
<td>EC, FAO, USAID</td>
</tr>
<tr>
<td>7. Enhanced Performance Livestock</td>
<td>FAO, EC, USAID</td>
</tr>
<tr>
<td>8. Forest and Rangeland Management</td>
<td>ADB, FAO, USAID, EC</td>
</tr>
<tr>
<td>9. Policy Planning and Systems Development</td>
<td>EC, FAO</td>
</tr>
</tbody>
</table>

Source: ADB 2004
also commenced with ADB funding in Balkh, under the Balkh River Basin Integrated Water Resources Management Project and on the Hari-Rud under the proposed Western Basins Project.

The river basin approach constitutes a sophisticated departure from previous experiences of resource administration in Afghanistan. It has been described as a simultaneous “top-down” and “bottom-up” process. The process both begins at the top level, since the government is committed to establishing a strong regulatory and legislative framework, and works from the bottom levels in most operational aspects. Essentially, the approach shifts responsibilities for planning, coordination and oversight of resources management and development to an autonomous RBA. This Authority will be advised and directed by the elected River Basin Council (which represents water users through sub-basin councils), but it will also coordinate directly with line ministry departments and the Provincial Development Committee. In this way, RBAs are designed to be sensitive to the needs and interests of all stakeholders in the catchment’s water resources.

River basin authorities will provide the technical expertise for planning and resources management, but will also be empowered to raise fees and revenues to ensure the “efficient and economic use

Figure 5: Institutional structures for Integrated River Basin Management
of water” and secure their financial independence. At a community level, RBAs have been charged with establishing and regulating participatory frameworks to engage water users in contributing to decision-making and taking responsibility for aspects of operational management at a community level.

While the primary focus of RBAs will be on water resources management, they are intended to cover a range of NRM, agricultural and socio-economic development actions. For example, RBAs are expected to coordinate with other ministries and agencies to implement programmes mitigating erosion, reforesting upper catchment areas, and supporting irrigation and cultivation patterns to improve water use efficiency and increase crop productivity. This intended role of coordinating integrated NRM and agricultural rehabilitation is evident in the Upper Catchment Rehabilitation projects initiated under the Kunduz River Basin Programme during 2005. Similar planning has also been undertaken under the auspices of the Western Basins Project which is setting out to improve farm returns and strengthen rural livelihoods.

The participatory planning and community-based approaches used in RBAs are expected to interact directly with other community-based national and regional programmes such as Community Development Councils (CDCs) established under the National Solidarity Programme and other local governance structures.

As a guiding principle of the NDF, the coordination of sector development strategies with national programmes comes through clearly in the 2004 Policy and Strategy Framework for the Rehabilitation and Development of Agriculture, which set out the major goals, approaches and institutional reforms required for rural regeneration. The overall objective of this framework was to structure the diversity of different planning initiatives and processes then underway. It set out the need for an integrated approach, community engagement in resources management, and coordination with existing national programmes. The framework further emphasised the anticipated role of the private sector in rehabilitation of the rural economy. Like the Water Resources Management Policy, the framework called for the establishment of an Inter-Ministerial Commission on Natural Resources Management, to grow out of a previously existing consultative group. These major themes were taken up again the following year as the MAAH continued with its major planning process. This process led to the drafting of the “Agricultural Sector Development Strategy,” later known as the “Master Plan.”

The Master Plan sets out a five-year strategy for agricultural and natural resources development and represents an investment of over 1.3 billion dollars. The Master Plan lays out three priorities. First, the commercial expansion of the horticultural sub-sector will serve as a basis for growth in exports and revitalising rural economies. Second, the Master Plan identifies the livestock sub-sector as holding potential for preferential development, both for export and domestic consumption. Third, it sets specific goals for food security, including doubling yields and rehabilitating irrigation. Cross-cutting priorities identified in the plan include NRM, research and extension, establishing financial systems and credit, and engaging farmers through community organisations.

The expanding poppy cultivation and the scale of the narcotics problem in Afghanistan led to the establishment of a specific Ministry for Counter

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Narcotics (MCN) in December 2004. This grew out of the former Counter Narcotics Directorate of the Ministry of Interior. The primary responsibility of the MCN was to oversee implementation of the National Drug Control Strategy.\(^{43}\) The first step toward this was the development of a Counter Narcotics Implementation Plan.\(^{44}\) Line ministries, donors, international organisations and NGOs prioritized efforts to garner information on ongoing counter-narcotics and alternative livelihood actions; this fed into the planning exercise during 2005.

By mid-2005, four years after the fall of the Taliban regime, the Government (with international assistance) was working on the agricultural and NRM sector. Substantial progress was being made toward planning for and institutionally coordinating the rehabilitation of the sector. Some important planning processes had recently been completed and others were ongoing. However, the focus of these activities remained almost exclusively in Kabul.

Very little of this new momentum in the ministries filtered down to provincial departments, which

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\(^{44}\) Ministry of Counter Narcotics, “Counter Narcotics Implementation Plan” (Kabul: MCN, 2005).

### Table 5: Principal goals and strategies set out in the Master Plan

<table>
<thead>
<tr>
<th>Sector</th>
<th>Master Plan Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Food security</strong></td>
<td>- Intensify production of food staples on reduced land area for expansion of horticultural production</td>
</tr>
<tr>
<td></td>
<td>- Encourage consumption of low-quality horticulture products</td>
</tr>
<tr>
<td><strong>Foreign exchange</strong></td>
<td>- Significantly expand agricultural exports</td>
</tr>
<tr>
<td></td>
<td>- Envisages that dried fruit and nuts alone will bring in $1 billion annually within ten years.</td>
</tr>
<tr>
<td><strong>Poverty reduction</strong></td>
<td>- Raise rural off-farm employment for the landless and resource poor</td>
</tr>
<tr>
<td></td>
<td>- Develop vibrant labour market through production of high quality products for export</td>
</tr>
<tr>
<td><strong>Gender equity</strong></td>
<td>- Prioritise livestock development (thought to be female dominated)</td>
</tr>
<tr>
<td></td>
<td>- Engage women in livestock product marketing and greater control of incomes</td>
</tr>
<tr>
<td><strong>Alternatives to poppy</strong></td>
<td>- Replace poppy incomes with horticultural production and fruit production</td>
</tr>
<tr>
<td></td>
<td>- Facilitate shift using agricultural credit and rural finance programme</td>
</tr>
<tr>
<td><strong>Building private sector</strong></td>
<td>- Currently, one million Afghan farmers are private sector “entrepreneurs”</td>
</tr>
<tr>
<td></td>
<td>- Guard against public subsidies</td>
</tr>
<tr>
<td></td>
<td>- Direct government assistance to this private sector</td>
</tr>
</tbody>
</table>

Source: MAAH 2005
therefore remained under-resourced and chronically weak. Furthermore, with the exception of socioeconomic surveys conducted under the National Risk and Vulnerability Assessment (NRVA) programme of the MRRD, very little was actually known about prevailing on-farm conditions and problems in the provinces, let alone the approaches to their solution. This deficiency in basic data for planning has been noted in several key policy documents, not least of which is the Master Plan itself.\textsuperscript{45} In the absence of a state-coordinated, systematic programme of research, planners have had to draw upon a diversity of disparate data sets produced by NGOs, international organisations and other institutions. These data are often held to varying standards and collected in different periods using different methods. This haphazard sourcing of data has perhaps inevitably resulted in continuing confusion (See box 1 on the next page).

### 2.3 Research objectives

<table>
<thead>
<tr>
<th>Table 6: Priority actions set out in the National Drug Control Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong> Vigorous enforcement action against drug traffickers</td>
</tr>
<tr>
<td><strong>2</strong> Development assistance to opium cultivating areas through national development programmes</td>
</tr>
<tr>
<td><strong>3</strong> Treatment and rehabilitation of drug users</td>
</tr>
<tr>
<td><strong>4</strong> Engaging community institutions against drug cultivation and use</td>
</tr>
<tr>
<td><strong>5</strong> Increasing the role of local and provincial government in drug eradication and law enforcement activities</td>
</tr>
</tbody>
</table>

*Source: MCN 2003*

In 2004-05 the agricultural sector was still struggling from the effects of conflict and drought. Already widespread planning had begun for the rehabilitation of the sector and sustainable rural development. However, this planning and strategising took place with little reliable information to inform decision-making. In some areas (such as alternative livelihoods), there were clear indicators that existing policy was failing to achieve its goals. This was the situation within which the WOL project was conceived.

The project was expected to, first, provide a framework for the systematic and longitudinal collection of data from selected localities around Afghanistan and, second, feed collected data back to decision makers and planners. In addition to providing data and evidence-based policy recommendations, the project’s implementation should also help strengthen the Government’s own capacity to collect and manage relevant data for planning and gauging policy impacts.

An important assumption underlying the conception of the WOL project was the inter-relationship between the major themes of research: namely, access to and management of natural resources, such as land and water, and the production of livestock and cropping behaviour (including the choice to grow opium). The project recognises that the opportunities, constraints and risks associated with these factors underpin the security and sustainability of many rural livelihoods, and ultimately the success or failure of rural development programmes.

By adopting a holistic, integrated approach to agriculture and NRM, the WOL project also closely reflects the policy positions of the Afghan government and their foreign advisors. Summary research objectives framing WOL research are set out in Table 7.

To most effectively achieve these complex objectives over three years, the project uses an implementation strategy that breaks down goals and outputs into discrete, achievable and logically sequential steps. According to this strategy, the first year goals of the project were to complete

\textsuperscript{45} The Agriculture Master Plan cites the need for “bottom-up research to respond to farmer needs” through “applied research hardly distinguishable from extension.” Master Plan, Section 5.2 [http://www.agriculture.gov.af/farsi/officals-file.htm](http://www.agriculture.gov.af/farsi/officals-file.htm) (accessed Nov 2007).
Box 1: What to believe? Problems with the data

A major problem faced by planners of agricultural rehabilitation in the years after 2001 has been accessing accurate data. A flurry of studies conducted during this period used different methodologies and approaches to extrapolation resulting in widely inconsistent results. An example describing the national land area under cultivation in 2003 is given below.

<table>
<thead>
<tr>
<th>Source</th>
<th>Total irrigated crop area in 2003 ('000 hectares)</th>
<th>Total rainfed crop area 2003 ('000 hectares)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAAH/WFP National crop output assessment (2003)</td>
<td>1,788</td>
<td>2,520</td>
</tr>
<tr>
<td>Central Statistics Office Yearbook</td>
<td>2,752</td>
<td>1,147</td>
</tr>
<tr>
<td>MAAH/FAO Agriculture and food production in post war Afghanistan (2003)</td>
<td>3,048</td>
<td>3,488</td>
</tr>
<tr>
<td>ADB</td>
<td>3,200</td>
<td></td>
</tr>
</tbody>
</table>

This example illustrates a 78 percent discrepancy between maximum and minimum values cited for irrigated cropped areas and an almost 200 percent discrepancy for rainfed land. All data are derived from credible sources.

Similarly wide discrepancies can be found in available data describing livestock, cropping patterns, yields and other important agricultural statistics, around which key policy formulation occurs. The absence of accurate and authoritative data raises the possibility of “data shopping,” or selective use of data sources to support particular arguments or points of view in policymaking.
research site selection and establish a baseline of knowledge, both in terms of individual sites and thematic areas of inquiry. This preliminary understanding informs the development of specific questions, which direct the research into more in-depth studies and analysis in its second year.

2.4 Key Points

- Weakened by factors related to conflict and drought, the agricultural sector has fallen below productive capacity, raising concerns for rural livelihoods and sustainable development in Afghanistan.

- Government has responded to disarray in the natural resources and agricultural sectors by undertaking extensive planning to develop more effective, integrated approaches to resources management.

- Concern about the quality of information available to rural planners and policy-makers provided the rationale for establishing the WOL.

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**Figure 6: Three year implementation strategy for WOL**

**YEAR 1**
- Field site selection
- Establish baselines for sites and thematic areas
- Refine key research questions for ongoing research
- Establish longitudinal studies

**YEAR 2**
- Explore key research questions
- Ongoing data collection
- Generate new questions and directions for research
- Identify outstanding gaps in knowledge

**YEAR 3**
- Ongoing data collection
- Field experiments testing recommendations
- Addressing outstanding research questions
- Drawing together key thematic content
- Identify issues for further research
### Table 7: Three year implementation strategy for WOL

<table>
<thead>
<tr>
<th>Sector</th>
<th>Research Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overall Objective</strong></td>
<td>To inform and influence rural policies and programmes leading to improved policies and programming effectiveness and impact</td>
</tr>
<tr>
<td><strong>Land Tenure</strong></td>
<td>• To investigate the forms of tenure farmers and other users hold to land resources</td>
</tr>
<tr>
<td></td>
<td>• To study the advantages and constraints of existing systems of land tenure and how these influence agricultural use and NRM</td>
</tr>
<tr>
<td></td>
<td>• To consider the effectiveness of the existing land policy framework and provide recommendations for its improvement</td>
</tr>
<tr>
<td><strong>Water Management</strong></td>
<td>• To investigate how irrigation water is managed in Afghanistan, how existing systems operate, how these systems are managed and how effectively they operate</td>
</tr>
<tr>
<td></td>
<td>• To ascertain the impacts of conflict, drought and development interventions on irrigation water supply and to develop recommendations for improving the equity and efficiency of its management.</td>
</tr>
<tr>
<td><strong>Livestock</strong></td>
<td>• To investigate the role of different types of livestock in rural livelihoods farm systems, including production constraints and opportunities, seasonal and gender dimensions</td>
</tr>
<tr>
<td></td>
<td>• To explore the management of livestock, access to pastures and the sustainability of pasture use.</td>
</tr>
<tr>
<td></td>
<td>• To study the operation of markets for livestock and their products, and assess the impact of conflict, drought and development interventions on production.</td>
</tr>
<tr>
<td></td>
<td>• To produce recommendations to improve the productivity and sustainability of livestock production.</td>
</tr>
<tr>
<td><strong>Opium</strong></td>
<td>• To explore the reasons for farmer choices in the cultivation of poppy and marketing of opium, and analyse the socio-economic consequences of these decisions</td>
</tr>
<tr>
<td></td>
<td>• To investigate the impact of conflict, drought, development programmes and government policy on the cultivation of poppy</td>
</tr>
<tr>
<td></td>
<td>• To produce recommendations for supporting the sustainable reduction of poppy cultivation in Afghanistan</td>
</tr>
</tbody>
</table>
3. Research Methods and Study Sites

The first chapter of this paper has described the situation that gave rise to the inception of the WOL project and its principal objectives. This second chapter discusses how these research objectives were approached and how data was collected. After introducing the concepts underpinning the research strategy, the discussion describes how research sites were selected and the basic research methods employed for collecting data during the first year of study.

3.1 Approaching the research

The growing literature on Farming Systems Research (FSR) provides a useful conceptual framework with which to structure WOL research (in terms of developing research questions, integrating and analysing results). Farming Systems Research approaches emerged originally from the Consultative Group on International Agricultural Research (CGIAR) Centres. The approach resulted from the recognised gap between experiments conducted under controlled conditions at research stations and the practice of farm management, usually embedded in a complex socio-economic and institutional framework. Farming systems theory suggests that farms are not just production systems but also ecological and social systems. Accordingly, the approach recognises that farm decision-makers extract benefits across a range of scales and values, and make trade-offs between multiple and often competing objectives. FSR is therefore typically cross-disciplinary, incorporating aspects of agronomy, animal sciences, economics, ecology, social sciences and participatory action research. Ironically, while the approach emerged in developing countries, it has gained increasing currency in developed countries as farming enterprises have become increasingly sensitive to environmental and community concerns. Farming Systems Research approaches these complex issues in an integrated, holistic way. It does this by considering all components of a system and their interactions simultaneously, rather than in isolation from each other. This runs contrary to how most research has hitherto been conducted in Afghanistan. Deconstructing farm systems into discrete components may be useful for exploring how these individual components work, but the security of farm livelihoods are the product of the farming system as a whole, including external factors.

There is little agricultural specialisation evident in Afghanistan. Where it occurs it is mainly restricted to pastoral nomads and some larger commercial farmers. Outside of this specialisation, most agricultural production occurs within the context of a mixed farming system including both crop and livestock components. Therefore, changes in resources management that lead to increases in productivity in one part of the system will influence outputs from other parts of the system. For example, an improvement in dairy production may be achieved through increased fodder cultivation, but land and water utilised for fodder crops will diminish production of other crop types. The net benefit or deficit to the farmer can only be understood by studying the whole farm system, including farmer livelihood outcomes.

Afghan farmers make these complex judgements daily in navigating risks and planning their resource use and farm management. Their strategies stem from a holistic appreciation of the farm system, so to understand farmer preferences and decisions researchers need to do likewise. Therefore WOL studies will combine the collection of environmental, agricultural and socio-economic data with in-depth explorations into farmer decision-making and the

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48 A good overview of recent studies, project documents and reports can be found in Afghanistan Research and Evaluation Unit, “Water Management, Livestock and the Opium Economy: Annotated Bibliography” (Kabul: AREU, 2006).
structures and institutions which support this.

The household plays a key role in decision-making about natural resources, production and consumption. As household livelihood security may be utilised as a proxy indicator for the effectiveness and sustainability of farming systems, this unit is identified as an important level of analysis. However, this research approach also recognises that households are not always unitary and neatly bounded but may also be sites for contested access to resources and competing interests. Externally, households are not necessarily autonomous and are commonly nested within social institutions, relations and organisations.

For the purpose of organisational simplicity, some WOL studies have been conducted with a defined thematic focus, and the results of these studies have been presented this way when reporting. However, in all cases research questions have been framed so that findings are placed within a broader-scale context and all individual studies have been designed to be mutually complementary. This paper provides the primary synthesis of research findings and thus the overall integrated analysis for the first year of the project. These findings and general observations will be discussed in the final two chapters of the paper.

### 3.2 Research site selection

The WOL project contract stipulated that primary research activities should be focused upon the provinces of Nangarhar, Ghazni, Herat and Kunduz. These selections were made in order to achieve coverage in four of the country’s five major river basins and thus a diversity of bio-physical, social

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49 For the purposes of this study, the household has been defined as a socio-economic entity that is normally (but not always) co-resident, and that centrally pools and reallocates resources (income, assets and labour), and so normally eats together.

and economic conditions. Within these provinces, site selections were restricted to areas where the project’s partner NGOs, German Agro-Action (GAA) and the Danish Committee for Aid to Afghan Refugees (DACAAR) were working.

Primary research sites were selected in collaboration with partner NGOs on the basis of eighteen variables recorded during preliminary site inspection visits to the provinces. These variables described bio-geographical attributes, natural resource attributes, agricultural attributes and socio-economic attributes. All potential research sites were visited and, on the basis of observations and the reports of local NGO staff, each was scored between 1 and 3 against each of the 18 variables. In this way a simple numeric site profile was completed for all sites where research was a practical possibility.

These values were then entered into a spreadsheet and selections were made to encompass the broadest possible combination of resource conditions and management practices. Applying this selection strategy produced an overall sample group of sites which captured the diversity of NRM conditions in Afghanistan.

Because of practical limitations on the number of sites that could be included in the research, a total of 20 research sites were selected, five from each province. In addition to the 20 village sites, two groups of nomadic pastoralists (Kuchis) were engaged for participation in the research.

### 3.3 Site descriptions

The careful selection process highlighted in the previous section captured a broad diversity of agro-ecological locales, farming systems and socio-economic conditions in the primary research site group. The sites, together with their key features are summarised here. The attributes of (and production systems at) these sites will be discussed in greater detail in the following chapters.

For simplicity, sites have been categorised into four basic agro-ecological types. The details of this typology being described below.

These classifications represent fundamental agricultural and ecological differences between research sites and farming systems. Irrigated farming in river valleys dominates the agricultural economy in Afghanistan, both in terms of production and population engaged in it. The largest number of selected research sites falls into this category. Upper catchment systems with irregular irrigation and rainfed systems also make important contributions to agriculture in Afghanistan and so are proportionately represented in the selected group of research sites (Table 8).

It has been estimated that up to one in ten Afghans may be practising some form of nomadic pastoralism although in recent years the system has been modified to allow for periods of waged labour and engagement with agricultural centres. Nomads are known to make very important contributions to the production of livestock in Afghanistan and are important stakeholders within the agricultural sector.

### 3.4 Research methods

In its first year, the WOL project used three complementary forms of data collection:

- Thematic studies
- Sample surveys
- Physical measurements

The first and most nuanced of these is thematic studies. The project utilised the services of seven

54 Frauke De Weijer, “National Multi-Sectoral Assessment on Kuchi” (Kabul: MRRD, 2005).
Table 8: Natural resource and agricultural profiles of research sites

<table>
<thead>
<tr>
<th>Site Name</th>
<th>Elev (m)</th>
<th>Agro-ecological</th>
<th>Production system (no. annual crops)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghazni Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zala Qala</td>
<td>2,560</td>
<td>Semi-irrigated</td>
<td>Rainfed cereals, small area of spring/karez irrigated legumes fodder and vegetables, many sheep and goats (1)</td>
</tr>
<tr>
<td>Qala-i-Naw</td>
<td>2,255</td>
<td>Irrigated</td>
<td>Canal irrigated, commercial fruit orchards, intercropped with fodders and cereals, livestock (2)</td>
</tr>
<tr>
<td>Turmai</td>
<td>2,300</td>
<td>Irrigated</td>
<td>Canal irrigated, commercial fruit orchards, intercropped with fodders and cereals, livestock (2)</td>
</tr>
<tr>
<td>Pyada Rah</td>
<td>2,490</td>
<td>Semi-irrigated</td>
<td>Rainfed cereals, small area of spring/karez irrigated legumes fodder and vegetables, high number of sheep and goats (1)</td>
</tr>
<tr>
<td>Chechel Gunbad</td>
<td>2,360</td>
<td>Irrigated</td>
<td>Canal irrigated, commercial fruit orchards, intercropped with fodders and cereals, livestock (2)</td>
</tr>
<tr>
<td>Nangarhar Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waruf China</td>
<td>690</td>
<td>Semi-irrigated</td>
<td>Tube well and karez irrigated poppy and some cereal. Sheep and goats (1)</td>
</tr>
<tr>
<td>Sra Qala</td>
<td>950</td>
<td>Semi-irrigated</td>
<td>Small wash irrigated area growing poppy cereals and vegetables (1)</td>
</tr>
<tr>
<td>Khawaji</td>
<td>1,700</td>
<td>Semi-irrigated</td>
<td>Small wash irrigated area growing poppy cereals and vegetables. Some fuel wood collection (1)</td>
</tr>
<tr>
<td>Otar Khel</td>
<td>1,680</td>
<td>Semi-irrigated</td>
<td>Small wash irrigated area growing poppy cereals and vegetables. Some fuel wood collection (1)</td>
</tr>
<tr>
<td>Jani Khel</td>
<td>550</td>
<td>Irrigated</td>
<td>Canal irrigated, growing cereals, industrial crops, vegetables and fodder (2)</td>
</tr>
<tr>
<td>Kunduz Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dana Haji</td>
<td>335</td>
<td>Irrigated</td>
<td>Canal irrigated, growing cereals, industrial crops, rice vegetables and fodder. livestock (2)</td>
</tr>
<tr>
<td>Abdul Nazar</td>
<td>800</td>
<td>Rainfed</td>
<td>Rainfed cereals, livestock (1)</td>
</tr>
<tr>
<td>Wakil Jangal</td>
<td>345</td>
<td>Irrigated</td>
<td>Canal irrigated, growing cereals, industrial crops, rice vegetables and fodder. livestock (2)</td>
</tr>
<tr>
<td>Afghan Mazar</td>
<td>340</td>
<td>Irrigated</td>
<td>Canal irrigated, growing cereals, industrial crops, rice vegetables and fodder. livestock (2)</td>
</tr>
<tr>
<td>Alam Bai</td>
<td>810</td>
<td>Rainfed</td>
<td>Rainfed cereals, livestock (1)</td>
</tr>
<tr>
<td>Herat Province</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khalifa Rahmat</td>
<td>1,305</td>
<td>Rainfed</td>
<td>Rainfed cereals, spring irrigated vegetables, many livestock (1)</td>
</tr>
<tr>
<td>Gawashk</td>
<td>1,090</td>
<td>Irrigated</td>
<td>Canal irrigated, cereals, pulses, vegetables fodder, livestock (1)</td>
</tr>
<tr>
<td>Tunian</td>
<td>1,030</td>
<td>Irrigated</td>
<td>Canal irrigated, cereals vegetables, fodder, livestock (1)</td>
</tr>
<tr>
<td>Ghorak</td>
<td>1,165</td>
<td>Semi-irrigated</td>
<td>Rainfed cereals, spring irrigated vegetables, many livestock (1)</td>
</tr>
<tr>
<td>Sir Zar</td>
<td>1,490</td>
<td>Rainfed</td>
<td>Rainfed cereals, spring irrigated vegetables, many livestock (1)</td>
</tr>
</tbody>
</table>
senior international researchers to undertake in-depth studies exploring carefully selected questions. In turn, these researchers used a variety of research methods to inform their studies, although the most common approach was through small group or individual farmer interrogative interviews and key informant interviews. Extensive use was also made of secondary data sources and direct observations were also made. By drawing heavily on the expertise and insights of individual researchers, thematic studies allowed the development of comprehensive understandings of key research questions and so generated new knowledge and new directions for productive enquiry.

While first year studies of land tenure, water management and livestock were principally focused upon the 20 selected primary research sites plus two nomadic groups, studies of the opium economy were necessarily broadened to investigate areas of key significance for understanding the dynamics of poppy cultivation and its livelihood context.\textsuperscript{55}

The second major research method was the sample survey, designed to establish a sampling frame and baseline for subsequent longitudinal household monitoring\textsuperscript{56} and generate basic site profiles for preliminary analysis.

A sample size of 400 households (100 in each province) was determined as appropriate for the baseline survey. This balanced the desire for the largest possible sample with practical considerations (namely the time available to field teams). However, this total of 400 was sufficient to provide a minimum

\textsuperscript{55} Out of the four provinces listed for research in the WOL produce contract, opium was only commercially produced in Nangarhar. Accordingly, additional studies were conducted in Balkh and Ghor, provinces outside of the primary project provinces.

\textsuperscript{56} This report details the results of the first year of WOL research. The methods and results of longitudinal monitoring will be drawn upon in the reports describing years two and three of the project.
10% sample of households at each primary research site. The distribution of sampling at the provincial level was structured using PPS (Probability Proportional to Size) so sampling at each primary research site was weighted according to the overall distribution of households in the selected sites for that province. Consequently, all households across the five primary research sites within each province had an equal probability of selection. Sampling within communities was random: Teams either compiled a list of households with elders and sampled at determined intervals from the list, or went household to household through villages sampling at predetermined intervals.

The survey data sheet consisted of four sections which dealt with general household information, a combination of socio-economic indicators, land and water use, and livestock information respectively. For accuracy, this data sheet was completed twice in each household, with the male head of household and with the senior female.57 Interviews were held simultaneously and separately so that data could be corroborated through two independent sources. Data collection for the survey was conducted between September and December 2005. On completion of the survey, data was entered into spreadsheets and imported into SPSS for further analysis.

During the first year of the WOL project, the collection of data on-farm through physical measurements remained quite limited. In spring 2006, work began by monitoring growth rates in selected new-born small ruminants and also daily lactation in a small sample of selected cows and goats. In addition, irrigation system studies began by mapping and establishing the structural features and their dimensions at four selected primary research sites. These initial activities were planned to lead to more substantive results and measurements in the subsequent years of study. These results will be

57 In female-headed households, the datasheet was only completed once.

<table>
<thead>
<tr>
<th>Province</th>
<th>Research site</th>
<th>Total households</th>
<th>Weighted sample</th>
<th>Percent of site total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghazni</td>
<td>Zala Qala</td>
<td>100</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Pyada Rah</td>
<td>21</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Qala-i-Naw</td>
<td>354</td>
<td>55</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Turmai</td>
<td>123</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Chel Gunbad</td>
<td>42</td>
<td>7</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>640</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Herat</td>
<td>Khalifa Rahmat</td>
<td>29</td>
<td>22</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>Tunian</td>
<td>35</td>
<td>25</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Gawashk</td>
<td>28</td>
<td>20</td>
<td>71</td>
</tr>
<tr>
<td></td>
<td>Ghorak</td>
<td>17</td>
<td>12</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Sir Zar</td>
<td>29</td>
<td>21</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>138</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
<tr>
<td>Nangarhar</td>
<td>Maruf China</td>
<td>160</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>Sra Qala</td>
<td>100</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Khawaji</td>
<td>60</td>
<td>7</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>Otarkhel</td>
<td>100</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Janikhel</td>
<td>425</td>
<td>50</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>845</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
presented in a future paper synthesising the findings from the second year of WOL research.

The following parts, presenting the substantive findings of the research, combine data collected using all of the aforementioned methods.

### 3.5 Key Points

- The WOL project uses a multi-disciplinary ‘farming systems’ approach to explore the management of natural resources, agricultural strategies and rural livelihoods in an integrated way.

- Research sites were carefully selected to capture a typical diversity of farm system types, agro-ecological and socioeconomic conditions from four provinces across Afghanistan.

- First year WOL research combined thematic studies (addressing specific aspects of farming systems and how these articulate with other aspects), physical measurements on-farm, and a random sample survey of about 420 farms across twenty villages and two nomadic communities.

<table>
<thead>
<tr>
<th>Province</th>
<th>Research site</th>
<th>Total households</th>
<th>Weighted sample</th>
<th>Percent of site total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kunduz</td>
<td>Abdul Nazar</td>
<td>40</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Alam Bai</td>
<td>26</td>
<td>9</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Dana Haji</td>
<td>40</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>Wakil Jangal</td>
<td>68</td>
<td>23</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Afghan Mazar</td>
<td>110</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>284</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Nomads</td>
<td>Khomari Khel</td>
<td>45</td>
<td>15</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Kutub Khel</td>
<td>35</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>80</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Overall Total</td>
<td></td>
<td></td>
<td>425</td>
<td></td>
</tr>
</tbody>
</table>
4. Land Resources and Tenure

Land access and use underlie all forms of agricultural production and constitute basic natural resources management. Security of land tenure is therefore an important prerequisite to improved agricultural practice and sustainable increases in productivity and development of the rural economy. Furthermore, in the Afghan context of weakened state institutions, limited rule of law and a fragile security situation, disputes over entitlements to land contribute to civil unrest and instability in some parts of the country. All major agricultural policy initiatives (up to and including the ‘Master Plan’) recognise the need for reform in land administration.

The purpose of this chapter is to provide an overview of land tenure and relations as they exist in rural Afghanistan, building upon the findings of WOL research conducted in twenty research sites around the country. This evidence, together with that of the succeeding chapters, will inform the final discussion and conclusions of the study. This chapter considers the land resource base currently available to farmers, the conditions and terms of tenure associated with that land and the institutions that support access to it. Finally there is an examination of the extent to which this system of land relations offers security to farmers, the nature of threats to tenure and thus rural vulnerability.

4.1 Land under cultivation and land holdings

WOL research indicates that broad diversity exists in farmer access to land resources across the 20 research sites. Cultivated land holdings are expressed below as both mean areas per household and per capita to indicate the available area of land per person and thus the relative pressure on land resources.

The area of land under cultivation reflects several factors, including the amount of land owned by the household and any land leased or sharecropped. Furthermore, the amount of land cultivated in any given year pertains to farmer decisions about the best allocation of agricultural inputs. At many sites with limited water resources, some land is left uncultivated and even sites irrigated from canals in river valleys may cultivate less land during the summer growing season (for sites with two growing seasons).

However, as a unit of measurement, ‘land under cultivation’ is more useful than landownership since many farmers do not derive their rights to use land exclusively from ownership. Also, this measure represents the actively productive land that contributes to rural livelihoods, as opposed to land that is owned, but not cultivated due to lack of resources. Furthermore, with the concept of ‘ownership’ so ill-defined in Afghanistan, enumerating the area upon which the farmer grows crops is a more easily gauged quantity and reflects the de facto pattern of land use. More comprehensive data on landownership and tenure in the research sample group is given elsewhere.

While research findings indicate important differences in land holdings between individual villages, it is worth noting that at some research sites, the recorded per capita cultivated area was extremely small. The smallest per capita land holdings were recorded in Nangarhar province, where some households have as little as 12 square meters per person (Table 11). Clearly, such small cultivated areas cannot alone sustain rural livelihoods.

58 Special acknowledgement is given to the work of Alec McEwen and Brendan Whitty in informing this chapter of the report. A more expansive description of land policy, conditions of tenure and land relations is offered in: Alec McEwen and Brendan Whitty, “Water Management, Livestock and the Opium Economy: Land Tenure” (Kabul: AREU, 2006).


60 The data in Table 9 describe the total cultivated area during the most extensive growing season (usually the winter), and include both rainfed and irrigated lands.
When organised by type of land and production system, frequency distribution of land holdings shows clear trends (Figure 8). In canal-irrigated river valleys, land holdings follow a smooth distribution curve with a modal value of about 1 hectare and a maximum value of 10 hectares. In terms of size, these types of land holdings tend to be relatively heterogeneous, occurring in different sizes and with a normal frequency distribution through the farming population. Many individual holdings are relatively small at around a single hectare, but land of this type is generally fertile and productive. Because of high population density in river valleys, the availability of irrigable land itself limits land use and cultivation (although in some areas water scarcity may also be a seasonal constraint to cultivation).

At semi-irrigated sites, irrigated from intermittently flowing water sources, land holdings are generally smaller than in irrigated valleys and much more uniform in size. There seem to be limits upon the area of cultivable land in this type of agro-ecological context, probably due to scarcity of water and local topography.

By contrast, the frequency distribution of rainfed land holdings by size exhibits a fairly consistent distribution of land holdings between 1-4 hectares, with frequencies only diminishing above 4 hectares. Even then, a considerable proportion of the sample lies beyond this level, with even larger land holdings. This distribution is consistent with the view that availability of land and irrigation water is less of a constraint on the cultivated area than where land is artificially irrigated, and that labour availability for land preparation and harvest places greater limits on the area cultivated.

A one way Analysis of Variance (ANOVA) was conducted to explore differences between irrigated, semi-irrigated and rainfed land

<table>
<thead>
<tr>
<th>Province</th>
<th>Research site</th>
<th>Mean household cultivated area (ha, Std. dev.)</th>
<th>Mean cultivated area per person (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghazni</td>
<td>Zala Qala</td>
<td>1.20 (1.808)</td>
<td>0.09</td>
</tr>
<tr>
<td></td>
<td>Pyada Rah</td>
<td>3.06 (4.562)</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Qala-i-Naw</td>
<td>1.24 (0.951)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Turmai</td>
<td>0.49 (0.452)</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Chel Gunbad</td>
<td>1.07 (0.863)</td>
<td>0.10</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>1.142</td>
<td></td>
</tr>
<tr>
<td>Herat</td>
<td>Khalifa Rahmat</td>
<td>2.49 (1.972)</td>
<td>0.22</td>
</tr>
<tr>
<td></td>
<td>Tunian</td>
<td>1.24 (1.612)</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Gawashk</td>
<td>2.99 (4.877)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ghorak</td>
<td>0.61 (0.664)</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Sir Zar</td>
<td>3.15 (2.030)</td>
<td>0.44</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>2.096</td>
<td></td>
</tr>
<tr>
<td>Nangarhar</td>
<td>Maruf China</td>
<td>0.8 (0.800)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Sra Qala</td>
<td>0.52 (0.374)</td>
<td>0.03</td>
</tr>
<tr>
<td></td>
<td>Khawaji</td>
<td>0.16 (0.160)</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>Otarkhel</td>
<td>0.26 (0.193)</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>Janikhel</td>
<td>1.18 (1.780)</td>
<td>0.08</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>0.584</td>
<td></td>
</tr>
<tr>
<td>Kunduz</td>
<td>Abdul Nazar</td>
<td>6.154 (3.742)</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>Alam Bai</td>
<td>4.714 (5.460)</td>
<td>1.36</td>
</tr>
<tr>
<td></td>
<td>Dana Haji</td>
<td>1.326 (1.102)</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>Wakil Jangal</td>
<td>3.524 (2.866)</td>
<td>0.29</td>
</tr>
<tr>
<td></td>
<td>Afghan Mazar</td>
<td>6.154 (3.742)</td>
<td>0.55</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
<td>4.374</td>
<td></td>
</tr>
</tbody>
</table>
holdings. With significance set at <0.05, a statistical difference was identified (p<0.005). Post-hoc comparisons using the Tukey HSD test revealed that all three categories of land holdings differed significantly from each other (Table 12).  

<table>
<thead>
<tr>
<th>Table 12: Mean land holdings by type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Irrigated sites</td>
</tr>
<tr>
<td>Semi-irrigated sites</td>
</tr>
<tr>
<td>Rainfed sites</td>
</tr>
</tbody>
</table>

### 4.2 Tenure systems

Farmers in Afghanistan access and utilise land for agricultural production under diverse systems of tenure, which range from full ownership to leasing or share-cropping, or taking possession of land as mortgage collateral. Studies indicate that each of these systems is rooted in the social, customary and economic institutions of rural Afghanistan. Land use must therefore be investigated within this institutional context if land management and farmer decision-making are to be better understood.

#### Landownership

WOL research suggests that very few rural Afghan farmers hold formally recognised rights of title to their lands. In most cases, though, reported informal entitlements seemed to enjoy the widespread recognition of the local community and institutions. Most farmer claims to land title originally derive from official land grants made by past governments or authorised individuals. Farmers reported that at the time that these land grants were made they were supported by official documentation detailing both the recipient and the area of land awarded and thus constituted valid legal title. In many cases these original documents still exist. However, the most recent of these land grants date back to the mid 1970s and many were reportedly issued during the early years of the twentieth century. Consequently, in all recorded instances, land had often transferred from the original title holders either by inheritance across generations or by sale.

Inheritance of land in rural Afghanistan usually involves the subdivision of holdings among several siblings. This process is very rarely notarised with local institutions and even in those cases where it is, none of the new landholders and their properties will match the specifications detailed on the original land grant document. Consequently, few (if any) landowners today hold legally recognised title to their lands.

Clearly, this problem emerges from the manner in which land transfers are normally managed and recorded. Investigations in rural communities across four provinces indicate that where records of land transfers do occur, these are informal and are notarised by witnesses or the village shura/jirga. While there is some local variation, transfers by inheritance are rarely notarised or supported by any form of documentation. However, the sale of land is invariably supported by transfer of a deed, which sets out the details of the owner, the land parcel and adjacent neighbours. These informal deeds are witnessed by respected community members, and these witnesses underpin the validity of the document. In some instances, landownership claims are not supported by any form of documentation but rest solely upon oral tradition or witness testimony.

The sale of land in rural Afghanistan is governed by the rules of *shafa*, which compel vendors to offer their land first to their heirs and, if these are not interested in purchasing the land, then to their

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61 One way Analysis of Variance (ANOVA) is a simple technique utilised to test for differences between the means of two or more independent groups. It can be used to determine whether apparent differences between means are statistically significant (i.e. differences exceed the expected Standard Error). The Tukey test is often used in conjunction with ANOVA to determine which means significantly differ from each other and therefore, between which groups statistical differences occur.

neighbours. Only if both heirs and neighbours have declined to buy the land can it be offered to the open market. Shafa rights are most meaningful in villages where large differences in wealth exist, where wealthier relatives and neighbours are more likely to afford to purchase land sold by an impoverished farmer.

Most communities visited perceived the security of their land tenure as deriving from the legitimacy of their local institutions and the approbation of their neighbours. Researchers found that farmers generally perceived the government to constitute a threat to their tenure rather than a source of security. While farmers are quick to point to the corrupt practices and misadministration of officials, they are also conscious that their informally held landholdings are not recognised by the state.

Consequently, some villages pay land tax in order to reinforce their claims to land. The tax is usually paid in those communities where an original land grant existed. Current holders of the land pay tax even though they are not listed as the owners on the original deed, viewing the tax receipts as providing additional security of tenure.

Sharecropping

Sharecropping (along with diverse other forms of tenure) performs an important function in research site communities. Sharecropping allows farmers to utilise land which they do not own by entering into a partnership with a landowner who would rather share the costs and income from working some of his land than work it himself. While sharecroppers are often equated with the landless in rural Afghanistan, WOL research suggests that farmers who already hold land may, in some circumstances, perceive it as advantageous to enter into sharecropping arrangements to access additional land.

Researchers found that sharecropping arrangements are always oral contracts and follow a similar format throughout the country. The owner contracts a

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63 Otharkhel and Khawaji, two villages in Upper Achin province, were the principal exceptions to the rules of Shafa among the 20 research sites.
sharecropper to cultivate his land. Both parties split the costs of inputs following pre-agreed terms, the sharecropper cultivates the crops and the harvest is shared according to the terms agreed.

Although the exact terms (respective inputs and subsequent division of harvest) of sharecropping agreements may vary widely, the principal inputs subject to negotiation usually included water, labour, seeds, fertiliser and draught (ploughing). The proportional division of harvests between sharecropper and landowner differ widely among locations and individual contracts. This division ranged from only 25 percent to over 80 percent of the harvest going to the sharecropper. The highest proportions of the harvest are received where sharecroppers make the largest contribution to agricultural inputs. Analysis of terms by research site indicated that in some communities sharecropping agreement terms seem standardised with little variation while elsewhere, terms appear much more diverse (and therefore more open to negotiation). These differences are shown as standard deviations from the mean in Figure 7.

At all research sites, the usual period for a sharecropping arrangement is the calendar year, after which the landholder reappraises the situation and either renews or terminates the arrangement.

Share-cropping relationships benefit landowners who—for reasons such as infirmity, occupation elsewhere or vast landholdings—are unable to farm their own land. Sharecroppers are drawn to these relationships to access additional land while sharing the costs of start-up capital and not paying rent in advance. Furthermore, sharecroppers see value in sharing the risks of cultivation with landowners, a benefit which may be particularly significant for the poorest and most vulnerable households. Although it is sometimes argued that landowners unfairly influence the choice of crop cultivated by sharecroppers, WOL research indicates that the interests of both the cropper and landowner are closely aligned in maximising production and incomes. While share-cropping relationships have sometimes been labelled as exploitative, it seems clear that they make a contribution to the rural economy and deserve further research.

Lease

Lease is another mechanism for gaining access to agricultural land in Afghanistan. Landholders typically seek to lease land when they migrate or otherwise move away, and cannot provide the supervision of tenants necessary for sharecropping. In the WOL research sites, lease is most commonly identified in villages with a large number of migrant and absentee landlords. Researchers found lease to follow similar principles to rental agreements elsewhere, namely the possession of land released for a fixed period in exchange for a predetermined rent. Evidence from research sites suggests that leasees normally need to pay rent up to six months in advance and carry all the costs of cultivation (which makes lease a costly proposition for farmers). Furthermore, the tenant bears the whole risk of harvest failure. Therefore, it seems that farmers normally enter into lease agreements to acquire access to additional land when they

Why these differences exist among research sites has not been ascertained but it is thought they may derive from a wide range of bio-physical, social and economic factors. There is some circumstantial evidence that sharecroppers may be more empowered to negotiate in communities where land markets are active (i.e. those where the most land transactions were reported to have occurred since 2001).
already have sufficient resources to cover heavy losses through other land resources or income streams. Leasing constitutes a high risk, high return strategy with high transaction costs.

**Mortgage**

The practice of mortgage (gerawi) is widespread in rural Afghanistan. Commonly, the landholder gives possession of the land to the mortgagee in exchange for credit. The mortgagee gains the use of the land and its produce for a specified time (usually until repayment is made), which effectively constitutes the “interest” on the loan made to the landowner. Anecdotal evidence suggests that landowners frequently overran the agreed payment period and, in this situation, mortgagees usually allow the agreement to roll over for another year to extend the period for which they have use of the land. If the mortgagee demands settlement, then the debtor will be required to sell the land (following shafa rules, probably to a family member) in order to repay the loan.

Landholders mortgaged land for two main reasons: either to raise money for a celebration (such as a son’s wedding) or to resolve situations of financial desperation (such as servicing short term debts or purchasing household necessities such as food). Anecdotal evidence indicates that the likelihood of a farmer regaining his land is higher in the former instance of a planned mortgage, while desperation mortgages more often result in sale of land when debts cannot subsequently be cleared.

Given that mortgagees benefit from production revenues raised from the mortgaged land, the availability of rural credit through mortgage is likely to decrease if the production of land diminishes (e.g. due to drought conditions or a ban on poppy cultivation) and to increase as productivity increases. Another strong incentive for the supply of credit through mortgage is that land markets within communities are not usually free. Transfers of land seldom occur outside the family, and so the supply of credit by gerawi mortgage is a way of by-passing community and family restrictions to gaining access to land.

When the first year of WOL research was conducted there was little available data on how much agricultural land in Afghanistan was under private management and what proportion was cultivated under sharecropping, lease or mortgage arrangements. Unfortunately, during WOL data collection, no distinction was made between these different forms of access arrangements, so they are described in aggregate. However WOL findings suggest that between a third and a quarter of all cultivated land across the 20 research sites may be worked under some form of temporary access agreement (mortgage, lease or sharecrop). Therefore, these forms of tenure are of significance in the rural economy (especially since they may facilitate access to land under social and economic conditions where this may not otherwise be possible).

While share-cropping and other forms of temporary access (subordinate) rights are often associated with the landless, evidence suggests that landowners with holdings of diverse sizes benefit from these additional land access contracts. Using Pearson’s PMCC statistic, a marked positive correlation was identified between the amount of land originally owned by farmers and the amount that they additionally acquired through land use agreements such as lease, mortgage and sharecrop.

![Figure 10: The relationship between landownership and further acquisition of land through sharecropping, lease or mortgage](image-url)
It is assumed that farmers already holding significant land resources would tend to gain access to additional lands through lease or mortgage rather than through lower risk sharecropping arrangements.

**Common property**

Access to common property land constitutes an important productive resource for many farmers, allowing them to use seasonal pastures for grazing livestock and providing them with sources of fuel wood and construction timber. Women in some areas also use common access land for the collection of herbs and medicinal plants.\(^{64}\) WOL research indicates that the common property pastures are most significant for livestock nutrition areas. Common property offers an alternative where the cultivation of fodder crops is inhibited due to the lack of irrigation water or cultivable land, namely at rainfed and semi-irrigated sites (Figure 16). The nomadic pastoral communities participating in the research were largely dependent on access to common property pastures to sustain their pastoral livelihoods.

Working from a village perspective, WOL researchers found that local appreciation of common property land rights deviated from that of the *Amlak*.\(^{65}\) Claims of access to common land were justified in different ways.

- **Shared individual deed.** Common property rights may stem from an original land deed granted to an individual in a community. Over the passage of time, this has evolved to confer shared rights to all villagers. This situation was observed in the village of Maruf China in Nangarhar.

- **Common ownership (maraha).** The concept of jointly held access to community common land for grazing is enshrined in Afghan civil law.\(^{66}\) Evidence from research sites suggests that communities accord this status to land not on the basis of legal provisions (such as the Taliban’s “loud voice” article)\(^{67}\) but rather on the more pragmatic basis of actual use and locally negotiated *shura* agreements with neighbouring villages.

- **Customary rights.** A number of communities described holding exclusive or non-exclusive rights to state owned pastures through customary usage. These rights were upheld by *shura*, *jirga* or customary law.

Evidence on the effectiveness of customary systems mediating access to common property resources was mixed. Researchers noted examples of strong inter-community cooperation over forest management between neighbouring *khel* (clan groups) at Khawagi and Otharkhel in Nangarhar. Similarly, in Chechel Gunbad and Turmai in Ghazni, rainfed land is managed as common property. The community *jirga* decides on land management and agricultural inputs collectively.

However, these examples were tempered by equally widespread accounts of abuses and discord over land access. In Nangarhar, a longstanding dispute between the *Abdul Rahman* and the *Mohmand* tribes over an area of common land periodically escalates into violence, despite efforts to resolve it by *jirga*. In the same area, a powerful “commander” was reported to have recently appropriated 30 hectares of rangeland and has resisted community efforts to regain access. At Payda Rah in Ghazni, the community reported increasing encroachment onto (and displacement from) their traditional grazing lands by more powerful villagers from Wardak. Furthermore, both communities of nomadic pastoralists participating in WOL studies report having recently lost access to parts of their traditional summer pastures in Panjshir and Kabul provinces. In one instance, villagers seized the land

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64 Anthony Fitzherbert, "Water management, Livestock and the Opium Economy: Livestock husbandry" (Kabul, AREU, 2006).

65 The *Amlak*, a property department of the Ministry of Agriculture, is responsible for the administration of all rural lands.


67 *Land Law*, 2000 defined the area of *maraha* to which a village was entitled as being equal to the distance that a loud man’s voice would carry from the edge of the village.
for wheat cultivation.68

Many farmers identified threats to common property resources as arising primarily outside the community, from powerful actors who are not bound by local regulations and institutions. However, WOL researchers identified at least one instance (at Qala-i-Naw in Ghazni) where influential figures within a community appear to have acquired exclusive access to what was formerly common land. The case involved seven village elders who allegedly used their positions as community leaders to acquire a government deed (made out to them personally) to an area of pasture adjoining the village. This formed the basis for an ongoing community dispute.69 This evidence inevitably raises questions about the equity of resource allocation under informal institutions.

### 4.3 Local institutions and relationships

WOL research makes clear that land tenure is currently upheld and managed by the community. The practice of land management at farm level is far removed from the statutes and complex legal frameworks of Kabul. Farmers instead look to jirga, shura customary law and community consensus to uphold land tenure, access and transfer. Arguably, the absence of a strong guiding and facilitating land administration has made rural communities increasingly self reliant over recent decades. However, there is invariably a degree of “institution shopping” where individuals or groups decide which type of institution or legal system to work with on the basis of which is most likely to deliver an outcome favourable to them. Even farmers confident of their own land rights within customary tenure-systems will pay government land taxes to further guarantee their continued rights.

The informal systems of land tenure observed and recorded by WOL researchers are perpetuated by community members. These individuals perceive themselves as stakeholders in a wider system of land relations, encompassing both private and common access lands. Despite distortions in access and allocation (related to wealth and power asymmetries within some communities), the overall system can serve the interests of all stakeholders (albeit in diverse ways). In this way, system-based inter-dependencies are created at the village level (Figure 11).

Resource-poor members of the community benefit from access to land under (low-risk, low-return) sharecrop agreements with those who have more land than labour to cultivate it. These agreements can be brokered according to a range of terms that potentially allow even the most destitute to access land. These informal systems also guarantee access rights to common property, which are of particular value to those community members with only limited access to private land. Informal institutions also protect the interests of the resource-poor through shafa, keeping land within kinship groups. While this tends to stifle land markets, the release of land to mortgage creates investment opportunities for those with the resources and inclination. The leasing of land also provides for the transfer of

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69 McEwen, “WOL: Land Tenure.”
In all, 83 percent of cases pertained to private land, while only 17 percent of cases brought to the NRC concerned common land. The data further showed that the large majority of disputes over private land concerned the rights of ownership rather than access, boundaries or other related issues (Figure 12). This may indicate that lesser disputes (those not concerning full rights of ownership) do not generally emerge under customary institutions or are resolved within the village.

### 4.4 Strengths and weaknesses of the system

Informal systems of tenure such as those observed at the WOL research sites are perceived to confer a range of benefits onto those active within the system. Perhaps most importantly, customary institutions were viewed as legitimate and accessible to the concerns and needs of land users when compared with formal institutions (courts and Amlak), which were generally viewed as corrupt. While clearly imperfect in some respects, informal systems were seen to uphold the security of tenure and meet the needs of village stakeholders effectively. Decision-making and arbitration within the system was also considered effective by most farmers. Indeed, land users pointed out that the whole system depended upon the continuing support of stakeholders for its survival. Disputes were only taken to the formal court system as a last resort or when dissatisfied with a local judgment.

Farmers from the research sites reported that while disputes over land resources sometimes emerge within communities, customary institutions and systems of adjudication are usually successful in resolving these. They made the case to researchers that the major threats to security of tenure arose externally and therefore involved parties not bound by local customary law or community institutions. To explore these assertions empirically, WOL researchers undertook a preliminary analysis of records pertaining to rural land disputes archived in the case database of the Norwegian Refugee Council.

**Box 2: The Norwegian Refugee Council Database**

The NRC offers legal assistance services to Afghan returnees from its seven provincial offices (ILACs) covering a total of twelve provinces. When providing information or legal services to clients involved in disputes, ILAC staff record short case summaries for their internal records. Since 2004 this information has then been entered into the ILAC database. The vast majority of these disputes concern land and property.

Because of the nature of the NRC mission, ILACs deal almost exclusively with refugee or returnee clients. This means that the dataset is predisposed toward disputes where refugees constitute the “plaintiffs” or claimants. Even so, in 2006 NRC records constituted one of the very few available data sources quantifying land disputes in Afghanistan.

Recognising the limitation, the NRC database nonetheless offers a unique resource for reviewing the attributes of land disputes in Afghanistan.

Over half of all private land disputes brought to NRC involved either members of the same family or members of the same village (Figure 13). On the surface, this evidence is inconsistent with claims that disputes arising within villages are also resolved within villages. However, a high proportion of these disputes relate to returnees challenging property rights within their village of origin. So then, after a long absence, they might from the villagers’
point of view be considered “outsiders.” Almost all disputes occurring among family members concerned inheritance.

Actors external to the community (and therefore not likely to be subject to its customary rules and regulations) include commanders,70 the government and the residents of other villages. Eighty percent of all common property disputes involved these external actors, though they played a less prominent role in private disputes. This evidence is largely consistent with WOL research participants’ claims that disputes within communities can usually be resolved internally and that the failure of these mechanisms is more often associated with external actors.

A particular problem with customary systems of land rights observed by researchers relates to inheritance and ownership of land by women. While women have the right of inheritance, researchers have found that they are rarely able to exercise this right. Across all research sites, WOL researchers only identified one instance of a woman successfully inheriting and managing her own land (at Khalifat Rahmat, Herat). Even if they are able to successfully inherit land from their fathers, the study found that women usually lose effective control of their land when they marry. A number of instances of this were recorded in the village of Zala Qla in Ghazni. One obstacle to women securing their land rights relates to their access to, and representation at, community shura and jirga.

Research suggests that the customary adjudication of land disputes through jirga is not aimed to deliver restitutionary “justice” as much as to achieve socially acceptable solutions and contain potential conflict. At one location, it was reported that jirga had responded to contested land by splitting it in two. Elsewhere, judgement on competing claims was made by awarding to one party after he swore an oath on the Quran as to the validity of his assertions.

While evidence from most of the research sites questions notions of universally exploitative land relations, under some conditions these relations do not seem to confer benefits equitably. In the poppy cultivating district of Achin in Nangarhar (where land is scarce and highly valued) sharecroppers receive as little as a fifth of the product of the land despite the high labour investment required for cultivating poppy. Even so, prevailing markets for land and labour seemed to have no difficulty in finding sharecroppers under these terms. Similarly, case studies of gerawi mortgage arrangements

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70 The term “commander” is here used to describe powerful and influential individuals who may control armed militia by virtue of tribal or political affiliations, through patronage or other by forms of compensation.
suggest that surrender of productive assets such as land can place some landowners at considerable disadvantage. The gerawi system tends to be rigid and inflexible; evidence exists of borrowers surrendering more land than the amount required for the sum borrowed, simply because land itself is not infinitely divisible. Loss of income from surrendered land obviously diminishes the borrowers’ capacity to clear the outstanding debt. In this respect, gerawi deviates from “western” concepts of mortgage in which the mortgager generally retains possession of the mortgaged property.

As pointed out by farmers, customary institutions of tenure are everywhere vulnerable to power asymmetries. This is why (for all their declared satisfaction with informal tenure) farmers invariably stated that, given the option, they would prefer to hold formal title. The absence of formally recognised title is part of the reason why many villagers remain deeply suspicious of government; they realise that in the eyes of the state they are in a very vulnerable situation and hold no real guarantee of their land rights. Until farmers hold legally recognised tenure, backed by the full power of the state, they cannot be wholly secure in their land holdings.

4.5 Emerging directions for further research

These preliminary findings suggest a number of important questions deserving more detailed study.

- What are the proportions of land under different types of tenure? Do these proportions change with location and over time? Why?

- What is the income value to farmers of access to common property, and does this benefit all wealth groups equally?

- Just how effective are informal tenure mechanisms? Are the benefits of participation in customary systems equitably divided between all members of the community?

- Why is there such diversity in sharecropping arrangements? What would be the impact of changes in the productive values of land on the terms of sharecropping agreements and rural livelihoods generally?

- Can government authorities build upon existing customary land rights and tenure systems in the rehabilitation of the national land administration? Should they do so and if so, how?

- What are the main weaknesses of customary land administration and adjudication? Where are the main problem areas and what can government and other actors do to facilitate resolution?
5. Irrigation and Water Resources

Across much of Afghanistan, cultivation and agricultural production are dependent upon artificial irrigation. There is a long history of irrigation and water management in the country: in some areas, functional irrigation infrastructure and/or management systems are hundreds of years old. Even modern, planned systems of irrigation are usually built upon sound historical traditions of water management. Such is the importance of irrigation and effective water allocation that a system of community-based “social water management” has evolved in parallel to other authority structures in rural areas. Over recent decades, conflict, population displacement, weakened social cohesion and infrastructure in disrepair have contributed to a decline in irrigation efficiency. Government strategies now prioritise rehabilitation of irrigation and water resources management at multiple levels.

In the first year of the WOL project, studies focused upon characterising the water management systems which were being practiced across the primary research sites. This chapter commences with an overview of irrigation structures and a preliminary assessment of their performance. The general aspects of social water management systems are then described with particular reference to constraints and other pertinent issues. Finally, the chapter considers the relationship between water use in agriculture and vulnerability.

5.1 Irrigation systems and their function

Owing to the research site selection strategy, the 20 WOL research sites encompass a broad variety of irrigation systems including upstream and downstream surface water systems, karez systems,71 spring and well irrigation, as well as unirrigated rainfed lands.72 Explorations of 16 irrigation systems took researchers from the extraction at source down to farm level where farmers irrigate their crops. These studies recorded considerable diversity in how irrigation systems were laid out, constructed and operated. Due to this diversity, the following discussion of irrigation systems is organised by lower catchment (“irrigated”) and upper catchment (“semi-irrigated”) sites.

Lower catchment systems

Lower catchment sites have been previously defined as those lying on the floodplains of river valleys, usually associated with a perennial albeit fluctuating river flow, canal irrigation and intensively cultivated lands. Sites of this type were examined in Nangarhar, Kunduz, Herat and to some extent, Ghazni.

Half of the studied lower catchment systems were served by improved diversion structures at point of intake into primary canals (these were generally concrete weirs). However, evidence for improved canal structures was found at a much lower

71 Karez are underground canals tapping groundwater and conveying it by gravity through galleries to a point where it surfaces and can be used for irrigation or other purposes.

proportion of sites, predominantly along the Jagatoo River in Ghazni. Elsewhere, irrigation structures were predominantly traditional (of earthen or rock construction), with the exception of gated division boxes and bifurcations.

Improved intake structures are clearly designed to increase the efficiency of water extraction from source. Researchers, however, observed that where rivers meander widely, traditional diversion structures (necessarily rebuilt each year after flood damage) may offer communities more flexibility. A good example is the intake to the Wakil Jangal canal in Kunduz, which over 15 years has gradually been moved approximately 5 kilometres upstream to obtain the best intake. Notably, these traditional intake structures remain features of the primary canals which were studied along cultivated river plains of both the Kunduz River and Hari Rud in Herat.

Researchers note that due to the chronological evolution of canal systems, it is usually the oldest canals which follow the most suitable alignments and slopes and therefore offer the widest command areas. More recent canals have been restricted to the areas between the older ones, following less favourable courses, and therefore may be more prone to problems of silt deposition. The conveyance of water from intake to irrigated areas presents major problems where canal sections are unsuitable or banks subject to washing out or erosion. Water conveyed down primary canals then enters complex secondary and tertiary systems further from the river.

The extent of these systems and command area of the canal are determined by the slope of the river. In Ghazni, the Jagatoo River descends steeply between hills. Here, primary canals traverse agricultural land at angles to the river—to gain as much command as quickly as possible—and divide irrigated land into diagonal parcels. In this situation, canal command areas often form the boundaries between village lands, although larger villages may be served by several canals. However, the intakes of canals from lower villages may fall within the lands of upper villages, so some land of the upper village may be supplied by the lower’s canal.

Where river flood plains are wide with relatively little slope, water must be conveyed over many kilometres from the intake to achieve sufficient elevation to command the land. This can be observed on the Aq Tepa canal in Kunduz and the Atishan canal in Herat. In consequence, intakes are always situated outside the lands that their canals irrigate. Long primary canals tend to supply multiple villages along the length of their command areas, although some villages may be supplied by more than one canal. Irrigation infrastructures can thus create a complex web of relationships among communities using water along primary canals. Communities situated on the lower end of canals depend upon the effective maintenance and management upstream to ensure that water reaches the tail of the canal. For these larger systems to function there is a need for cooperation between communities along the canal.

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73 The command area is the total area that a canal can irrigate (by virtue of its elevation).
The research site at Dana Haji in Kunduz typifies a lower catchment tail end community. The offtake into the Eshanarak secondary canal lies about 11km downstream from the source of the Aq Tepa canal, and it supplies several tertiary canals in addition to the Dana Haji canal (Figure 14). There are no improved structures downstream from the primary bifurcation. A second canal (the lab-i-darya) irrigating the lower fields had been damaged by flooding in 2005 and was not operational.

All irrigation systems in Afghanistan follow seasonal cycles of water surplus and scarcity. At the end of the winter and start of the spring, river flows are at their lowest and much effort is required to get water into canals. Through spring and early summer, water levels reach their peak with melt-water flooding rivers and often damaging intakes and diversion weirs (see Table 15). Farmers must make regular repairs to keep the water flowing in. As floods recede and water levels decline, farmers will need to make further extensive repairs to intakes and damaged canal structures. Through the months of low water, farmers are faced with the problem of getting water into canals and conveying it the necessary distance to fields without losing too much.

Studies have identified that the period of melt water flood differs slightly around the country. Local peak flows come to Ghazni and Nangarhar at the end of March, but not to Herat farmers until a week or two later. Sites along the Kunduz River receive flood waters last, where flooding generally occurs in late April but endures longer than elsewhere.

The challenges facing lower catchment canal irrigation relate to their capacity to convey sufficient water to all parts of the system during the dry summer and autumn seasons. This is particularly important to enable farmers to have valuable second or even third cultivation seasons and harvests. In order to better manage water scarcity, farmers have widely adopted the mirab system (see Section 5.2)

**Upper catchment systems**

Irrigation systems found in the upper parts of catchments often draw from limited or seasonal flow sources such as springs, karez or streams. Of the eight sites of this type investigated, only one has an improved intake structure: the spring-fed system at Ghorak in Herat had been completely rehabilitated under an NSP programme. Three have some structural improvements including lined canals, concrete bifurcations, gates or storages. Irrigation systems at the remaining four sites were found to be unimproved.

These types of systems differ from lower catchment systems in a number of ways. Overall these systems are much smaller scale and usually confined to a single village. They are often associated with steep slopes, so canals are usually terraced. Canals necessarily follow contour lines to convey water to irrigated land and so trace long and winding courses between hills. As rate of discharge from springs and karez may be very low, it is common for these systems to include a hawz (traditional accumulation pool) which can be used to regulate irrigation lower down the system.
Karez were utilised as sources of irrigation water at research sites in Ghazni and Nangarhar. Among these, the three major types of karez are represented: Long, Short and Tile (with short karez as the most common). These karez derive their water from shallow aquifers in hills or subsurface flows along washes and all are of traditional stone-lined construction. Investigators found that the older karez generally produce the highest and most reliable discharge. This is because their mother wells have been best situated to drain aquifers and their subsurface shafts follow the best lines for collecting percolated water. Villages added on more recent karez as the population grew and tapped inferior resources. Unlike surface water systems, karez and the water they discharge may be privately owned (like wells).

At Payda Rah in Ghazni, land is irrigated from five separate karez and spring sources (Figure 15). Flows from these sources are irregular and insufficient for summer cultivation, but DACAAR has been working to assist the rehabilitation of the system.

Typically, farmers in upper catchments face severe water scarcity in the summer and autumn seasons. Only on the perennial upper Paikhar wash in Nangarhar (Khawaji, Othar Khel) is irrigation water sufficient for a second annual crop. Instead farmers often combine irrigated cultivation with rainfed cereals. At some sites (such as Sir Zar in Herat), marginal irrigation is sufficient only to allow communities to grow small plots of fruit or vegetables, which are extremely important for local nutrition and health.

<table>
<thead>
<tr>
<th>Site</th>
<th>Water sources</th>
<th>Crop (seasons)</th>
<th>Crop (diversity)</th>
<th>Water Supply</th>
<th>Constraints</th>
</tr>
</thead>
<tbody>
<tr>
<td>Khawagi</td>
<td>Perennial wash</td>
<td>2</td>
<td>6</td>
<td>49.5</td>
<td></td>
</tr>
<tr>
<td>Othar Khel</td>
<td>Perennial wash</td>
<td>2</td>
<td>6</td>
<td>52.25</td>
<td>Summer water shortage</td>
</tr>
<tr>
<td>Sra Qala</td>
<td>Karez</td>
<td>2</td>
<td>8</td>
<td>40.75</td>
<td>Siltation of intakes</td>
</tr>
<tr>
<td>Maruf China</td>
<td>Tubewell</td>
<td>1</td>
<td>6</td>
<td>30.5</td>
<td>Summer water shortage</td>
</tr>
<tr>
<td>Jani Khel</td>
<td>Perennial River</td>
<td>2</td>
<td>9</td>
<td>87</td>
<td>No major problem</td>
</tr>
<tr>
<td>Ghazni</td>
<td>Karez</td>
<td>1</td>
<td>5</td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>Pyada Rah</td>
<td>Karez</td>
<td>1</td>
<td>4</td>
<td>29</td>
<td>Karez maintenance</td>
</tr>
<tr>
<td>Qala-i-Naw</td>
<td>Perennial River</td>
<td>2</td>
<td>6</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>Turmai</td>
<td>Wells</td>
<td>2</td>
<td>7</td>
<td>59.25</td>
<td>Unplanned sinking wells</td>
</tr>
<tr>
<td>Chel Gunbad</td>
<td></td>
<td>2</td>
<td>4</td>
<td>52</td>
<td>Long irrigation intervals</td>
</tr>
</tbody>
</table>
The performance of irrigation systems

With the possible exception of sites along the Jagatoo River in Ghazni, water availability was found to be a serious constraint upon agricultural productivity. The basic characteristics of irrigation at research sites are set out in Table 13.

In this table “water supply” is an arbitrary value derived by aggregating farmer assessments of how fully their irrigation needs were met in each individual season of the year. This value should not be confused with absolute quantities: Farmers growing water-intensive crops such as fruits, nuts or vegetables will have higher water requirements than cultivators of dry cereals. However, the value indicates farmers’ satisfaction with water availability relative to their own agricultural strategy, and so facilitates comparison among different types of production systems.

These findings confirm the intuitive assumption that irrigation water supply appears to be positively correlated to crop diversity (Pearson coefficient, r=0.565). However, field observations suggest that the situation is more nuanced than a direct

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74 Individual farmers were asked to select from a range of categories to describe the sufficiency of the irrigation water they had received for each season of the previous year. Categories instead of numbers were used for simplicity and clarity. These responses were then enumerated and annual means calculated for each research site. They pertain to the year 2005-2006, a year of good rains in many parts of Afghanistan.
relationship between water supply and agricultural diversity.

Perhaps less important than the absolute quantity of water is its availability. Irrigation systems must be able to convey water to agricultural land during the annual period of low flow if a second crop is to be possible. A second annual crop allows farmers to increase productivity of limited land resources and so makes important contributions to rural livelihoods. As Table 13 shows, a second crop is grown at many sites irrigated from a perennial source. However, water scarcity during the low flow season generally results in a reduction of the area under cultivation. The evidence of this study indicates that during the low flow period, most farmers could only bring a proportion of their available land under cultivation. Consequently, the fact that farmers are able to grow two or more crops annually should not necessarily be taken as an indicator of irrigation efficiency. It might be better to compare the area of low-flow irrigated cultivation (and the types of crops it is possible to grow), to that in the season of peak flow.

Only in Ghazni, where the Band-i-Sultan dam is utilised to stabilise the flow of the Jagatoo River, was there little apparent difference in irrigation performance between seasons. Many Ghazni farmers have also sunk tube wells to supplement surface water irrigation during periods when the river is low. Because of their relatively secure irrigation status, farmers in the Jagatoo River valley are able to cultivate perennial crops throughout the year (high-value orchard fruits intercropped with fodder and vegetables).

Researchers observed that a second important temporal unit affecting farmer decision-making and cultivation practices is the “irrigation interval.” This is the period between successive irrigations. It is determined by the rotating allocation of water among farmers sharing a water source. It was noted at some sites that, although available water could potentially support more diverse and higher-value crops, the length of the irrigation interval (in some cases up to 10 days) precludes this. In Achin district of Nangarhar, the long irrigation interval may have been a factor contributing to farmers’ decisions to cultivate opium poppy.

<table>
<thead>
<tr>
<th>Table 14: Irrigation performance and agro-ecological context</th>
<th>Mean crop diversity</th>
<th>Std. dev</th>
<th>Water supply</th>
<th>Std. dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrigated</td>
<td>8.44</td>
<td>2.698</td>
<td>57.72</td>
<td>14.534</td>
</tr>
<tr>
<td>Semi-irrigated</td>
<td>5.57</td>
<td>1.397</td>
<td>39.32</td>
<td>9.048</td>
</tr>
<tr>
<td>Rainfed</td>
<td>3.75</td>
<td>0.500</td>
<td>37.87</td>
<td>7.273</td>
</tr>
</tbody>
</table>

Organisation of data by site type exposes marked differences among them. One-way ANOVA reveals statistical differences in both crop diversity \( p=0.003 \) and water supply \( p=0.014 \). Using the Tukey HSD post-hoc test it was determined that water supply was significantly different between irrigated farms and those in more marginal areas (semi-irrigated and rainfed). Likewise, the post-hoc test showed that significant difference in crop diversity lay between irrigated farms and the other two categories.

However, the availability of water from source does not solely determine the quantity and timing of water allocation to farmers. Irrigation structures ultimately function to harness water resources from a natural state and channel them into managed environments. This management alone allows the agricultural potential of these resources to be realised and benefits transferred to water users. Therefore, the second part of this chapter turns to consider the ways in which Afghan farmers and communities organise themselves to manage water for agricultural use.

75 Data suggest that low-flow cultivation could range from about 90 percent of peak cultivated area down to as low as 30 percent.
5.2 The management of water resources

The effective operation of irrigation systems in Afghanistan requires considerable management inputs. Intakes must be maintained and aligned to ensure the best possible extraction of water into the canal systems throughout the annual flow cycle. Necessary repairs and maintenance to canals and other structures must be first identified and then supervised. Entitlements and allocations among water users must be determined and enforced, with any disputes arising from the allocations resolved. It is within this context of need that the system of the community-embedded *mirab* (water master) has emerged.

The *mirab* system is widespread across Afghanistan. Large-scale, centrally-planned irrigation schemes, such as those governing the Helmand and Kabul River Valley, were built during the 1970s. They tended to replace community-based water management with civil servants and government technicians. This top-down, centralised management has proven particularly vulnerable to civil disruption and sporadic conflict over recent decades, and consequently, some areas have readopted the *mirab* system for their primary canals.

It is often assumed that all irrigated water sources have *mirabs*, but WOL research demonstrates that this is not the case. Not only are *mirabs* not normally involved in the management of large state-planned irrigation schemes, but they are sometimes absent from smaller, informal irrigation systems. Furthermore, investigations focusing on four provinces indicate that considerable differences in approach exist for water management around the country.

The organisation of water management

Despite regional differences, where it exists across the country the *mirab* system has several recognizably common features.

- *Mirabs* are individuals appointed by landowners holding irrigation entitlements (or their nominees), rather than by government.
- The appointment is not hereditary, but depends on the support of the communities served. *Mirabs* are frequently replaced if their performance is poor.
- *Mirabs* live within the command area of the canal they serve and usually own land within the same system.
- Generally the *mirabs* of primary canals are from the lower end of the system, which is most at risk from water scarcity.
- Usually, *mirabs* are paid and supported by the irrigators of the canal rather than by the government.

In large scale systems involving many users and complex relationships, the system of the *mirab* is sometimes developed into a hierarchical structure. Senior water masters (known as *maribashi* or *wakil*) represent all primary canal communities and lower *mirabs* (*kokbashi* or *chakbashi*) work at the secondary canal level. This multi-tiered organisation was observed in the major lower

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**Figure 16: The institutional arrangements for irrigation water management**

![Diagram of institutional arrangements for irrigation water management](image)
catchment systems of Kunduz and Herat, where water management demands were greatest.

However, communities with restricted water resources and little irrigated land (often upper catchment sites) do not normally appoint a specialist mirab. Instead, these communities often use an elder or other community leader to take responsibility for the allocation and management of water resources. The absence of the mirab system at these locations may be because some are settled nomadic or semi-nomadic herders with no prior culture or institutions of water management. By utilising traditional community leadership structures, these communities avoid creating additional and potentially competitive layers of authority.

A good example of water management in the absence of the mirab system is karez irrigation. At all research sites which utilise karez, these were either managed by the community shura or by private individuals. Local shuras (such as those in Payda Rah and Zala Qala in Ghazni) discuss the performance and necessary maintenance of their irrigation systems and may call upon community members to implement decisions.

Overall, evidence shows that the mirab system has been adopted in locations where the greatest management demands exist and the political context of management is most complex (i.e. multiple water using communities). Figure 16 sketches out the rough relationship among these determinants. However, it was also found that in situations of extreme water scarcity, communities would sometimes appoint a mirab (often only temporarily), in an effort to alleviate water stress.

Mirabs are appointed by their community peers and are charged with ensuring that irrigated water reaches all farmers’ fields in accordance with customary rights and entitlements. In return for fulfilling this responsibility, the mirab receives a payment (usually in kind as harvested wheat) from

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77 Often the community arbab plays this role.
the beneficiaries of his services. The rate of annual compensation was found to vary significantly among research sites. Rates seemed to range from 588kg of wheat for a mirab (kokbashi) on the Aqtepa canal in Kunduz to 2400kg of wheat for a mirab along the Atishan canal in Herat. Consequently in 2005, most lower-tier mirabs were receiving an equivalent of between USD100-USD200 annually. The position of mirab should be considered semi-voluntary, with the prospect of enhanced community status being one of the few incentives to take it.

A widespread institution of social water management, (both in those areas with mirabs and those without) is the system of hashar. This is the labour or in kind contributions provided by farmers toward the maintenance of their irrigation system. Where mirabs do exist, the supervision of hashar is an important responsibility of their position. As previously noted, the traditional irrigation structures prevalent in rural Afghanistan require considerable maintenance annually: to repair flood damage; clear silt from canals/karez; and to make adjustments to intakes to improve abstraction. Each farmer’s hashar contribution on each canal is calculated on the basis of the area of land he cultivates (and thus his water allocation). In some areas maintenance operations are underway for up to 60 days each year and demands on any individual farmer’s time may be heavy.

As evidenced by Table 15, the greatest demand for hashar generally coincides with the busiest period of the agriculture calendar, when land is prepared for summer crops and livestock are birthing and lactating. Consequently mirabs and other water managers often face difficulties raising manpower for annual maintenance works. These problems are greatly accentuated in lower catchment irrigation systems, where the conveyance of water to the tail of the canal will depend on effective cooperation among water users along different sections of the canal’s length. This need for canal-wide cooperation among communities has at some sites led to the adoption of the multi-tiered mirab system.

A further problem associated with irrigation maintenance in lower catchment systems is the distance the canal needs to run in order to gain command of the land. At research sites in Kunduz, some farmers need to walk to up to 4 hours to reach canal intakes belonging to their village. This clearly makes maintenance difficult. In upper catchment systems, canals are generally much shorter but problems may arise where intakes lie on the irrigated land of upstream villages.

Water entitlements and sharing

Evidence from various research sites indicates that surface water is generally regarded as a common property resource and subject to community management. Water may also, however, be private property if extracted through a privately-constructed karez or tube well. Under these circumstances the community has no say in the use of this water, even where over-extraction has an adverse effect on other irrigation systems.

Individual water allocations to surface water irrigation are normally based on landownership. All irrigated or semi-irrigated land in Afghanistan comes with some form of accompanying water right and land is never sold or transferred without this right. The only exception to this rule occurs if agricultural land is sold for urban development, in which case the water right is not transferred but may remain with the original farmer to use elsewhere on his land.

Illustration 2: Camels drink from spring fed lined irrigation channel, Herat province
In theory, the water allocation for any particular canal (the amount directed to flow into it) should be sufficient to fulfil the recognised water entitlements of all the land owners along it. Community leaders and irrigators will be aware of these collective and individual entitlements, probably in terms of a timed period of flow through the canal intake. However, in practice the full canal allocation will only be achieved if sufficient water is available from upstream. While this principle of aggregating water rights to the canal level extends across all provinces covered by the WOL study, there are clear differences among systems and units of measurement.

In Kunduz, water allocations are calculated according to a formula of weight-to-time called paw-ab-daqiqa, (paw of water per minute). Although literally translating into a fixed unit, the measure of a paw varies according to the position along the canal. At Dana Haji at the tail end of the Aq tepa canal, a paw is reported to be sufficient to irrigate only 0.2 hectare of land while at other locations it was reported sufficient to irrigate 2 hectares. The unit may therefore be linked to the amount of water and rate of flow in the source canal: positions lower down the canal access comparatively less water for the same period of flow as higher up.

Water entitlements along the Atishan canal in Herat follow a different system, based upon the juftgaw. This historical measure describes combined units of land and irrigation water, and is based upon the area a pair of oxen can plough in a day. Like the paw, the value of the juftgaw varies according to local land and soil conditions and position on the canal. The water entitlement of any particular community is the sum of the juftgaw for that community and allocations along the primary canal are calculated according to historical juftgaw rights.

Water entitlements, defined by various localised nomenclature and units (but universally linked to land holdings), determine the allocation to communities along secondary and tertiary canals. However, the actual distribution of allocation among farmers follows a traditional system of rotation widely known as the shab-wa-roz (night and day) system. According to this system, farmers receive a multiple or a fraction of 24 hours flow of water, based upon their individual entitlements. For example, a farmer at one research site in Ghazni

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78 In Balkh, the local unit for allocating irrigation water is the Paikal, which differs from either the Paw in Kunduz or the Juftgaw in Herat. It seems probable that other regions of Afghanistan may utilize other localized units of water allocation.

79 The shab-wa-roz is also known as the mardi kar system in Kunduz.
described how his tertiary canal flowed for 24 hours every 8-10 days. The farmer described how his share amounted to 3 hours of this 24 hours in 8-10 day cycle. At most research sites, the mirab holds responsibility for ensuring that water distribution follow the prescribed allocation and resolving any disputes which may arise among water users.

At some research sites, there is evidence for the informal loan or sale of water between farmers. During periods of scarcity, an upstream farmer receiving a surplus to his need may agree to loan water to a farmer with insufficient water for his crop. The loan will usually be agreed as hours or fractions of hours within the shab-wa-roz, and the downstream farmer commits to repay the same number of hours in future or a proportion of his crop. In some cases, water may be sold for cash, particularly water from private sources such as tube wells or private karez. On occasion, tail end communities may even appeal for the release of additional water from upstream on the basis of religious charity.

**Function and equity in social water management**

A great strength of the mirab system is that mirabs are rooted in the communities that they serve, rather than externally imposed by government bureaucrats. Mirabs will have comprehensive knowledge of local water rights and entitlements and are also in a position to bring degrees of social pressure to bear on transgressors. Mirabs can be (and frequently are) replaced by their constituents if their performance fails to meet community expectations. In this sense, they are more directly accountable to the community than if they were government employed.

In addition, customary water management offers flexibility at a local level, allowing farmers to share and exchange water on a needs basis. Although generally under-resourced, the customary system does allow rapid community responses to immediate need (such as damage to an intake during the important peak flow season). These are clear advantages over more formal systems of irrigation management. However, customary water management is also characterised by a number of serious weaknesses.

In the first instance, mirabs are selected by the landowners who hold water rights to the canal in question. Landless sharecroppers or tenants do not normally participate in the selection process. Women may also not represent themselves on water issues, although those holding water entitlements may be represented by a male proxy. Of all primary research sites, only in Achin district of Nangarhar does the whole (male) community participate in the selection of the mirab. It is therefore apparent that the mirab system primarily works at the direction of the land-owning elite rather than the community at large.

Furthermore, it has been observed that some mirabs obtain and retain their positions by political influence and wealth. They may be able to continue in the role despite complaints and the dissatisfaction of small-holders, tenants and sharecroppers. In one instance, researchers found that the wakil (primary mirab) of an important agricultural area was a former commander with strong political and ethnic affiliations who could potentially intimidate weaker constituents into continuing support for his position. However, a more general problem is the lack of capacity among mirabs.

Compensation for holding the position is small and, as working farmers themselves, mirabs have competing demands on their time. Poor compensation raises the incentive to overlook transgressions or accept bribes from irrigators. Furthermore, mirabs depend entirely upon the cooperation of the community to contribute to hashar and comply with negotiated resolutions to disputes. The mirab has no power of enforcement and must work alongside other local authority structures (the members of which may hold their own vested interest in water allocation). Moreover, without access to heavy equipment for canal operation and maintenance (or even a regular operational budget), there are clear limits on the effectiveness of mirabs in managing water.

A clear cause for concern associated with the customary management of water pertains to uncontrolled extraction from private water sources
which is likely to have severe impact on local groundwater, with implications for crops. Sub-surface water, extracted by privately owned tube wells and karez, is considered to be private property and thus falls outside the purviews of community management. Researchers observed that in some areas of Nangarhar and Ghazni, wealthier farmers were sinking tube wells for uncontrolled extraction either for use on-farm or, more often, to sell to adjacent farmers. Although the sinking of unapproved wells is technically illegal, lack of enforcement means that tube wells have proliferated in the Jagatoo valley in Ghazni. Some wells were also observed in very close proximity to canals and other surface water conveyances and so were effectively drawing on these sources without being subject to customary regulation. Mainly it is the wealthy who can afford to sink tube wells on their land and poorer water-deficit neighbours who are disadvantaged. These circumstances exacerbate economic and agro-ecological inequities.

Despite the existence of widely understood entitlements and regulations, subject to the supervision of customary institutions, transgressions, disputes and water theft are reported at many research sites. While these problems are geographically widespread, generally speaking, the management of water in upper catchment (semi-irrigated) sites is less complex than in wide river valleys. Although water is usually scarcer, infrastructure is simpler and systems may be limited to a single or very small number of communities. Furthermore, as slopes are often steeper and conveyance distances shorter, there may not be the same systemic inequities that occur at the end of long flood-plain canals. The management of water can be more problematic where more competing interests (economic but also social, ethnic and political) are at stake.

Researchers found that mirabs rarely come from upstream communities. This is not so much to ensure that downstream communities’ interests are better represented, but because upstream communities do not need them. Downstream communities are disadvantaged in several important ways through the organisation of irrigation in Afghanistan.

The hydraulic performance of canal structures means that (all other factors aside) the tail end will always receive less water than the head. This problem is particularly exacerbated where canals are long, slopes are low and the canal structures themselves are unimproved. These features were all found characteristic of major irrigated agricultural areas in the study. Under these conditions, hydraulic inequities along the canal are further compounded by high conveyance losses.

Upstream communities (by virtue of their location) are in a position to exceed their allotted water entitlements to the direct detriment of those lower down the system. Evidence from research sites demonstrates that this does sometimes occur.

While there are strong incentives for down-stream communities to contribute hashar to clean and maintain the whole length of the canal system, the same incentives do not exist for upstream communities. Their only real concern is the performance of the intake. Consequently, it was observed that downstream communities contribute disproportionately to labour for canal maintenance. This was observed in Kunduz on the Char Gul canal, where men from the village of Afghan Mazar, at the tail of the canal, were compelled to clean the whole
length of the canal to the intake 20 km distant to ensure they received water.

Rural Afghans have a proverb that clearly indicates the structural and social inequities in water allocation faced by those at the end of the canal. It suggests that these inequities may be beyond the influence of the *mirab* to resolve.

*Even though you be the son of a mirab, it’s better to be one intake higher up the canal.*

With reference to the three categorised land types (Section 3.3), research indicates that the land seasonally best served with water resources and associated with the most complex infrastructure is also that with the potential for the greatest inequities in distribution. Conversely there is evidence from areas with limited or irregular irrigation of a simplified and less political management. By logical extension, in the absence of irrigation (for example, in rainfed sites), water is scarce, but distribution wholly equitable.

### 5.3 Water management and farmer livelihoods

Accessing and managing water effectively is essential to the livelihood security of most farmers. The situation and conditions of irrigation (both water availability from source and subsequent management) affect farm systems (and by extension rural livelihoods) in important ways.

First, the availability of irrigation water (both quantity and timings/rotation) is an important factor influencing farmer options concerning which crops to cultivate. It has been observed that, with the exception of opium poppy, the cultivation of high-value horticultural or industrial crops (such as oil seed, cotton or sugar) is largely restricted to river valley sites where land is well irrigated.  

Even where water scarcity or other problems deter the cultivation of high-value cash and industrial crops, the cultivation of fodder crops (including perennial lucerne or annual clover) is important to many farmers. Although these can be marketed, their primary function is to support domestic livestock, usually cows. Data show that water scarcity may preclude the cultivation of irrigation intensive fodder crops, with direct implications for rural households in terms of nutrition and subsistence. Conversely, researchers have argued that poppy (requiring relatively little water after initial

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80 For more detailed data on cropping patterns at sampled research sites, see Roe, “WOL: Baseline Survey.”
irrigations) becomes comparatively more attractive to farmers who face water-scarce conditions.

Households with access to only small areas of land (<0.2 ha) are especially vulnerable to water scarcity. This is because with such limited land resources they are under pressure to grow high-value crops (if not poppy, then vegetables) to extract maximum value from the limited land area. Licit high-value crops are often very water intensive. Furthermore, smallholders do not have sufficient land to forgo cultivation of one part in order to direct additional water to another (a strategy often employed by medium and larger scale farmers, which allows them to grow higher-value crops). Consequently, the related factors of water and land scarcity in combination interact as “multipliers” of vulnerability.

Farmers’ access to water also influences crop diversity. Many Afghan farmers use agricultural diversification as a strategy for spreading risk and strengthening livelihood security. Looking at the farm strategies of prosperous farmers, cropping invariably includes a combination of food staples for domestic consumption, high-value crops for sale and fodder crops to support livestock. At WOL research sites, communities with the most secure access to water could cultivate 13 types of crop over two or more annual growing seasons. By contrast, communities with only marginal water resources were restricted to 3 or 4 crops in one growing season. Lack of diversity renders farmers vulnerable to crop failures, plant diseases, pests or weakening markets.

Unless farmers have unviable land holdings (<0.2 ha), they usually cultivate for subsistence (household consumption) first. Only after these household needs have been met do they dedicate the remaining land to market-oriented crops. Consequently, where farmers are restricted by water availability to one growing season with only 3 or 4 crops, these are usually low-value and predominantly intended for household consumption. Water scarcity, then, may also dampen economic mobility by trapping farmers at subsistence level production, precluding entry into agricultural markets.

The opportunity costs of labour committed to canal maintenance include opportunities for on-farm work and off-farm paid labour. For the resource poor and vulnerable (e.g. those at the tail end of low-slope river valley systems), off-farm labour may be an opportunity to supplement low agricultural incomes. Inequitable divisions of labour will therefore impact most heavily on the resource disadvantaged, and further accentuate economic differences.

In contrast to the problems associated with water scarcity and inequities in management, research provides examples where water irrigation appears to work quite effectively. One is found in Ghazni on the Jagatoo River. Here, not only does the Band-i-Sultan dam stabilise and regulate the flow of water at source, but there is greater evidence of infrastructural modernisation, which reduces conveyance losses and improves management. The slope of the Jagatoo River canals is not long, simplifying issues of water allocation and cooperation along canals. In all cases, water distribution is overseen by village councils rather than by a specifically nominated mirab (or mirabs) and labour is not as onerous or unequally allocated as elsewhere. Under these circumstances, Jagatoo River land is generally well irrigated, allowing farmers to grow high-value perennial orchard crops (including apricots, plums and apples) in addition to cereals and vegetables for household consumption. Water is also sufficient to allow intercropping orchards with fodders, supporting livestock production as an addition to horticulture.

5.4 Emerging directions for further research

These findings form the first year of WOL research raise some specific questions which deserve more detailed attention in subsequent years.

- Are customary water management institutions fundamentally inequitable? Can this inequity be measured? If fundamental inequities exist, why is this the case and who is benefiting?
- How do water management institutions respond
to scarcity? What strategies do they adopt and how effective are these in managing it?

- How does irrigation water supply affect agricultural yields, crop choices and land management? To what extent can the impact of irrigation efficiency be measured in livelihoods?

- To what extent (and how), should customary water management institutions be utilised in planning the rehabilitation and development of water resources management in Afghanistan?

- What are the agricultural and livelihood benefits to farmers of rehabilitating irrigation conveyance at the village level, (as opposed to the basin and canal levels where development planning is focused)?

- What since 2001 has been the impact of government policy and donor programming in irrigation water management? What steps have been effective and what has been learned?
6. Livestock and its Management

Historically, the management of livestock and sale of its products have made an important contribution to rural livelihoods in Afghanistan. With large areas of the country unsuitable for cultivation, but seasonally or perennially exploitable for livestock, the rural populace has commonly managed stock either as a complementary component of mixed farming or alternatively as specialist pastoralism. The importance of livestock is now recognised not only in terms of livelihoods and rural food security but also as a potential contributor to natural national economic growth. Although surprisingly resilient through the years of conflict, the livestock sub-sector was severely affected by drought between the years 1998 and 2003, which was understood to have precipitated significant decline in livestock numbers.

The first year of WOL research focused on characterising the basic features of livestock ownership and husbandry at research sites across the country, examining the practices of management and the opportunities for (and constraints upon) livestock development. Furthermore, researchers set out to examine the ways in which livestock management interacts with other aspects of the farming system (something which has hitherto not commanded much attention in Afghanistan) and NRM more widely. In this way, studies were designed to gather valuable baseline data as well as to facilitate more in-depth investigations in subsequent project years. The main areas of study were sheep, goats and cattle, while recognising that other species such as poultry, donkeys and camels may also make important contributions to rural livelihoods.

6.1 Livestock ownership

Overall, WOL research determined that most households across the 20 research sites used some form of livestock within their livelihood system. Just over 62 percent of all sedentary households kept at least one sheep or goat (mean 9.37, Std. dev. 13.342), and 57 percent reported ownership of cattle (mean 2.543, Std. dev. 1.607). A further 2 percent, mainly in the northern province of Kunduz, owned camels. A more detailed description of livestock ownership patterns is given elsewhere.

Some general observations can be made from reported patterns of livestock ownership (Table 16). First, it can be seen that while sheep and goat ownership may vary widely among provinces, among villages and among households within villages (evidenced by high standard deviations), we observe much less diversity in cattle ownership. Generally, farmers in the sample group owned just one or two cattle, which may suggest production was directed principally to domestic supply.

On superficial inspection, it appears that the largest sheep and goat populations are associated with research sites under rainfed cultivation.

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Table 16: Mean household ownership of Cattle and Small Ruminants by research site

<table>
<thead>
<tr>
<th>Research Site</th>
<th>Small Ruminants Mean (Std.dev)</th>
<th>Cattle Mean (Std.dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kunduz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdul Nazar</td>
<td>5.00 (6.50)</td>
<td>2.66 (1.50)</td>
</tr>
<tr>
<td>Alam Bai</td>
<td>4.42 (3.64)</td>
<td>2.00 (1.73)</td>
</tr>
<tr>
<td>Dana Haji</td>
<td>1.81 (1.66)</td>
<td>2.45 (1.69)</td>
</tr>
<tr>
<td>Wakil Jangal</td>
<td>4.17 (9.30)</td>
<td>3.26 (1.78)</td>
</tr>
<tr>
<td>Afghan Mazar</td>
<td>2.91 (9.72)</td>
<td>1.86 (1.53)</td>
</tr>
<tr>
<td>Nomads</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khomari Khel</td>
<td>44.4 (36.19)</td>
<td>1.13 (0.99)</td>
</tr>
<tr>
<td>Kutub Khel</td>
<td>48.1 (47.22)</td>
<td>0.40 (1.26)</td>
</tr>
</tbody>
</table>

81 Means and standard deviations here are given for those households owning one or more animal, not for all households in survey.

82 See Roe, “WOL: Baseline Survey.”
hypothesis that livestock ownership relates to local agro-ecological conditions of farming was then tested through one way Analysis of Variance (ANOVA).

Analysis of variance confirms that ownership of small ruminants and cattle vary according to agro-ecological conditions. These differences appear most acute for small ruminants ($p=<0.005$), with the largest holdings of these stock found at rainfed research sites, and the least at irrigated river valley sites. Cattle populations show less overall variation. Standard deviations for cattle suggest greater homogeneity both within and among research site groups. At the 0.05 level of significance, post-hoc comparison using the Tukey HSD test reveals that the number of small ruminants owned by rainfed farmers differs significantly from ownership by semi-irrigated or irrigated farmers, which does not statistically differ.

At this stage, it has not been finally determined whether high sheep and goat populations at rainfed sites correspond to some comparative advantage for herding in those areas, or whether, conversely, they reflect the lack of opportunity for other forms of farming. What is clearer is that cattle numbers appear to be more independent of agro-ecological context. This may suggest that use of rangeland resources is less important in their management or, alternatively, that farmers prefer to manage very small numbers of cattle, even where resources might allow for more.

The first year of WOL research investigated the practice and organisation of livestock husbandry within farm systems in considerable detail.83

<table>
<thead>
<tr>
<th>Research Site</th>
<th>Small Ruminants Mean (Std.dev)</th>
<th>Cattle Mean (Std.dev)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nangarhar</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khawagi</td>
<td>0.85 (0.77)</td>
<td>0.53 (0.75)</td>
</tr>
<tr>
<td>Othar Khel</td>
<td>2.90 (1.09)</td>
<td>0.33 (0.55)</td>
</tr>
<tr>
<td>Sra Qala</td>
<td>0.57 (1.75)</td>
<td>1.09 (1.20)</td>
</tr>
<tr>
<td>Maruf China</td>
<td>1.80 (2.32)</td>
<td>0.68 (1.00)</td>
</tr>
<tr>
<td>Jani Khel</td>
<td>0.19 (0.61)</td>
<td>1.08 (1.25)</td>
</tr>
<tr>
<td><strong>Ghazni</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zala Qala</td>
<td>13.53 (14.44)</td>
<td>0.33 (0.90)</td>
</tr>
<tr>
<td>Pyada Rah</td>
<td>11.00 (9.64)</td>
<td>2.33 (2.08)</td>
</tr>
<tr>
<td>Qala-i-Naw</td>
<td>1.07 (2.92)</td>
<td>1.36 (1.39)</td>
</tr>
<tr>
<td>Turmai</td>
<td>0.70 (1.60)</td>
<td>0.75 (1.72)</td>
</tr>
<tr>
<td>Chel Gunbad</td>
<td>9.85 (10.51)</td>
<td>2.00 (1.73)</td>
</tr>
<tr>
<td><strong>Herat</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tunian</td>
<td>3.00 (6.52)</td>
<td>0.80 (1.10)</td>
</tr>
<tr>
<td>Gawashk</td>
<td>1.55 (1.40)</td>
<td>1.00 (0.72)</td>
</tr>
<tr>
<td>Khalifa Rahmat</td>
<td>17.27 (17.95)</td>
<td>3.22 (3.26)</td>
</tr>
<tr>
<td>Ghorak</td>
<td>15.23 (13.30)</td>
<td>0.00 (1.00)</td>
</tr>
<tr>
<td>Sir Zar</td>
<td>18.85 (19.57)</td>
<td>1.35 (1.46)</td>
</tr>
</tbody>
</table>

Irrigated lower catchment systems

Studies across all research sites suggest that when farm land is intensively irrigated, this can create a stable basis for livestock production, notably through grain and fodder production, but also reliable access to water.

Field observations from the Jagatoo valley in Ghazni provide a compelling illustration of crop and livestock integration. With good access to water and effective irrigation management, the river valley villages specialise in high-value horticultural crops, notably fruit orchards of Bukhara plums, apples and apricots. These are intercropped with perennial lucerne (*Medicago sativa*) which grows for five or six years and is cut three or four times per season. In some places,

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83 Fitzherbert, “WOL: Livestock Husbandry.”
annual clover is also intercropped and harvested four times. Intercropping benefits both crops; the fodder crop is assured the same regular irrigations that the high-value crop receives, while the trees benefit from the fixation of nitrogen. Other land is used to cultivate cereals and vegetables for domestic consumption.

In addition to feeding animals directly, several forage crops and herbage on pastures are also cut and stored for hay, as is straw after threshing of cereals. All other edible crop and vegetable residues (including weeds and fallen leaves in the autumn) are collected as feed for stock. In the Jagatoo villages, livestock feed during the day around the edges of the cultivated land, irrigation canals and pathways, which contribute to the fertility of soils. During the cold winter months, animals are housed in stalls and hand fed straw, hay or other stored crop residues.

Similar patterns of integrated crop-livestock management were recorded at the village of Jani Khel on the Kabul river irrigation scheme where a diverse range of crops are cultivated, including cash crops such as sugar cane and cotton. It was also observed in the irrigated villages of the Kunduz river valley. At irrigated sites with direct access to rangeland (such as Gawashk in Herat, Chechel Gumbad in Ghazni and Afghan Mazar in Kunduz), grazing on cultivated land may be supplemented by some seasonal use of pastures.

The number of sheep and goats managed by households solely dependent on their irrigated farms (and without access to rangelands) are limited by the land area available for the cultivation of fodder. Even relatively large irrigated land holdings (if cultivating a normal variety of crops) may be insufficient to support more than a few animals.

As previously noted (Section 5.1), irrigated river valleys are associated with high crop diversity and the potential for high-value cash cropping. The management of sheep and goats in these villages may therefore be related to the availability of cash for investment and desirability of diversification. However, with relatively small herd sizes recorded at the household level, it seems unlikely that small ruminants constitute major sources of cash income.

<table>
<thead>
<tr>
<th></th>
<th>Small Ruminants</th>
<th>Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Std.dev</td>
<td>Mean</td>
</tr>
<tr>
<td>Irrigated</td>
<td>3.57</td>
<td>9.10</td>
</tr>
<tr>
<td>Semi-irrigated</td>
<td>5.87</td>
<td>9.68</td>
</tr>
<tr>
<td>Rainfed</td>
<td>14.36</td>
<td>17.03</td>
</tr>
</tbody>
</table>

Data indicate (and field observations support) that the majority of lower catchment households who own cattle have only a single animal (usually a dairy cow). Cows are less frequently taken outside the village for grazing than sheep or goats. In most instances, they are grazed within the village agricultural lands, on or around the crops. This makes their management dependent upon access to agricultural land.

Although some exceptions were noted (such as at the village of Afghan Mazar in Kunduz and Tonian in Herat), the use of oxen or bullocks for ploughing in river valley sites was more limited than observed elsewhere.

**Semi-irrigated upper catchment systems**

Research found that farmers with access to limited irrigated land often either prioritised high-value crops to generate a cash income or grew vegetables for household supply. In a few upper catchment locations (such as Zala Qala and Pyada Rah in Ghazni), evidence was found for intercropping fruit trees with clover (*Trifolium resupinatum*) or cultivating small plots of other irrigated fodders. But the potential for sustaining animals solely on the products or by-products of this type of irrigated agriculture is low.
Researchers found that farmers at upper catchment sites often diversify away from water-intensive fodder crops and some seasonally cultivate drought-tolerant legume and pulse crops, including those locally known as *shaftal*, *talkhak* and *shamlit*. The seeds of these are then milled and can be used as a winter feed. They are considered to be higher yielding than wheat under conditions of water scarcity.

In addition to irrigated cultivation, hillside communities often attempt to sow a cereal crop (usually barley, wheat or—sometimes maize) on adjacent unirrigated lands. However, rainfed cultivation is highly opportunistic and results are often poor. Nevertheless, in good years, farmers report harvesting about ten times the quantity of seed originally sown, and even a crop that fails to mature has some value to livestock for grazing.

Most of the upper catchment research sites in the study have ready access to adjacent rangelands and pastures. This is in contrast to most river valley sites, where livestock have to pass through the lands of neighbouring villages to reach grazing lands. To best utilise range resources, small ruminants (and in some cases cattle) are daily shepherded out to grazing lands during the spring and summer seasons. In the case of Ghorak village in Herat, there is evidence for seasonal transhumance, with part of the community still migrating into the mountains with goat hair tents to accompany their flocks.

In consequence, while semi-irrigated research sites have only limited access to land for fodder cultivation, in some cases households at these sites manage relatively high numbers of small ruminants which are grazed primarily on surrounding range resources or the products of rainfed cereal cultivation. These herds may be sufficient in number to make important contributions to the household economy. However, they are very vulnerable to drought or failure of pastures, and lack of winter fodder.

The lack of irrigated land available for the cultivation of fodder seems to have a more direct impact on the number of cattle owned and managed at semi-irrigated sites. Data demonstrate that of the three categories of agro-ecological sites, these support the lowest populations of cattle.

Nevertheless, at several of these locations (possibly due to their remoteness, the local topography of the land or small irrigated areas), farmers appear to use oxen for ploughing more than in river valleys.

Sheep and goats appear to play a significant role in the livelihood strategies of farmers at semi-irrigated research sites. It is probable that they make a contribution to the monetary economy of the household in addition to supplying products for domestic use. In an environment where the potential income from irrigated cultivation is limited, livestock husbandry constitutes an important productive activity.

**Rainfed systems**

In the absence of irrigable land (or where only negligible irrigation water is available) communities may engage in rainfed cultivation. Farmers in Khalifat Rahmat and Sir Zar in Herat and Abdul Nazar and Alam Bai in Kunduz regularly sow extensive areas of land with cereals, notably barley and wheat. Following good precipitation, farmers also may cultivate areas of cash crops, notably chick peas, oil seeds and also melons. In good years, these communities may produce a surplus to their own cereal requirements (which can be sold along with any cash crops). Failure of rains, though, can have a disastrous impact without the buffer of irrigated agriculture. Furthermore, without irrigation, farmers are limited in their cultivation choices to

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84 *Shaftal* was reported in Ghazni and is believed to be a species of vetch. See Fitzherbert, A., “WOL: Livestock Husbandry.”

85 *Talkhak* has not yet been positively identified; *Shamlit* is believed to be Fenugreek (*Trigonella foenum-graecum*) (Anthony Fitzherbert, personal communication)

86 Of all semi-irrigated sites, livestock ownership was lowest among the villages of upper Achin district, Nangarhar. However, anecdotal evidence suggests that prior to data collection in 2005 there had been considerable sales of small ruminants from the area to cover loss of income from compliance with the poppy ban that year.

87 Researchers note that even under these conditions of uncertainty, some farmers practise forms of crop rotation to maintain yields. For example, Thomson, “WOL: Livestock Production and Health.”
a few drought-tolerant crop types, which provide little safeguard against risk.

Under these conditions, a majority of households engage in the management of livestock as a complementary activity. Abdul Nazar is typical of this type of site: respondents reported that sheep and goats were herded collectively by shepherds and taken daily into the surrounding hills and plains to graze for as long as weather permitted. At Khalifat Rahmat, the community reported that the village herd would still be taken into the surrounding mountains for two months of the year, under the supervision of a shepherds and accompanying family members who dwell in goat hair tents. There, the animals are milked and durable dairy products are prepared.

After the harvest of cereals and other crops, the sheep and goats are brought to graze on the extensive stubble and post-harvest residues. Through the winter, both small ruminants and cattle are stall-fed (mainly straw, but also barley or cotton seed cake by those farmers who can afford it). Farmers also reported collecting thistles and wild plants from the surrounding areas in the autumn to store for winter feed.

Farmers have little access to irrigated fodders—such as clover or lucerne, which are particularly important for cattle during the winter months as hay—but their cropping system produces a regular surplus of post harvest cereal residues, straw or failed barley stands. Adding livestock into the agricultural system is a way of extracting extra value from an activity that involves high risks and the production of relatively low-value crops (i.e. transforming low-value barley and wheat into higher-value milk products and live animals). It is unclear whether a farm system based upon the production of rainfed cereals alone would be viable. Furthermore, livestock help buffer farmers against this risk; growth in the herd during a year of good rains, pastures and harvests will help carry farmers through the impoverishing effects of a subsequent year when crops fail.

Given the very limited scope of agriculture in unirrigated areas, dairy products are of significant nutritional value to households. However, in the absence of fresh green fodder, and restricted access to drinking water, milk production from cows is low and unreliable, so even two animals may only serve the needs of a single household. Furthermore, due to the remoteness of the settlements, the limited availability of cash and local topography, researchers found greater use of plough oxen in these areas than elsewhere, adding to the local cattle population.

Nomadic pastoralism

WOL research into nomadic pastoralism focused on two participating sub-clan groups, the Khomari Khel and Kutub Khel aggregations of migratory Kuchis. Both communities follow established seasonal migratory routes between summer pastures at higher elevations and winter camping grounds, typical of many nomad migrations in and out of the Afghan central highlands (Fig. 18).

The Khomari Khel winter in the lower valleys of Laghman province before moving on to temporary campsites on the Shomali plain (where some households remain to allow men to engage in waged labour), while herds are moved to the upper pastures of the Panjshir valley for summer grazing. Similarly, the Kutub Khel spend the winter in

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88 See, for example, the findings of De Weijer, “National Multi-Sectoral Assessment on Kuchi.”
in the lower Kabul river valley in Nangarhar, before migrating to Paghman from where some households proceed into Wardak for the spring and summer grazing and cropping seasons.

In both cases, the pattern of migration is similar. Winter camps in lowland areas offer reprieve from the worst of the Afghan weather and close proximity to agricultural settlements for purchases of cereals, lucerne, fodder, or straw, or other transactions with local farmers. Supplemental feeding of healthy animals continues only until the spring migration begins. Both communities then establish spring camps in outlying districts of Kabul province. Some families will remain here through the summer, principally engaged in waged labour on local farms or in Kabul, while other households (those specialising in shepherding) will take herds to summer highland pastures for fattening and milk production.

Sheep and goats form the most important livestock resources for both herding communities. However, one of the two communities also owned a few small cattle, managed primarily for the supply of fresh milk to households in addition to sheep and goat lactation. These are fed purchased straw through the winter season but, without access to irrigated fodders, the quantity and quality of milk is low and lactations last less than six months.

In the absence of any form of tenured land resources, migratory herders are dependent upon transactions with cultivators and settled landholders, both for the purchase of winter fodder (which they cannot grow themselves). In some instances, they also rent access to camping and grazing grounds over which neighbouring communities hold rights. With growing pressure upon land resources, migratory herders have reported increasing difficulty in maintaining their traditional practices. To some extent, the production of livestock is now linked to the receipt of waged incomes and pooling of resources. As with rainfed farm systems, pastoral herds are very vulnerable to the effects of drought, failed pastures or resource scarcity in the agriculture system.

6.2 Livestock and Land

WOL research highlights important linkages between livestock and the use of land resources. Most importantly, land resources underlie the production of feed for livestock and therefore, the attributes and accessibility of land will influence farmer strategies for feeding stock. Conversely, livestock ownership can influence farmer decisions about how to manage their land. Daily livestock management also has implications for soil fertility.

**Box 5: Impact of drought on the nomadic Khomari Khel**

Pastoralists from the Khomari Khel community reported the effects of drought (1998-2002) on their livelihoods.

Prior to the drought, their camp of 70 households accounted for some 5,000-6,000 sheep and goats. By the end of the drought, this combined herd had diminished to less than 1500 head. The loss of so many livestock pushed many households to the point where they could no longer sustain a pastoral livelihood and many had to diversify into (or depend wholly upon) waged labour.

Implementing a strategy to maximise the rate of restocking, the Khomari Khel had managed to restock their herds to about 3000 by spring 2006.

By dispossessing the most vulnerable households into wage labour, (and with the asset-wealthy households better able to recover their herds), the drought may have accentuated wealth differences in the community.

Researchers collected data from 298 sedentary farmers, who ranked the importance of categorised sources of livestock feed during the previous year.

The summary results of this
exercise are given in Figure 19. These data appear to indicate that purchased feeds were ranked as of prime importance most frequently by lower catchment farmers. Not a single farmer at a rainfed site cited purchased feeds as of primary importance to his livestock through the year. However, rangeland was of greater importance as a feed source at semi-irrigated and rainfed sites.

Cultivated sources of feed were also reported as important under semi-irrigated and rainfed conditions. This may initially appear counter-intuitive. It is not inconsistent, however, with observations that livestock production at semi-irrigated and un-irrigated research sites was closely linked to the cultivation of rainfed cereals, yielding straw and extensive post-harvest residues. In many parts of the country, 2005-06 produced a rich cereal harvest.

To better understand the relationship between livestock ownership, land and fodder cultivation, linear relationships were explored statistically using Pearson’s correlation. The investigation draws upon data collected on purposely cultivated fodder crops (e.g. Lucerne and Persian clover, but excluding other crops which produce edible residues or by-products) and herd sizes at research sites. The results, together with proportions of land reported under fodder cultivation, are given in Table 18.

Data confirm field observations that irrigated farm systems tend to have the largest proportion of land dedicated to fodder cultivation (albeit with a high standard deviation). A slightly lower proportion of land is allocated to fodder at semi-irrigated sites. Rainfed farmers reported cultivating very little fodder. Analysis suggests that with irrigated cultivation, there is little discernable relationship

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**Table 18: Statistical relationships between fodder cultivation and livestock ownership under different farming conditions**

<table>
<thead>
<tr>
<th></th>
<th>Fodder (% cult. area)</th>
<th>Std.dev</th>
<th>Small Ruminants</th>
<th>Cattle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n r sig (p)</td>
<td>n r sig (p)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irrigated</td>
<td>9.20 18.13 0.006 0.927</td>
<td>252 0.228 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semi-irrigated</td>
<td>7.78 18.4 0.027 0.798</td>
<td>90 0.487 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainfed</td>
<td>0.30 2.24 0.280 0.034</td>
<td>58 -0.019 .888</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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89 Given that river valley farmers also appear to purchase livestock fodder with the greatest frequency, this could indicate active markets for irrigated fodder and production for market supply in those areas.
between the area of fodder cultivated and the numbers of small ruminants owned. Only a mild positive relationship is found in rainfed areas. However, a similarly weak but significant relationship is also apparent between cattle ownership and fodder cultivation on irrigated farms and a stronger, moderate relationship ($r = 0.487$) is identified in semi-irrigated systems.

Overall, these findings are consistent with observations that sheep and goats utilise a wide range of agricultural forages and residues, so their upkeep is not necessarily strongly associated with cultivation of special fodder crops (especially at irrigated sites where more supplements are purchased).

The significant relationships between cattle ownership and areas of fodder cultivated are perhaps clearer. At irrigated and semi-irrigated research sites, the area of fodder cultivation correlates positively with cattle numbers (Table 18). As would be expected, this association is strongest at semi-irrigated sites, where the least irrigated land is available for the cultivation of fodders and where supplement purchases play a smaller role. There is virtually no correlation between cattle ownership and fodder cultivation at rainfed sites.

While evidence of correlation does not indicate
causality, these findings appear consistent with two hypotheses: first, that under irrigated (and semi-irrigated) farming systems, cattle seem to be more heavily reliant upon cultivated fodder crops than small ruminants and second, that scarcity of irrigable land may limit cattle numbers at semi-irrigated sites. However, under rainfed conditions, cattle are apparently managed without the local cultivation of irrigated fodder crops.

A general pattern of land and feed resource use (although subject to local variation according to site-specific resource and socioeconomic conditions) is given in Table 19. Researchers note that while up to 90 percent of the nutrient requirements of nomadic herds may be supplied by rangeland grazing, all livestock management systems depend upon the access to feed supplementation during the winter months and therefore all forms of livestock production are integrated with land management and cropping practices (albeit to different extents, and in different ways).

**Managing soil fertility**

The nutrient uses of livestock manure is valued by Afghan farmers, particularly as a fertiliser for perennial crops that cannot easily be rotated, such a fruit trees and lucerne. At WOL research sites, manure was applied to a wide variety of crops, such as vegetables, pulses and potatoes (sometimes in combination with crop rotation). In addition to contributing valuable nitrogen, phosphorous and potassium elements, manure improves soil structure and returns organic matter to the soil.

Under stalled or penned management (as occurs during the winter months), livestock excrement (and soiled bedding materials such as straw), can be easily collected by farmers and transported to selected fields, sold or exchanged.

At research sites where irrigated cultivation is practiced, cattle and small ruminants are often taken daily for foraging on the owner’s cultivated lands (or by agreement, his neighbour’s). While cattle are often tethered, sheep and goats are more usually shepherded along the fringes of the cultivation and canals to avoid damage to field crops and feed on weeds and grasses. Stock may be grazed on some fodder *in situ* and will go onto other plots directly after harvest to clean away stubbles, residues and fallen leaves. Fertilisation of soil by livestock directly grazing on the land is less targeted than if measured and applied by the farmer, but has labour saving benefits. The value of livestock manuring land can be seen in farmers’ traditional encouragement of nomads and other livestock owners to bring animals onto land to graze residues post harvest (although this transaction now involves monetary exchange in some areas).

Residue grazing constitutes a particularly important part of the management of extensive areas of rainfed cereal crops such as those of around the sites of Alam Bai in Kunduz and Sir Zar in Herat. These rainfed areas are so extensive and the risk of crop failure so high that chemical fertilisers are not normally applied, except after good rains and for higher-value crops.

### 6.3 Livestock husbandry and production

This section outlines how livestock husbandry and production is undertaken, who is responsible for its management and the limitations which exist on these production systems.

**Cattle**

The evidence of field observations suggests that there is considerable consistency in the management of cattle (particularly cows), at research sites across the country.

At sites where higher *per capita* cattle ownership was reported and where there was ready access to range resources, households sometimes appointed a community herder. This individual was responsible for taking the collective stock to graze on surrounding lands during the day and return them to their respective owners’ homes in the evening. However, at most locations, animals were fed locally on forages and supplements within the village. Straw makes up the bulk of winter feed. Under this system, productivity was quite low, with
heifers usually first calving in their third year and thereafter at intervals well beyond twelve months. Lactations were reported to last between six and nine months, depending on management. Very few farmers owned breeding bulls because traditionally, the services of these animals must be freely given to all cow owners in the village. Therefore there is little incentive for the individual farmer to incur the expense of keeping one. Accordingly, observations suggest that breeding bulls are only easily accessible in about half of all studied communities.

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In nearly all cases, cows are maintained for subsistence purposes, to supply milk and dairy products to the household rather than for the commercial production of meat and milk. Farmers at most sites consider it shameful to sell milk to neighbours within their own communities and instead shared the surpluses in non-monetary transactions. A few exceptions to this were recorded, notably in the Jagatoo valley villages where intercropped fruit orchards provided sufficient fodder for multiple cows and a dairy surplus could be supplied to the nearby urban market at Ghazni.

Within the household, cows are usually under the daily management of women or children who hold responsibility for nursing sick animals, cutting fodder and forage, and cleaning the pens and shelters. Women and children are also usually responsible for milking and the processing of milk into durable products for storage (Table 20).

Oxen for ploughing are most frequently found at remote sites, where tractors are not easily accessible for hire or topographic conditions preclude their use. Demand for traction may explain the relatively higher incidence of cattle at this type of site.

With a slow calving rate, limited potential for local sale of products, and maintenance requiring green fodder and other supplements, farmers do not commonly invest in cattle for income or capital growth values. Management is low input and low output, and consequently the farmer perceives little benefit in owning more cows than sufficient to meet his own domestic dairy needs.

**Sheep and Goats**

The management of sheep and goats around the country showed considerable variation. Differences were noted in daily management practices, but also in the reasons why sheep and goats were being kept.

Access to rangeland seems to be a more important factor in the management of sheep and goats than cattle, and, where access exists, farmers often aggregate their animals into flocks of between 200-300 and entrust them to the care of a hired shepherd for daily herding on the range. Where no such access exists, per capita ownership is lower and animals are managed similarly to house cows.

Where only a few sheep are owned (commonly at irrigated villages in river valleys), ewes are allowed to run with rams through the year and lambing may occur at any time, but management of larger flocks and herds is better planned. Consequently, rams and bucks are introduced in the autumn at the most favourable time. Ewe fertility varies and is sensitive to location, feed regime and health status, but at

<table>
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<th>Table 20: Common rural dairy products</th>
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For fuller description of preparation of these products, see Fitzherbert, “WOL: Livestock Husbandry,” Appendix 2.
rainfed/rangeland sites in Herat was given as about 80 percent. Lambs and kids are weaned at about three months. Lactation of ewes can last an additional two months with good grazing, doe goats longer. Women produce a similar range of dairy products from sheep and goats milk as from cow’s milk (Table 20) but again, in villages this is rarely sold for cash. However the nomadic Kromari Khel and Kutub Khel routinely sell any dairy surplus.

Under normal (low input) management, male lambs are sold, uncastrated, at 6-9 months of age, before the onset of winter. However some wealthier producers were observed to castrate lambs and raise them to 18 -24 months at which (with proper feed) age a male castrate could achieve 70kg.

Farmers at most research sites shear sheep and clip goats, but the use of fibres is largely restricted to weaving domestic products. Fleeces, goat hair, cashmere and women’s woven products were only supplied to markets by nomadic communities and from two villages in Herat.

Even though the management of sheep and goats is commonly based upon minimising input expenditures, their relative fertility encourages some farmers to invest in them for capital growth in the herd and profits from sales of lambs. Access to pastures and rangeland seems to be a precondition to this form of speculation and it forms the basis of both rainfed/pasture-dominant and nomadic pastoralism. In good years, small ruminants may offer the chance of wealth generation and upward economic mobility. But access to capital for live animal purchases, feeding and veterinary care restricts farmer access to this form of investment opportunity.

**Labour and decision-making**

A range of social and biophysical factors appear to influence how livestock are managed. There is an apparent distinction between management which is directed to market supply and cash generation, and that which is more oriented toward subsistence values and domestic consumption.

Subsistence-oriented management (of both small and large ruminants) involving shepherding and processing of dairy products is undertaken primarily by women who may in turn delegate daily chores and herding tasks to junior members of the household. By contrast, management of larger groups of sheep and goats most regularly occurs at the direction of male heads of household or under the management of a hired male employee. The rationale underlying these differences may be that subsistence level production is largely non-monetarised (with the exception of any necessary winter fodder or veterinary purchases). Thus most of the tasks surrounding this form of livestock management lie within the female sphere of economic activity which is primarily for the household. Also, the spatial proximity of livestock to the household and village makes their management more culturally accessible to women.

Where herds are managed primarily as cash investments or for their income values, management is, by necessity, more intensive and proactive, with financial expenditures. These may include hired shepherding for more active husbandry and maximising the use of available pasture, veterinary inputs, and purchased feed supplementation to assist fattening. The actual marketing of the animals also incurs expenses and requires travel and activities that may not be culturally appropriate for women within their communities. Cultural norms shaping women’s engagement with the monetary economy

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**Box 6: Speculation on Livestock**

Two brothers in Nangarhar decide to invest in livestock and buy 30 pregnant ewes for the equivalent of USD $2,280 in August 2005. This purchase is partly financed by a loan. After the loss of two animals, 27 lambs were produced. The sale of 13 male lambs the first year was expected to raise the equivalent of USD $884, sufficient to pay the interest on the loan and about a fifth of the capital sum. Despite high risks, by the end of the first year the asset value of the flock had increased to about USD $2600.
will also limit their access to credit, an important factor in commercial livestock production.

It would be wrong to suggest that women are totally excluded from monetarised livestock production. This will vary regionally and among ethnicities, but as a general observation women have been observed to play a greater role managing livestock where this is primarily oriented to the domestic economy (Figure 20).

Limitations and constraints on livestock production

Although many rural households manage livestock, evidence suggests that under present management animals rarely achieve their full productive potential. Structural constraints on livestock production are undermining potential benefits to farmers and households. They also slow the process of restocking of herds after the destructive effects of drought.

Perhaps the greatest set of constraints on productivity involves access to feed resources (and in particular winter fodder). This problem is closely linked to issues of landownership and tenure, farmers’ cropping decisions and cash availability for purchases. Consequently feed resource availability lies at the core of farm management decisions (and NRM more broadly).

Under most livestock production systems, high quality fodder production is reliant upon irrigated cultivation. While in some instances improvements in irrigation water supply may lead to increased fodder yields, many farmers face water scarcity and most are unable to extend their area of cultivation (even if sufficient water is available) due to limited land holdings. WOL research has highlighted a trend whereby livestock owners with access to rangelands and rainfed cereal cultivation (and therefore with the potential for cheap grazing and competitive production) also tend to be those with the least capacity to cultivate their own irrigated fodder crops for winter feed. Thus, they must either depend on straw and other supplements of poor nutritional value for their animals, or increase production costs by purchasing irrigated winter fodder from farmers who produce a surplus.

Livestock managers are also challenged by conflicts over common-property land tenure and access to pastures. Research has shown that pasture constitutes a highly important economic resource for livestock production, especially for larger and more market-oriented herds. Nevertheless as previously discussed in Section 4.2, access to this type of land is heavily contested, and both the Khomari Khel and Kutub Khel migratory pastoralists report having faced increasing threats to, and incursions upon, both their traditional summer and winter pastures.

While nomads are particularly vulnerable to disputes over land, researchers also identified cases where competition over common property had displaced sedentary graziers from traditional grazing areas. These problems were reportedly particularly severe in Ghazni, where access to pastures has been threatened both by other herders and also by the construction of buildings.

Many farmers report that disease limited

91 For further information on barriers to women’s participation in monetarised herding, see Jo Grace, “Who Owns the Farm: Rural Women’s Access to Land and Livestock” (Working paper, Kabul: AREU, 2005).

92 A more comprehensive description of these problems is given elsewhere. Thomson, “WOL: Livestock Production and Health,” Appendix 1.
production. Farmers widely cited instances of mortality among their stock and complained about the ineffectiveness of veterinary services. However, nomadic communities (with larger herds and a more market-oriented system of production), appear to have a better appreciation of disease and its management than their sedentary counterparts. When exploring the impact of veterinary services, researchers found that farmers at sites in irrigated river valleys (such as Qala-e-Naw in Ghazni, Tonian in Herat and Jani Khel in Nangarhar) are better served by local Veterinary Field Units (VFUs) than their counterparts in more remote upper catchment and rainfed areas. Ironically, as WOL research has indicated, it is at these rangeland areas that the largest herds are managed and they tend to be of greater importance to rural livelihoods. Even when nomads and farmers in remote areas are able to access treatment from VFUs or pharmacies, there was real concern about the quality of pharmaceuticals and drugs.93

There is little evidence that owners are able to strengthen their genetic stock through selective breeding. The scarcity of bulls reported at many research sites means that owners have little option but to use any available animal to service their cows. Consequently, a wide diversity of phenotypes was observed. This variation was less evident in sheep and goats, as most farmers owned their own rams and bucks.

Another serious problem is farmers’ incapacity to maximise market opportunities for their livestock products. Problems of cash scarcity and debt often compel herders to sell lambs shortly after weaning (early summer), when there is an abundant supply to markets and prices are low. Herders and farmers are aware that they are missing an opportunity for adding value to their product by fattening lambs for a longer period. Preliminary estimates indicate that if farmers were able to fatten lambs five extra months, from June through to November, they could increase their margins of production by more than $30 per animal.94 However, problems of access to pastures, the costs associated with purchasing feed for fattening and the risk of mortality from disease combine to deter most farmers from fattening to a more profitable sale weight. Furthermore, with wheat and major crop harvests coming in summer, farmers and their families may be facing cash shortages in the period prior to the harvest.

In conclusion, studies show that at most research sites, livestock are receiving a quality of diet below the level required for them to reach their genetic potential for growth, lactation and fibre production. Lack of access to good breeding stock and effective veterinary services exacerbate under-productivity and farmers are further losing value through the marketing of young animals. So long as production strategies remain based upon minimising expenditures, this situation will continue. Unfortunately, under observed conditions of rural poverty and economic stresses, producers cannot easily break the established cycle of low inputs and low outputs without access to credit.

6.4 Livestock relationships and informal institutions

Livestock management is enmeshed in the complex web of non-monetary transactions and relationships that prevails in rural Afghanistan. Reciprocity and collaboration in management occur in many ways: pooled shepherding, productive specialisation and divisions of labour within and among spatial groups at time of migration. Productive specialisation was recorded in the nomadic communities (such as among the Khomari Khel), where only a small section of the community migrates up the Panjshir valley herding most of the stock, while other households spend the summer camped in the vicinity of Bagram. There, the men of non-migratory families undertake waged labour. Similarly, at Khalifat Rahmat (one of several villages where transhumance is still practiced), the migratory party includes skilled herders and milk processors, while remaining villagers monitor crop cultivation. Access to, and use of, common-

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93 One interviewed pharmacist explained that he stocked inferior quality products so he could be competitively priced. Illiterate farmers were unable to recognise the difference between antibiotics of European and Chinese origin and there were major differences in price.

94 For an indicative gross margin calculation, see Thomson, “WOL: Livestock Production and Health.”
property rangeland are also regulated by the wider system land-relations and rural interdependencies described previously (Section 4.2).

Exchange of most animal products within village (and nomadic) communities is non-monetary, creating internal relationships of obligation and interdependence. Surplus dairy products are commonly shared, as are post-harvest residues for grazing and the services of breeding bulls. Superficially, it appears these relationships work to the benefit of the poorer, smaller-scale farmers who may share in the economies of scale and resources of the larger, wealthier animal owners. It is clear, though, that reciprocity often takes the form of unwaged labour. This can be observed in the labour of women processing milk products from larger herds, and labour to harvest cereal and fruit crops for farmers comparatively rich in assets but low on labour. Wealthier farmers in the community may, in this way, draw upon valuable labour.

Participation within a system of exchange and reciprocity in livestock, land and labour certainly enhances the resilience of rural households and facilitates their access to resources that they might otherwise lack. It might be considered a strategy for communal “risk aversion.” Nonetheless, in some cases cooperative behaviour and the social redistribution of goods and services may absorb the production of potentially saleable surplus, and thus inhibit wealth accumulation and economic mobility.

6.5 Livestock and rural livelihoods

WOL researchers have recorded diversity in the ways that livestock contribute to rural livelihoods. Livestock may be used in different ways according to species, production context, resource availability and farmer choice. The productive values of animals further change over time. The final part of this chapter focuses on some of the ways in which Afghan livestock are valued by their owners and how livestock contributes more generally to rural livelihoods.

Livestock and monetary incomes

Sheep and goats are most commonly managed for their income values. By contrast, the majority of farmers at research sites had insufficient cows to produce a saleable surplus.

Data show that migratory nomads such as the Khomari Khel and Kutub Khel manage the largest herds and produce the largest saleable surplus of livestock products. Nomads sell dairy products, hides, fibre and herd offtake, including weaned male lambs, barren ewes and other culled animals. Research participants estimated that under the current system of range-based production, the number of animals required to meet the basic income needs of a normal household was eight sheep per person.95 Baseline survey data indicate a mean holding per person of eight animals (albeit with a high standard deviation) across both nomad groups.96 Therefore, depending on the shape of this distribution, a proportion of the studied migratory

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95 See Thomson, “Livestock Production and Health.”

96 See Roe, “WOL: Baseline Survey.”
households own sufficient animals to meet their basic income needs from livestock incomes.

Households at rainfed research sites have a much lower mean sheep and goat to human ratio: about 2.5 animals per person. So it appears that while livestock may contribute some monetary income to these households, this contribution will be proportionately less significant than for nomadic households. Semi-irrigated and irrigated systems have even lower sheep and goat to human ratios. Although a few individual households of these types may manage larger commercial herds, the observed trend is for sheep and goats to make a relatively smaller contribution to household cash incomes.

Although in absolute terms, sheep and goats may account for a relatively small proportion of household incomes, the timing of income from sales of dairy products and weaned lambs comes during a period of cash scarcity for many farming households, prior to the main summer cereal harvest. Consequently, these incomes can serve an important bridging function.

Evidence for market-oriented dairy production was found at only two or three households in Ghazni. These households owned multiple cows, controlled sufficient irrigated land to cultivate green fodder, and importantly, had access to a local urban market in Ghazni city; (it is considered shameful to sell locally). Most farmers sell male calves after weaning, constituting an additional income stream.

Livestock as stores of wealth (capital growth)

Closely related to the income-generating utilities of livestock (although in some ways distinct from them) are livestock functions as both stores of wealth and assets for capital growth.

A fundamental problem facing Afghan farmers (especially households on high-value, irrigated lands) is the lack of opportunity for wealth generation. Although improved management inputs or changed cropping patterns may bring improved yields and returns, most farmers are constrained from economic growth by the scarcity of (and high demand for) irrigated land. Unless the farmer has the possibility of renting or otherwise procuring additional land—or increasing his allocation of finite water resources—the potential for asset growth will ultimately be limited.

By contrast, under careful management and with good fortune, sheep and goats naturally reproduce to increase the original capital investment. As earlier findings have demonstrated, there exist entry constraints on investment in livestock. With high risks of loss from disease, drought or weak markets, managing animals as speculative investments will not be possible for all farmers. Nevertheless, investment in livestock offers one of the few legitimate opportunities for the Afghan farmer to accrue wealth and improve his or her wealth status. However, given the entry constraints, it is again the wealthier and more established farmers who have the greatest capacity to engage in, and benefit from, such activities.

Even in production systems where larger herds are managed, sheep and goat herds tend to follow cycles of “boom and bust.” One or a sequence of good years permits growth in the herd, but one or more bad years undermines this growth and leads to sales. Livestock have the advantage of being both a movable and highly liquid asset, easily convertible back to cash (should the need arise), and so constitute an opportunity for storing wealth where few alternatives may exist.

Livestock and human nutrition

In Afghan rural households, both cattle and small ruminants are milked to provide for domestic consumption. While cows generally have a longer lactation period (greater than six months) and higher yield, sheep and goats have the advantage of requiring less specialist management and diet. Doe goats generally lactate longer than sheep and have the added advantage of being able to subsist on a wide range of browse materials and household scraps. While much milk is consumed during the main seasons of lactation (in the spring and early summer), production for all but the smallest herds exceed household demand and the surplus
Milk and dairy products (together with eggs) provide valuable sources of calcium, protein and nutrients that are otherwise absent from the high carbohydrate diets of rural Afghan families. Even in mid-winter (just before the onset of the new milking season), households at irrigated and semi-irrigated research sites retained sufficient stores of durable dairy products to be consuming more than two dairy-based meals weekly. The frequency of consumption of dairy products during the peak lactation period would likely be much higher than this. In addition to contributing key nutritional elements to rural diets, dairy products (like other stored farm products) can help smooth household consumption through the year, allowing surpluses to be carried over into seasons (and years) of cash and food scarcity. Dairy products are of additional importance to households that may not have regular access to markets for food supplies. Lactation from sheep and goats is at its peak concurrent with the key grazing season in spring, when livestock are being shepherded in remote pastures. The on-site production of food assists in the exploitation of these grazing resources.

The importance of dairy products to household subsistence can be seen in the widespread ownership of dairy cows (commonly just one, sufficient for domestic supply) in rural households. This pattern of ownership is prevalent across all types of farm system and all socioeconomic groups, other than the very poorest.

Evidence indicates that consumption of red meat is relatively low among all groups of livestock producers participating in the study. When eaten, red meat is usually purchased from markets, as slaughter only occurs on ceremonial occasions or if an animal needs to be culled due to sickness. On these occasions, the meat is shared with neighbours and other members of the community with the prospect of future reciprocity. The consumption of home-produced meat is therefore highest among nomadic pastoralists simply because they have the largest number of stock and so are likely to cull more often.
6.6 Emerging directions for further research

First-year studies of livestock under WOL highlight number of important questions that will be used to structure ongoing research.

- What is the productive performance of Afghan livestock under farm management? How does this compare with livestock elsewhere and their theoretical potential?

- What are the gross margins of production for livestock and how do these compare with other agricultural crops or production activities? How do gross margins differ under distinct conditions of production?

- If livestock feed is a constraint on production, how are animals fed, and how are these feeds accessed in different production systems in Afghanistan?

- What are the principal products from livestock under different systems of management? How effective is this production and where are products sold?

- How do livestock markets currently operate and what are the shortcomings in and constraints on how they facilitate livestock value chains?

- Livestock in Afghanistan are managed under different systems. Which form of production has the strongest potential for development of a competitive livestock subsector, and into which systems of management should development interventions be invested?

- What since 2001 has been the impact of government policy and donor programming in the livestock sub sector? What has been achieved and what lessons have been learned?
7. Opium Cultivation

Concerns about the proliferation of opium poppy cultivation in parts of rural Afghanistan had garnered the attention of the Afghan government and its international partners at the inception of the WOL project in 2005. Interpretations of this problem, and thus policy approaches, were at that time being principally derived from aggregate statistics describing cultivated area at the provincial level. Nevertheless, some studies had already indicated that poppy cultivation could not be viewed simplistically as a “criminal act” by farmers, but instead that opium had in some parts of the country become deeply enmeshed in the rural socioeconomy, was providing access to land and credit, and underlay food security for many farmers.97 Accordingly, some argued that ‘Alternative Livelihood’ approaches, as championed under the National Drugs Control Strategy, were focusing too narrowly on the creation of alternative incomes and failing to appreciate the broader context of how rural farmers and households make choices, and the constraints they face.98

In the light of this debate, and with a clear need to further explore the “drivers” of opium cultivation, the first year of WOL research focused on the dynamics of proliferation. Specifically, researchers explored decision-making underlying poppy cultivation within the contexts of farm resource conditions and wider economic and institutional environments. These studies were undertaken comparatively, encompassing areas where the practice was respectively increasing, in decline, and in stasis. Although the research was consistent with the farming systems framework developed by WOL, the geographic focus of studies was extended to two additional provinces, which provided instructive case studies of proliferation in opium cultivation.

7.1 Expansion and reduction: Opium cultivation in four provinces

Sites for WOL opium studies were selected to illustrate some aspect of change (or the absence of change) in cultivation patterns. The provinces of Balkh and Ghor were identified by researchers as areas of emerging cultivation. Although poppy cultivation had a ten-year history in Balkh, it had expanded most rapidly in the years 2001-05. By contrast, poppy cultivation had first been recorded in Ghor in 2002. Cultivation then expanded rapidly in the subsequent two years (although it declined slightly in 2005).

Quite the contrary had occurred in Nangarhar province, which had typically been among the major opium cultivating provinces in the country. Working through district administrators and security officials, provincial authorities imposed a ban on the cultivation of poppy that resulted in an unprecedented reduction in cultivated area between 2004 and 2005. In Kunduz, poppy had a more recent history of commercial cultivation and this had remained fairly constant, without evidence for either major expansion or contraction (Figure 21).

The following sections provide an overview of the context of opium cultivation in each province.

Cultivation in Balkh

Studies of opium poppy cultivation in Balkh province focused on the Chintal and Charbolak districts. These have been identified as major opium cultivating areas by the UNODC.99 Agriculture at

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98 Further discussion of the issues surrounding the alternative livelihoods concept at that time was offered in David Mansfield and Adam Pain, “Alternative Livelihoods: Substance or Slogan?” (Kabul: AREU, 2005).

these (and other districts) is structured by a complex network of 18 canals which convey irrigation water from source at the Balkh River. This system is very old, and irrigates a total of 479,880 ha. Due to the length of canals and high-settlement density, water allocation was managed through a three-tier system of mirabs and required effective cooperation among communities. However, by 2003 there was evidence that this long-standing system of water distribution had largely broken down, and that upstream canals were extracting almost double their allocation to the detriment of downstream canals.100

Villages along the length of the Imam Sahib canal in Chimtal were visited and all appeared to be affected by water scarcity. Upstream, farmers that had previously double-cropped a range of cereals, fodder, field and cash crops (including cotton), had now abandoned cotton and were only able to cultivate a single winter crop. Midstream, not only had double-cropping been abandoned but the area cropped with winter wheat had been reduced, with a proportion left fallow each year. Farmers downstream had faced severe water reductions that transformed them from net producers of wheat to consumers relying on wheat purchases. Annual wheat grain deficits were roughly 50 percent.101 While farmers upstream tended to blame water shortages on over-extraction by communities higher up the Balkh River, those downstream instead characterised the problem in terms of inequities in distribution along the canal itself.

At all locations along the Chimtal canal, farmers cited the decline in water availability as a major factor driving them to poppy cultivation. They argued that without summer cropping and with low wheat prices, poppy was the only crop that would provide sufficient return to sustain a farm-based livelihood. The high daily wages associated with the crop also brought agricultural labour opportunities to communities. The direct association between water scarcity and poppy cultivation appeared to be corroborated by cultivation patterns: more poppy appeared under cultivation at the tail end of the canal than at the head.

Superficially, the situation further down the Balkh River along the Charbolak canal was similar. There, farmers in upstream villages had traditionally practiced an intensive system of agriculture and horticulture, while villages at the tail end of the canal (with less water and poorer soils) had been largely restricted to the single cropping of cereals in combination with livestock. The Charbolak canal had similarly been affected by water scarcity, which was so severe at the tail end of the canal that it was hardly sufficient to meet basic drinking water requirements of downstream villages.

However, in exploring the history and distribution of opium poppy in Charbolak, it was found that cultivation had begun and was most concentrated in the better irrigated, upstream villages along the canal. Why was the pattern of cultivation in Charbolak so different to Chimtal? One possible reason is that there was simply insufficient water


at the tail end of the canal to cultivate a viable opium crop. This would suggest that water scarcity can increase farmer incentives to grow poppy, until a level of scarcity is reached beyond which incentives diminish again.

The pattern of ethnic settlement in Charbolak is also relevant to understanding the development of the opium economy. The ethnic group populating the upstream villages of the canal were of the same ethnicity as (and connected by descent to) those controlling opium trading networks in the province and also the district security officials responsible for controlling the cultivation and trafficking of opium. Farmers downstream were of different ethnicities and so did not share the same level of access to these networks.102

Cultivation in Ghor

Ghor is one of the most isolated and impoverished provinces in Afghanistan. Slightly more than 15 percent of agricultural land is irrigated, with some districts having as little as 6 percent irrigated agricultural land. Most farmers depend upon the cultivation of rainfed wheat and barley in combination with animal husbandry. Some fodder is grown on available irrigated land and recently there has been an increase in potato cultivation, but otherwise most crops are cultivated for household consumption.

The high risk involved in rainfed agriculture in an unpredictable climate has led to a history of migration from Ghor in search of waged labour, particularly during the drought of 1998-2002. Since the late 1990s, there have been increasing labour opportunities for agricultural work within the fast-growing opium economy in southern Afghanistan. Consequently, many farmers from Ghor gained an initial insight into the cultivation and harvesting of opium poppy.

Opium poppy cultivation was first introduced to Ghor by southern farmers and opium traders (described locally as Kandarharis), after the Taliban had effectively banned the cultivation of poppy in their districts during 2001. Research shows that the seed varieties, agricultural equipment and techniques of storage of opium in Ghor are today the same as those found in the southern region.103

Some farmers planting poppy in 2001 and 2002 experienced relatively good yields. A strong market for opium led many neighbouring farmers to follow by taking up the crop in 2003 and 2004. A further

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102 A more comprehensive discussion of the role of power relationships and networks in poppy cultivation in Balkh is offered in: Adam Pain, “Water management, Livestock and the Opium Economy: Kunduz and Balkh” (Kabul: AREU, 2006).

incentive for farmers to move into poppy cultivation was the impact of drought (1998-2002), which reduced livestock holdings. These had previously been a primary source of cash income for rural households and, with their numbers depleted, households faced cash scarcity.

However, despite this strong initial impetus extending the area under opium poppy, opium productivity was low in Ghor (generally less than 25kg/ha). This is in part because agricultural conditions (including insufficient irrigated land, frost, drought and diseases blighting the crop) are not well suited for poppy in Ghor, and in part because of poor agricultural practices, perhaps reflecting the novelty of the crop for many farmers.\(^{104}\)

Low yields in 2003 and 2004 prompted a contraction of cultivated area in 2005. Typically, opium poppy remained more prevalent among those farmers with access to better irrigated land resources. These farmers could cover the risk of another crop failure and also had the highest likelihood of a successful crop. However, even these households often allocated “low-value” female and child labour to minimise opium production costs. In the most resource-poor areas, there was very little cultivation, with farmers instead favouring migration to seek off-farm labour. However, another (relatively) good yield in 2005 again attracted many Ghor farmers back to poppy cultivation.

Evidence from Ghor shows that the emergence of poppy cultivation was linked to the local effects of drought. The drought coincided with the rising price of opium due to the cultivation ban in neighbouring provinces. Under these conditions, many farmers moved into poppy, which was probably a locally unsuitable crop. Not only are yields generally low, but after depreciation of opium prices, market access from Ghor was limited. Furthermore, as farmers were very dependent on food production for subsistence through the winter, the land allocated to opium cultivation carried high opportunity costs. Poppy cultivation was also less complementary with livestock production than their traditional cropping systems. Unless market forces again raise cultivation incentives for farmers, it seems unlikely that the cultivation of opium poppy will expand much further in Ghor.

### Cultivation in Kunduz

Kunduz, like Balkh, is the site of a large-scale irrigation system. In the major river valleys, the agricultural landscape is structured by the alignment of the major canals. While there is evidence for inequities in water distribution along some of these canals, and seasonal water scarcity in some areas, the overall picture of resource availability is better than that observed in Balkh. In irrigated districts of Kunduz, most farms cultivate a wide diversity of food, fodder and cash crops and two crops annually are common (see Section 5.1). In these districts, livestock ownership is widespread and although animal numbers are small, they are well integrated into the agricultural system (Section 6.1). Levels

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\(^{104}\) Mansfield describes planting with mixed varieties of seed at inappropriate times, ineffective weeding and unsystematic harvesting contributing to reduced yields. Mansfield, “WOL: Nangarhar and Ghor.”

| Table 21: Opium poppy cultivation and resource access at Nangarhar
<table>
<thead>
<tr>
<th>Distance from road (Km)</th>
<th>Mean # of-farm incomes</th>
<th>Annual crops</th>
<th>Irrigated land per person (ha)</th>
<th>Poppy winter crop (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jani Khel</td>
<td>7.6</td>
<td>2.8</td>
<td>2</td>
<td>0.08</td>
</tr>
<tr>
<td>Maruf China</td>
<td>15.3</td>
<td>1.5</td>
<td>1</td>
<td>0.06</td>
</tr>
<tr>
<td>Sra Qala</td>
<td>21.8</td>
<td>3.1</td>
<td>1</td>
<td>0.03</td>
</tr>
<tr>
<td>Othar Khel</td>
<td>30.7</td>
<td>1.1</td>
<td>1</td>
<td>0.002</td>
</tr>
<tr>
<td>Khawaji</td>
<td>36.7</td>
<td>1.6</td>
<td>1</td>
<td>0.001</td>
</tr>
</tbody>
</table>
of landlessness are low and both waged labour and livestock bring supplementary cash incomes to households. Data suggest that by 2003, Kunduz was largely a food secure province.\textsuperscript{105} Food insecurity and vulnerability were mainly restricted to outlying districts, where farmers depend upon rainfed cereal cultivation, or the tail end of irrigation canals, where seasonal water shortages occurred.

Superficially, there appear to be good reasons why opium cultivation might become established in Kunduz. Turkmen communities in Kunduz have traditionally cultivated small areas of opium poppy for domestic use. Not only is the province considered to be an important trafficking route, but many men from Kunduz go to work as labourers in the Badakhshan opium fields.

After the recorded emergence of commercial opium cultivation in the year 2000, there has been little expansion in cultivated area for a combination of reasons. First, prevailing agro-ecological conditions (such as the high water table, salinity and humidity) may not be conducive to high yields from poppy. Second, the opportunity to grow diverse, high-value crops for market supply (such as cotton, vegetables, fruits and rice) and the waged labour opportunities that these crops offer similarly influence farmers’ choices. Furthermore, evidence also suggests that the political and administrative authorities in the province may also have exerted influence on the course of opium production.\textsuperscript{106}

**Cultivation in Nangarhar**

A densely populated province bordering Pakistan, Nangarhar receives irrigation water from the Kabul and Kunar rivers. The irrigated river valleys have a sub-tropical climate that allows double-cropping and the cultivation of high-value crops such as citrus and olives. However, there is greater scarcity of land and water resources in the semi-irrigated areas outside the main valleys, especially during periods of drought. Labour migration as well as trade and economic exchange with Pakistan make a substantial contribution to the economy of the province.

Nangarhar province has a long history of opium production and was historically ranked the second-highest producer in Afghanistan after Helmand. The Taliban were able to engage the support of the influential Shinwari tribe to enforce their ban on poppy in 2001, but thereafter cultivation within the province resurged to more than 28,000 ha. Evidence shows that the opium economy has become deeply rooted in many rural communities.

In late 2004, the provincial administration made a concerted effort to eliminate opium cultivation from the province. The authorities applied pressure on security officials, district administrators and local leaders to dissuade farmers and communities from planting opium. As a result of this campaign, opium cultivation in 2005 decreased by 96 percent in Nangarhar, and this achievement was widely lauded as a success.

However, WOL research conducted in the province during 2006 illustrates that the previous years’ ban had wide ranging social and economic impacts. Rural labourers lost a high proportion of their previous annual incomes, and diminishing purchasing power meant that small businesses and rural shopkeepers saw their turnover halved. The ban also deeply deflated demand for unskilled waged labour in Jalalabad, the provincial capital.

The impact of the ban on households cultivating opium appeared differentiated by resource access. Resource-secure households (which tended to be located in the main irrigated areas) had better market access to sustain a transition to licit cultivation and were able to send more household members to the provincial centre to seek daily wages. Consequently, they were less likely to be compelled to sell productive assets such as land and livestock. By contrast, households which were constrained in their access to irrigated land and to markets and off-farm labour appeared much more vulnerable. In these latter cases, loss of farm incomes from opium could not be offset by cultivation of high-value licit crops or waged labour.

\textsuperscript{105} National Risk and Vulnerability Assessment, 2002-2003 data.

\textsuperscript{106} It has been suggested that provincial officials may have disrupted production in some areas for political advantage. Pain, “WOL: Kunduz and Balkh.”
so during the year of the ban they replaced poppy with wheat for household supply.

Consequently, marginal households that were driven still further into debt had to reduce expenditures on basic food items, withdrew children from school and sold from their productive assets. This general impoverishment fuelled popular resentment against the government (and the foreign institutions perceived by farmers to be behind the ban).

Although the poppy ban was widely sustained into the following year (2006), there was evidence for a creeping return of opium poppy cultivation into outlying districts of the province. While in some areas poppy had never completely been abandoned, its pattern of return was clear. The crop re-established itself first in areas of resource scarcity, where farmers had limited access to land, irrigation water, livestock and lacked direct access to agricultural or labour markets. Households which had observed the previous year’s ban in these areas had assumed the highest levels of debt. Resource-scarce areas (where the economic incentives to cultivate poppy were highest) also tend to be furthest from institutions of state governance and enforced security. They are more often subject to tribal and informal institutions of governance.

This pattern in the distribution of opium cultivation can clearly be seen in data collected by the WOL project along a transect up the side of the Kabul river valley (Table 21) from October to December 2005.

Analysis of these data shows a strong positive correlation between farmers’ decision to cultivate opium and their distance from the main Torkham road \( (r= 0.701) \). This indicator could be taken as a proxy for access to markets, but maybe also as a measure of the penetration of state governance and institutions into the rural hinterland. By contrast, there was a strong negative correlation between cultivation of opium and the irrigated land to population ratio \( (r= -0.754) \) and an even stronger negative relationship between the growing

**Figure 22:** Relationship between mean cultivated land area and percentage cultivated with poppy on transect up the southern slope of the Kabul river valley, Nangarhar

![Figure 22](image-url)
of poppy and the number of off-farm incomes each household receives ($r = 0.818$). Regression equations describing household cultivated land areas and the proportion of area dedicated to poppy are given below. The respective lines highlight a strong inverse relationship (Figure 22).

These findings are consistent with the view that those farmers with preferential access to land and water resources and to markets and economic opportunities were better able to sustain the transition to licit livelihoods. By contrast, in outlying parts of Achin district, opium cultivation persisted through the 2005 poppy ban and the crop’s re-emergence began in these areas. Landholdings in upper Achin district are today so small and population densities so high that (with only limited access to labour and agricultural markets) it is difficult to see how they could sustain their present populations without recourse to opium production. Farmers’ responses to the poppy ban in Nangarhar highlight how the opium economy is embedded in rural livelihoods and show how farmer decisions to grow the crop are related to locally dynamic contexts, including resource availability, economic opportunity, and governance and security.107

| Table 22: Comparative overview of poppy cultivation in four selected Afghan provinces 2005-06 |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| **Balkh**                                      | **Ghor**                                        | **Kunduz**                                      | **Nangarhar**                                   |
| History of poppy cultivation                    | History of poppy cultivation                    | History of poppy cultivation                    | History of poppy cultivation                    |
| >10-year history of cultivation                 | <5-year history of poppy cultivation           | >5-year history of poppy cultivation           | >10-year history of poppy cultivation           |
| Land                                           | Land                                           | Land                                           | Land                                           |
| High population density; high level of land insecurity and landlessness | Low population density except in a few irrigated areas; mainly rainfed land; all cultivation high risk | High population density in irrigated areas; low levels of landlessness | High population density; in semi-irrigated areas; per capita cultivable land area extremely low |
| Irrigation water                                | Irrigation water                                | Irrigation water                                | Irrigation water                                |
| Severe water scarcity at tail end of irrigation canals | Very small proportion of land irrigated; generally water-scarce | Some seasonal water scarcity at tail end of canals | Water sufficiency in irrigated areas; scarcity in outlying semi-irrigated locations |
| Agricultural diversity                          | Agricultural diversity                          | Agricultural diversity                          | Agricultural diversity                          |
| Crop diversity related to water availability; poor diversity at tail of canals, usually single annual crop possible downstream | Generally low crop diversity (low-value crops) together with extensive livestock production to supplement farm incomes | Generally high crop diversity in irrigated areas; double cropping and cultivation of high-value crops widely practiced | High crop diversity and double cropping possible at irrigated sites; more restricted agricultural diversity and single crop at outlying locations |
| Agro-ecology                                    | Agro-ecology                                    | Agro-ecology                                    | Agro-ecology                                    |
| Where irrigation water suffices, and soil conditions allow, reasonable opium yields can be achieved | Water scarcity and severe frosts make much of Ghor unsuitable for achieving high opium yields | Waterlogging of soils, salinity and high humidity make production of high opium yields difficult | Reasonable opium yields possible on slopes of Spin Ghar mountains |
| Market access                                   | Market access                                   | Market access                                   | Market access                                   |
| Differentiated access to opium markets based on ethnicity; opium production highest among communities sharing ethnicity with controllers of opium trade | Generally poor market access, for opium, other high-value crops or agricultural products | Good market access, for all agricultural crops (including opium) in main irrigated areas; rent-seeking behaviour of officials and commanders adds to transaction costs | Differentiated market access; good access to agricultural commodity markets in lower river valley areas, restricted access from more remote areas (except for opium) |
Drivers of opium cultivation: cross site comparisons

The comparative study of opium cultivation across four provinces emphasises the importance of locally specific factors in shaping farmers’ livelihood strategies and cropping decisions. The range of factors addressed in Table 22 is not exhaustive, but it illustrates how farmers’ choices about opium cultivation are reached within complex agro-ecological, socioeconomic and institutional landscapes.
7.2 Opium cultivation in farming systems

Farm systems theory places farm management decisions within their agro-ecological, social and institutional frameworks. Table 22 exemplifies observed trends in farmer decision-making across four provinces. This section draws on the evidence of WOL research to review the relationships between opium and components of farm systems in greater detail.

Opium and land tenure

The evidence of WOL research suggests the existence of links between land insecurity, rural landlessness and farmer decisions to cultivate poppy. Studies in both Nangarhar and Balkh (and supporting evidence from Kunduz) show that farmers’ decisions to cultivate opium provide farmers with improved security for their existing land assets (or conversely may improve their access to land under sharecropping agreements). Participation in the cultivation of opium poppy may confer security to farmers in two ways: first, economically, as returns from a (perceived) higher-value crop, which may open lines of credit or more favourable sharecropping terms; second, politically, through the patronage and support of landowners, local commanders and other powerful figures with an interest in the opium trade. This patronage can strengthen actors within the system of customary land relations (see Section 4.3).

The choice to cultivate poppy is heavily influenced by local agro-ecology and soil conditions and by other factors that may permit or preclude the cultivation and marketing of alternative high-value crops. However, in outlying areas where resource conditions make licit crop systems unviable, there is an observable trend associating poppy cultivation with low per capita land holdings. Where cultivable land per capita is scarce, farmers are under pressure to maximise their income returns to sustain farm-based livelihoods. Under these conditions, many land-poor farmers see no viable alternative to cultivating poppy.

Opium and water access

The links between access to irrigation water and poppy cultivation appear nuanced. While opium poppy may be successfully cultivated with relatively fewer irrigations than many other high-value crops, it still requires irrigations at key junctures of its growth. Water scarcity (which may preclude wide crop diversity or a second summer crop) initially increases farmers’ incentives to cultivate poppy rather than other high-value crops. However, beyond a certain level of water scarcity, there is insufficient water even for poppy (and therefore insufficient water for most other crops that can offer a viable livelihood).

Evidence from Chimtal in Balkh shows how poppy cultivation was primarily concentrated at the water-scarce downstream end of the canal. Similarly, in Nangarhar, poppy cultivation was most widely practiced in areas outside the Kabul River irrigation scheme. However, in Ghor and Charbolak in Balkh, poppy cultivation was concentrated in the most highly irrigated areas. While there may be other contributory reasons for this distribution, the absolute deficit of water in those areas may restrict the cultivation of poppy to the best-irrigated land.

WOL research indicates clear associations between farmers’ access to water and the function of local institutions (see Section 5.2). This suggests that inequities in water distribution, which undermine farmers’ capacity for viable licit livelihoods, can arise from asymmetric rural power relations.

Opium and livestock

WOL research indicates that small ruminant production is predominantly directed to market supply (as is opium production), while cattle predominantly supply domestic consumption needs (see Section 6.5). Accordingly, research in Nangarhar identified a predominantly inverse relationship between poppy cultivation and cattle ownership, which may indicate competition over irrigated land for fodder cultivation. By contrast, researchers identified a milder, positive relationship between ownership of small ruminants and opium cultivation, possibly indicating that poppy...
cultivating farmers had been able to maintain their livestock through the 2004 ban (or if they returned to cultivation in 2005, could access credit to restock). This relationship seems consistent with reports of widespread livestock sales of small ruminants in response to the loss of opium incomes during the ban. The evident dichotomy between small ruminants and cattle in their relationship with opium crops may reflect the greater reliance of the latter on cultivated fodders.

Evidence from Ghor further complicates this picture. In Ghor, many farmers initially moved into opium cultivation as a partial substitute for livestock incomes lost during the drought. However, poppy cultivation was generally less complementary to livestock production than traditional crops; poor opium harvests in 2003, 2004 and 2006 reduced the rate of restocking and may even have prompted further livestock sales.

Overall, it appears that livestock assets that are managed for their cash- or income-generating values directly relate to the fortunes of the opium economy. Farmers invest in livestock as stores of wealth when opium incomes allow, and necessarily disinvest when opium incomes are lost through harvest failure or official proscription. However, anecdotal evidence suggests that some farmers may be investing in livestock as income-generating alternatives to growing opium, but WOL research has not yet produced conclusive evidence for this.

Livestock managed for their subsistence values appear to be less sensitive to the fluctuations of the opium economy and less compatible with it.

**Opium and rural vulnerability**

Data from Nangarhar and field observations from Balkh and Ghor appear to link the decision to cultivate opium poppy with chronic resource scarcity. Farmers cultivating poppy are commonly those most constrained by scarcity of, or insecure access to, land and water resources.

Likewise, farmers growing opium are often those with little opportunity to benefit from economic development, waged labour or the development of value market chains in agri-business. Geographic isolation, exclusion on the basis of ethnicity, and lack of political influence are all likely explanations. In addition, opium producers often face conditions of insecurity, poor governance and asymmetric power relations governing access to land, water and agricultural credit.

Within this context of vulnerability, it is perhaps easier to understand farmers’ decisions to cultivate poppy. In some cases, farmers have little choice but to incorporate opium into their cropping system to sustain their livelihoods. The crop has the potential to create cash incomes when many other crops cannot. It also provides labour opportunities for rural communities and there may be better prospects for marketing opium (as opposed to other commodities) from remote locations. Perhaps most significantly, the choice to grow opium (and the patronage this may imply) may help farmers access essential land, water and credit resources, including those necessary to feed their households.

However, it would be an oversimplification to suggest that those engaged in opium cultivation are universally vulnerable. Studies in Balkh suggest preferential access to local networks of traders and security officials may facilitate entry into opium production. In Ghor, where the risks and opportunity costs associated with opium poppy cultivation are very high, poppy cultivation has become polarised between the most desperate and those with resources to survive a crop failure. Moreover, for every sharecropper cultivating an opium crop in Nangarhar, Balkh or elsewhere, there are landowners accruing predetermined portions of the final yield. Where land relations are exploitative, as described in Section 4.2, these landowners will enjoy considerable profits. Nevertheless, observations from all provinces indicate that where farmers have the governance environment and agricultural resources to engage in a licit farming strategy that is both profitable and sustainable, they generally favour this over illicit cropping.
7.3 Emerging directions for future research

The preliminary year of WOL emphasises the need to address some key questions in subsequent studies.

- What are the gross margins for opium production under different production conditions and how do these compare with other crops under similar conditions?

- How does opium cultivation fit into farm systems and household livelihoods? How does it integrate with other activities on- and off-farm?

- What factors explain differences in household dependency on opium cultivation in opium-cultivating areas? Why do some households cultivate more than others and what are the attributes of these?

- Are there differences in patterns of opium cultivation on lands under different forms of tenure?

- What set of conditions provides the “enabling environment” for households to move out of the cultivation of opium?

- What is the impact of eradication programmes or alternate livelihoods projects on farmers’ decisions to cultivate opium?
8. Natural Resources and Livelihoods

The primary management objective for most Afghan farmers is to achieve and sustain a viable livelihood. Current approaches to understanding livelihoods characterise them as complex constructs of household assets, capabilities and agency, interacting with an uncertain environment of institutions, shocks and risks.109

Accordingly, construction of farm livelihoods brings together key factors of access to resources, agricultural production, household labour and consumption, rural institutions, and household decision-making. Some aspects of household livelihood security and well-being can therefore be considered as proxy indicators for the effectiveness of farming systems, which is the unified outcome of various farm system components. Consequently, this chapter draws together many strands of evidence presented in previous chapters to examine the implications of Afghan NRM and farm systems for rural livelihoods.

The discussion builds on previous research110 in challenging the assumption that rural livelihoods are predominantly based on farm production. Drawing together the evidence of previous chapters, this chapter then reviews the effectiveness of different production systems in sustaining livelihoods, considering how access to and decisions about resources influence farmers’ strategies. It reviews the status of rural livelihoods associated with different types of production systems and thus contributes further to our understanding of rural vulnerability in Afghanistan. Finally, through this analysis, the discussion highlights key structures influencing farm decision-making and therefore helps structure an agenda for further research.

### Table 23: Reported sources of off-farm income 2005-06

<table>
<thead>
<tr>
<th>Seasonal/temporary incomes</th>
<th>Permanent incomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural weeding and harvest</td>
<td>NGO employee</td>
</tr>
<tr>
<td>Land preparation</td>
<td>National/provincial administration</td>
</tr>
<tr>
<td>Shepherding</td>
<td>Teacher</td>
</tr>
<tr>
<td>Livestock trading</td>
<td>Driver</td>
</tr>
<tr>
<td>Opium trading</td>
<td>Construction labourer</td>
</tr>
<tr>
<td>Cash for work</td>
<td>Carpenter</td>
</tr>
<tr>
<td>Irrigation maintenance</td>
<td>Shopkeeper/merchant</td>
</tr>
<tr>
<td>Construction labour</td>
<td>Smuggler</td>
</tr>
<tr>
<td>Wood collecting</td>
<td>Guard</td>
</tr>
<tr>
<td>Daily labour</td>
<td>Butcher</td>
</tr>
<tr>
<td></td>
<td>Afghan National Police</td>
</tr>
<tr>
<td></td>
<td>Afghan National Army</td>
</tr>
<tr>
<td></td>
<td>Construction</td>
</tr>
<tr>
<td></td>
<td>Blacksmith</td>
</tr>
<tr>
<td></td>
<td>Livestock trader</td>
</tr>
<tr>
<td></td>
<td>Ferry captain</td>
</tr>
<tr>
<td></td>
<td>Carpet weaver</td>
</tr>
<tr>
<td></td>
<td>Well/karez digger</td>
</tr>
</tbody>
</table>


110 Grace and Pain, “Rethinking Rural Livelihoods.”

### 8.1 Off-farm incomes

WOL research provides further evidence for the contribution of waged labour to farming households around Afghanistan. Of the 417 participating households, 83 percent reported supplementing farm revenues with some form of temporary or permanent waged labour during the year 2005-06.
Households reported members engaging in a wide range of activities to earn monetary incomes (Table 20). Waged labour was predominantly a male activity, with the exception of carpet weaving, which was undertaken by women in villages in Kunduz and Herat.

While in some cases labour was local and workers remained within the household, labour migration was very common, with household members working both nationally and internationally. An important source of seasonal labour was poppy harvesting, both in Nangarhar and in other provinces. Often, seasonal labour migration occurred during periods of low demand for on-farm labour, but sufficiently high incentives would attract household off-farm labour at any time. Many households reported receiving multiple off-farm incomes (mean 1.8, Std. dev. 1.16), with the maximum number of incomes received by a single household being seven.

The households’ capacity to access off-farm incomes relate to a range of factors: notably, the size and composition of the household, its geographic location, the labour demands of each farm and opportunity costs of allocating labour elsewhere, and any preferential access (or barriers) to employment on the basis of ethnicity, kinship, or other social or political networks. Although data suggest that the number of off-farm incomes correlates directly with adult male household membership ($r = 0.440, p <0.05$), field observations show that households are intrinsically adaptable and may reallocate labour roles to further opportunities for bringing in additional incomes. In Ghor province, women and children moved into male labour roles on farm to facilitate adult male labour migration.

Off-farm waged labour constituted a valuable buffer against economic losses or hardship. This was reported among nomadic pastoralists after livestock losses (Section 6.1), in Ghor and Nangarhar provinces following a fall in opium incomes (Section 7.1) and where households had been forced to mortgage their land capital (Section 4.2). Furthermore, given the highly seasonal and episodic nature of farm incomes (incomes following agricultural sales often come at only one or two junctions during the year), off-farm incomes can serve a valuable income-smoothing function. A good example of smoothing can be seen in the pattern of pastoral migration of the Khomari Khel and Kutub Khel. Both groups establish camps in outlying districts of Kabul Province from where some members undertake waged labour and share this income with migrating livestock herders during the cash scarce summer months.

The evidence of WOL not only situates income diversification and waged labour under conditions of resource stress, but also as a strategy for consolidation of assets and wealth accumulation. Many farming households in the more prosperous

111 The most international common labour destinations were Pakistan and Iran, with a couple of households reporting members in the United Arab Emirates. One household reported a member in the United Kingdom.

112 “WOL: Baseline Survey” enumerated separate sources of income. Therefore, it is possible for individuals to hold multiple jobs either simultaneously (e.g. taxi driver and shopkeeper) or consecutively (e.g. construction labourer in winter, agricultural labourer in summer).

113 Wider discussion of the role of off farm incomes in rural livelihoods is given in Grace and Pain, “Rethinking Rural Livelihoods.”
districts of the Nangarhar, Ghazni, Kunduz, and Herat benefited from waged labour incomes. Indeed, in many respects, wealthier households may be better able to respond to off-farm labour opportunities. This is because resource-poor households are often located in remote or outlying areas with more limited access to labour markets (Section 7.2). These same households are most likely to be bound into networks of patronage reciprocity or exploitation, involving the provision of unwaged labour to other households (Sections 5.3 and 6.4). Uncompensated labour, be it irrigation works, harvesting, shepherding or milk processing, erodes the households’ capacity to benefit from other remunerated labour opportunities.

To investigate the relationship between external incomes and farm production and household well-being, researchers employed a methodology to quantify these incomes for the previous year. This revealed a mean monthly household income of US$85 dollars, with a maximum value of US$1060 dollars. However, frequency distribution analysis shows that 40 percent of all households received a mean monthly off-farm income of less than US$42 dollars (Figure 23). Researchers noted that households receiving higher external incomes tended to have multiple members in employment at regional centres, internationally or alternatively managed small businesses. Employment in lower income households was more commonly linked to lower paid temporary or seasonal daily labour.

8.2 The household economy and well-being

Owing to limitations of time and resources, the WOL baseline survey adopted two simple indicators to characterise household economic well-being: household nutrition and assets. Nutrition was used to gauge the quality and diversity of rural

114 Household incomes are a very sensitive topic, and collecting accurate data is notoriously difficult. Rather than asking households about incomes directly, WOL researchers asked about which household members had worked during the previous year, where and for how many days. As data were being analysed, researchers consulted with other local employees and labourers in the same locality to verify rates of pay during the study period. Trading and business incomes alone are based upon the household’s own estimates of turnover.
Household diets and consumer assets were utilised as an indicator of disposable income.

**Household nutrition**

In most cases, data from research site households deviate from internationally recommended dietary structures. Diets in participating households were dominated by starchy foods (notably rice and bread), with fruits and vegetables often under-represented. Some poorer households reported subsisting on a diet almost wholly consisting of bread and tea. Organising data on household food consumption by farm production system revealed marked differences among them (Figure 24).

Perhaps surprisingly, there was a greater reported frequency of vegetable consumption at semi-irrigated sites than in irrigated river valleys (albeit with high standard deviations). Given the very limited irrigated area associated with these hillside sites, two hypotheses may be advanced. First, perhaps households in these areas purchase vegetables from elsewhere. Second, and more likely, irrigated cultivation in semi-irrigated systems is largely devoted to household supply, rather than directed to markets, so a larger amount is domestically consumed in these sites than in the valleys.

Rice, a crop associated with well-irrigated river valleys, is more commonly consumed by households in those areas than other locations, although it is apparently purchased and constitutes a food staple at all sites. Doubtless, its durability and compactness makes transport to, and storage at, remote locations more viable than vegetables (which are very rarely consumed at rainfed sites).

Households in irrigated river valley sites also reported consuming protein rich foods such as meat, eggs and dairy products more frequently than households outside river valleys. However, only the wealthiest of these households reported eating meat as frequently as once a week. By contrast, reported consumption of protein rich foods in rainfed areas was extremely low, despite the proportionately larger livestock populations found there. This might be consistent with observations suggesting that a larger proportion of products from livestock at these sites is directed to markets.

Overall, households in irrigated and semi-irrigated production systems show a relatively diverse (although still structurally deficient) diet. Households in remote rainfed areas report that nearly 90 percent of all meals consumed are primarily carbohydrate-based, with only 2 percent of meals being based upon vegetables or fruits. This raises the possibility of serious vitamin or mineral deficiencies.

**Household assets**

Household possession of purchased consumer goods (including sole or joint ownership) was investigated as an indicator of disposable income. Obviously, for some categories of assets, geographic location and logistics influenced patterns of ownership. For example, households without electricity

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(either from a private generator or public supply) were unlikely to possess a television. Cell phone network coverage may also influence mobile phone ownership. Equally, findings may reflect proximity to markets for the purchase of goods and the commodities needed to maintain them (e.g. batteries, diesel).

Nonetheless, findings were fairly consistent with the results of the investigation of off-farm incomes and household nutrition. For all but the very cheapest consumer goods, households on irrigated farms persistently demonstrated the strongest asset portfolio, and rainfed farmers were the most asset poor (Figure 25). In combination, these findings are indicative of dietary vulnerability and cash scarcity among households dependent upon high-risk rainfed farming in outlying regions.

8.3 Farming and livelihoods

Research findings show that Afghan farmers construct livelihoods within a wide diversity of production conditions and agricultural systems. By necessity, this paper focuses upon emerging trends and patterns in the data. It sketches some examples to illustrate the extent of difference and diversity, and the reasons for these.

Production systems in overview

Examining the overall trends in access to natural resources and livelihoods as identified through the first year of WOL research highlights some clear patterns (Table 24). Perhaps intuitively, we see that the overall effectiveness of irrigation water supply for cultivation depreciates between permanent canal irrigated systems and semi-irrigated karez or spring-dependent systems. Rainfed lands received the least effective water supply. Clearly related to this trend is the corresponding decrease in crop diversity between production systems. While crop diversity correlates with water supply across all production systems, the strongest relationship between crop diversity and water is found on rainfed farms ($r=0.64$), which may indicate that water-scarce systems are the most sensitive (in terms of opportunistic cropping choices) to changes in amounts of water (actual or anticipated rainfall).

The overall pattern of land holdings across production systems is also distinct, with farms in irrigated lands working larger areas than farmers dependent on irregular irrigation sources. Landholdings under rainfed cultivation, unbounded by constraints of irrigation, are considerably larger, although almost certainly very much less productive and restricted by both yields and crop diversity. The trend in household ownership of sheep and goats runs contrary to access to irrigation water, reflecting the limitations of crop-based agriculture under conditions of water scarcity, but also the superior access to pasture associated with outlying villages. The largest herds are managed by nomadic pastoralists.

As previously discussed, cattle ownership seems unlike other categories of farm assets in that no major differences in ownership were observed across all production systems. While not all households possess cows, if they do it is usually only one, sufficient for supplying the household with milk. There is an ongoing use of draught oxen for ploughing in some outlying areas.

The distribution of values for household nutrition is, at face value, a little surprising. We find that the mean value for semi-irrigated sites is higher than that for irrigated sites. At present, the reason for this is not fully understood. However, it should be noted that the semi-irrigated sites in Nangarhar province all reported unusually high consumption of vegetables, fruits and meat, which raised the mean for the production system. Whether this was factually correct or misreported is not known. If the data from the Nangarhar sites are excised from the sample, mean household nutrition at semi-irrigated sites in the remaining three provinces falls to a level midway between that of the irrigated farms and the rainfed farms (68.53, with Std. dev 25.26). It is also noteworthy the pastoral groups score comparatively highly on nutrition. This is because of the way that different food groups were assessed (with higher values allocated to protein- and energy-rich foods such as dairy products and meat). Pastoralists often have a higher proportion of these foods in their diets than cultivators, but
parameters that frame decision making related to livelihoods.

In Afghanistan, access to land and conditions of tenure underlie all aspects of farm production and livelihoods. Under prevailing systems of tenure (and where land is available), land deficit farmers may enter into sharecropping (or other temporary use agreements) with landowners. While this form of resource access is thought to lower the risks for the resource poor, there may be constraints on cropping choices (an emphasis on cash crops rather than on food staples). Given that the sharecropper’s primary contribution to the partnership is labour, it may have implications for the household’s capacity to simultaneously access off-farm incomes. Conversely, landowning households are able to use mechanisms such as lease and sharecropping to increase incomes and free up their own household labour (should it be more profitably utilised off farm).

Due to land fragmentation and scarcity, most farmers may have little choice pertaining to the amount and type of land they cultivate. Nevertheless, each will determine the optimal area of land either to directly cultivate or to indirectly make available through sharecropping or lease against a variety of criteria (such as household labour availability, farming risks, markets, off-farm labour opportunities and the local terms of lease or sharecropping). Farmers then seek to move toward the most optimal resource status, either through acquisition of additional land (which is rare) or by divesting surplus land under various tenure arrangements.

This does not necessarily indicate food security: pastoralists do not normally slaughter healthy animals for food. High levels of meat consumption can be an indication of livestock mortality or illness and, therefore, food insecurity.

There is a discernible relationship between crop diversity and household nutrition in both irrigated ($r = 0.57$) and semi-irrigated farms ($r = 0.64$). Vegetables and other high-value foods are cultivated for household consumption at these sites and so this is reflected in the quality of the diet. However, there is no corresponding relationship in rainfed areas, where farmers primarily grow wheat; if they diversify beyond this, they do so into barley, sorghum or legumes. Although the latter are nutritious, they do not appear prominently in the diets of rainfed farming households.

It is interesting to note the relationship between the number of off-farm incomes reported at each type of site and the values of those incomes. While households in rainfed areas reported the highest number of external incomes from waged labour, the total value is only about half that received by households in irrigated and semi-irrigated areas.

This is consistent with the hypothesis that households in remote areas do not share the same level of access to well-paid employment as those in river valleys. In these outlying areas, the main labour opportunities are for low paid seasonal agricultural work.

**Farm strategies and livelihoods**

Preliminary data do not yet permit us to draw firm conclusions about farm management and livelihoods. However, despite obvious complexity, it is possible to identify some general parameters that frame decision making related to livelihoods.

In Afghanistan, access to land and conditions of tenure underlie all aspects of farm production and livelihoods. Under prevailing systems of tenure (and where land is available), land deficit farmers may enter into sharecropping (or other temporary use agreements) with landowners. While this form of resource access is thought to lower the risks for the resource poor, there may be constraints on cropping choices (an emphasis on cash crops rather than on food staples). Given that the sharecropper’s primary contribution to the partnership is labour, it may have implications for the household’s capacity to simultaneously access off-farm incomes. Conversely, landowning households are able to use mechanisms such as lease and sharecropping to increase incomes and free up their own household labour (should it be more profitably utilised off farm).

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**Box 9: Are all sharecroppers resource poor?**

The settlement history of Gawashk village indicates that a high proportion of land is owned by absentee landowners. Even the local community leader owns no land of his own and instead works as a sharecropper on a farm of 24 ha. Due to the size of the farm, he shares this work with three related households. Collectively, the four households receive three-fifths of the yield with two-fifths going back to the owner. The households have to supply all the production inputs.

Through the sharecropping arrangement the leader has access to the product of 3.5 ha of land sufficient (along with any other household income sources) to sustain his political and administrative status in the community.
These households already struggle to attain viable agricultural and livelihood strategies (both on and off farm) and, under these conditions, the allocation of labour to irrigation will have high opportunity costs.

Improved farm access to irrigation water allows greater diversification in cropping. This has implications for both household nutrition (cultivation of vegetables for domestic consumption) and income (cultivation of cash crops, fodder for livestock, or income substitution by cultivation of domestic food). In theory, improved access to irrigation water should be related to labour inputs into irrigation maintenance. The reality appears to be more complex, with the most advantaged farmers being so by virtue of their position and not necessarily needing to make heavy allocations of labour. They are thus free to use this labour either on or off farm to increase household incomes.

Instead it is at water-scarce downstream sites where labour investment in canal maintenance brings the greatest direct benefits to households.

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### Table 24: Comparison between generic production systems

<table>
<thead>
<tr>
<th></th>
<th>Irrigated (n=252)</th>
<th>Semi-irrigated (n=106)</th>
<th>Rainfed (n=58)</th>
<th>Pastoral nomadic (n=25)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water supply</strong></td>
<td>Mean</td>
<td>Std. dev.</td>
<td>Mean</td>
<td>Std. dev.</td>
</tr>
<tr>
<td></td>
<td>57.72</td>
<td>14.53</td>
<td>39.32</td>
<td>9.04</td>
</tr>
<tr>
<td><strong>Mean annual crop diversity</strong></td>
<td>8.44</td>
<td>2.69</td>
<td>5.57</td>
<td>1.39</td>
</tr>
<tr>
<td><strong>Mean cultivated area (ha)</strong></td>
<td>1.78</td>
<td>2.39</td>
<td>0.65</td>
<td>0.92</td>
</tr>
<tr>
<td><strong>Sheep and goats</strong></td>
<td>3.57</td>
<td>9.1</td>
<td>5.87</td>
<td>9.69</td>
</tr>
<tr>
<td><strong>Cattle</strong></td>
<td>1.68</td>
<td>1.63</td>
<td>0.58</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Household Nutrition</strong></td>
<td>78.64</td>
<td>23.38</td>
<td>85.66</td>
<td>21.94</td>
</tr>
<tr>
<td><strong>Household assets</strong></td>
<td>3.64</td>
<td>2.91</td>
<td>2.11</td>
<td>2.47</td>
</tr>
<tr>
<td><strong>Number off-farm incomes</strong></td>
<td>1.86</td>
<td>1.22</td>
<td>1.57</td>
<td>1.01</td>
</tr>
<tr>
<td><strong>Mean incomes value (US$)</strong></td>
<td>1183.89</td>
<td>1555.91</td>
<td>926</td>
<td>1027.12</td>
</tr>
</tbody>
</table>

(with terms as advantageous to the owner as the land market will sustain).

Impoverished nomadic pastoral households in Laghman were found to be supplementing their livestock incomes by collecting livestock manure, loading it on donkeys and transporting these loads 10 km from their camp to the district market. Each donkey load of manure was sold for the equivalent of $6 US dollars, sufficient to purchase enough flour to last their family for a week.

### Box 10: Making Ends Meet: Supplemental Incomes

Impoverished nomadic pastoral households in Laghman were found to be supplementing their livestock incomes by collecting livestock manure, loading it on donkeys and transporting these loads 10 km from their camp to the district market. Each donkey load of manure was sold for the equivalent of $6 US dollars, sufficient to purchase enough flour to last their family for a week.
Farmers’ decisions about production are related to factors of land, water and other common property resource access, household constitution, access to markets, and off-farm income opportunities. Any particular strategy has its own unique set of possible returns, risks and opportunity costs, which farmers and households evaluate (and continue to re-evaluate over time). Some general strategies for farming under different conditions have been observed through WOL research.

Under irrigated conditions, where water and land resources suffice, farmers often prioritise production for domestic supply through production of a combination of cereal, vegetables, fodder and livestock. Once household subsistence needs have been met, the farmer is able to divert remaining land, water and labour resources for income generation through cash cropping, commercial livestock production or off-farm employment. The wealthiest farmers, who have sufficient on- and off-farm resources to absorb losses following a failed cash crop, may choose to adjust to a commercially-oriented production strategy to maximise farm revenues. Likewise, at the lower end of the resource-access spectrum, farmers lacking land and water resources sufficient for household subsistence may be pushed into dedicating their resources to highervalue, market-oriented production in an effort to purchase items that their land cannot produce. This high risk strategy may also be driven by the terms of tenure in share-cropping agreements or indebtedness.

Alternatively, farmers lacking a viable natural-resource base due to drought, appropriation, forced sale or mortgage may move to a cash-based livelihood through waged labour. Specialised pastoralism constitutes another example of a production system that skips subsistence farming to jump directly into a cash-based domestic economy. Nonetheless, acquisition and management of sheep and goats without secure access to grazing land and winter feed resources constitute a further farming risk.

Production systems in which water is scarce often have (or are compelled to seek) the comparative advantage of direct access to rangeland under customary rights. Grazing on pastures in the spring
and early summer season, in combination with access to cereal residues in the summer and stocks of winter fodder, form the basis of commercial livestock production. Under these farming conditions, households may need to supplement cultivated food staples with purchases of other foods, cash allowing. The risks intrinsic in rainfed cultivation may be buffered by combining this activity with herding.

In Afghanistan, sheep and goat herding (like cash crop cultivation) usually represent commercially-oriented production activities. Consequently, sheep and goat herding has the potential to generate cash incomes for households, while simultaneously meeting some of their subsistence needs and mitigating risks associated with rainfed agriculture. Herds also hold the potential for capital growth, but in some respects entry to the activity is restricted by high risks and the need to access rangeland and crop residues during the annual cycle. Herds are therefore most commonly restocked or built up by households with secure resources or those receiving external incomes. Specialist pastoralists also engage in commercial livestock production although many now seek to mitigate associated risks through off-farm labour.

In a complex and fluctuating agricultural and socioeconomic environment, off-farm waged employment holds the potential for diversifying and smoothing farm incomes, sustaining livelihoods through times of crisis and subsidising on-farm activities through cash scarcity. External cash incomes may also facilitate investment in production capital such as land or livestock, leading to (if other conditions allow) the production of surplus for, or a transition toward, more market-oriented production. Where opportunities exist, the allocation of labour off farm may come with a cost to farm production. Resource-wealthy households are usually better placed to manage domestic labour shortages. These households will draw on unwaged labour through networks of reciprocity, disinvest in land by renting or sharecropping, or simply hire labour in at a lower rate than what is being earned off farm.

However, off-farm earnings constitute an essential bastion for the resource poor and may, in some cases, provide the subsidy that enables farming households to remain on the land. Resource-poor households demonstrate great flexibility and innovation in accessing waged labour through household division, reallocation of labour roles and the temporary migration of members. When farmers have the choice (and incentive) to do so, off-farm employment may also provide an exit strategy for households transferring out of agricultural production into a purely wage-based livelihood.

To offer a generalised description of household farm strategies risks oversimplifying the complex decision-making process undertaken by farmers. Nevertheless, this form of model can be considered policy relevant, if only to illustrate the wide range of strategies and livelihood options rural households may assume in constructing a livelihood.

The resource conditions identified through WOL research suggest that the largest proportion of Afghan farming households would be clustered around the centre and centre-left areas of Figure 26. Here, they construct livelihoods based upon agricultural production for household supply and make up inevitable shortfalls through additional off-farm labour and small amounts of marketable production. Households facing high levels of agricultural resource deficit (at the left of the diagram), may be driven to high levels of market engagement, either by dedicating their limited resources to the high risk strategy of producing for markets, or (if there is opportunity to do so) by providing labour to markets. In extreme cases, households may have no other option but to sell any remaining productive assets—such as livestock and ultimately land—through markets. Being unable to produce sufficient food, resource deficit farms rely on access to markets to meet these requirements (assuming they can afford purchases).

However, off-farm earnings constitute an essential resource to move beyond subsistence and produce a marketable surplus (toward the right of the diagram). Even fewer command sufficient resources and security of position to orient solely to market production.
While Figure 26 may be misleading in suggesting a linear relationship between different farming strategies, the model raises an important question: namely, under which resource conditions and strategies do farmers cease to be farmers and become categorised as something else? The evidence from preliminary WOL research has already shown that a high proportion of farming households (at all levels of resource access) draw upon off-farm incomes in constructing livelihoods. This evidence further challenges assumptions that rural livelihoods in Afghanistan remain entrenched in agricultural production.

8.4 Factors influencing farm-based livelihoods

WOL research highlights a number of elements structuring how decisions are taken and how households and communities act to construct livelihoods. The final part of this chapter returns to these main structural elements and, in doing so, defines avenues for future investigation.

Resource/asset portfolios and location

Farm strategies are closely linked to the available resource/asset portfolio available to individual households, and livelihoods may be widely differentiated on this basis. Resource/asset portfolios encompass the quantity and attributes of resources available to the household. These often include not only natural resources such as land, water, common property rangelands, soil condition and local climatic variables, but also human assets such as household constitution, health and labour capacity. Field studies have further highlighted the importance of social capital, through networks and relationships, in constructing farm livelihoods. Movable assets, such as livestock, machinery and consumer goods also constitute productive capital and stores of wealth, which may be variously exploited by households to achieve livelihood goals.

Research has further shown that resource availability and condition can be synonymous with place (such as the position a farm occupies along a river basin or canal, its location with respect to common grazing lands, or its proximity to markets or district administration). Access to each of these resources is related to the geographic location of the household. Diversity in Afghan farm environments exists not only at provincial and district levels but also within districts and across communities.

Institutions, informal rules and networks

In the absence of formal institutions, this study has provided evidence for the centrality of informal institutions in mediating farmer access to natural and other resources.

In rural Afghanistan, informal institutions structure user rights to both private land and common property resources such as grazing land and irrigation water. The first year of WOL research has demonstrated that rules of resource management differ not only by type of resource but also by location. As yet the overall impact of these social systems remains unqualified. In some cases, rural institutions appear empowering and equitable in sharing resources to sustain communities, while in others there is clear evidence that the interests of some stakeholders may be taking precedence over those of others. There is also evidence that some systems may have broken down irrevocably. The overall situation suggests increasing pressure upon finite resources and growing challenges associated with their management. Inequities draw attention to the distribution of power and influence in rural society and the impact of how such power is used.

This research has further highlighted the importance of informal transactions and transfers of labour, cash, land and other resources as strategies for managing risk and scarcity or accumulating assets. Participation within these rural networks is widespread and different actors are able to use them in different ways.

Dynamism, decisions and opportunities

Even without time sequence data, the first year of WOL research captures a picture of widespread change and adaptation in farming and livelihoods. Rather than linking the resilience of Afghan farmers
through crisis and instability to stolid perseverance with traditional farming systems, findings indicate that Afghan farmers are highly flexible and innovative in their acquisition and use of natural resources, in their agricultural strategies, and in their movements both in and out of diverse on- and off-farm activities. There is evidence for division and productive specialisation at community level and for outmigration, shuffling labour roles and the restructuring of livelihood strategies at household level.

Adaptation at all levels of farm systems occurs not only as a coping strategy to avert crisis and scarcity but as an enabling mechanism that allows farmers to respond to opportunities for diversification, accumulation and commercialisation.

The rural landscape is inherently dynamic over time, with changing patterns of resource availability and scarcity, security and power structures, government policy and markets, as well as changes in the constitution of communities themselves. These broader fluctuations overlay the regular pattern of seasonality and the cycles of reproduction that characterise farming households themselves.

8.5 Emerging directions for future research

Findings from the first year of WOL research highlights some key questions regarding farming systems and their contribution to rural livelihoods. These warrant further study.

- Can we measure gross margins of production for farms under different systems of production and management? What do these suggest about current farming strategies and resource allocation?

- What are the relative contributions of different types of farm production to household incomes? And how does this change over time and between production systems?

- What type of farming and socioeconomic conditions are best suited to agricultural production for market supply and are there conditions under which subsistence production should be encouraged?

- How are our farmer livelihoods influenced by the effectiveness of institutions governing access to natural and agricultural resources? Can we establish and qualify a link?

- To what extent do active markets for agricultural products (e.g. livestock and high-value crops) benefit farming households and rural livelihoods? Are these benefits equally shared by all farmers?

- To what extent can cash crops, sheep and goats, and other supply directed to markets displace the role played by poppy cultivation in opium producing households under different conditions of resource access and production?
9. Implications and Recommendations for Policy

This paper constitutes the first synthesis of findings from the three-year EC-funded WOL project, bringing together the results of research during 2005-06. It does not represent the final conclusions of the project: the first-year goals of research have been to explore the attributes of selected research sites, establish a baseline and identifying key issues for further investigation in more detailed longitudinal studies.

WOL research has a strong empirical basis, and research findings represent very extensive field studies undertaken by members of the project team. The project researchers hope to foster an improved understanding of conditions of agricultural production in remote farming communities among government officials, policymakers, expatriate advisors and members of the international community in Kabul. Due to time and resource constraints, WOL research has focused primarily upon 20 research sites across four provinces although fieldwork was undertaken in eight provinces.

The project was initiated during a key period of planning and policy development in Afghanistan, when there was a recognised need for information about agriculture and NRM at farm level. Supported by its international partners, the Government of Afghanistan views agriculture as the main source of livelihood for a majority of Afghans and now identifies the sector as the “engine of growth” for the national economy. Key policy directions for agriculture and NRM were set out in the Agricultural Master Plan and subsequent policy documents. The major elements of this strategy are to liberalise the agricultural economy and reduce the role of government to facilitating an enabling environment. Under the Master Plan, project interventions will focus on creating value chains for the production and marketing of high-value agricultural products, notably from the horticulture and livestock subsectors. The Master Plan links food and livelihood security to the stimulation and growth of thriving agro-industries and rural employment markets. This final section of the paper draws together some of the key findings of the research, and considers the policy implications of these. The chapter concludes with some preliminary recommendations.

9.1 General findings

The findings of WOL research validate a holistic “farming systems” approach to exploring agricultural production and rural livelihoods. This integrated approach has been suggestive of important relationships and linkages between farmer access to different natural resources, agricultural strategies and livelihoods. It places decision-making within a broader environment of opportunity, risks and institutions. The approach highlights tradeoffs within farming strategies—for example the allocation of valuable labour away from the farm to produce monetary incomes or sustain important socioeconomic relationships)—and reallocation of natural resources between different subelements of the farm system.

Farmer behaviour and rural livelihoods are characterised as innovative and dynamic, with households constantly seeking new ways and better combinations of activities to achieve livelihood goals, mitigate risks, and take advantage of available opportunities. WOL provides evidence of farmers changing cropping and production strategies from one year to the next or moving out of agriculture completely. Studies reveal innovation and adaptation both among and within farming communities and also at the intrahousehold level, with members realigning themselves in different ways at different times.

Furthermore, preliminary findings indicate that access to and management of key resources such as land and water are widely mediated by customary

and informal institutions. Initial indications suggest that while these institutions can be effective in regulating access within communities where there is a convergence of interests among stakeholders, they are less effective externally where strong conflicts of interest may exist. Under these circumstances, resource access more usually reflects the prevailing distribution of power among resource holders. The role of these “gateway” institutions and how their function affects rural livelihoods and development is clearly an issue requiring further, more detailed inquiry.

Data indicate a strong subsistence orientation in irrigated farming, reflecting an aversion to risk in a high risk production environment. Farmers commonly prioritise cultivating food crops sufficient to meet their household requirements and so achieve a degree of independence from markets. However, few households command the resources to achieve subsistence. Accordingly, it is usually necessary for them to generate cash incomes for additional purchases, either through the supplementary cultivation of a high-value crop, through sale of livestock products or off-farm waged labour. Most Afghan farmers practice a diversified composite strategy of this type.

Specialised production for market supply is uncommon among farmers involved in the study and is normally associated with high risks. It is sometimes practiced by those wealthy farmers with sufficient (natural, financial and social) resources to survive the failure of the crop itself or the collapse of markets. Only under these conditions do farmers appear confident to practice classical economic “maximising” behaviour. However, at the other extreme, households under conditions of severe resource scarcity may be pushed to produce high-value products for market if their resources cannot supply sufficient food to meet their requirements.

Finally, WOL data suggests that while there are spectrums of livelihood security and vulnerability across all forms of agricultural production, those dependent upon rainfed agriculture are the most vulnerable of the categorised groups investigated. This was through virtue of remote locations, poor access to off-farm employment, low crop diversity and high risk agriculture. Nonetheless, findings suggest that nearly all the rural households studied risked dietary deficiencies.

Drawing upon the findings arising from the first year of WOL, several recommendations can be made with regard to the agricultural policy.

**Build farmer confidence in markets**

With the exception of opium, farmers see few precedents for effective markets for agricultural products and commodities and even these have been subject to major price fluctuations, leaving many households feeling vulnerable and at risk. Farmers observe that in a year of good harvests, prices for their products fall and prices often increase only when they have less to sell. It will therefore be very important that, in establishing an enabling environment for commercial agriculture, the government build farmer confidence in the function of markets and the private sector. This may involve a very significant cultural shift for many farmers, and will be linked to the incremental development of rural infrastructure. It might be unrealistic to expect all farmers to transition to production for market supply on the basis of a few demonstration projects and isolated market-related structures.

**Support the resource-poor to enter markets**

It is important to ask who will be the principal beneficiaries of “free” rural markets. WOL research indicates that participation in agricultural production for market supply is not universal and is associated with high risk. Many Afghan rural households face very severe resource scarcity; indeed, very few have access to sufficient land to effectively participate in markets, even assuming they first ceased cultivating food crops. Programmes aiming to stimulate agricultural markets should offer the resource poor preferential access to credit and other agricultural inputs.

**Promote equity of access to natural resources**

There exist direct links between common property resources (such as water and pasture) and production for market supply. Access to these resources is heavily mediated by informal institutions and
evidence shows that these may serve to reinforce the existing distribution of power and wealth. There is need for legislation unambiguously codifying user rights to natural resources. Furthermore, relevant state and community institutions must be empowered to ensure equity in how resources are allocated.

**Build value chains where production is already for market supply**

Owing to general unfamiliarity with (and lack of confidence in) markets, a strong recommendation arising from this research is that the Afghan government and its partners begin the stimulation of markets and value chains in those subsectors and locations which already produce mainly for market supply. It will be much more difficult to foster confidence in markets for newly introduced products or products that are not traditionally associated with the monetary economy.

**Implement integrated agricultural development strategies**

Sustainable agricultural livelihoods are most likely to emerge under conditions of secure tenure and access to natural resources, diversified agriculture with production for strong rural markets and opportunities for ancillary off-farm labour. Security and good local governance also contribute to this enabling environment. Accordingly, policy will be most effective if based upon a multi-sectoral convergence of interventions to foster rural development.

**Recognize the value of non-market agricultural production**

The heavy emphasis of policy on agricultural production for market supply risks overlooking the important functions of non-monetarised production. Particularly in remote locations with poor access to markets and services, farm products can make important contributions to household well-being, both in the long term and during specific periods of crisis or special needs. These functions include bridging periods of cash scarcity, non-monetary transfers to service social networks, and livestock being maintained as stores of value.

Some additional recommendations are made regarding the organisational and institutional context of agricultural development in Afghanistan.

**Strengthen cross-ministerial coordination**

This study highlights the inextricable links between natural resource access, agricultural practices and household wellbeing, together with the wider impact of these on economic development and governance issues. Accordingly, the study highlights a need for integrated approaches to the complex, multi-faceted problems of rural development. Institutionally, this necessitates cooperation and coordination between line ministries (and provincial authorities). Some progress has already been made in this respect, but there remains much room for improvement.

**Strengthen provincial departments**

At the time this study was undertaken, little of the progress toward building capacity in, and resourcing the line ministries had filtered down to provincial departmental level. Provincial departments will be of central importance in the implementation of agricultural policy and relaying information on impact back to Kabul, but in some provinces they were observed to be virtually inactive. There is a clear need for building the role and capacity of these departments.

**Standardise data collection**

There is currently no standardised mechanism for the collection of data on which to base agricultural policy. Such data that are collected come unsystematically from diverse locations, as well as different NGO and institutional sources: they derive from different measures and standards, which hinders integration and comparison. The government should take the lead to establish a systematic framework for data gathering, around which all institutions can then build their own data collection. The results of all future studies could then be integrated in a central database.

The following sections outline some preliminary findings in specific thematic research areas.
9.2 Key findings on land

In Afghanistan, few if any farmers hold official title to the land they occupy. Nearly all transactions and adjudications are undertaken within the customary system, which at face value appears to function quite effectively within communities, especially with respect to private land holdings. Under this system, farmers access land under diverse forms of tenure with different associated terms and levels of risk. WOL research indicates between a quarter and a third of all cultivated land at research sites is managed under some form of temporary use agreement.

Fragmentation of private land holdings and growing pressure on land resources everywhere means land markets are largely stifled. However, there are significant differences between mean land holdings under different systems of production. At some research sites, per capita land holdings are clearly insufficient to sustain livelihoods under licit cropping without supplementary incomes.

Common property land resources are of particular value to the resource poor. While disputes over these resources are less common than those over private land, they more frequently involve actors external to customary management systems and consequently less easily addressed by informal institutions.

Several interim recommendations are made as follows:

Register land through a deeds registry

Afghanistan needs to move toward an effective system of land registration and administration of private lands. Given the wide acceptance and convenience of customary systems, a locally situated and managed deeds registry should be established in rural areas. This will avoid the complexity and expense of a cadastral survey and destabilising disputes in resolving final title, yet achieve many of the benefits of registering land titles. A deeds registry can indeed constitute a useful step toward establishing final title.

Promote land transfer documentation

It is important to raise public awareness among rural Afghans to always record and document transfers of land, by whatever means are available. At present, transfers of land by inheritance are almost never recorded and notarised. Even informal documentation will be of assistance to land administrators and local officials (and the land managers themselves) when a system of land registration is introduced.

Resolve disputes over common property

There is a need for an effective mechanism for arbitration and resolution of disputes over common property; at present customary-based informal systems of adjudication are least effective in resolving these as they often involve actors from outside the community or power asymmetries. There is clearly a need for outside agencies to sanction the outcome of negotiated settlements between disputants or to lead dispute resolution themselves.

Improve understanding of subordinate land rights

Temporary rights of land use, through lease, mortgage and sharecropping should be left as they are. They play complex and specific roles in the rural economy and should not be altered or removed from the legislation without further review and consideration. Nevertheless, there is need for a more comprehensive analysis of the terms and conditions associated with temporary use agreements and the impact of these on rural livelihoods.

9.3 Key findings on water management

Although surface water is usually managed as a common property resource, groundwater from wells and karez is more commonly managed as private property, beyond community sanctions. This can give rise to unregulated extraction to the deficit of other irrigators and water users and may exacerbate socioeconomic inequalities.
Beyond source, the effectiveness of surface water irrigation is related to three major factors. These are the hydraulic performance and structural attributes of the conveyance system, the location of the farm site, and how water allocation is being managed locally through institutional arrangements.

While the general principles of water management are similar across Afghanistan, there exists considerable regional variation in practices, reflecting specific cultures and resource conditions. Large and complex lower catchment irrigation systems appear most susceptible to structural and social inequities in water allocation. The mirab system, found widely in these lower catchments, is not always sufficiently resourced to resolve situations of inequity, and may indeed simply institutionalise local power relations.

The supply of irrigation water appears to directly impact on-farm diversification, food security and entry into agricultural markets and prospects for sustainable licit livelihoods. Furthermore, inequitable irrigation management places inordinate labour demands on the most vulnerable.

The following interim recommendations are made.

**Improve community water management accountability**

There seem to be strong arguments for retaining some form of community-based irrigation water management, building upon existing institutions, capabilities and knowledge. However, as unresolved conflicts of interest and power asymmetries undermine the equitable governance of water, there is a clear need for the adequate resourcing and strengthening of these institutions. Stakeholders would be better empowered through improved and broader representation.

**Rehabilitate intakes with caution**

Improving diversion structures and intakes from sources with fixed structures (a common strategy in irrigation rehabilitation) may increase extraction efficiency in the short term, but for communities in river valleys the most effective strategy may be moving the point of extraction to follow the changing level and alignment of the river. Furthermore, building permanent offtakes at the heads of canals may disproportionately benefit upstream communities and reduce their incentive to contribute labour to canal maintenance elsewhere.

**Derive equitable benefits from irrigation rehabilitation**

Owing to structural inequities, conveyance losses associated with water at the lower end of long canals has a direct impact on the most vulnerable and water-scarce farmers. Due to the resource-stresses associated with their physical position on the system, these farmers will be the least able to invest resources in rehabilitation and improvement. Programme interventions should therefore be planned with communities to try to ensure equitable benefits and responsibilities throughout the system.

**Rehabilitate upper catchment irrigation**

Research indicates that water management in small-scale upper catchment systems is often more effective than in more complex river valley environments. Furthermore, upper catchment systems may be more sensitive to water supply in terms of crop diversification. While system rehabilitation at semi-irrigated sites has previously been conducted piecemeal and led by NGOs, this form of intervention may be worth exploring further in terms of cost benefits and advancing of licit livelihoods.

**Control groundwater extraction**

There needs to be urgent enforcement of legislation prohibiting the unlicensed extraction of groundwater. At present, there appears to be little or no official enforcement of existing regulations on sinking new wells. The beneficiaries of this are usually wealthy farmers, often to the detriment of other water users. Unlike surface water, groundwater use is not subject to community oversight and therefore its extraction does not appear subject to any form of control.
9.4 Key findings on livestock

Livestock can perform a range of different functions within farming systems and livelihoods, depending upon farmers’ choices, available resources and production conditions. Small numbers of animals can be effectively integrated into irrigated cropping systems, bringing the benefits of diversification, while under high risk rainfed conditions, the herding of sheep and goats form a complementary and potentially value-adding activity.

The management of sheep and goats for market supply seems dependent upon access to natural pastures and rangelands (this particularly true for nomadic pastoralism), although all systems of production ultimately depend on access to cultivated or purchased winter fodder.

It was found that overwhelmingly, farmers attempt to minimise production costs and thus their management is rarely achieving animals’ productive potential. The entry costs and risks of investing in livestock for income generation and capital growth restrict this to wealthier farmers or specialised herders. Furthermore, livestock extension and healthcare services seem to be concentrated in locations where animals are usually managed for subsistence rather than market values. Management for market supply is usually practiced in rangeland communities and livestock support services appear under-represented there.

The following interim measures are recommended.

*Include rangeland communities in developing value chains*

Efforts to build livestock value chains should first target communities that traditionally produce for market supply. The greatest focus of development interventions has been on more accessible river valley sites where animals are not so regularly managed for monetary values.

*Increase focus on livestock husbandry*

Historically, there has been a strong veterinary focus to livestock development initiatives in Afghanistan. This research draws attention to important weaknesses in the management, nutrition and marketing of animals, and recommends that greater efforts be directed to improve livestock husbandry practices.

9.5 Key findings on opium cultivation

While opium represents a profitable high-value crop for a small number of wealthy landowners, for many households afflicted by severe resource scarcity, it constitutes the only crop that can sustain a farm-based livelihood given available resources. Movement into and out of opium cultivation can therefore involve a spectrum of “push” and “pull” factors. Indeed, there is no single reason for or set of conditions under which farmers choose to cultivate a poppy crop. Farmers reach their choices within a complex and changing management environment, and therefore it seems unlikely that there can
Extend development initiatives to outlying districts

At present, the main agricultural and infrastructural development programmes largely focus on the more densely populated districts of the lower catchment river valleys, where the majority of the rural population lives. Policymakers should consider extension of these programmes into outlying resource-scarce areas, where incentives for poppy cultivation are particularly high.

Encourage livestock husbandry where appropriate

Evidence shows that many poppy cultivating areas are characterised by resource scarcity, where alternatives for irrigated cropping are limited. Policymakers should therefore consider supporting the expansion of livestock production in those areas. With access to rangeland resources and appropriate management inputs, this can contribute to farm incomes.

Strengthen rural institutions and governance

Some informal institutions mediating farmer access to agricultural resources (such as land, water and credit) provide incentives for poppy cultivation. It is therefore critical to enhance the performance of both formal and informal governance structures in outlying areas to try to counter-balance these influences.

Recognise heterogeneity with “smart” interventions

Policymakers and implementers should recognise the diversity and heterogeneity among opium cultivating farmers, and look to the evolution of “smart” strategies. For example, authorities should target landowners and resource-rich cultivators of opium with enforcement and eradication measures. Likewise, care should be taken to avoid rewarding this privileged group through randomly scattered development assistance and instead target resource-poor households who otherwise lack the resources for sustainable licit livelihoods.

117 In economic terms, a multiplier is when an economic activity stimulates growth in other parts of the economy, with the consequence that the compounded impact of the activity is greater than the direct impact.
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