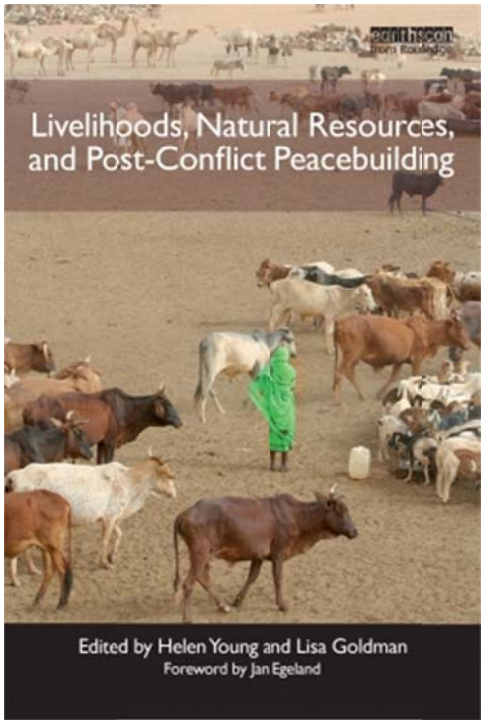
This chapter first appeared in *Livelihoods, Natural Resources, and Post-Conflict Peacebuilding,* edited by Helen Young and Lisa Goldman. It is one of six edited books on Post-Conflict Peacebuilding and Natural Resource Management (for more information, see www.environmentalpeacebuilding.org). The full book can be ordered from Routledge at https://www.routledge.com/products/9781849712330.



Swords into Ploughshares? Access to Natural Resources and Securing Agricultural Livelihoods in Rural Afghanistan

Alan Roe [a]

[a] *National Field Research Centre for Environmental Conservation in Oman*

Online publication date: November 2015

Suggested citation: A. Roe. 2015. Swords into Ploughshares? Access to Natural Resources and Securing Agricultural Livelihoods in Rural Afghanistan. In *Livelihoods, Natural Resources, and Post-Conflict Peacebuilding,* ed. H. Young and L. Goldman. London: Earthscan.

Swords into plowshares? Accessing natural resources and securing agricultural livelihoods in rural Afghanistan

Alan Roe

Field experience in Afghanistan emphasizes the importance of understanding rural livelihood security when planning for peace within the broader context of natural resources and agro-ecological landscapes. Achieving secure and sustainable rural livelihoods in the context of such landscapes is a prerequisite to achieving social and political stability in outlying (and often volatile) areas and, therefore, it is important for the Afghan government and its supporters to recognize sustainable rural livelihoods as a distinct goal within the overarching objective of economic growth.

This chapter examines experiences in promoting access to natural resources in rural Afghanistan and the implications for agricultural livelihoods. The first sections of the chapter outline field research conducted in Afghanistan between 2005 and 2009, introduce the context of political and agricultural instability in Afghanistan, and discuss the emergence of a market-oriented agricultural and natural resource management policy. The chapter then draws on the results of the 2005–2009 research to examine the status and attributes of different farming systems, making particular reference to inclusion and exclusion in access to natural resources, and provides evidence of the potentially destabilizing impact of inequitable access to natural resources across different systems of land use. Finally, the chapter highlights lessons that may guide future efforts to strengthen peacebuilding through agricultural policy reform in Afghanistan and other post-conflict situations.

THE RESEARCH (2005–2009)

Data informing this study were collected under the auspices of two natural resource management research projects conducted between 2005 and 2009 across several provinces and districts in Afghanistan.

Alan Roe is a research leader with the National Field Research Centre for Environmental Conservation in Oman and an adjunct research fellow at the School for Environmental Research, Charles Darwin University; he previously served as senior research manager for natural resource management at the Afghanistan Research and Evaluation Unit (AREU).

The first research project took an integrated farming systems approach to understanding natural resource management, agricultural production, and rural livelihoods within socioeconomic and biophysical contexts.[1] This approach recognizes that farm decision makers extract benefits across a range of scales and values and make trade-offs between multiple, competing objectives both on the farm and off (Collinson 2000). The research utilized diverse methods, including a longitudinal seasonal farm survey across several provinces,[2] in-depth case studies to examine specific issues, physical measurements of resource conditions, and on-farm experimental research. Comparative studies encompassed a range of different land uses and production systems, including uses and systems employed by nomadic pastoral groups (see figure 1 for land uses in Afghanistan).

The second research project investigated rural conflicts over natural resources and methods for resolving these conflicts. This research involved constructing a typology of natural resource conflicts in Afghanistan, identifying representative

[1] This applied, thematic research into water management, the opium economy, and livestock was conducted by a consortium of institutions led by the AREU, with funding from the European Commission.

[2] Surveys were taken in the following provinces: Badakhshan, Balkh, Ghazni, Ghor, Herat, Kunduz, and Nangarhar.

conflicts, and piloting formal and informal conflict resolution processes within nomadic and sedentary rural communities in the Afghan provinces of Baghlan, Herat, Kunduz, Panjshir, and Parwan (Deschamps and Roe 2009).[3]

These two coordinated research activities produced a wealth of data regarding natural resource management, farming systems, and wider livelihood strategies at district and subregional levels across Afghanistan, which afforded researchers the rare opportunity to adopt an integrated landscape-scale analysis of the processes and conditions shaping livelihood strategies and farming decisions in rural Afghanistan (see sidebar) (Pijanowski et al. 2010).

In recognition of local heterogeneity and complexity, the research focused on identifying patterns in relationships between natural resource conditions and access, social and political factors, institutions, and livelihood outcomes (Frost et al. 2006; Wu 2006). In particular, application of an integrated landscape approach helped address some of the inadequacies and limitations of largely thematic and sectoral studies previously used to inform Afghan agricultural development policy. A good example of this integrated approach were studies that investigated the dynamics of the opium economy over time across a range of social, political, economic, and agro-ecological conditions and spatial locations (Pain 2006; Mansfield 2008).

These research projects were designed and initiated at a time when the Afghan government and its international backers were struggling to develop an effective and licit agricultural economy to bring stability and prosperity to rural Afghanistan and counter the spread of an illicit opium poppy economy.

Reports and publications

The Natural Resource Management team at the Afghanistan Research and Evaluation Unit (AREU) produced over twenty studies and research reports between 2005 and 2009, authored by more than ten different researchers. Many of these studies and reports (all available online at www.areu.org.af) are cited in this chapter, including the following:

Deschamps, C., and A. Roe. 2009. *Land conflict in Afghanistan: Building capacity to address vulnerability.* Issues Paper Series No. 43. Kabul: AREU.

Flaming, L., and A. Roe. 2009. *Water management, livestock and the opium economy: Opportunities for pro-poor agricultural growth.* Synthesis Paper Series No. 44. Kabul: AREU.

Roe, A. 2008. *Water management, livestock and the opium economy: Natural resources management, farming systems and rural livelihoods*. Synthesis Paper Series No. 97. Kabul: AREU.

Roe, A. 2009b. *Water management, livestock and the opium economy: Challenges and opportunities for strengthening licit agricultural livelihoods*. Synthesis Paper Series No. 80. Kabul: AREU.

Rout, B. 2008. *How the water flows: A typology of irrigation systems in Afghanistan.* Issues Paper Series. Kabul: AREU.

Wegerich, K. 2009. *Water strategy meets local reality*. Issues Paper Series No. 67. Kabul: AREU.

[3] The AREU's Capacity Building to Address Land Conflict and Vulnerability project was supported by funding from the World Bank.

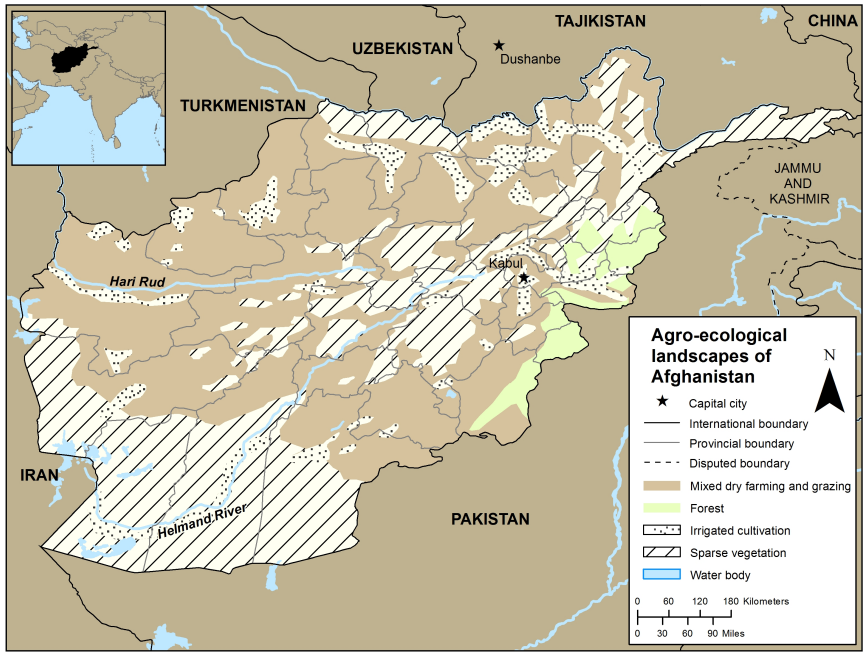


Figure 1. Agro-ecological landscapes of Afghanistan
Source: Roe (2009b).

A LEGACY OF INSTABILITY

Until 1978, Afghanistan not only produced enough food for its own needs but also exported a considerable volume of agricultural products, notably livestock and dried fruits. Historically, agriculture had been the largest and most important sector of the Afghan economy, with a high proportion of the population pursuing livelihoods in agriculture and related activities (FAO 1997a).

Following the Soviet invasion in 1989, political instability and episodic conflict severely disrupted Afghanistan's long-established system of natural resource management and the country's agricultural economy, the negative effects of which were exacerbated by a subsequent severe and prolonged period of drought (1998–2002) (MIWRE 2004). Over the course of the turbulent 1980s and 1990s, and over the course of the drought years, significant numbers of internal and cross-border rural populations were displaced, resulting in widespread abandonment of land and agricultural infrastructure. Similarly, traditional market chains for agricultural products were disrupted or collapsed completely.

Variations in agricultural sector

The impact of these disruptions on the agricultural sector was more nuanced than the donor and development community initially recognized. Although data from

this period are known to be inaccurate, the variation reflected in the data sets illustrates the economic instability of this period and reveals how different parts of Afghanistan's agricultural economy responded to years of conflict and drought.

For example, data derived from the *Afghanistan Statistical Yearbook* indicate that, after losing a significant proportion of irrigated land during the initial Soviet invasion, Afghan farmers were slowly able to rebuild their capacity to irrigate lands throughout the 1990s, or at least until the 1998–2002 drought (CSO 2006). Similarly, populations of fast-breeding sheep and goats increased after the initial Soviet invasion, until drought decimated the remaining herds. By contrast, cereals production seems to have been relatively resilient through the years of conflict (food crops were prioritized), and although production declined sharply during the drought, it had recovered to the point that, by 2005, cereals production exceeded pre-Soviet levels. Similarly, the cattle population (used primarily to supply food products for domestic consumption) remained relatively stable during the conflict and drought period, and, since then, has experienced steady growth.

Consequences of sporadic disruptions and population growth

Over the past thirty years, sporadic disruptions to natural resource management systems—made worse by oscillations in agricultural productivity and rapid population growth—significantly decreased political stability and livelihood security in rural Afghanistan. While statistics indicate diversity and complexity in how different parts of the Afghan agricultural economy responded to the instability created by conflict and drought in recent decades, changes in natural resource conditions and agricultural productivity over this period must also be considered in the context of a rapidly growing population. The county's population is expected to double in thirty years (Population Institute 2011; Reuters 2011). This section examines how political instability, when combined with rapid population growth, can exacerbate already tense situations and lead to further conflict over access to, and the use of, land and other natural resources.

First, a decrease in per capita agricultural production has caused food deficits throughout Afghanistan. Even in a good agricultural year, such as 2005, the country faced a 10 percent deficit in cereals demand compared to domestic cereals production (FAO 2006). As local production fell below consumer demand from 2000 through 2005, there was a growing trend toward importation of many domestically produced foods (see table 1). In 2008, deficits in local food production contributed to rising prices for food staples, which triggered political instability and food riots in Afghanistan's major cities.

Second, while political turmoil, institutional weakness, disrupted markets, and physical insecurity have adversely affected many types of agricultural production in Afghanistan, under these same conditions, illicit cultivation and marketing of opium has thrived. According to available data, the amount of Afghan land area currently used for opium poppy cultivation steadily increased over the past

Table 1. Value of Afghanistan's annual food imports, 2000–2005 (in thousands US$)

	2000	*2001*	*2002*	*2003*	*2004*	*2005*
Wheat	5,533	17,700	96,008	47,529	49,119	85,539
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: CSO (2006).

decade, reaching 193,000 hectares in 2007 at the peak of opium production (UNODC 2009). In 2006, the United Nations estimated that over 12 percent of the Afghan population was in some manner involved in opium cultivation (UNODC 2006).[4]

MARKET-ORIENTED STRATEGY FOLLOWING THE TALIBAN'S FALL AND THE BONN AGREEMENT

After the fall of the Taliban regime in 2001, the Bonn Agreement established the Transitional Islamic State of Afghanistan, at which time the international community committed to support new governance structures, initially through the National Development Framework and, later, through the Afghanistan National Development Strategy (ANDS). The goal of the ANDS included achievement of "pro-poor growth"—economic growth benefiting the poor more than the nonpoor as a means to share the benefits of development across the nation's entire population (IROA 2008b, 27).

This planning process highlighted agriculture as an engine for economic growth and recovery. Under the ANDS process, the Afghan Ministry of Agriculture and Animal Husbandry (later renamed the Ministry of Agriculture, Irrigation and Livestock, or MAIL) became a focus for extensive international technical assistance, which led to development of the Agriculture Master Plan. This master plan shaped the direction of agricultural and rural development policy in Afghanistan, including through the ANDS Agriculture and Rural Development (ARD) Sector Strategy (IROA 2008a).

Despite the stated national objective of achieving pro-poor growth, Afghan agricultural development policy in the post-conflict redevelopment period initially emphasized fostering market chains for high-value agricultural products. For example, the ARD Sector Strategy downplayed the role of subsistence agriculture in favor of large-scale commercial production. The strategy explicitly advocated targeting development initiatives in agriculture and rural development zones with high commercial potential around the cities of Herat, Kabul, Kandahar, Kunduz, and Mazari Sharif. Specifically, the ARD Sector Strategy argued that:

[4] For analyses of opium production, control efforts, and post-conflict peacebuilding in Afghanistan, see Catarious and Russell (2012) and Pain (2012).

> The advantage of promoting large scale commercial agriculture is that it is led by investors and entrepreneurs who bring substantial resources and market linkages and who are well positioned to: (1) identify profitable opportunities; (2) expand access to quality inputs, technologies and markets; (3) lower costs through volume purchase; (4) lower risk through production contracts; (5) extend credit and extension services; (6) facilitate growth of local allied industries; and (7) provide quality control services (IROA 2008a, 29).

With this strategy in mind, MAIL and its international supporters promoted a range of initiatives to stimulate growth in high-value horticultural production, primarily orchard fruit, vegetables, and industrial crops such as flax and cotton, along with fodder crops and improved livestock production. These crops were considered suitable for a growing export market (including India) and, therefore, most likely to attract foreign investment in the country's growth.

The first years of the Transitional Islamic State were a time of optimism in Afghanistan, which was reflected in the relative stability and security across most of the country (Cordesman 2009). However, sporadic acts of resistance to the new, internationally sponsored government increased; by 2007, the number of monthly insurgency incidents had grown more than tenfold (see figure 2). The activity of the Taliban and other antigovernment elements first escalated in the southern and eastern parts of the country, and by mid-2007, the level of insecurity in the outlying districts of Helmand, Khost, Kunar, Nangarhar, Paktika, and Uruzgan had risen to such a degree that the UN categorized these districts as "hostile environments." Since then, violence and insecurity has spread into other formerly secure parts of the country, including previously stable provinces in western and northern Afghanistan.

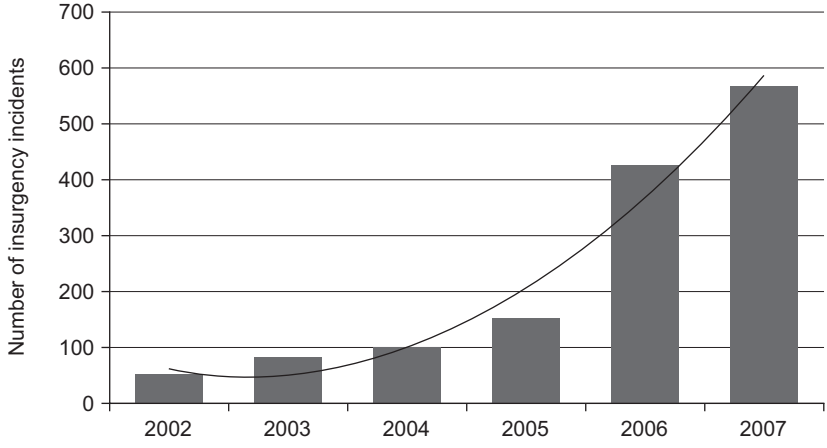


Figure 2. Mean monthly insurgency incidents in Afghanistan, 2002–2007
Sources: Cordesman (2008, 2009).

Many commentators have provided nuanced political and ethnicity-related interpretations of the drivers of the insurgency, and some have suggested links between the insurgency and the country's extensive opium economy (Rubin 2013; UN Country Team in Afghanistan 2013). Few analysts have considered, however, how distribution and management of natural resources and other associated rural livelihood options may have contributed to instability. The following analysis addresses this gap, highlighting some of the risks associated with an economic growth-driven agenda for agricultural development and concluding that an important prerequisite to enhancing political stability may be agricultural policy that improves rural livelihood security.

AGRICULTURAL-BASED LIVELIHOOD ADAPTATION AND CONFLICT DUE TO UNEQUAL RESOURCE ACCESS IN AFGHANISTAN

In many regions of Afghanistan, farming and livestock rearing are economically difficult livelihood options, made worse by—and in turn sometimes exacerbating—patterns of conflict and instability. Given the overall lack of alternative opportunities, however, agricultural production remains a predominant source of income for many Afghans, particularly those residing in rural communities. Agriculturalists utilize a variety of farming systems based on the availability of and access to water resources, and the geographic distance of farmed land from irrigation infrastructure. The following sections examine how disparities in access to natural resources that affect agricultural output can increase competition and conflict in vulnerable, rural communities.

Landscapes, farming systems, and livelihoods

Afghanistan is a rugged and mountainous country covering approximately 65 million hectares, 8 million of which are under cultivation (FAO 1997b). Eighty percent of Afghanistan's crop output relies on irrigation, although in an average year, less than half of the country's agricultural land receives irrigation. The most intensively cultivated and settled areas are located on Afghanistan's alluvial plains and in river valleys, where water from mountain snowmelt can be diverted for crop irrigation. Biannual cropping is possible in river valley regions where conditions—such as reliable summer water flows—are sufficient to support numerous crop seasons. Other regions lacking access to irrigation systems utilize a rainfed system of agricultural production, which typically produces low yields.

After extensively reviewing and comparing farming (agricultural and livelihood) systems across eight Afghan provinces, researchers specializing in water management, the opium economy, and livestock arranged the farming systems under consideration in the following categories: irrigated farming, semi-irrigated farming, rainfed farming, and nomadic pastoralism. While these categorizations risk oversimplifying complex and overlapping farming strategies (both on- and

off-farm), they facilitate preliminary comparisons between natural resource access and livelihood outcomes at the landscape level. Subsequent comparative studies, however, reveal important differences between these systems with regard to rural livelihood security and opportunities (see table 2).

Irrigated farming in river valleys

Among the farming systems in Afghanistan, the systems associated with irrigated river valley lands tend to receive the most regular and stable water supplies (through canal systems) and, as a consequence, are able to grow a diverse range of crops. In some areas, these include high-value cash and industrial crops. Road networks and major settlements located in these irrigated river valleys also provide relatively direct access to markets at comparatively low costs in terms of transactions. Farmers in river valleys can also grow fodder crops to feed the families' milk cows, which provide their families with milk. Other livestock, including sheep and goats, graze on seasonal pastures considered common property, but because valley farmers do not have ready access to these pastures, they tend to raise few of these livestock. In terms of livelihoods, however, not only can river valley farmers potentially grow high-value agricultural products and relatively easily take these products to market, they also have ready means to supplement on-farm production income by hiring themselves out as off-farm waged labor in neighboring towns.

Management of irrigation systems in river valleys. Management of irrigation systems in Afghan river valleys usually involves conveying water over long distances and through primary canals that traverse land owned by several communities. Accordingly, management of irrigation water can be highly political and therefore challenging, particularly in the summer months when river flows diminish and water becomes increasingly scarce. Traditionally, Afghan river valley communities practiced sophisticated water management to address challenges associated with water flow and access. Within these traditional and institutionalized systems, landownership carries with it associated water entitlements, and hierarchies of community-elected water masters (*mirabs*) represent the interests of irrigators at the primary and secondary canal levels.

In practice, systemic inequities in access to water resources exist between communities at the head and tail of irrigation canals. These inequities are due in part to inefficiencies in the hydraulic performance of canal infrastructure. Importantly, however, these inequities also reflect asymmetries in power, wealth, and influence among the communities involved, and often relate to ethnic or political affiliations. By virtue of their position, upstream irrigators can and do exceed their allotted water entitlements to the detriment of those downstream. In rural Afghanistan, water-intensive horticulture, as well as cultivation of sugarcane, cotton, and other high-value summer crops, tend to be clustered in the upper and middle reaches of the canal systems. A study of irrigated farming from

Table 2. Comparison between mean production and livelihood attributes of households practicing different farming systems in Afghanistan

	Cultivated area (ha)	*Irrigation water supply*	*Annual crop diversity*	*Sheep/ goats*	*Cattle*	*Household nutrition*	*Household assets*	*Number off-farm incomes*	*Mean incomes value (US$)*
Irrigated farming (n = 252)									
Mean	1.78	57.72	8.44	3.57	1.68	78.64	3.64	1.86	1183.89
Std.dev	2.39	14.534	2.69	9.10	1.63	23.38	2.91	1.22	1555.91
Semi-irrigated farming (n = 106)									
Mean	0.65	39.32	5.57	5.87	0.58	85.66	2.11	1.57	926.00
Std.dev	0.92	9.04	1.39	9.69	1.03	21.94	2.47	1.01	1027.12
Rainfed farming (n = 58)									
Mean	3.58	Not applicable	3.75	14.36	2.34	61.00	1.74	2.00	488.87
Std.dev	3.12		0.50	17.03	2.43	17.23	3.37	1.35	523.70
Nomadic pastoralism (n = 25)									
Mean		Not applicable		45.88	0.76	82.12	1.96	Not available	
Std.dev				40.04	1.14	16.51	1.60		

Source: Roe (2008).

Notes: Irrigation water supply: Farmer assessment of the extent to which their farm irrigation water requirements are met, expressed as a percentage.
Annual crop diversity: Number of different types of crops cultivated annually.
Cultivated area: Cultivated area in hectares (ha).
Sheep/goats: Number of sheep and goats owned.
Cattle: Number of cattle owned.
Household nutrition: An arbitrary value calculated by weekly consumption of different food types within the household.
Household assets: An arbitrary value describing household ownership of nonessential and luxury items (proxy for disposable income).
Number of off-farm incomes: Number of off-farm incomes received by household (irrespective of monetary value).
Mean incomes value (US$): Total annual income (sum of all off-farm waged incomes).
n: Number of households.

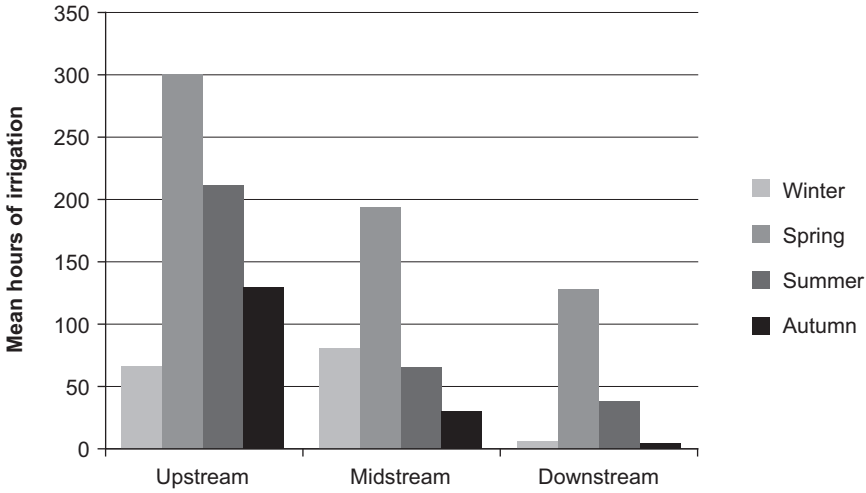


Figure 3. Mean monthly hours of irrigation by farm position in Afghan irrigation systems, 2006–2007
Source: Roe (2009a).
Note: Data from surveying 171 households.

2006 to 2007 indicates that upstream farms received more than twice the mean hours of irrigation flow than comparably sized farms downstream (Roe 2009a) (see figure 3).

Downstream sites have significantly lower mean irrigated wheat yields per hectare, even at higher seed and fertilizer application rates (Roe 2009a). In addition, records indicate that downstream farmers shoulder a much higher burden of irrigation maintenance labor, with direct implications for their opportunity to engage in off-farm waged labor.

Owing to the demand for irrigated land (and the prospect of good farm returns), between 25 and 30 percent of all farmland in Afghan river valleys is worked under a sharecropping arrangement (whereby landowners grant sharecroppers access to use agricultural lands in exchange for an agreed percentage of the harvested crop). As demonstrated by data from Balkh and Kunduz provinces, sharecropped lands tend to be in the middle and lower reaches of irrigation systems and, therefore, carry higher attendant risks than lands in the upper reaches of the canal system. Yet, even land sited along the lower reaches is attractive to farmers who own no land or who are seeking to acquire additional land under subordinate rights. These lands can potentially sustain diverse cropping (including higher-value crops), given sufficient irrigation flows. Sharecropping as a form of tenure is more common in Afghanistan's irrigated river valleys than elsewhere in the country, but the terms of agreement are also less favorable to the sharecropper due to vast disparities in the ultimate division of the harvest between sharecropper and landowner (Roe 2009a).

Preliminary overview. Farmers in Afghanistan's irrigated river valleys enjoy a relatively high level of livelihood security. Despite land scarcity and a low level of cultivated area per capita (given dense clusters of settlement), the soil in these valleys is generally fertile and annual fluctuations in irrigation water supply are often predictable. Cropping is sufficient, on average, to provide more than 50 percent of the food that families require. In these valleys, on average, approximately 60 percent (by monetary value) of the food consumed each week by farming families is produced on-farm, with the remainder purchased at market (Roe 2009a). Farmers in these comparatively populous river valleys have easy access to nearby markets and greater opportunity to engage in off-farm labor for supplementary wages. From 2005 to 2006, river valley households earned a mean off-farm income of close to US$100 per month, an income significantly above the national mean.

However, irrigated river valley farming involves large, structural inequities in resource access—in terms of both land access and water usage. In some districts, gradients of wealth, opportunity, and livelihood security are evident along the canal systems; the farther upstream one goes, for example, the more high-value, irrigation-intensive crops are grown. High levels of sharecropping in the middle and lower sections of these systems indicate that a high proportion of revenue is directed back into the hands of upstream or absentee landowners, further exacerbating wealth, opportunity, and livelihood security inequity (Roe 2009b).

Semi-irrigated highland farming

Higher up in river catchments, in foothills overlooking river valleys, Afghan farmers in remote villages cultivate small plots of land irrigated by intermittent springs, streams, or *karez*—man-made, subterranean canals that draw water from hillside springs and carry it where needed. Here, water scarcity is a constant limitation, and irrigable land areas are often extremely small. Consequently, crop diversity is much lower than in the river valleys, and very little marketable surplus is, or can be, produced. Farmers are often far from regional markets and lack easy access to off-farm wage-earning labor opportunities. Lacking irrigable land for fodder crops, these farmers keep relatively few cows. They do raise other livestock, however. With better access to grazing rangelands and pastures than in river valleys, farmers with access to open hill slopes can maintain relatively high numbers of sheep and goats.

Although the rate of discharge from springs and karez can be high during snowmelt, this rate slows considerably during summer months, and flow can even cease. Consequently, in highland farming systems, there is only one season for cultivation. Also, given the small scale of irrigation infrastructure (canals may only be a few hundred meters in length), there is little difference between the amount of water received on plots at the heads of canals and those at the tail end. Such small-scale infrastructure means that irrigation water moves throughout

farming systems in a single village. As a result, upland villages do not normally have specialized governing institutions for water management; rather, village councils of elders typically reach decisions and direct actions on behalf of the village. Therefore, while irrigation water resources tend to be scarcer in highland farming systems than in river valleys, the management of these resources tends to be more equitable.

The small size of irrigated plots in highland farming systems also means that households are generally not self-sufficient in food production. On average, only 45 percent (by monetary value) of food consumed by these households is produced on-farm. Access to labor opportunities is likewise poor, and there are high rates of labor-based migration to other provinces and neighboring countries (RECCA IV 2010). Despite this outward migration, mean off-farm waged incomes among highland farming households remain lower than those recorded among river valley farming households. Also contributing to livelihood insecurity among highland farmers is the remoteness and high elevation of villages and the severity of winter snows, which can cut villages off from the nearest markets for several months each year.

In some districts in central and eastern Afghanistan, highland communities with limited irrigation water and very small irrigable land area (which heightens the need for cash income for food purchases) have become deeply engaged in opium poppy cultivation. Opium poppy is one of the few viable crops available given the lack of alternative resources, and its cultivation can help secure access to scarce land resources and, thus, reduce exposure to risk. In the case of opium poppy cultivation, remoteness from lowland population centers, markets, and law enforcement agencies is an advantage rather than a disadvantage to these households.

Rainfed farming

Across many parts of Afghanistan, outside of river valleys, remotely scattered settlements practice marginal rainfed farming on elevated tablelands (plateaus), on hill slopes, and on lower-elevation plains. Here, unlike agriculture in irrigated or semi-irrigated areas, cultivation is not limited by land scarcity but, rather, by the labor required to prepare and harvest large areas of land. The crops are primarily wheat and barley (cereals) sown in expectation of winter rains. While yields are highly variable between years, they tend to be low. Cultivation of these cereal crops provides food staples for households. Households also gather straw to feed livestock in winter.

Livestock production is a primary source of monetary income for farmers in rainfed systems. In spring, given good access to surrounding pasturelands, and in summer, given the possibility of grazing herds on residues from cereal harvests, farmers in this system are able to produce large flocks of sheep and goats to take to market. The sale of these herds at market not only generates income but also buffers farm households against financial impacts of drought and other risks. In

good years, livestock numbers rise, although this capital growth can easily be absorbed or exceeded by forced sales during drought years when crops fail. Although cattle are found most typically in rainfed areas, they are not valuable dairy cows but rather plowing oxen.

Due to their often remote locations, rainfed farming communities tend to have poor access to commodity and labor markets. These communities engage in a high level of waged employment, but it tends to be low-paid temporary work helping with local harvests. Due to the relative abundance of available land, sharecropping agreements are rare, and when such agreements are made, the terms tend to favor cultivators, not landowners. However, access to other lands, such as common-property pastures, is essential for sheep and goat herds that constitute the primary marketable production output of this farming system.

Rainfed farming households also have the poorest diet (corresponding to household nutrition in table 2) of any of the rural farming production systems in Afghanistan; however, they also report the highest level of food self-sufficiency (Roe 2009a). Given the predominate cultivation of cereal crops, their diets are dominated by carbohydrates, supplemented by dairy products (mostly from sheep and goats). Few quantities of additional food are purchased at market, so consumption of fresh fruits and vegetables is low. As mentioned earlier, these households have regular access to off-farm employment, but it is nearly always temporary and primarily agricultural (assisting other farmers), as a consequence of which these households receive significantly less off-farm income than other farming household types (a mean of US$40 per month) (Roe 2008). Low cash income as well as geographic isolation helps explain why these rainfed farming households generally lack the means to diversify and improve their dietary intake.

In sum, rainfed cultivation is associated with high risks of many different kinds, including potential nutritional deficiency, not only due to the vagaries of the Afghan climate and precipitation but also due to extremely low crop diversity. For these communities, a sequence of bad agricultural years can have disastrous effects (as was the case during the 1998–2002 droughts). Although sheep and goat herds can buffer the risk and uncertainty of rainfed farming, these communities regularly engage in livestock sales during years of environmental stress when livestock prices are depressed, which amounts to a risk-averse strategy that limits the potential for economic growth.

Nomadic pastoralism

Of all the farming systems in Afghanistan, nomadic pastoralism most reflects market supply. Aside from processed milk products, nomadic pastoralists generally consume very little of what their livestock produce, relying instead on cash sales from large herds of sheep and goats to purchase food staples. Seasonal mobility offers distinct advantages over most sedentary farming systems in accessing markets; migration routes encompass markets where nomadic pastoralists sell their livestock

products, seek opportunities for waged labor, and purchase necessary food stocks and other items.

Afghan pastoralists have traditionally managed their flocks in the mild lowlands during the winter, and then migrated to common-property (open-access) central highland pastures in the spring. While pastoralists continue this lifestyle of transhumance, it is practiced in a modified form today, with tribal groups occasionally opting to camp during the summer months on the outskirts of Kabul. From there, they can access waged labor to supplement income from livestock sales.

The main risk factor associated with nomadic pastoralism in Afghanistan is dependence on access to common-property pasturelands. Pastoralist sheep and goat production is based on a low-input, low-output strategy, in which pastoralists attempt to minimize costs by accessing free or cheap grazing lands during the spring and early summer months (Fitzherbert 2007). Given growing population pressures and the weakening of environmental governance regimes in many parts of the country, nomadic pastoralists' traditional rights of access to common-property pastures face growing opposition (Alden Wily 2004). Conflicting rights of access to pastures and grazing land can lead to violent conflict between pastoralists and settled communities.[5]

Natural resources and farming systems overview

Natural resources (and the social and political mechanisms underpinning natural resource management) support a range of agricultural livelihood strategies across rural Afghanistan. While some Afghan landscapes support rural, agricultural livelihoods where high levels of market engagement are possible, other agriculture-based livelihoods remain more marginalized and subject to high risk and insecurity.

Studies conducted in Afghanistan from 2005–2007 characterize fundamental patterns of resource management, farming behavior, and livelihood security. Analysis of these patterns highlighted a range of natural resource, agricultural, and off-farm factors underlying rural livelihood security, economic opportunity, and sustainability. These factors include the type, tenure status, and condition of local natural resources and the types and functions of informal institutions that govern access to natural resources. Another important predictor of livelihood security is access to markets for a variety of needs, such as to sell farm products, purchase food, and obtain credit, as well as to gain opportunities for waged labor. On- and off-farm diversification is important in terms of both risk aversion and wealth accumulation (Grace and Pain 2004).

---

[5] For a more detailed discussion on pastureland conflicts in Afghanistan's central highlands, see Liz Alden Wily, "Resolving Natural Resource Conflicts to Help Prevent War: A Case from Afghanistan," in this book.

DRIVERS OF LIVELIHOOD INSECURITY AND RURAL INSTABILITY

Afghanistan has a long history of insecurity, which fuels conflict. In the absence of physical and economic security, disputes over existing and available natural resources exacerbate local tensions and can lead to violent conflict. The following sections explore the factors that drive livelihood instability and conflict in different Afghan contexts.

Resource access, scarcity, and drivers of instability

Internationally, associations between poverty, vulnerability, and chronic conflict have been widely documented. Many commentators have suggested that poverty and lack of opportunity are primary predictors of civil conflict in fragile states (Collier and Hoeffler 1998; Hegre et al. 2001). Further, it has been postulated that "vulnerability to poverty and vulnerability to violence" influence the probability that individual households will participate in, or support, armed groups (Justino 2009, 5).

Others argue that poverty itself is not particularly destabilizing but rather the prevalence of horizontal inequalities, such as the perceived or actual biases in a given society that impact the distribution of assets, opportunities, power, and influence (Zaur 2006; Stewart 2008). This dynamic has been noted in agricultural societies where certain segments of society are or have been disadvantaged by geographic location, dysfunctional or biased markets, and exploitation by well-organized and powerful interests controlling access to key resources. Under these circumstances, individuals may be driven to migrate, confront the status quo, or assume other extreme coping strategies (de Soysa and Gleditsch 1999), which may hinder agricultural recovery and the transition to stability (Longley et al. 2007).

As elucidated thus far, the study of natural resource management in Afghanistan has provided evidence of resource scarcity and associated livelihood vulnerability. In some cases, this has contributed to armed conflict, banditry, and even opposition to local authorities (Deschamps and Roe 2009). The following subsections provide examples of natural resource conditions and conflict over access to natural resources that have precipitated rural unrest.

Water management and localized conflict in river valleys

Structural inequities in irrigation water supply in Afghanistan can contribute to instability and increase the potential for localized conflict. A study of the Khalazai Canal in Parwan Province revealed that overextraction of water by villages of one ethnicity at the inlet of the canal led to chronic water scarcity for villages primarily made up of another ethnicity at the tail end of the canal (Deschamps and Roe 2009). As a result, 600 families were displaced and whole villages abandoned as downstream livelihoods became untenable during the drought of 2006. Likewise, there is evidence from the Hari Rud river system that water

stress has intermittently flared into violence and bloodshed between upstream and downstream irrigators in Herat Province (Lee 2007). During the 2006 drought, some downstream farmers reported receiving as little as fifteen minutes of irrigation flow over a two-month period, which led to a widespread collapse of cropping systems on the lower Hari Rud. Conflicts over water access were further exacerbated by historical alliances held by the two groups during the civil war. Earlier studies have described similar situations in the Balkh River Basin (Lee 2003).

This research indicates that conflict over irrigation water access and usage in river valleys is, or often has been, intensified not only by drought but also other drivers of rural conflict and insecurity, such as differences in ethnicity and, in the case of Afghanistan, opium poppy cultivation. Structural inequities that affect access to water resources may also serve as precipitants or multipliers of rural conflict. Indeed, many disputes between communities along irrigation systems can persist at low levels of intensity for many years before igniting due to catalytic incidents, such as drought or ethnic or political friction. It does not help that local authorities and policy makers tend to overlook existing, low-level disputes until the disputes erupt into overt violence.

Resource scarcity and emergent conflict in Afghanistan's highlands

In the semi-irrigated, highlands farming systems in Afghanistan, absolute resource scarcity often drives local instability and conflict. In some villages on the upper slopes of the Spin Ghar Range in Nangarhar Province, the mean cultivated area can be as low as 0.001 hectares per person, making it extremely difficult for farming households to achieve livelihood security through licit agriculture alone. Accordingly, households engaged in farming in these resource-scarce areas heavily depend on opium poppy cultivation and labor out-migration to offset risks. In 2006, in the face of a Nangarhar provincial ban on opium poppy cultivation and lack of easy recourse to off-farm wages (other than as paid fighters with armed insurgency groups), members of the Khogiani and Shinwari tribes united to oppose the ban, confronting the authorities with a show of force. Immediately, security conditions began to deteriorate, not only in the Spin Ghar region, but throughout the highlands (Mansfield 2008). Analyses also have attributed the rise of banditry and physical insecurity in 2006 across outlying districts of the Ghor Province to drought-related stresses so great that natural resources could no longer sustain remote farming populations (WFP 2001). In the absence of livelihood alternatives, coping strategies in the highlands and other remote areas included affiliation with criminally or politically motivated armed groups.

Experiences from the Laghman and Nangarhar provincial highlands show that competition over scarce natural resources is an ongoing precipitant of conflict (Koehler 2005). The tiny landholdings associated with semi-irrigated farming systems in the highlands are the result not only of baseline resource scarcity but also of inheritance mechanisms that increasingly fragment landholdings through

successive generations. Given the scarcity and high value of irrigable land in the highlands of Afghanistan, little land is open for sale, so growing families must constantly compete to acquire access to land in other ways or, alternatively, move away. In 2005, a survey of twenty-five highlands community disputes revealed that thirteen stemmed from disputes over land and water, and all but two disputes resulted in violence (Koehler 2005).

High-risk rainfed farming and competition for grazing land

In most respects, farmers of rainfed land are more vulnerable to production risks and livelihood insecurity than farmers of semi-irrigated land. Heavily dependent on cereals cultivation for their domestic food consumption, rainfed farming households are among the first to be adversely affected by drought, and profoundly so. In recent years, rainfed farming communities in the remote western and central parts of Afghanistan have been so severely impacted by winter food shortages (and growing population pressures) that they often appropriate and plow pasturelands for cultivation. Anecdotal evidence also suggests that wealthy and powerful landowners sometimes seize large areas of pasturelands in an effort to accumulate and maximize their wealth through landownership (Deschamps and Roe 2009; Unruh and Shalaby 2012).

While it is difficult to assess precisely how many common-property pastures in Afghanistan have been converted for cultivation, a 2003 national survey found that community leaders in 45 percent of all districts reported losses of grazing land (National Surveillance System and Vulnerability Analysis Unit 2003). In addition, between 1999 and 2003, Dasht-e Laili (common-property grazing land in Jawzjan Province) alone lost 15,600 hectares to plowing and cultivation (Favre 2003). Conversion of range or pasturelands formerly used as a common-property resources for livestock grazing seems to have occurred on a large scale, bringing appropriators into direct conflict with migratory livestock herders.

In some parts of the central highlands, competition between migratory livestock herders and other land users over access to pastures has escalated into open conflict. In 2008, armed clashes in the Behsud area of Nangarhar Province resulted in the deaths of dozens of people, displaced thousands more from their homes, and revived national tensions between the ethnic Hazaras and Pashtuns. Since then, conflict over land use has escalated into a significant threat to national stability (Alden Wily 2004).

Comprehensive review of data on land conflicts in Afghanistan indicates that disputes over access to common-property resources are among the most severe, intractable, and enduring land conflicts in Afghanistan (Deschamps and Roe 2009; Alden Wily 2004). While informal institutions and traditional governance systems may be effective in managing internal community disputes over private property, they provide little opportunity for recourse when disputes involve common property and actors who do not share a common set of customary rules and regulations (Roe 2008).

Livelihood vulnerability associated with agricultural production in marginal, resource-scarce areas has the potential to undermine rural stability and peace-building efforts outside of Afghanistan's main river valleys and population centers. Consequently, the oft-cited military adage about Afghanistan—"where the road ends, the insurgency begins"[6]—may hold currency for framing political and policy choices regarding agricultural and rural development. Specifically, it raises questions as to whether policy makers should focus agricultural development investments on sites and industries with maximum potential to drive national goals for economic growth, or whether they should they look beyond "where the road ends" to consider the potential risks of such a market-driven program.

Driving economic growth and fostering rural stability: What the evidence shows

Field experience highlights three key risks associated with market-driven models for agricultural development in Afghanistan, such as those proposed in the 2005 MAIL Agriculture Master Plan and the 2008 ARD Sector Strategy.

First, it is clear that through implementation of the master plan and sector strategy, opportunities for growth in horticultural production would primarily benefit farmers with preferential access to irrigation water, as most horticultural crops require intensive irrigation. Thus, economic growth in Afghanistan's river valleys would be clustered in areas already comparatively prosperous, namely the upstream parts of preexisting irrigation canals. Even where sufficient irrigation flow permits high-value horticulture downstream of the best irrigated lands (for example, in the middle ranges of canal systems), the high incidence of sharecropping recorded in these middle ranges means that a significant proportion of the benefits would be directed back to wealthy landowners.

Second, assuming that planned agribusiness growth would focus solely in populated river valleys, it is likely that households in isolated outlying districts would not share the same level of access to employment opportunities, as is already the case.

Third, Afghan agricultural policies have given little recognition to the value of farm production to household consumption, which implies that this is not an economic value per se but rather an irrational use (in economic terms) of farm resources.

Following from these observations, policy focused on maximizing agricultural sector growth carries with it the risk (at least initially) of exacerbating preexisting differences in wealth between relatively prosperous farming communities and those that are most vulnerable and resource insecure (Roe 2009b). From a purely economic perspective, the wisdom of stimulating growth in the nation's most

---

[6] See, for example, U.S. Senate (2008).

productive agricultural subsectors and regions is unquestionable. From a political perspective, stimulating growth in river valleys and regional centers also makes good sense because the majority of the rural population lives there, and therefore stands to benefit from such growth. Important to this equation, however, is the fact that the central government in Kabul and its international backers face a growing insurgency and diminished influence in remote rural districts. Therefore, policies that further disadvantage farming communities in outlying areas constitute a high-risk strategy that carries with it the potential to further fuel volatility, chronic insecurity, disaffection, and an entrenched, illicit opium economy.

Clearly, the goal of fostering a market-driven, competitive rural economy must be balanced with the need to build a stable rural society as a prerequisite to sustainable growth of the rural economy. The question is how to achieve this. What does the evidence suggest in terms of how to achieve a stable rural society and sustainable growth of the rural economy? Specifically, how can agricultural policies contribute to peacebuilding—to the forging of swords into plowshares—in Afghanistan?

STRENGTHENING PEACEBUILDING THROUGH AGRICULTURAL POLICY: FUTURE DIRECTIONS

While many factors contribute to ongoing political conflict in Afghanistan, resource conditions and disputes over access and use of natural resources can increase insecurity in already volatile regions and exacerbate underlying tensions. In Afghanistan, outlying, natural resource–insecure areas tend to be in or near chronically unstable insurgency strongholds. This is due primarily to the remoteness of communities from centers of governance and the relative inaccessibility of security forces. Even if no causal relationship could be shown between natural resource scarcity, livelihood insecurity, and cycles of conflict and confrontation, there are nevertheless obvious political (if not economic) reasons to target these areas with initiatives designed to mitigate local vulnerability. In this context, agricultural policies that address this vulnerability can contribute to rural stability. Many of the studies conducted in Afghanistan (and cited earlier in this chapter) suggest ways in which this could be done as a means to lend weight to rural conciliation and state building.

Need for more evidence-based policy making. The Afghan government should engage in a greater degree of evidence-based policy making that is sensitive to the heterogeneity of the country's agro-ecology and farming systems. If utilized, this approach could lead to more pragmatic trade-offs between goals rooted in ideology and goals rooted in what is needed on the ground.[7] This kind of decision

[7] For challenges in advancing evidence-based policy making in Afghanistan, see Belinda Bowling and Asif Zaidi, "Developing Capacity for Natural Resource Management in Afghanistan: Process, Challenges, and Lessons Learned by UNEP," in this book.

making clearly requires a sophisticated appreciation of farming behaviors, determination of the types of natural resources available to farming households, and an understanding of the social and political contexts in which these households make decisions. Afghanistan already benefits from mechanisms such as the National Surveillance System, which has been highly effective in directing aid assistance to relieve short-term food security crises. However, more location-specific information is needed to inform future policy development, including how farming systems function and how the various farming systems present in Afghanistan affect livelihood outcomes.

Need for policies that facilitate greater equality in natural resource access. Access to natural resources and livelihood opportunities in Afghanistan is characterized by systemic inequities. While these inequities may be a consequence of local geography and agro-ecology, they are nonetheless often affected by asymmetric power relationships and the function of customary gateway institutions, such as the mirab system. Policies that facilitate greater equality in resource access are needed to create an environment that enables widespread participation in agricultural sector growth (and, more generally, in state building). A number of projects have piloted techniques to improve community management of land and water resources, and have since found traction among Afghan policy makers (Deschamps and Roe 2009; Stanfield et al. 2013).

Comparative advantages among farming systems. The fact that farming systems in Afghanistan are heterogeneous and have distinct advantages is in some ways beneficial as it creates an opportunity for policy making that fosters diverse agricultural production and market chains, each tailored to different production environments and natural resource conditions. For example, while there is little opportunity for rainfed farming communities to participate in production of high-value horticultural crops for export, there is a high potential for them to engage in an industry built around supplying weaned lambs and sheep to irrigated farms for finishing on agricultural by-products. Equally, the opportunity cost of directing labor from semi-irrigated farms to off-farm wage-earning opportunities is comparatively low.

By investigating different farming systems and identifying their respective comparative advantages, decision makers can offer genuinely pro-poor opportunities to mitigate poverty and other vulnerabilities in marginal areas. It is particularly important that planners and decision makers avoid concentrating agricultural initiatives, services, and facilities in populated river valleys, as in the past.

Further, agricultural policy in Afghanistan (and elsewhere) must place greater value on strengthening the whole of farming systems, not just market chains for agricultural products. In particular, agricultural policy must enhance and diversify farm livelihood security by improving access to off-farm incomes or by supporting farm production for domestic consumption. Studies in Afghanistan have shown that subsistence agriculture focused on production of food crops for

household consumption can represent an economically efficient allocation of household resources when household monetary savings on food purchases equal or exceed the value of income that could be earned from commercial crops or other sources of income. This situation is common in remote areas with poor market access and a good example of how important it is for development planners and decision makers to take a broader view of how agricultural livelihoods are constructed.

POSTSCRIPT

MAIL's National Agricultural Development Framework (released in April 2009) places significantly greater focus on the need to improve natural resources access. While the policy still identifies middle-scale farmers as "the backbone for sustainable growth in agriculture" (MAIL 2009, 19), the new framework also incorporates a bottom-up approach to agricultural development, citing the need for more equitable distribution of the benefits arising from growth in agriculture. The policy also places less emphasis on prioritizing agricultural development in agro-ecologically favorable areas, focusing more on specific commitments to tailor opportunities for the resource-poor nomads and others across all agro-ecological zones, including populations in the remote highlands and rainfed farming areas.

In an environment of escalating insurgency, this aspirational policy reform reflects a new understanding by the Afghan government and its international supporters that they are more likely to establish a market-driven agricultural economy by adopting a more measured approach during the transitional period. By tempering economic growth with initiatives targeting structural vulnerability and livelihood insecurity, the framework may offer a more effective approach to restoring peace and stability in rural Afghanistan.

REFERENCES

Alden Wily, L. 2004. *Looking for peace in the pastures: Rural land relations in Afghanistan*. Issues Paper Series. Kabul: Afghanistan Research and Evaluation Unit.

Catarious, D. M., Jr., and A. Russell. 2012. Counternarcotics efforts and Afghan poppy farmers: Finding the right approach. In *High-value natural resources and post-conflict peacebuilding*, ed. P. Lujala and S. A. Rustad. London: Earthscan.

Collier, P., and A. Hoeffler. 1998. On economic causes of civil war. *Oxford Economic Papers* 50 (4): 563–573.

Collinson, M. 2000. *A history of farming systems research*. Wallingford, UK: Food and Agriculture Organization of the United Nations / Centre for Agriculture and Biosciences International.

Cordesman, A. H. 2008. *Losing the Afghan-Pakistan war? The rising threat*. Washington, D.C.: Center for Strategic and International Studies. http://csis.org/files/media/csis/pubs/081021_afghanthreat.pdf.

———. 2009. The Afghanistan-Pakistan war: The rising intensity of conflict 2001–2007. Washington, D.C.: Center for Strategic and International Studies. http://csis.org/files/090701_rising_intensity_conflict_2001-2007.pdf.

CSO (Central Statistics Office, Islamic Republic of Afghanistan). 2006. *Afghanistan statistical yearbook*. Kabul.

Deschamps, C., and A. Roe. 2009. *Land conflict in Afghanistan: Building capacity to address vulnerability*. Issues Paper Series No. 43. Kabul: Afghanistan Research and Evaluation Unit.

de Soysa, I., and N. P. Gleditsch. 1999. *To cultivate peace: Agriculture in a world of conflict*. Oslo, Norway: Peace Research Institute Oslo.

FAO (Food and Agriculture Organization of the United Nations). 1997a. *Afghanistan agricultural strategy*. Rome.

———. 1997b. Afghanistan. AQUASTAT database. www.fao.org/nr/water/aquastat/countries_regions/afghanistan/index.stm.

———. 2006. Afghanistan's agricultural prospects for the year ahead. July 17. http://reliefweb.int/report/afghanistan/afghanistans-agricultural-prospects-year-ahead.

Favre, R. 2003. Grazing land encroachment: Joint helicopter mission to Dasht-e Laili, March 25–27. Kabul, Afghanistan: Food and Agriculture Organization of the United Nations.

Fitzherbert, A. 2007 *Water management, livestock and the opium economy: Livestock feeds and products*. Case Study Series No. 58. Kabul: Afghanistan Research and Evaluation Unit.

Flaming, L., and A. Roe. 2009. *Water management, livestock and the opium economy: Opportunities for pro-poor agricultural growth*. Synthesis Paper Series No. 44. Kabul: Afghanistan Research and Evaluation Unit.

Frost, P., B. Campbell, G. Medina, and L. Usongo. 2006. Landscape-scale approaches for integrated natural resources management in tropical forest landscapes. *Ecology and Society* 11 (2): 30. www.ecologyandsociety.org/vol11/iss2/art30/.

Grace, J., and A. Pain. 2004. *Rethinking rural livelihoods in Afghanistan*. Synthesis Paper Series. Kabul: Afghanistan Research and Evaluation Unit. www.areu.org.af/Uploads/EditionPdfs/424E-Rethinking%20Rural%20Livelihoods%20SP.pdf.

Hegre, H., J. Ellingsen, S. Gates, and N. P. Gleditsch. 2001. Toward a democratic civil peace? Democracy, political change, and civil war, 1816–1992. *American Political Science Review* 95 (1): 33–48.

IROA (Islamic Republic of Afghanistan). 2008a. Agriculture and rural development sector strategy: Afghanistan National Development Strategy. Kabul: Ministry of Agriculture Irrigation and Livestock.

———. 2008b. *Afghanistan National Development Strategy 1387–1391 (2008–2013): A strategy for security, governance, economic growth and poverty reduction*. Kabul: Afghanistan National Development Strategy Secretariat. www.undp.org.af/publications/KeyDocuments/ANDS_Full_Eng.pdf.

Justino, P. 2009. *Poverty and violent conflict: A micro level perspective on the causes and duration of warfare*. MICRON Research Working Paper No. 6. Brighton, UK: Institute of Development Studies. www.microconflict.eu/publications/RWP6_PJ.pdf.

Koehler, J. 2005. *Conflict processing and the opium poppy economy in Afghanistan*. Jalalabad, Afghanistan: GIZ (Deutsche Gesllschaft für Internationale Zusammenarbeit) Project for Alternative Livelihoods in Afghanistan.

Lee, J. 2003. *Water resource management in the Balkh Ab River and Hazhda Nahr canal network: From crisis to collapse*. Kabul, Afghanistan: Central Asian Free Exchange.

———. 2007. *Water management, livestock and the opium economy: The performance of community water management*. Case Study Series. Kabul: Afghanistan Research and Evaluation Unit.

Longley, C., I. Christopolos, T. Slaymaker, and S. Meseka. 2007. Rural recovery in fragile states: Agricultural support in countries emerging from conflict. *Natural Resource Perspectives*, No. 105. London: Overseas Development Institute.

MAIL (Ministry of Agriculture Irrigation and Livestock, Islamic Republic of Afghanistan). 2009. Economic Regeneration Programme (ER). Kabul. http://mail.gov.af/Content/Media/Documents/EconomicRegenerationProgrammeDocumentfinal2Apr092392012152836718553325325.pdf.

Mansfield, D. 2008. *Water management, livestock and the opium economy—Resurgence and reduction: Explanations for changing levels in opium poppy cultivation in Nangarhar and Ghor in 2006–07*. Case Study Series. Kabul: Afghanistan Research and Evaluation Unit. www.areu.org.af/Uploads/EditionPdfs/810E-Resurgence%20and%20Reduction-CS-print.pdf.pdf.

MIWRE (Ministry of Irrigation, Water Resources and the Environment, Islamic Republic of Afghanistan). 2004. *Emergency drought assessment in 12 vulnerable southern provinces*. Kabul.

National Surveillance System and Vulnerability Analysis Unit. 2003. *National risk and vulnerability assessment*. Kabul, Afghanistan: Ministry of Rural Rehabilitation and Development.

Pain, A. 2006. *Water management, livestock and the opium economy: Opium cultivation in Kunduz and Balkh*. Case Study Series. Kabul: Afghanistan Research and Evaluation Unit.

———. 2012. The Janus nature of opium poppy: A view from the field. In *High-value natural resources and post-conflict peacebuilding*, ed. P. Lujala and S. A. Rustad. London: Earthscan.

Pijanowski, B., L. Iverson, C. Drew, H. Bulley, J. Rhemtulla, M. Wimberly, A. Bartsch, and J. Peng. 2010. Addressing the interplay of poverty and the ecology of landscapes: A grand challenge topic for landscape ecologists? *Landscape Ecology* 25 (1): 5–16.

Population Institute. 2011. From 6 billion to 7 billion: How population growth is changing and challenging our world. www.populationinstitute.org/external/files/reports/from-6b-to-7b.pdf.

RECCA IV (Fourth Regional Economic Cooperation Conference on Afghanistan). 2010. Working group paper on economic development: Labor migration. http://mfa.gov.af/Content/files/LABOR%20MIGRATION.pdf.

Reuters. 2011. Afghanistan fights population growth with birth control. August 23. www.reuters.com/article/2011/08/23/us-afghanistan-birthcontrol-idUSTRE77M4MU20110823.

Roe, A. 2008. *Water management, livestock and the opium economy: Natural resources management, farming systems and rural livelihoods*. Synthesis Paper Series No. 97. Kabul: Afghanistan Research and Evaluation Unit.

———. 2009a. *Applied thematic research into water management, livestock and the opium economy: Findings from the first year of farm and household monitoring*. Case Study Series. Kabul: Afghanistan Research and Evaluation Unit. www.areu.org.af/Uploads/EditionPdfs/917E-Household%20Monitoring-CS-print.pdf.pdf.

———. 2009b. *Water management, livestock and the opium economy: Challenges and opportunities for strengthening licit agricultural livelihoods*. Synthesis Paper Series

No. 80. Kabul: Afghanistan Research and Evaluation Unit. www.areu.org.af/Uploads/EditionPdfs/920E-Strengthening%20Licit%20Agricultural%20Livelihoods-SP-web.pdf.

Rout, B. 2008. *How the water flows: A typology of irrigation systems in Afghanistan*. Issues Paper Series. Kabul: Afghanistan Research and Evaluation Unit.

Rubin, B. R. 2013. *Afghanistan from the Cold War through the war on terror*. New York: Oxford University Press.

Stanfield, J. D., J. Brick Murtazashvili, M. Y. Safar, and A. Salam. 2013. Community documentation of land tenure and its contribution to state building in Afghanistan. In *Land and post-conflict peacebuilding*, ed. J. Unruh and R. C. Williams. London: Earthscan.

Stewart, F., ed. 2008. *Horizontal inequalities and conflict: Understanding group violence in multi-ethnic societies*. Basingstoke, UK: Palgrave Macmillan.

UN (United Nations) Country Team in Afghanistan. 2013. *Natural resource management and peacebuilding in Afghanistan*. Nairobi, Kenya: United Nations Environment Programme. www.unep.org/disastersandconflicts/portals/155/countries/Afghanistan/pdf/UNEP_Afghanistan_NRM.pdf.

UNODC (United Nations Office on Drugs and Crime). 2006. *Afghanistan opium survey*. Vienna, Austria.

———. 2009. Afghan opium production in significant decline. September 2. www.unodc.org/unodc/en/frontpage/2009/September/afghan-opium-production-in-significant--decline.html.

Unruh, J., and M. Shalaby. 2012. Road infrastructure reconstruction as a peacebuilding priority in Afghanistan: Negative implications for land rights. In *Assessing and restoring natural resources in post-conflict peacebuilding*, ed. D. Jensen and S. Lonergan. London: Earthscan.

U.S. (United States) Senate. 2008. Afghanistan: A plan to turn the tide? Hearing before the Committee on Foreign Relations, United States Senate. Hearing No. 110-609. Washington, D.C.: United States Government Printing Office. www.gpo.gov/fdsys/pkg/CHRG-110shrg45330/html/CHRG-110shrg45330.htm.

Wegerich, K. 2009. *Water strategy meets local reality*. Issues Paper Series No. 67. Kabul: Afghanistan Research and Evaluation Unit.

WFP (World Food Programme). 2001. WFP Afghanistan update on humanitarian situation No. 22. http://reliefweb.int/report/afghanistan/wfp-afghanistan-update-humanitarian-situation-no-22.

Wu, J. 2006. Landscape ecology, cross disciplinarity and sustainability science. *Landscape Ecology* 21 (1): 1–4.

Zaur, I. 2006. Agriculture and conflict: A conceptual framework for development. Unpublished Master's thesis, Tufts University. On file with author.