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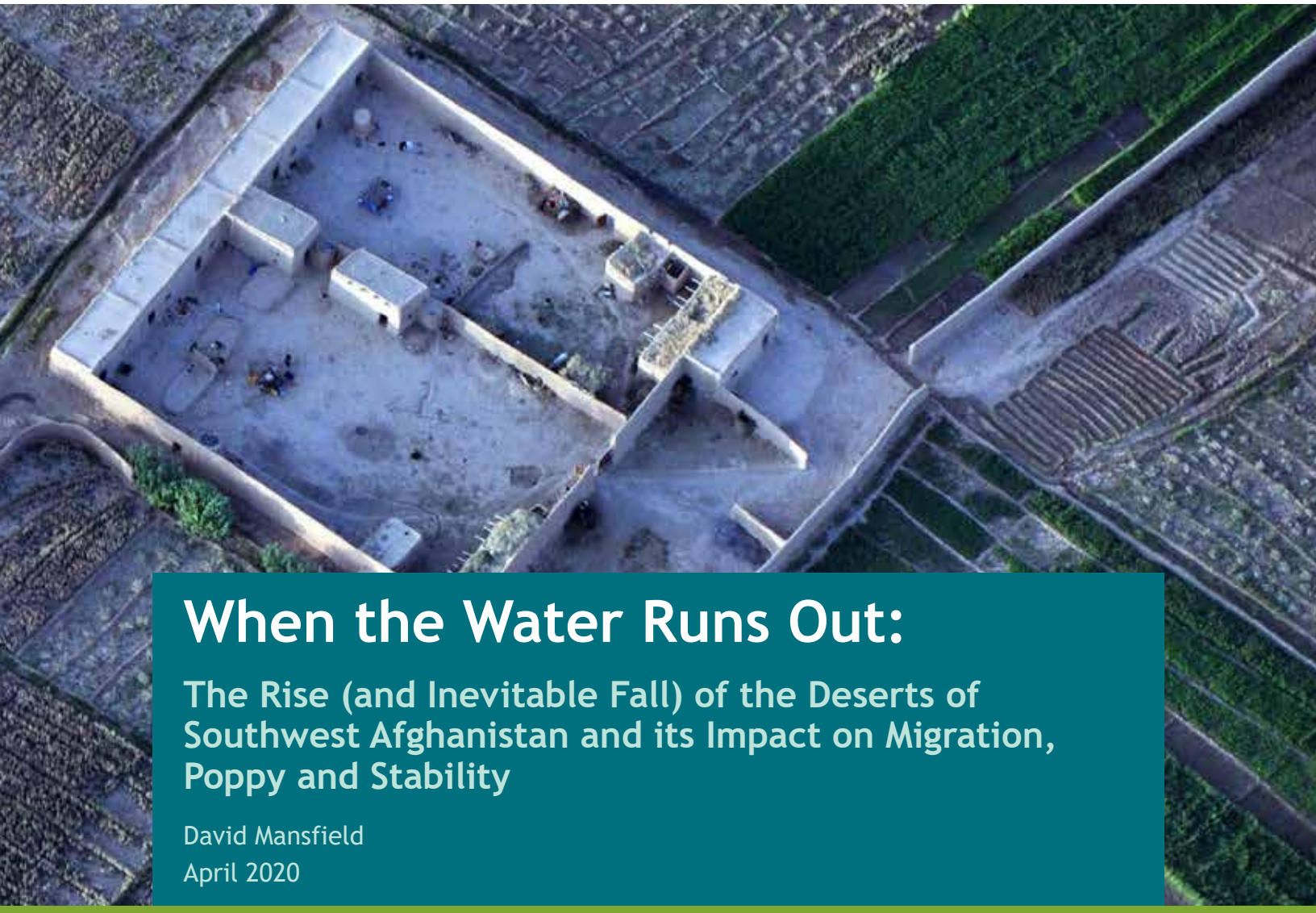

When the Water Runs Out:

The Rise (and Inevitable Fall) of the Deserts of Southwest Afghanistan and its Impact on Migration, Poppy and Stability

David Mansfield

April 2020

Afghanistan Research and Evaluation Unit

Synthesis Paper

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About the Afghanistan Research and Evaluation Unit

The Afghanistan Research and Evaluation Unit (AREU) is an independent research institute based in Kabul that was established in 2002 by the assistance of the international community in Afghanistan. AREU's mission is to inform and influence policy and practice by conducting high-quality, policy relevant, evidence-based research and actively disseminating the results and promote a culture of research and learning. Since 2020, AREU organization is registered with Ministry of Economy (MoEc) as a non-profit NGO. As the top think-tank in Afghanistan and number three in Central Asia according to the Global Go To Think Tank Index Report at the University of Pennsylvania, AREU achieves its mission by engaging with policy makers, civil society, researchers and academics to promote their use of AREU's research-based publications and its library, strengthening their research capacity and creating opportunities for analysis, reflection and debate. AREU is governed by a Board of Directors comprised of representatives of donor organizations, embassies, the United Nations and other multilateral agencies, Afghan civil society and independent experts.

AREU's core donor is the Swedish International Development Cooperation Agency (SIDA). Specific projects in 2019 are being funded by the European Union (EU), Global Challenges Research Fund (GCRF), Central Asia Regional Economic Cooperation Institute (CAREC), The Foundation to Promote Open Society (FPOS), The French Medical Institute for mother and children (FMIC), The Royal United Services Institute (RUSI), Institute for Integrated Transitions (IFIT), and UN Women.

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In 2018, AREU was awarded Best International Social Think Tank by Prospect Magazine.

ABOUT THE AUTHOR

David Mansfield is an independent consultant working with AREU since 2005. He has been conducting research on rural livelihoods and poppy cultivation in Afghanistan for twenty four consecutive growing seasons. This research has involved over 16,000 indepth household interviews in rural Afghanistan. David has a PhD in development studies from the School of Oriental and African Studies, London is the author of A State Built on Sand: How opium undermined Afghanistan, and produced more than 75 research based products on the drugs economy and rural livelihoods in Afghanistan.

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FOREWORD

The Afghanistan Research and Evaluation Unit (AREU) is pleased to share with its audience a comprehensive synthesis paper, "When the Water Runs Out: The Rise of the Deserts of Southwest Afghanistan and its Impact on Migration, Poppy and Stability". The paper is written by AREU's lead expert on opium and rural livelihoods Dr David Mansfield and generously funded by the European Union (EU) as part of the EU three-pronged research effort into essential areas of Natural Resources Management (NRM) project.

This paper draws on fieldwork conducted over a ten years period, and using high resolution remote imagery, and indepth fieldwork charts the processes that led to the encroachment, settlement and transformation of the deserts of the south west. The paper documents how patterns of migration to these areas varied over time and by location, and details how these once barren landscapes were transformed into areas of permanent settlement. It then provides evidence of how this rapid transformation of the former desert areas has impacted on the population that reside there, and the threats to the long-term viability of their livelihoods. Finally, the paper recommends what needs to be done to mitigate the pressures on this desert population: not just in addressing the factors that drive migration to these former desert areas but also interventions that might ease the economic, social and environmental challenges that those living there currently face in order to reduce the potential, and subsequent impact of a massive displacement of people within Afghanistan, to neighboring countries and possibly further afield.

The paper also documents the particularly challenging lives of the women live in these desert areas, who talk of their isolation, depression and even suicides; a function of their isolation from their families and friends in their place of origin, the increased burden of agricultural labour in the barren desert landscape, and the absence of education and health services. It is also important to note that these desert communities are highly dependent on opium production as a means of livelihood, including the cash it generates to invest in what are high cost farming techniques. As such, the population's welfare ebbs and flows with the price and productivity of its opium crop. When opium yields fall and crops fail - as they did for four consecutive years between 2012 and 2015 - the impact on household income is significant. Low opium prices have the same deleterious effect, forcing households to reduce expenditures on food and healthcare and to look for new ways to reduce the costs of farming inputs, including the uptake of new, even more efficient technologies.

What is of greatest concern is that with almost 1.4 million people now living in these former desert areas in the southwest, and increasing numbers of farmers installing deep wells powered by solar technology, the ground water these farmers depend on for their livelihoods is fast running out. There are questions over as to where would these people go when they no longer have water for their households, their livestock and to irrigate their crops? Most of these farmers felt compelled to migrate to the desert in the first place, fleeing fighting and the prohibition of opium in the more accessible irrigated areas, and firmly believe they were denied development assistance due to their landless status and government corruption. Those that reside in these former desert areas express their views about the government in the harshest terms and have little faith that there is a viable development model for them back in the irrigated areas.

When the current economic efforts fail, will the population of these former desert areas return to the areas where they came from? Is there sufficient land for them to farm and to sustain their families? Having lived under the auspices of the Taliban - and having little affection for the government - would these returnees agitate against the authorities? Perhaps some would go to the cities, further increasing the population pressure there. Are there the jobs, housing and services to absorb these migrants, particularly in Kabul where the ground water is already under threat of depletion. Finally, what is the risk that a proportion of this 1.5 million people (and the others in former desert areas beyond the southwest) look to be smuggled abroad, joining the many that have already left Afghanistan, and find themselves in Iran, Turkey and Europe?

I am confident this comprehensive paper could be used as a critical resource on rural migration, environmental aspects of using ground water and an important source for developing realistic policies to addressing the current questions about the population of the former southwest desert areas. Last but not least, AREU would like to acknowledge and thank the two major partners on this assignment: OSDR and Alcis for their incredible support in data collection and our anonymous peer reviewers for their significant contributions.

Dr. Orzala Nemat
AREU Director

CONTENTS

Executive Summary

There are up to 1.4 million people in southwestern Afghanistan whose livelihoods are under threat. These people reside in the former desert areas of Farah, Nimroz, Helmand and Kandahar. In the 1990s, this region was largely barren uninhabited land, apart from the valley of Khash Rud in Nimruz and the lower part of Marjah. The transformation of the desert started with land grabs by local power brokers and their supporters in the early years of the Karzai government. This was followed by multiple waves of migrants, taking or purchasing land, and settling these former desert areas on a permanent basis. By 2012, at the end of the US military surge in Afghanistan–much of it deployed to the southwest–there were 157,000 hectares of land under agriculture in the former desert areas, up from 48,000 hectares in 2002. And the people just kept coming: between 2014 and 2019, a further 48,000 household compounds were built in the desert, the equivalent of as many as 96,000 people settling each year. By 2019, supported by technological innovations, including solar-powered deepwells, this population had successfully transformed a former desert area into 344,467 hectares of agriculturally productive lands, much of it cultivated with opium poppy.

The economic benefits that have accrued to the settler population have been important. Many came from the irrigated lands from districts nearby, where they had been employed as sharecroppers, tenants, or had insufficient lands of their own due to the growing population pressures that beleaguer many parts of rural Afghanistan. For most, the move to the desert was a chance to own land for the first time and make a life for themselves; few have any intention of leaving. These farmers have levelled and improved the land, dug deepwells, built homes, and purchased what many consider basic necessities for life in these desert areas: a motorbike, a generator, and some solar panels. Despite the austere landscape, the men go about their daily life as they did in their original villages, tending their crops, looking after any livestock they have and visiting the local market—once a makeshift weekly gathering of local traders, now a multitude of permanent shops where locals say you can "find goods that can't be purchased in Lashkar Gah," the provincial centre of Helmand. Much of this population appears to have settled and embedded.

For policy purposes, the primary concern has to be over the long-term consequences and sustainability of the settlements in these former desert areas. The women that live in these desert areas talk of their isolation, depression and even suicide resulting from almost no interactions with families and friends, the increased burden of agricultural labour in the barren landscape, and the lack of education and health services. Furthermore, these communities are highly dependent on opium production, including the cash it generates to invest in what are high-cost farming techniques. As such, the population's welfare ebbs and flows with the price and productivity of its opium crop. When opium yields fall and crops fail—as they did for 4 consecutive years between 2012 and 2015—the impact on household income is significant. Low opium prices, such as in 2018 and 2019, have the same deleterious effect, forcing households to reduce expenditures on food and healthcare and to look for new ways to reduce the costs of farming inputs, including the uptake of new technologies.

It was in part low opium yields that led to the dramatic uptick in solar technology. To reduce the recurrent costs of using adulterated diesel, as well as the damage it does to generators and pumps, farmers began to experiment with solar power as early as 2014, a time when many were experiencing losses on their opium crop. By 2018, there were more than 50,000 solar deepwells, and projections indicate that there were at least 63,000 in 2019. The impact of this technology and the continued inflow of people into the former desert lands is significant. Groundwater levels are falling at a dramatic rate, exacerbated by poor management, such as evaporation from the reservoirs that often accompany solar wells and the local perception that "water is free." High applications of chemical fertilisers—typical for opium poppy but even more so in the former desert areas—has also led to the contamination of ground water, particularly of nitrates. The widespread shift to chemical-based herbicides in the farming of opium poppy will inevitably have detrimental effects on the environment, as well as human health.

The Afghan government and development donors should be concerned about what will become of this new frontier of development in these former desert areas, and, most importantly, the people that reside there. In some areas, the groundwater is contaminated with nitrates. Most importantly, very little is

known about the aquifer that is supporting the lives and livelihoods of well over 1 million people: how it is recharged, and when and if it might run dry. With the water table currently falling by up to 3 metres a year, and each year more people arriving in the desert and installing solar deepwells, there are local fears that there will fast become a time when agricultural production will no longer be viable and there will be an outflow of large numbers of people.

There are questions over as to where these would people go; indeed, this is a population that has little love for the Afghan authorities. Most felt compelled to migrate to the desert, fleeing fighting and the prohibition of opium in the more accessible irrigated areas, and believe they were denied development assistance due to their landless status and government corruption. Those that reside in these former desert areas express their views about the government in the harshest terms and have little faith that there is a viable development model for them back in the irrigated areas.

When the current economic model fails, will the population of these former desert areas return to the areas where they came from? Is there sufficient land for them to farm and to sustain their families? Having lived under the auspices of the Taliban—and having little affection for the government—would these returnees agitate against the authorities? Perhaps some would go to the cities, further increasing the population pressure there? Are there the jobs, housing and services to absorb these migrants, particularly in Kabul where the groundwater is already under threat of depletion. Finally, what is the risk that a proportion of these 1.4 million people (and the others in former desert areas beyond the southwest) look to be smuggled abroad, joining the many that have already left Afghanistan, and find themselves in Iran, Turkey and Europe?

Drawing on fieldwork conducted over a 10-year period, and using high-resolution remote imagery, this paper charts the processes that led to the encroachment, settlement and transformation of the deserts of the southwest. It documents how patterns of migration to these areas varied over time and by location, and details how these once barren landscapes were transformed into areas of permanent settlement. The paper then provides evidence of how this rapid transformation has impacted the population that reside there, and outlines the threats to the long-term viability of their livelihoods. Finally, the paper recommends solutions to the pressures on this population, not just in addressing the factors that drive migration to these former desert areas, but also interventions that might ease the economic, social and environmental challenges that those living there currently face, potentially preventing a massive displacement of people within Afghanistan, to neighbouring countries and possibly further afield.

1. INTRODUCTION

Underpinning media reports about the failure of the Afghanistan that is associated with the "Afghanistan Papers" is a narrative of western hubris: a waste of blood and treasure in a country that remains almost unchanged despite billions of dollars in investment by western donors over a 20-year period.[1] This discourse focuses on policy and programmatic failure: on how little has been achieved in Afghanistan despite, or because of, the vast amount of monies spent. Perhaps rightfully given the nature of this discussion, there have been questions over the accuracy and efficacy of the metrics used to measure progress in Afghanistan, and accusations of mendacity and hubris have been levelled against government officials, with the suggestion that they have looked to report success where the evidence was to the contrary.[2]

While there is little doubt that there is some truth in the allegations of waste, this is far from the only story in Afghanistan. Beyond the media headlines, achievements have varied. While there are clear failures, there are also areas of Afghanistan that are have become unrecognisable over the last decades, that is, where there is robust evidence of adaptation, innovation and economic improvements. Moreover, the inclination to directly tie the overall performance of Afghanistan's economy, political system and security to western interventions—as many of the evaluative systems tend do—is to adopt a reductionist and teleological approach to both development and assessment, while ignoring the wider socio-economic, political and environmental processes at work, and neglecting the agency of the Afghan state and its people. To believe that development success or failure is largely a function of western efforts and funds is to fundamentally misunderstand the dynamism of the Afghan economy and its people.

This research examines the former desert areas of south western Afghanistan; an area that consisted of bare and barren earth when the Taliban regime fell in late 2001. This is an area where there have been few direct interventions, and even the military effort has been limited. But it is an area that has, at least in the short term, gained significantly from the indirect benefits of the state-building project over the last 2 decades, from improved access to infrastructure, technology, markets and knowledge that the international effort has brought to almost every corner of the country. Defined as having a hyper-arid environment, with temperatures that reach as high as 50 degrees centigrade in the summer, these areas extend westward from the major irrigation works in Helmand funded by the United States Government in the 1970s and 1980s, passing the Khash Rud river in Nimroz, and the desert plains of the district of Bakwa, and finishing at the foothills of Lor Koh mountain in the edge of Bala Bulok district in Farah (see Figure 1). This is an area of around 2,315 square kilometres, which, in 2003, had only 21,000 hectares of land under agriculture, all of it focused along the Khash Rud river and what remained of the karezes in Bakwa.

Even as the Afghan state building project began to pick up pace in 2005—after Hamid Karzai had been elected President in Afghanistan's first democratic election and when the amount of development assistance began to rise dramatically—there remained little life beyond the irrigated valleys of the Helmand, Khash Rud and Farah Rud rivers. There were only a few hundred households comprising people in search of a home and some agricultural land where they could try and earn a living. These were desperate people that had fled drought, population pressures and a lack of land in their own villages in the irrigated valleys, hoping they might be able to make ends meet—and at least own their own land—in this harsh desert climate.

1 Craig Whitlock, "At War with the Truth," *Washington Post, 9 December 2019*. https://www.washingtonpost.com/graphics/2019/investigations/afghanistan-papers/afghanistan-war-confidential-documents/

2 Jeff Schogol, "US Government Officials Are Encouraged to Lie about Progress in Afghanistan, Special Inspector General Says," *Task and Purpose, 15 January 2020*. https://taskandpurpose.com/news/afghanistan-lies-sigar-sopko

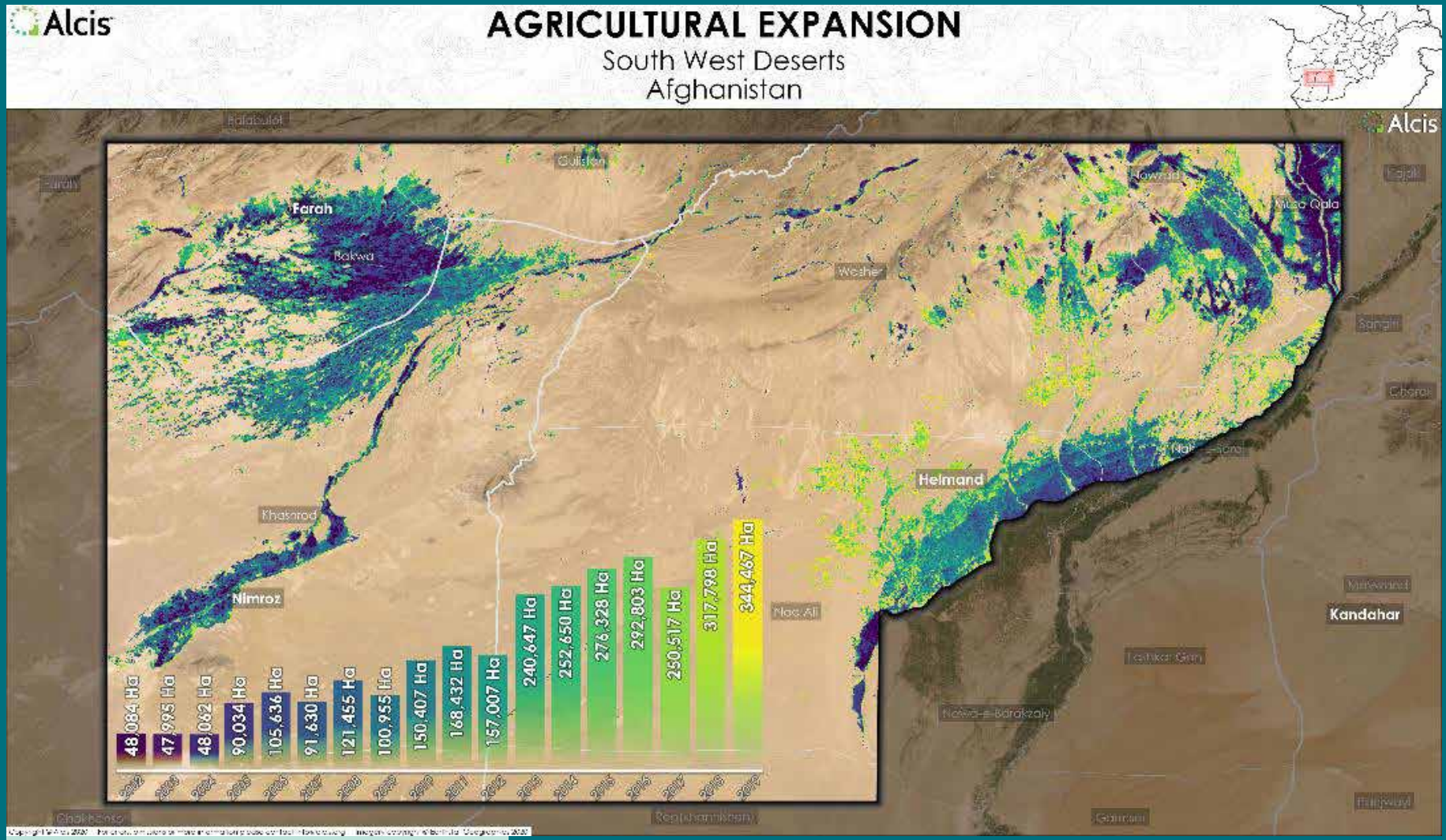


Figure 1: Imagery showing the expansion in agricultural land in Southwest Afghanistan, 2002-2019

Source: Alcis.

However, this began to change and, by 2009, as many as 101,000 hectares of this former desert land were under agriculture. There were also growing signs of a more embedded population: A large number of household compounds had been built, deepwells sunk, and there were a number of weekly markets established where the population could meet and buy goods, rather than have to travel into the irrigated areas and district centres. By 2019, these former desert areas were unrecognisable. There was no longer a limited number of isolated farms in this vast desert space. Instead, there was a patchwork of contiguous agricultural land, which from the air looked almost identical to those parts of Nad e Ali, Marjah and Nahre Seraj that are fed by major canal works built under the Helmand and Arghandab Valley Project. Permanent markets had also been established; following investments in solar power, including accompanying reservoirs of up to 1,200 square meters, there were as many as 141,000 household compounds and an embedded population of as many as 1.4 million people (see Figure 2).[3]

This paper draws on longitudinal research conducted in these former desert areas to assess the viability of these communities. The paper is divided into five sections. The next section outlines how a combination of in-depth fieldwork and high-resolution satellite imagery overcame many of the challenges of conducting research in remote and insecure areas, and on illicit activities. The third section details the encroachment and settlement of the former desert areas of southwest Afghanistan over the last 2 decades through a comparison of the desert area north of the Boghra canal in Helmand, and in the Bakwa desert of Farah and Nimroz.

The fourth section examines the transformation of these desert areas: the innovation and uptake of technologies that have supported agricultural production on one barren land and how this has impacted those that live there. The fifth section examines the consequences of the dramatic social, economic and environmental change that has taken place in these former desert areas. It also documents the technological innovations that have been adopted, assesses their impact and long-term viability, and outlines the possible scenarios if the current model of development being pursued in these desert areas proves unsustainable. Finally, the sixth section offers a conclusion and recommendations.

3 This estimate is based on a count of 141,714 household compounds in this desert area and an average household size of ten people.

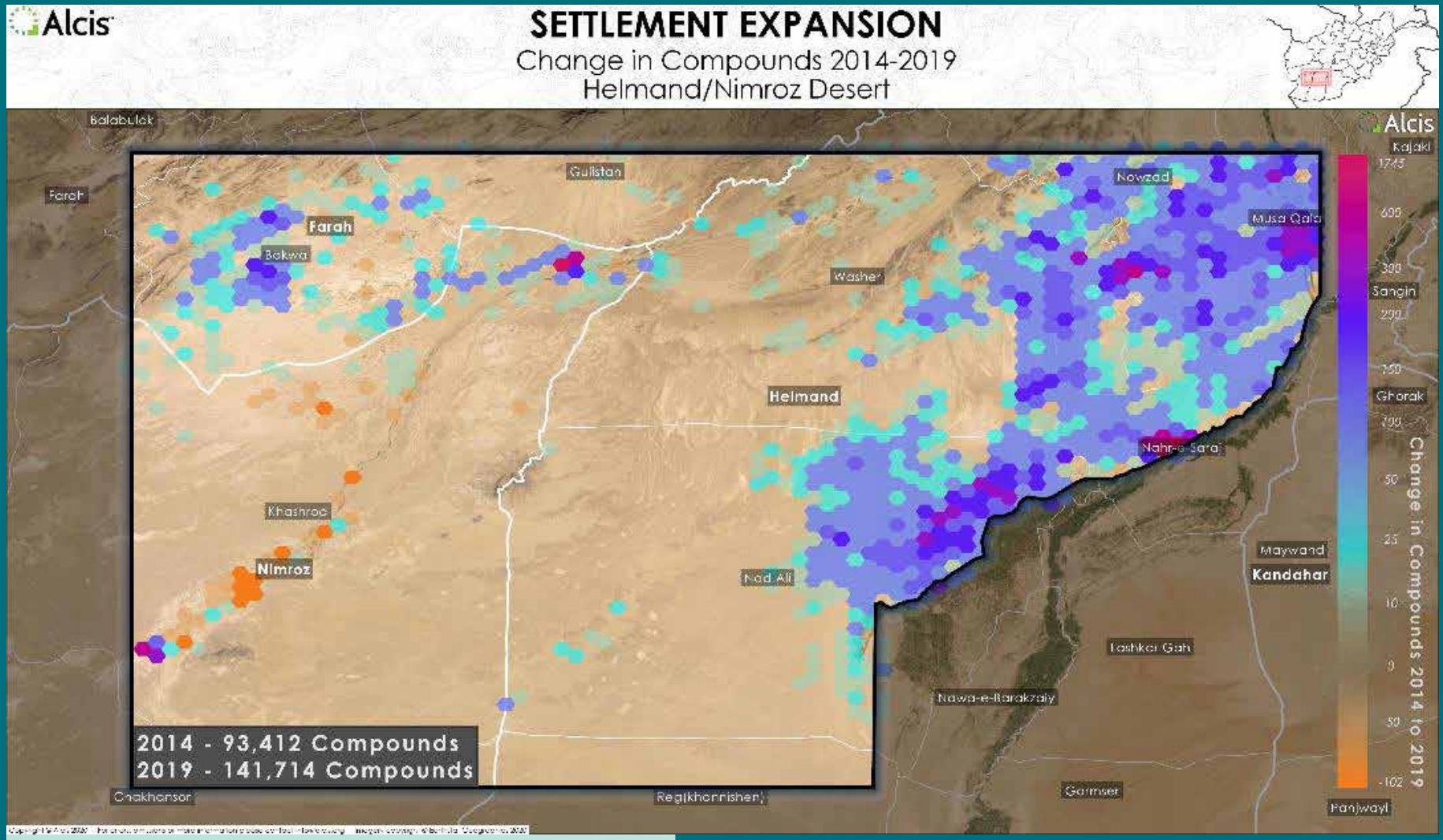


Figure 2: Geospatial analysis showing the change in the number of household compounds in the desert areas of Southwest Afghanistan, 2014-2019

Source: Alcis.

2. METHODOLOGY

This report builds on a decade of research that combined in-depth fieldwork and high-resolution imagery in 20 research sites across the desert areas that runs from north of the Boghra canal in Helmand to Bakwa and the border with Bala Bulok.

Fieldwork consisted of 1,418 interviews with rural households and supplementary data collection among those providing services to these communities. In total, 853 interviews were conducted with farmers at eight research sites in the area north of the Boghra canal in Helmand Province between 2010 and 2018, and 513 interviews with farmers at 12 research sites in Bakwa in Farah Province.[4] Each year, a further 40 interviews were conducted with individuals serving the population in the former desert areas in the cities of Lashkar Gah, Gereshk, Farah and Delarem, including those trading solar panels, diesel, pesticides and those who leased drilling equipment for sinking deepwells, known as *barma*. In 2018, fieldwork was supplemented by a further 52 interviews with women who resided in the former desert areas north of the Boghra in Helmand. Water samples were also collected from deepwells in both areas in 2017 and 2018 to test for chemical and biological content.

This field research was further supported by parallel fieldwork in the canal-irrigated area of Helmand, an area that came to be known as the Helmand Food Zone (HFZ) between 2008 and 2012. In total, 1,780 household interviews were conducted with those that resided in the HFZ. This second body of data includes some respondents who had resided in the former desert areas, or who had family members living there on a seasonal or permanent basis.

2.1. RESEARCH SITE SELECTION

Research sites were selected based on several criteria. The most important criterion for site selection was the date and duration of settlement in the former desert area, as this would support a better understanding of the motivations that led to households migrating and settling in the former desert areas, and how these varied over time. For this task, Geospatial Imagery Systems analysis was essential and involved a review of the Normalized Difference Vegetation Index. This is a measure of agricultural activity and allowed several potential research sites to be identified by the year that they came under agricultural production (see Figure 3). High-resolution imagery was then reviewed to assess the scale of cultivation and the presence of household compounds, along with any other features.

The second stage of site selection was to review this initial list with local researchers and consider access. The security situation across these desert sites is challenging: the insurgency has maintained a constant presence in these areas and those that reside there are suspicious of outsiders. Local researchers who had good knowledge of the area and contacts in the selected sites were recruited. Where some research sites were identified as potentially inaccessible, the site was replaced with another location that had the same history in terms of the year of settlement. This ensured there was a sufficient cross-section of research sites with different dates of settlement.

4 The research in the former desert areas was also supported by longitudinal fieldwork in 12 sites in the main canal-irrigated area of Helmand from where many of those that have settled north of the Boghra originate. The results of this work can be found in a number of other publications including most recently, “The Helmand Food Zone: The Illusion of Success” by David Mansfield, AREU, November 2019, https://areu.org.af/wp-content/uploads/2019/12/1908E-Helmand-Food-Zone__English__4.pdf

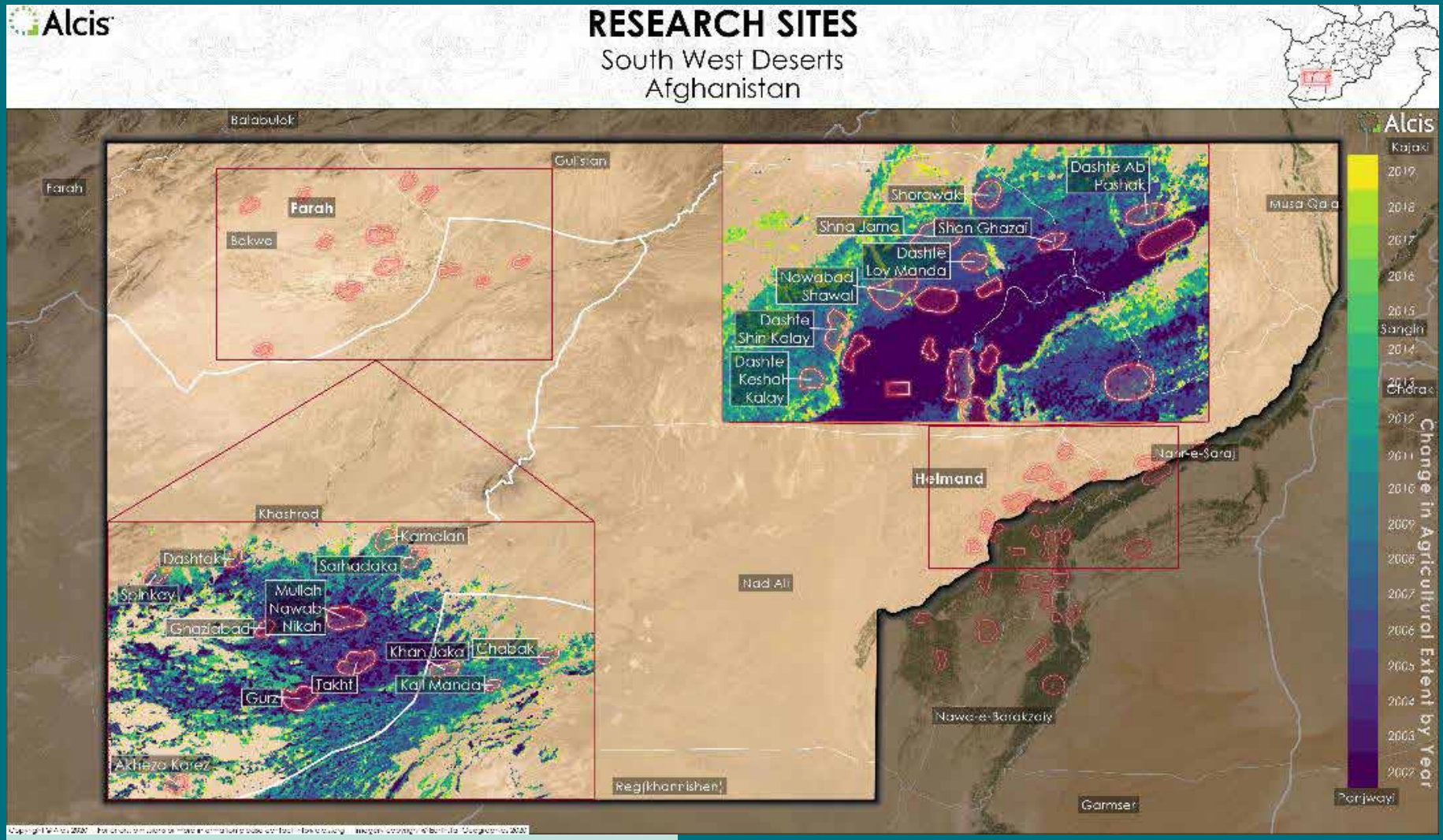


Figure 3: Imagery showing map of research sites in the deserts north of the Boghra and in Bakwa, and the years that they came under agricultural production

Source: Alcis.

2.2. FIELDWORK

As noted above, fieldwork was conducted by a local team that had a deep knowledge of the desert areas and had worked closely with the lead researcher and author for more than a decade. To circumvent the inherent problems associated with researching an illegal or underground activity, the research focused on household livelihood strategies. Pressure on the Afghan government to act against opium cultivation and trade has made illicit drugs a more sensitive discussion topic with farmers and other stakeholders than was the case in the 1990s and early 2000s. However, the rural household remains the most accessible unit of analysis when looking at the national opium economy, as it offers a basis for cross-referencing findings both with other work on rural livelihoods, and with other research on the specific role of opium production in Afghanistan and elsewhere.

Male respondents were selected in situ. To capture socio-economic diversity within the research sites, and the different experiences that households had, local researchers interviewed the following range of different land-owning groups within each research site where they existed: (i) the land-poor, that is, those who were landless or had insufficient land to meet their families' needs and had to work as tenant farmers or sharecroppers on the land of others; (ii) owner cultivators, that is, those with enough land to meet their families' needs; and (iii) landlords, that is, those with land surplus to their requirements who employed others to work their land, either as tenants or sharecroppers.

Discussions with both male and female respondents focused on the direct experience of respondents and their households rather than on events or phenomena over a wider geographic area, where answers become increasingly speculative.[5] Individual interviews with male respondents were conducted in the field as farmers tended their crops, since holding interviews in the household compound can become subject to interruptions and biases. Group discussions with farmers were avoided, as they tend to be dominated by community elites, are inappropriate for sensitive issues, such as opium poppy cultivation, and increasingly represent a security threat to both respondents and researchers in rural Afghanistan, particularly in the south.

Interviews with women were conducted by a father and daughter team. This research focused on those families that had lived in the former desert areas north of the Boghra canal on either a seasonal basis or had lived north of the canal for a number of years, but had moved back to the canal-irrigated area in 2018. The reason for this focus was practical. Insecurity and the cultural restrictions on the movement of women in the areas north of the Boghra in Helmand and in Bakwa made it impossible to deploy a suitably educated female researcher. Instead, research had to be conducted in the canal-irrigated area of Helmand, targeting the female members of those families that had returned from the former desert area after the opium poppy harvest was finished north of the Boghra. It is recognised that this more limited sample does not represent the views of those women who live in the former desert area year-round and on a permanent basis.

However, the inclusion of several women who had recently returned to the canal command after living there for some years and having abandoned their farms north of the Boghra offers some insights into the lives of those women living in the former desert areas on a permanent basis. This part of the research provided invaluable insight into an important but hard to access group who are an essential part of the labour force required to settle and cultivate the former desert lands, and who may have some authority over decisions over seasonal and permanent migration there and the livelihoods pursued once there.

5 Swedish Committee for Afghanistan, "Farming Systems of Nad Ali District, Helmand Province," in *Agricultural Survey of Afghanistan, Report 15, Peshawar, 1992: page 1.*

Fieldwork was conducted during the planting and/or harvest season for opium when respondents are most aware of the agricultural and financial outcomes of the previous crop and when farmers are most actively engaged in deciding what to grow next. The visible presence of the opium crop in the ground also allows researchers to verify some of farmer's responses and, if needed, prompt respondents where they are not being entirely candid regarding the crops they are growing, and the extent.

Finally, water samples were collected from a total of 40 deepwells, 20 of which were from the 12 research sites in Bakwa and a further 20 from the eight research sites north of the Boghra in Helmand. Both sets of samples were transported to Kabul and tested. The samples from Helmand were tested for both chemical and biological content. The samples from Bakwa were tested only for chemical content as they could not be collected from the research sites and transported to Kabul within the 24 hours required.

2.3. INTEGRATION OF GEOSPATIAL ANALYSIS

Another key element of the research method was the use of high-resolution satellite imagery. As discussed above, geospatial data were used to identify research sites; however, this was not the only way in which remote sensing data were used. High-resolution satellite imagery was also used to verify that fieldworkers had been to the identified sites and to examine the primary data. Debriefings with the lead researcher also involved talking through each research site and the surrounding environment, drawing on both maps and historical imagery products showing change over time. This kind of imagery supported more detailed conversations on local phenomena, such as the impact of insecurity on planting, the identification of crops under cultivation, the extent of salination and new or damaged physical infrastructure. Imagery also allowed many of these phenomena to be measured.

Finally, geospatial analysis extrapolated research findings over a wider geographic range beyond the research sites themselves. For example, where phenomena were identified on the ground in several research sites, imagery could be used to assess the extent to which this was common across all sites and the wider area. An example of this would be the mapping of solar tubewells: Supported by the identification of a unique signature of an accompanying reservoir and solar panels, this was a phenomenon that could be easily spotted using high-resolution satellite imagery and an assessment of the frequency could be made over an area of almost 1,000 square kilometres.

3. ENCROACHED AND SETTLED: MIGRATION INTO THE DESERTS OF THE SOUTHWEST

The process of encroachment into the former desert areas of southwest Afghanistan has differed largely based on the original pattern of settlement in the irrigated areas nearby. Central to this process is a local narrative of ownership. In contrast to Afghan law, where these lands are owned by the government, local and what are perceived as indigenous communities claim traditional rights and look to restrict the incursion of those from "outside", even those that have might have resided in nearby irrigated lands for many generations. This section compares the process of encroachment and settlement of the area north of the Boghra canal in Helmand, and the former desert area in Bakwa.

3.1. CAPTURED AND SOLD: SETTLING THE DESERTS NORTH OF THE BOGHRA

The deserts of central Helmand had already been transformed in the 1950s, 60s and 70s by the Government of Afghanistan. Over this period, the Helmand and Arghandab Valley Authority, with the help of US funds and technical support, brought around 20,100 hectares of former desert land in the districts of Nad e Ali and Marjah under agricultural production by 1975, settling around 5,500 households.[6] Many of these settlers were *kuchi* (nomadic) herders and farmers from outside Helmand, including from the provinces of Nangarhar, Laghman, Wardak, Ghazni and Farah. The land they were given was former desert to the south of the newly built Boghra canal, which ran southwest for over 100 kilometers from the village of Sangchal in Nahre Seraj to the southern tip of Marjah, before heading east and rejoining the Helmand river in Nawa Barakzai.

At the time, these settler communities from outside Helmand, known locally as the *naqel*, or "transferred", talked of the reluctance of the indigenous Helmandi tribes to take the former desert lands of Nad e Ali and Marjah when they were first offered. Poor soils, a failure to level the land and salination led to low agricultural yields, and made the early years of settlement difficult. Some settlers even left the area due to poor yields and the harsh lifestyle.[7] Any initial reluctance to take lands in the former desert areas was cast aside during the civil war in the 1980s, when Noorzai, Barakzai and Ishaqzai mujahiddin commanders occupied land abandoned by the *naqel*, as well as new lands—former desert and forest—in Nad e Ali and Marjah. In the 1990s, further desert land was taken by politico-military actors from the powerful indigenous tribes, especially the northern Alizai, who had gained a growing influence over central Helmand through the governorship of Mullah Nasim Akhunzada, and his brother Rasul, following Nasim's murder. These land grabs in central Helmand changed the political geography of the settled areas of Nad e Ali and Marjah, further marginalising the *naqel*, who had been brought in by the government to farm these former desert lands, with the objective of weakening the influence of the powerful Helmandi tribes, particularly the Alizai, Ishaqzai and Noorzai.[8]

With a dominant position in central Helmand, and a successful model of converting desert lands into productive agriculture, the indigenous tribes of Helmand showed no reluctance in settling the desert lands north of the Boghra canal when the opportunity arose and technology and opium prices made agriculture viable. In fact, the former desert areas north of the Boghra have been subject to multiple waves of migration, with the most successful in terms of bringing land under cultivation being with the imposition of an opium ban on central Helmand (see Figure 4 and 5).

6 Frydoon Shairzai, Ghulam Farouq and Richard Scott, *1975 Farm Economic Survey of the Helmand Valley, (Kabul: USAID/DP, 1975), p. 6.* http://scottshelmandvalleyarchives.org/docs/fes-78-03.pdf

7 Richard Scott, "Tribal and Ethnic Groups in the Helmand Valley." (Occasional Paper No. 21, The Asia Society, 1980).

8 David Mansfield, *A State Built on Sand: How Opium Undermined Afghanistan (Oxford: Oxford University Press, 2016) page 249.*

The first wave took place in the late 1990s during the Taliban regime and was more limited in scale. Consisting of farmers from Washir and Nowzad looking to escape the prolonged drought, these migrants occupied only a few hundred hectares of land around Shurawak by the late 1990s, using pumps from the canal to irrigate their land.

The second wave of migration north of the Boghra area began in 2002 after the fall of the Taliban and was largely led by local commanders who resided in adjacent land to the south of the Boghra canal. These commanders simply took possession of hundreds of hectares of land, justifying their grab on the grounds that they and their men had "defended the land against the Soviet occupation," and had some traditional claim over the desert land due to its proximity to the settled village land. In reality, many of these commanders had links to the provincial administration of the governor at the time, Sher Mohammed Akhundzada (2002-06), the son of Rasul Akhundzada and nephew of Nassim. Some of these commanders even had jobs in the local security services or familial or tribal links to the former mujahiddin commander, and subsequent commander of the 93rd division of the Afghan National Army, Moallem Wali.[9]

For example, the area known as Shna Jama was captured by Abdul Tahir Noorzai, a former security commander in Nad e Ali, during Akhundzada's governorship, while the area around Naquilbad, including Nawabad Shawal, fell to Haji Kabir Khan, the former head of the traffic police in Lashkar Gah, and close associate of his fellow Noorzai tribesmen, and former head of the provincial police, Abdul Rahman Jan.[10] Haji Qadoos is alleged to have taken the land in Dashte Ab Pashak. He was the deputy commander of the 93rd Division of the Afghan Military Forces between 2001 and 2004, before the division was disbanded and then formed a militia under contract to US Special Forces to guard Camp Price.[11]

After this initial land grab, commanders subsequently gifted land to their subordinates and their extended families, a tribute that is essential to retain power and influence and to mitigate the risks of conflict with tribal rivals. Those interviewed reported that the gifting of land continued until as late as 2007, demonstrating that individuals with strong links to the government maintained some ownership over land north of the Nahre Boghra despite the growing influence of the Taliban in the area. In Shen Ghazi, for example, a number of farmers claimed that they had received land as late as 2007 from Abdul Khaleq. In many areas, the patronage of specific commanders and the claims of their tribes over the land were evident, due to the predominance of specific tribal groups among those interviewed (see Table 1).

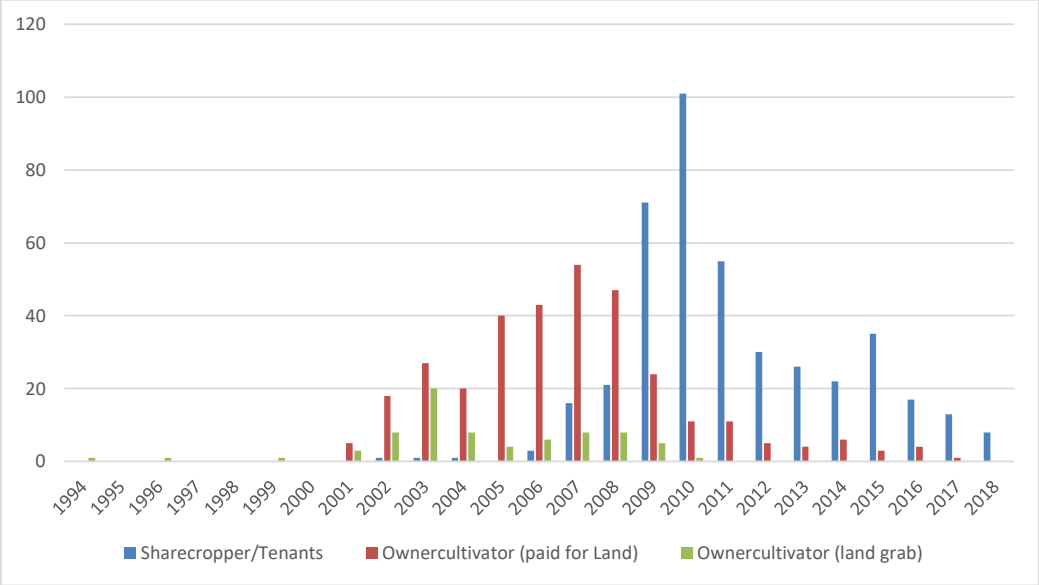
For example, two-thirds of those interviewed in Shen Ghazi were Alkozai, the same tribe as Commander Abdul Kaleq. In Shna Jama, 65 percent of those interviewed were Noorzai, as was the commander Abdul Tahir, who was accused of initially taking the land. The dominance of the Barakzai in Dasht e Ab Pashak and Dashte Loya Manda also corresponds with the tribal affiliation of commanders Haji Abdul Qatoos and Abdul Haq who were alleged to have captured the land in the early days of the Karzai administration. In other research sites, a greater mix of tribes was present. For example, in Dashte Shin Kalay and Dashte Koshal Kalay, where a more opportunistic process of land grabs was claimed to have been in effect, it was possible to find a much wider range of tribes, including shepherds, known as *maldar,* from both Baloch and Kakar tribes that claimed traditional land use rights over the area. It was also clear that the influx of an increasing number of households taking land as tenants or sharecroppers changed the tribal composition of some of the sites covered by this research over time.

9 Moallem Mirwali was one of the nine parliamentary candidates that the Independent Electoral Commission ruled in favour of in August 2011, replacing Massud Noorzai as the Member of Parliament. Martine van Biljert, "A New Result for the Parliamentary Election?" *Afghan Analysts Network, 21 August 2011.* http://aan-afghanistan.com/index.asp?id=2032)

10 Tom Coghlan, "The Taliban in Helmand: An Oral History," in *Decoding the New Taliban: Insights from the Afghan Field*, ed. A. Guistozzi, 173 (London: Hurst & Co, 2009).

11 Deedee Derksen, "War and Peace: Armed, Disarmed, Rearmed: How Nahre Seraj in Helmand Became One of the Deadliest Districts in Afghanistan" *Afghan Analysts Network, 6 January 2014, pp. 2-3.*

Figure 4: Year of settlement in the desert lands north of the Boghra, by land tenure (n814)[12]



Source: Fieldwork.

It is notable that movement into the desert areas was not open to all. Even when purchasing land north of the Boghra, or obtaining land as a tenant or sharecropper, tribal and familial links were critical to access. All of those residing in the former desert area were found to have contacts who had already migrated to the area a few years prior and could provide support during the initial years of their resettlement. It was also a common refrain from respondents that the desert lands "belonged" to those from the southern tribes, such as the Ishaqzai, Noorzai, Barakzai, Alizai and Alkozai, and that it was not for those tribal groups that had been settled by the Afghan government in the canal-irrigated areas of central Helmand in the 1960s and 70sto purchase or work the land there. In fact, almost 90 percent of those interviewed north of the Boghra were from these five tribes, and less than 1 percent were *naqel*, primarily Taimani from Ghor.

The third wave of migration in the area north of the Boghra canal involved the commoditisation of land and its subsequent sale. This wave began in 2007 and continued, although at a much slower pace, into 2018. This is the period where the vast majority of the land north of the Boghra canal was brought under agricultural production; further, migration into this area was heavily influenced by events in central Helmand, notably increasing levels of conflict and violence between the Afghan National Defense and Security Forces, NATO military forces and the Taliban between 2006 and 2011, as well as the implementation of the HFZ, a counternarcotics effort launched in the fall of 2008.

Levels of violence were particularly high in central Helmand following the arrival of UK military forces in 2006, and with the subsequent uptick in UK and US military forces in 2007 and 2008. In 2007, much of the military campaign was targeted on the northern districts of Kajaki, Musa Qala and Sangin. However, by the summer of 2008, insurgents launched a dramatic attack on the Provincial Reconstruction Team in the provincial centre of Lashkar Gah. Subsequent military operations aimed at clearing the Taliban from the surrounding areas, in Nad e Ali in late 2008, and then in Marjah in March 2009, led to rising levels of violence that were to have a significant impact on the rural population.

12 This figure does not include all 853 respondents north of the Boghra, as some did not offer a year of settlement.

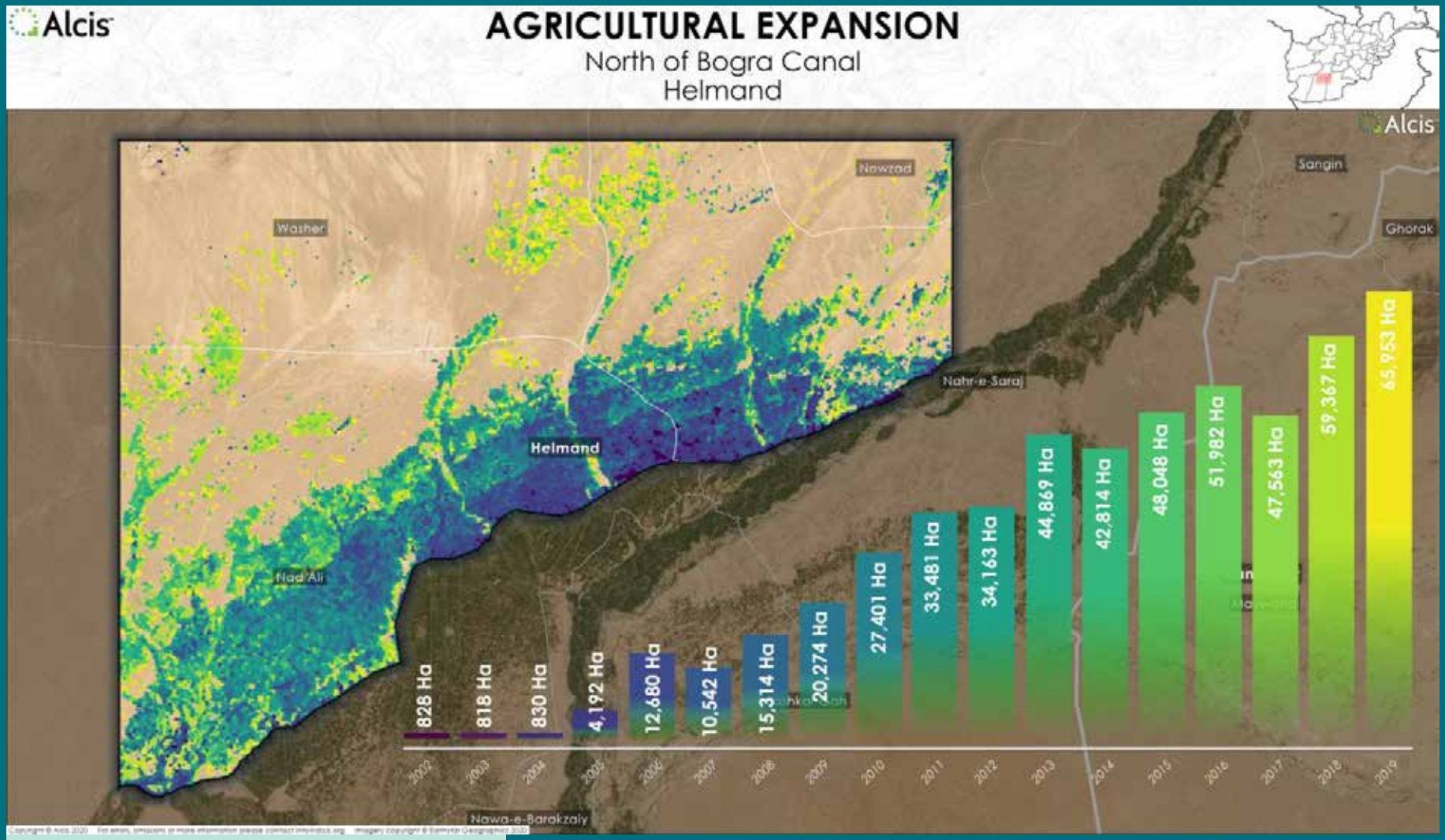


Figure 5: Geospatial analysis of area under agricultural production, north of the Boghra canal, 2002-2019

Source: Alcis.

Further, military campaigns in 2009 ("Khanjar" [June], "Panther's Claw" [July], "Tor Shpa'h" [December]), and Operation Moshtarak—a major offensive in February 2010 involving as many as 14,000 international and national military forces—resulted in further fighting and an increased number of deaths and injuries in rural areas. The response of some was to flee the violence and leave the central irrigated area of Helmand into the former desert area north of the Boghra canal. While without physical and social infrastructure, and facing a growing Taliban presence, the desert was uncontested, and, at least prior to the military surge, NATO forces showed little interest in launching anything but a more limited incursion.

The HFZ was launched in the fall of 2008 alongside some of these military operations and was supported by the significant presence of international and national forces in central Helmand. The HFZ was a three-pronged effort aimed at eliminating opium production primarily within the irrigated area of central Helmand. Designed by two foreign advisers, driven by the then Governor, Gulab Mangal, and supported by the Provincial Reconstruction Team and the United States Government, this initiative combined persuasion (information operations), reward (agricultural inputs, primarily wheat and fertiliser) and coercion (eradication) to try to influence farmers to abandon opium poppy cultivation across much of the central districts of Lashkar Gah, Nad e Ali, Nawa Barakzai, Nahre Seraj, as well as Garmsir, Musa Qala and Kajaki. In 2011, following Operation Moshtarak, the HFZ was extended into Marjah.

Initiated when opium prices were as low as US$60 per kilogram, the lowest since before the Taliban ban in the 1990s, global cereal prices were at a peak, and wheat prices in Afghanistan itself were as much as $1 per kilogram (in contrast to a typical price of around $0.22 per kilogram), the timing could not have been more fortuitous for a campaign aimed at reducing opium poppy cultivation.[13] With this shift in prices, farmers across Afghanistan became increasingly concerned about food security; many opted to cultivate wheat rather than cash crops. In the less fertile areas where opium had little tradition and the population lacked experience and skills, farmers realised that they could produce wheat on their own land rather than using opium profits to purchase wheat. Under these conditions, farmers did not need to be coerced to abandon opium production, although this did not stop the political leadership or counternarcotics community from taking credit for reduced cultivation.[14]

13 David Mansfield and Adam Pain, "Counter Narcotics in Afghanistan: The Failure of Success?" (Kabul: Afghanistan Research and Evaluation Unit Briefing Paper, 2008), p. 14.

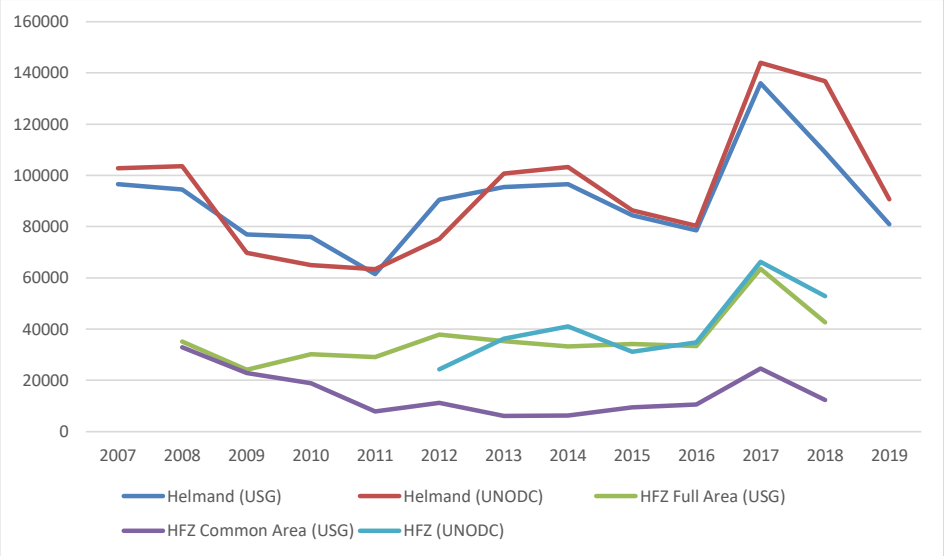
14 David Mansfield and Adam Pain, "Counter Narcotics in Afghanistan: The Failure of Success?" (Kabul: Afghanistan Research and Evaluation Unit Briefing Paper, 2008), p. 14; UNODC/MCN 2008 United Nations Afghanistan Opium Survey (Kabul: UNODC/MCN, 2008), p. 2.

Table 1: Nature and tribal composition of encroachment of land in the research sites north of the Boghra, Helmand (Source: fieldwork)

	Nature of Land Grab	Details of Commander	Tribal Composition
Shen Ghazi	Commander-led - Abdul Khaliq (Alikozai)	**Alikozai** - Hezbe Islami with links to former 93rd Division Commander Moallem Mirwali and Member of Parliament.	**Alikozai (67%),** Noorzai (14%), Barakzai (8%), Ishaqzai (8%), Kharoti (1%), Alizai (1%) (Total 95)
Shna Jama	Commander-led - Abdul Tahir	**Noorzai** - former security commander for Nad e Ali. Killed in car accident in 2010.	**Noorzai (65%),** Ishaqzai (13%), Barakzai (9%), Alikozai (4%), Kharoti (3%), Suleimankhel (3%), Kakar (2%), Baloch (1%), Alizai (1%). (Total 116)
Dashte Loy Manda	Commander-led - Abdul Haq (Barakzai), known as Hajji Amir	**Barakzai -** Hezbe Islami killed in 2008. Father Allaudin was *wakil* of the area. His brother Hajji Malang was Afghan National Police commander in Malang, His other brother Mohamed Haq was in the Afghan National Defense and Security Forces.	**Barakzai (54%),** Noorzai (19%), Ishaqzai (12%), Alikozai (10%), Alizai (4%). (Total 106)
Dashte Ab Pashak	Commander-led - Abdul Qadoos (Barakzai)	**Barakzai -** former Commander of Moallem Wali and Deputy of 93rd Division of Afghan National Army (disarmed in 2004). Brother controlled checkpoints between and Ab Pashak and Gereshk.	**Barakzai (60%),** Noorzai (17%), Ishaqzai (13%), Alikozai (7%), Alizai (4%). (Total 112)
Dashte Koshal Kalay	No single commander. Opportunistic settlement by different tribes; police commanders from checkpoint at Shawal are alleged to have taken bribes from settlers.		Ishaqzai (35%), Noorzai (28%), Baloch (12%), Kakar (7%), Alizai (6%), Barakzai (5%), Alikozai (4%), Taimani (3%), Poplazai (1%), Mangal (1%). (Total 82)
Nawabad e Shawal	No single commander but some initial influence of Hajji Kabir Khan (Noorzai). Opportunistic settlement by different tribes; police commanders from checkpoint at Shawal took bribes from settlers.	Hajji Kabir Jhan (Noorzai) previously from Washir; former head of traffic police in Lashkar Gah, killed in 2008.	Noorzai (36%), Ishaqzai (35%), Barakzai (7%), Alizai (6%), Alikozai (6%), Suleimankhel (4%), Kharoti (3%), Taimani (1%). (Total 102)
Dashte Shin Kalay	No single commander. Settled by *kuchi* in 2003 who claim the land as traditional pasture land.		Ishaqzai (40%), Noorzai (21%), Alizai (7%), Alikozai (7%), Baloch (7%), Kakar (7%), Barakzai (3%), Suleimankhel (3%) Taimani (1%). (Total 98)
Shurawak	No single commander. Initially inhabited by Noorzai from Washir and Nawzad.		Noorzai (43%), Ishaqzai (18%), Barakzai (14%), Alikozai (9%), Baloch (6%), Alizai (5%), Kakar (5%), Suleimankhel (1%). (Total 103)

In Helmand, with increased military presence and a shift in the terms of trade between wheat and poppy, the push for reduced levels of cultivation under the HFZ proved successful. Between 2008 and 2009, the United Nations Office of Drugs and Crime estimated that cultivation in Helmand fell by one-third, from 103,590 hectares to 69,833 hectares, with most of the reduction concentrated in the irrigated areas of central Helmand (see Figure 6). As the US military surge took full effect, and the Afghan authorities gained great control over central Helmand, the boundaries of the HFZ were expanded—and greater amounts of development monies were spent—far beyond what was disbursed under the HFZ. Cultivation fell even further and by 2011 was as low as 69,833 hectares, a figure commensurate with the estimate in 2006, when British military forces were first deployed to Helmand.

Figure 6: Graph showing estimated levels of opium poppy cultivation in Helmand and the HFZ, 2007-2019 (hectares)



HFZ = Helmand food zone, UNODC = United Nations Office of Drugs and Crime, USG = United States Government.

Source: UNODC and USG Crime and Narcotics Centre

The effects of the HFZ, and the push to reduce opium poppy, did not take long to materialise north of the Boghra canal in the former desert areas. While the second wave of migration into the deserts had divided land ownership among key actors and their networks, much of the land had remained unused. This changed in 2007. By pressing for a reduction in cultivation, while at the same time targeting development assistance at those that owned land inside the canal-irrigated areas of Helmand, the HFZ and the wider development effort dispossessed the land-poor, forcing them into the former desert areas in search of a livelihood.

This was a group that had been heavily dependent on opium poppy not only for income, but for land shelter, credit and water. As a particularly labour-intensive crop, requiring as much as 360 person days per hectare compared to 54 persons days per hectare for wheat, the cultivation of opium required landowners to employ farmers as tenants or sharecroppers.[15] Employed under these arrangements, farmers typically received a building to house their family, access to water for their family, and for irrigating the crops, as well as land for cash crops such as opium poppy, and food crops like wheat, but also a kitchen garden for vegetables and fruit. With many landowners turning to wheat as a substitute for opium poppy between 2008 and 2011, those who had sharecropped or rented land within the boundaries of the HFZ found themselves surplus to requirements. No longer able to find land in the canal-irrigated areas of central Helmand, this group had little choice but to move into the former desert areas and cultivate opium poppy and, once there, were

15 David Mansfield, *A State Built on Sand: How Opium Undermined Afghanistan (Oxford: Oxford University Press, 2016) pages 105 and 270.*

Figure 7: Aerial photograph of former desert area north of the Boghra, 2010

encouraged to grow even greater amounts of poppy by more unfavourable land tenure arrangements and the faint prospect that they, too, might be able to buy some desert land if they had a good year. With this new workforce, what had been more isolated farms, some distance apart, were transformed into contiguous agricultural land with ever smaller desert spaces between farms (see Figure 7).

As Figure 4 shows, this third wave of migration accelerated when the land-poor began leaving the HFZ and migrating to the former desert north of the Boghra canal to escape the imposition of the opium ban. Those with sufficient capital borrowed money on their future crop, and purchased land in these former desert areas; however, the majority migrated as sharecroppers and tenant farmers, many of them in 2008 and 2009 when the reductions in opium were at their most dramatic. In effect, the HFZ created a mobile workforce skilled in opium poppy cultivation and in desperate need of land to cultivate. With an economic model that appeared to work and the government unable to prevent land being sold and settled, more land north of the Boghra came under cultivation each year. Over the course of the HFZ, the amount of land north of the Boghra more than doubled from 15,143 hectares in 2008, to 34,904 hectares in 2011, much of it cultivated with opium poppy. Land prices in these former desert areas had almost doubled during this period, rising from the equivalent of $1,250 per hectare to $2,100 per hectare.

However, with more desert land being cultivated with poppy and less rotation with other crops, opium yields began to fall. The area was hit with 4 consecutive years of low productivity between 2012 and 2015, resulting in financial losses, particularly for those farmers renting land. With the drawdown of international military forces from parts of central Helmand, and less pressure on opium production within the boundaries of what had been the HFZ, some tenant and sharecropping households even looked to return to the canal-irrigated areas to find land. Rates of migration to the desert areas north of the Boghra slowed and, as the next section will show, it was only with a shift to new technology—and an improvement in opium yields—that agricultural production became financially viable again, prompting a significant uptick in the amount of land under agriculture north of the Boghra from 48,189 hectares in 2017, to 59,920 hectares in 2018 and 65,953 hectares in 2019.

In sum, what had begun in the late 1990s as just a few isolated farms north of the Boghra, irrigated by water pumps from the canal, became a 10-kilometre deep expanse of almost contiguous agricultural land that runs from Ab Pashak, on the outskirts of the city of Gereshk, almost 60 kilometres down the canal to the northern tip of Marjah. With 45,590 household compounds in 2019, up from 26,032 in 2014, and a population of almost half a million people, this is an area that has come to rival the irrigated areas under the canal. In fact, in the spring when the poppy and wheat is in full growth, it is sometimes difficult to distinguish by eye the former desert areas settled by the government in the latter part of the 20th century, and those settled by the local tribes in the early part of the 21st century (see Figures 8 and 9).

Figure 8: Aerial photograph showing agricultural land to the north (on the left) and south (on the right) of the Boghra canal, central Helmand

Source: Alcis.

Figure 9: Aerial photograph of land to the north and south of the Boghra canal, central Helmand.

Source: Alcis.

3.2. KINGS OF THE WILD FRONTIER: SETTLING THE DESERTS OF BAKWA

In Bakwa, migration and settlement of the former desert land took on a different form than the more linear process seen in Helmand; nevertheless, it is also dominated by indigenous tribes. While in central Helmand, as the desert land became increasingly occupied near to the Boghra canal, farmers were compelled to move further north, deeper into the desert area in search of land to settle and cultivate, the movement into the deserts of Bakwa centred on the 13 original villages irrigated by underground water systems known as *karez* (see Figure 10). Scattered across a wider area, these villages are dominated by the Bahadarzai and Chalakzai tribes of the Noorzai, the original settlers in the area, and who comprise 99 percent of the respondents for this research.

A dry area, with excessive summer heat, Bakwa is located on the road from Delarem in Nimroz to the provincial capital of Farah. Primarily occupied by animal husbandry in the early part of the 20th century, and historically caught in the middle of the conflicts between Kandahar and Herat, agricultural land was limited even in the settled villages until the early 1900s. Once well-supplied with water from approximately 300 *karez*, there were fewer than 60 in working order by the start of the 19th century;[16] by the 1990s, farmers began to move from their original village lands out into the desert, driven by the drought that beset the southwest region during much of the decade, and that was at its most acute between 1998 and 2002.

16 Historical and Political Gazetteer of Afghanistan, Vol. 2, Farah and Southwestern Afghanistan, Edited by Adamec, L., 1973, page 30. https://www.scribd.com/document/243566461/1973-Historical-and-Political-Gazetteer-of-Afghanistan-Vol-2-Farah-and-SW-Afghanistan-s-pdf

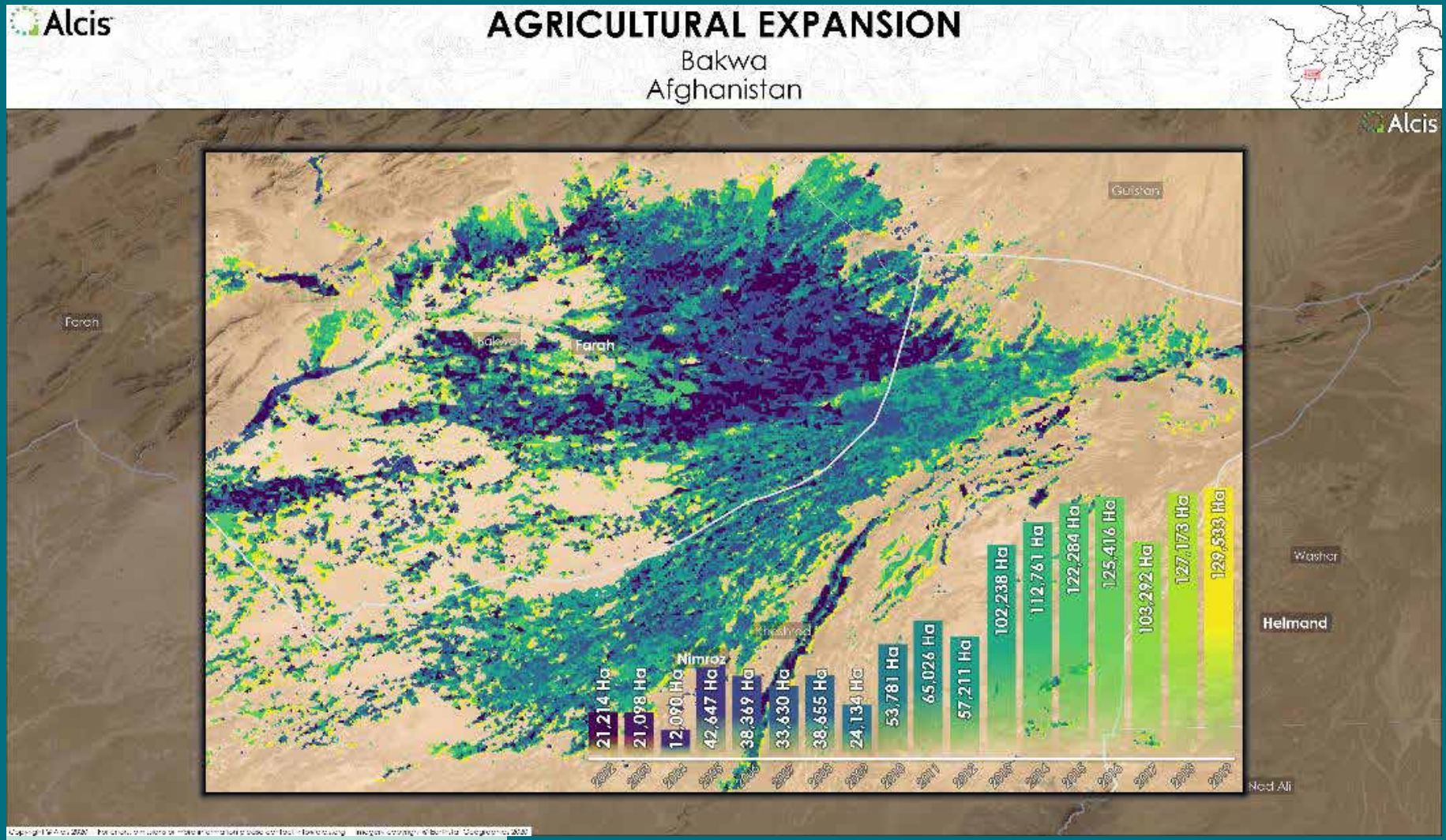


Figure 10: Geospatial analysis of area under agricultural production in Bakwa, 2002-2019

Source: Alcis.

With insufficient water from their *karez*, farmers left their traditional lands and absorbed the surrounding desert lands some distance from the epicentre of their original village. With similar encroachments occurring around each village, settlers were cautious not to stray too far into the desert and encroach upon land that might be claimed by the neighbouring village. Locally, it is said that disputes over desert land between villages were kept to a minimum by the limited amount of land available, and by the ethnic homogeneity of the rural population and their ability to resolve matters within the indigenous Noorzai tribe.

Any newly acquired desert land was distributed among the villagers according to local tradition, with the amount of land allocated to each household determined by the proportion of land they owned in the original *karez*-irrigated village. Under these rules, a household with 1 hectare of land in the original *karez*-irrigated village of 80 hectares of agricultural land would get as much as 14 hectares of the 1,120 hectares of desert land that the village had absorbed. With thousands of hectares of desert land available, and no government able to prevent incursions into what is legally government land, these settlers often received as much as 15 to 20 hectares of land to be divided among their family.

Those who initially settled in this desert space looked to find ways to fund the drilling and establishment of deepwells that would bring their newly acquired land under agricultural production. Some sold parcels of their land to migrants from other parts of the south, including from other districts of Farah, such as Gulistan and Bala Bulok, and Shindand in Herat. Facing both population pressures and a shortage of land in their home villages, some farmers came to Bakwa seeking a better quality of life. These initial land sales helped finance the capital required to bring new land under cultivation, which in turn produced opium that could be then sold, and the money earned reinvested to bring further land under agricultural production. It is claimed that through this process some of the original settlers acquired as many as three or four deepwells, each of which can irrigate up to 4 hectares of agricultural land.

As opposed to the area north of the Boghra canal, land in Bakwa was not commoditised and sold on a large scale (see Figure 11). The vast majority of sales occurred between 2004 and 2010, in the early years of settlement, with the latest reported in 2013.[17] In fact, after an initial flurry of sales to help finance the development of their own land, the original Noorzai settlers looked to retain ownership within the tribe. Instead of selling land, the Noorzai landowners hired tenant farmers and sharecroppers. These individuals offered a cheap and skilled labour force, improved the land through their toil, and in some cases provided the capital investments required to bring the land permanently under cultivation. This labour force has been critical to the transformation of these former desert lands.

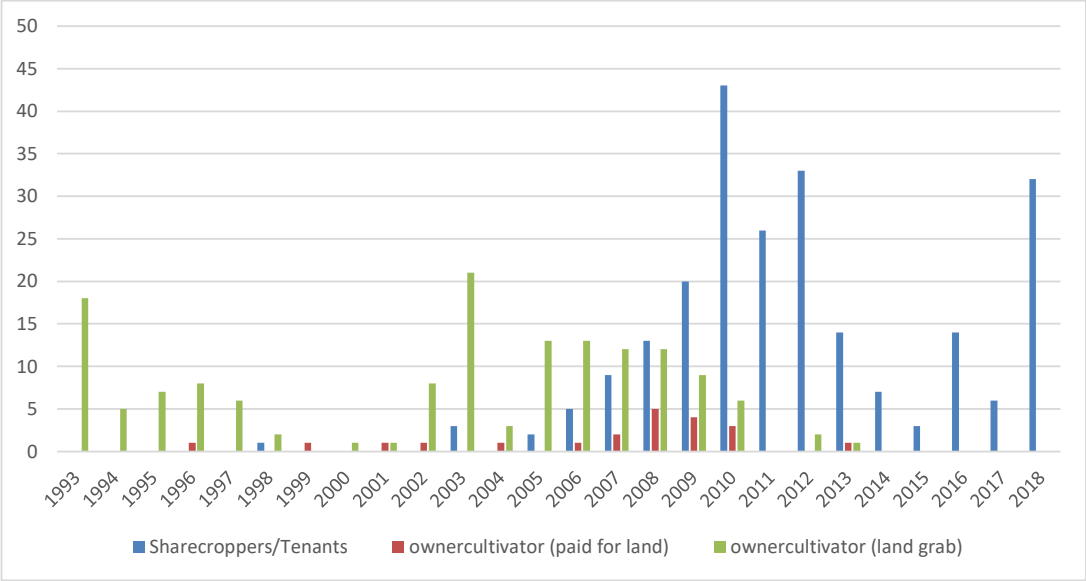
To support this investment and retain land ownership, many of these farmers were recruited under an arrangement known as *lekha*. Described locally as sharecropping, this arrangement is more akin to tenancy, where the farmer is responsible for all recurrent costs, and chooses what crops are grown on the land. In return for his expenses and efforts, the farmer receives 5/6 or 6/7 of the final crop grown, with the landowner getting the residual. The *lekha* is a five-year agreement, where the landowner is only responsible for providing a deepwell and generator at the start of the tenancy. When the tenancy comes to an end, the tenant is required to ensure that the deepwell is still operating. It is an arrangement that is mutually convenient to both sides, with the landowner receiving a fully productive farm at the end of the tenancy that he can then employ a sharecropper for only 1/5 of the final crop.

As in Helmand, all of those that migrated to Bakwa on a temporary basis had pre-existing contacts in the area and the vast majority were from tribes indigenous to the southwest of Afghanistan. All were bound to the area by family or friends. Most of those working as tenant farmers or sharecroppers came to Bakwa because they did not have any land, or sufficient land in their own village. They came to the area looking to escape the conflict in northern Helmand and in other parts of Farah, particularly Gulistan. A sizable population arrived in Bakwa in 2006 and 2007 from the district of Farah, all looking for land in direct response to the imposition of an opium ban in those areas around the provincial centre. A further wave

17 Over this time period, prices varied from the equivalent of US$700 to $3,000 per hectare, a function of location and the quality of land. There was no evidence of land prices increasing over time with the higher prices paid in 2003 and 2004 than in 2013.

came between 2010 and 2013 from central Helmand districts such as Nad e Ali, and Marjah, escaping the impact of the government's opium poppy ban. Only a minority came from more distant provinces such as Ghazni and Wardak, but even these had existing contacts in the area, initially working as skilled labourers building mud brick houses before obtaining land to cultivate opium poppy.

Figure 11: Year of settlement in the desert areas of Bakwa, by land tenure (n400)[18]



Source: Fieldwork

Latterly, there was a shift in the patterns of migration in Bakwa. Since 2016, there was growing evidence of movement between the former desert areas of Bakwa itself, as more farmers took land as sharecroppers or tenant farmers, in what they believed to be more productive lands within the district. Such was the incidence of this internal migration that, in 2018, almost one-fifth of all those interviewed in 2018 reported that they had arrived "this year", with all but one from another part of Bakwa, and all of them Noorzai (see Figure 11).

Prompted by poor opium yields and low prices, these farmers claimed to have moved from land with poor quality soils—stony land known as *shagai*—in areas like Aliabad and Nisoo to other parts of Bakwa where they believed they would obtain better yields. One respondent had come from Delarem in Nimroz, complaining of a lack of work due to an economic downturn that they associated with the fall in opium prices and yields. All of these new settlers were renting land and paying in cash or wheat, or taking land on a sharecropping basis receiving only one-fifth of the yield. None reported taking land under a *lekha* arrangement. In fact, with much of the desert land of Bakwa already under cultivation, it is unlikely that landowners would be offering such an arrangement, but with low opium prices and yields, it is equally unlikely that farmers would be willing to accept it.

In 2019, the amount of agricultural land in Bakwa grew only marginally, by less than 2,000 hectares compared to 2018. Troubled by persistently low opium yields and falling farm gate prices, as well as the consequences of encroaching into lands with poor soils and low productivity, the farming system had been stretched to its limits. With none of the investments that past tenant farmers had brought to the area, persistent complaints of low yields and falling incomes, and evidence of farmers desperately in search of

18 This chart does not include all 513 respondents in Bakwa because some did not offer a year of settlement. These respondents cited that they were "from this village" and "had always lived there," reflecting the local claim that the desert land that surrounded the original *karez-irrigated village had always belonged to them.*

new desert lands due to the failure of the opium crop in their own village, one has to wonder whether further desert encroachments are even likely, and whether the settlement of the desert lands in Bakwa has finally reached its zenith at 25,301 households and a population of around one-quarter of a million.[19]

In conclusion, a comparison of these two desert areas shows clear differences in the patterns of settlement. Tribal homogeneity has clearly aided a more orderly process of migration and settlement of the desert areas surrounding the original villages of Bakwa and the subsequent retention of land ownership by the dominant Noorzai tribe. In contrast, the more fragmented process of settlement of central Helmand under the Afghan government between the 1950s and 1970s, and then by the various warring factions in the latter part of the 19th century, is reflected in the incursions and subsequent sale of desert lands north of the Boghra canal following the fall of the Taliban regime. This was more of a "free for all", with land being captured and gifted by a variety of dominant actors and their clients, before being sold—sometimes more than once—to farmers from Helmand's dominant indigenous tribes.

There are, however, also some commonalities in the factors driving the settlement of these desert spaces. A key common factor was the inability of the Afghan government to prevent the encroachment into these former desert areas and confront local claims of traditional ownership. Government presence in both these former desert areas is, and has always been, minimal at best. It is largely the case that the government has abrogated any responsibilities over what is legally deemed government land to local powerbrokers, such as tribal leaders, politico-military actors, and, to some extent, the insurgency, and concentrated its efforts on extending its writ in what are the more productive irrigated lands. This position has allowed traditional claims over land and patronage to dominate the desert landscape, where, in the case of central Helmand, they had played a negligible role in distributing the former desert lands at the time the Boghra canal was built.

A second common factor shaping migration and the settlement of these desert areas is the resource constraints in these more productive irrigated areas. In both central Helmand and in the original settlements of Bakwa, irrigated land shortages had become acute, particularly with growing population pressure, and, in the case of Bakwa, a dwindling water supply from the *karez*. With land split and then shared among multiple siblings with each generation, parcels became too small to sustain a household that typically contains between eight and 12 members. Acquiring new lands, as well as non-farm income, has often been the only way for successive generations to sustain themselves, hence the migration to cities like Kabul, and the push into the former desert areas of the southwest.

Perhaps the most obvious common factor driving migration and settlement into these former desert areas is illicit opium production. Were it not for the relatively high price of opium following the Taliban ban in 2000, and the economic returns on the crop, the high cost of agricultural production in these desert areas would not have been financially viable, and much of the land would probably have remained fallow. The downturn in opium prices and yields in both desert areas, and their impact on migration patterns, as well as shifts in the amount of land under agriculture, is testament to the importance of a buoyant opium economy in the settlement of these areas.

19 The estimate of the number of household compounds is based on analysis of high-resolution imagery. The population size is based on household data collected for this research and an average household size of ten people.

It should also be recognised that efforts to control opium production, such as the HFZ, also spurred on migration and settlement of these former desert areas. Attempts to limit cultivation, such as the Taliban prohibition in 2000-01, but also subsequent bans imposed by the Afghan government at the behest of its foreign donors, inflated farm gate prices and improved the financial viability of bringing desert land under agricultural production. However, poorly considered interventions also created the conditions for further migration into the former desert areas. The HFZ was particularly problematic in replacing a labour-intensive crop like opium poppy with a low-input crop such as wheat, without any consideration of the existing land tenure arrangements, or putting in place mitigating actions to absorb those who found themselves unable to find land in the canal command area. In doing so, it created a mobile, cheap and relatively skilled labour force in search of new lands where they could grow poppy.

The final common factor shaping migration and settlement of these former desert areas is the availability of new technology. Technology, and innovation, particularly with regard to access to groundwater, has proven critical to the settlement, and ultimately the transformation, of these desert lands. The next section will chart how farmers have adapted to these changing conditions using the availability of new technology to maintain the financial viability of opium production and their farming systems, even when confronted by falling yields and prices.

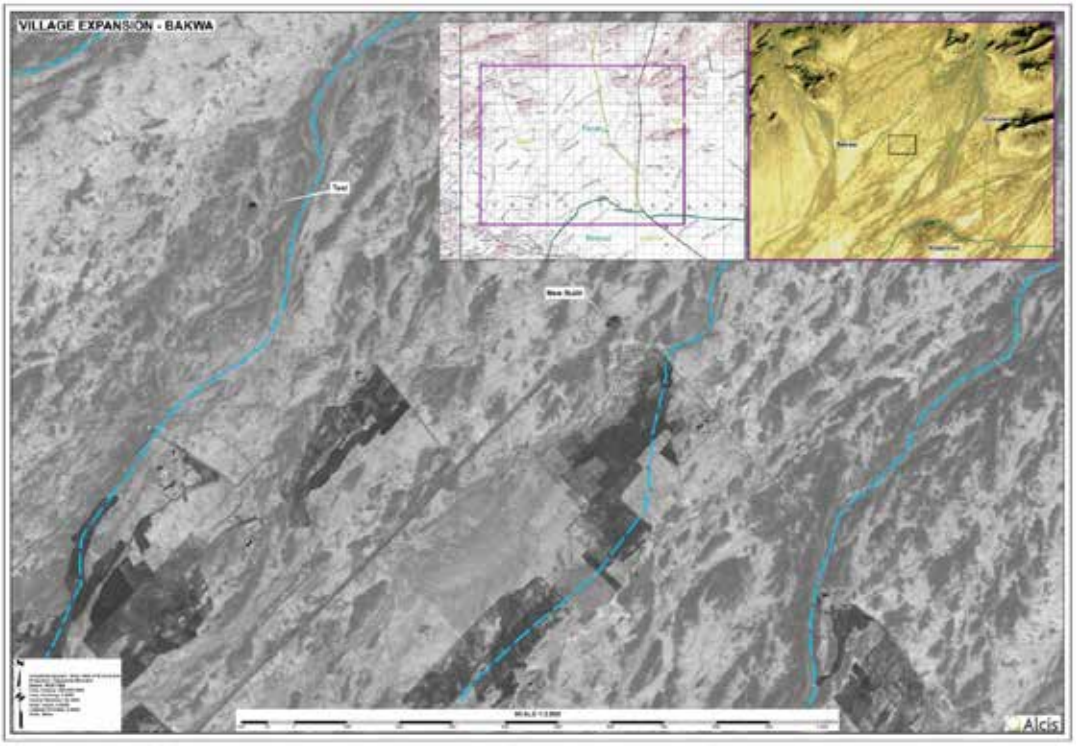
4. TRANSFORMATION: TECHNOLOGY, INNOVATION AND MARKET DEVELOPMENT

While encroachment and settlement of the desert lands north of the Boghra and in Bakwa have often differed, the transformation of these lands has followed a similar path. Central to this has been the role of technology and its adaptation to the changing economic and environmental conditions, and, in particular reductions, in the net returns on opium. This next section charts the role technology played in bringing the former desert lands north of the Boghra and in Bakwa under agriculture, how farmers have innovated in response to the availability of new technology and changing conditions, and the wider impact this has had on the economy of these areas.

4.1. THE ROLE OF TECHNOLOGY IN ACCESSING, AND REDUCING THE COST OF, WATER EXTRACTION

The move to the desert was not easy, especially for the those who settled on lands that had not been farmed before. For the first settlers who either captured or bought what was described as "hard land", it was back-breaking work; they had to remove the stones that littered the area, level the land so that it was suitable for agricultural production, apply animal manure and fertiliser[20] and sink a deepwell so that they could bring water to the land, themselves and what little livestock they had. They lived in tents until they built a house, after which they sent word back to their villages and brought their families (see Figures 12 and 13).

Figure 12: Imagery showing how farmers initially settled desert land, Bakwa.



Source: Alcis.

20 Respondents reported incurring considerable costs during their initial 2 years of settlement. On top of the costs of bringing land under cultivation, which were particularly high due to the cost of sinking a well and the rates of fertiliser application (more than twice that of the canal command area), they also had to build a household compound. These could cost the equivalent of US$600 for a simple room that they built themselves, to more than $7,000 for a multi-roomed compound with a boundary wall.

Figure 13: Aerial photograph of desert area north of the Boghra, after land has been cleared and prepared for cultivation.

Critical to settlement was the sinking of a well. While some of the initial settlers sank shallow wells, known as *bawre*, these ran dry. It was access to deepwell technology, known locally as a *barma*, that led to the dramatic expansion of the former desert lands (See Figure 14). Locally, it is claimed that there was a growing awareness of deepwell technology in the early 1990s, largely due to the efforts of NGOs to provide potable water. With the onset of drought in the late 1990s, as both shallow wells and *karez* in the south became increasingly dry, farmers turned to deepwells as a way of improving their access to irrigation. Low-cost water pumps and generators produced in Pakistan and subsequently in China also made deepwell technology more affordable.

In central Helmand and Bakwa, it was claimed that the equipment needed to drill the wells commercially was first brought into Pakistan by local traders who saw the market potential. Indeed, many of those who drilled deepwells in Helmand learned their trade in Balochistan in the early part of the 21st century. When they returned to Afghanistan, they offered their services to the population in former desert areas both south and north of the Nahre Boghra. As time passed and a growing number of people saw the money that could be made from drilling wells—particularly between 2006 and 2011—there was a proliferation of the number of businessmen entering this market and yards were established for those drilling wells in both Lashkar Gah and Bolan.

Figure 14: Aerial photograph of barma being used to sink deepwell north of the Boghra

While deepwells allowed farmers to access a ready supply of water, they did so at a high price. Sinking a deepwell of up to 90 metres north of the Boghra and 130 metres in Bakwa, along with pipes, a generator and a water pump cost around US$2,000 (see Table 2). What became of greater concern was the high recurrent costs associated with this diesel-powered system (see Figure 15). Adulterated diesel meant that generators ($420) and water pumps ($650) would break after only 1 year, lasting a maximum of 2, adding to the costs of agricultural production. Oil and the filter for the generator need changing every 2 weeks, at a cost of $25, and diesel prices could fluctuate by as much as 100 percent, increasing up to $1.40 per litre in March 2015. With as many as 400 litres required to irrigate one hectare of opium poppy, recurrent costs soon mounted—and were doing so at a time when opium yields were particularly low, and in their fourth consecutive year of failing.

Table 2: Cost of installation of a diesel and solar powered deepwell

	Diesel-powered system		Solar-powered System	
Item	Number of Units	Total (US$)	Number of Units	Total (US$)
Dig well (meters)	100	550	100	550
Water Pump	1	650	1	700
Plastic Pipes (meters)	30	550	30	550
Generator	1	420	0	0
Transformer	0	0	1	220
Solar Panels (300 Amp)	0	0	36	3,960
Electric Wire (bundle)	0	0	2	60
Frame	0	0	5	250
Installation	0	0	1	60
Reservoir (tractor hours)	0	0	40	240
Total		2,170		6,690

Figure 15: Aerial photograph of household compound with diesel powered deepwell, north of the Boghra

In 2014, farmers in Bakwa and Helmand began to innovate again, this time experimenting with solar technology for the pumping of groundwater.[21] The tell-tale sign was the building of reservoirs (see Figures 16 and 17). Often up to 1,200 square metres in size, and 1 to 2 metres deep, an ever-increasing number of reservoirs became visible each year. This, however, does not reveal the full extent of the number of solar deepwells. Those with smaller landholdings, however, are less inclined to build a reservoir and lose land that they could otherwise cultivate with crops. These farmers pump water directly on to their land rather than store it in a reservoir before use, making it more difficult to identify the exact number of solar deepwells using remote sensing imagery.

Figure 16: Aerial photograph of household compound with reservoir used for storing water after it has been pumped from the ground

21 The first example the author came across was in 2013 in Badurzai, in Spin Boldkak, Kandahar province. This farmer reported paying the equivalent of US$12,200 to install a solar deepwell, complaining that the recurrent costs on his diesel deepwell had been $1,757 per year for maintenance and diesel.

Figure 17: Ground photograph of household compound with reservoir and solar panels, north of the Boghra canal

However, even with this incomplete picture, the rise in the use of solar technology has been dramatic and what began as just a few isolated examples, soon became common practice. In fact, respondents in Bakwa offer a vivid example of the uptake in solar technology. Whereas in 2013, all of those interviewed in Bakwa fuelled their deepwells with diesel and none used solar power, by 2017, 68 percent were using solar, and 98 percent of respondents had solar tubewells in 2018. In the desert areas north of the Boghra, the uptake of solar was not as rapid, increasing from none of those interviewed in 2013, just two isolated cases in 2015, to 33 percent of those interviewed in both 2017 and 2018.

High-resolution satellite imagery also showed a shift to solar technology in the desert areas. For example, in Shna Jama in the area north of the Boghra, the number of reservoirs increased from only one in 2013 and 2014 to 248 in 2019, with the most dramatic growth taking place between 2015 and 2016 (see Figure 18).

In fact, geospatial analysis reveals just how widespread solar deepwells have become across the southwest, beyond the desert areas north of the Boghra and Bakwa (see Figure 19). This shows that by 2018, as many as 50,360 water reservoirs could be identified in the provinces of Farah, Helmand, Kandahar and Nimroz, up from 8,927 in 2015, and only 182 in 2014. By 2019 there were as many as as 67,000 water reservoirs, suggesting further increases in the number of solar deepwells. With water reservoirs only revealing a part of the picture, it is clear that solar deepwell uptake is even higher (see Figure 19).

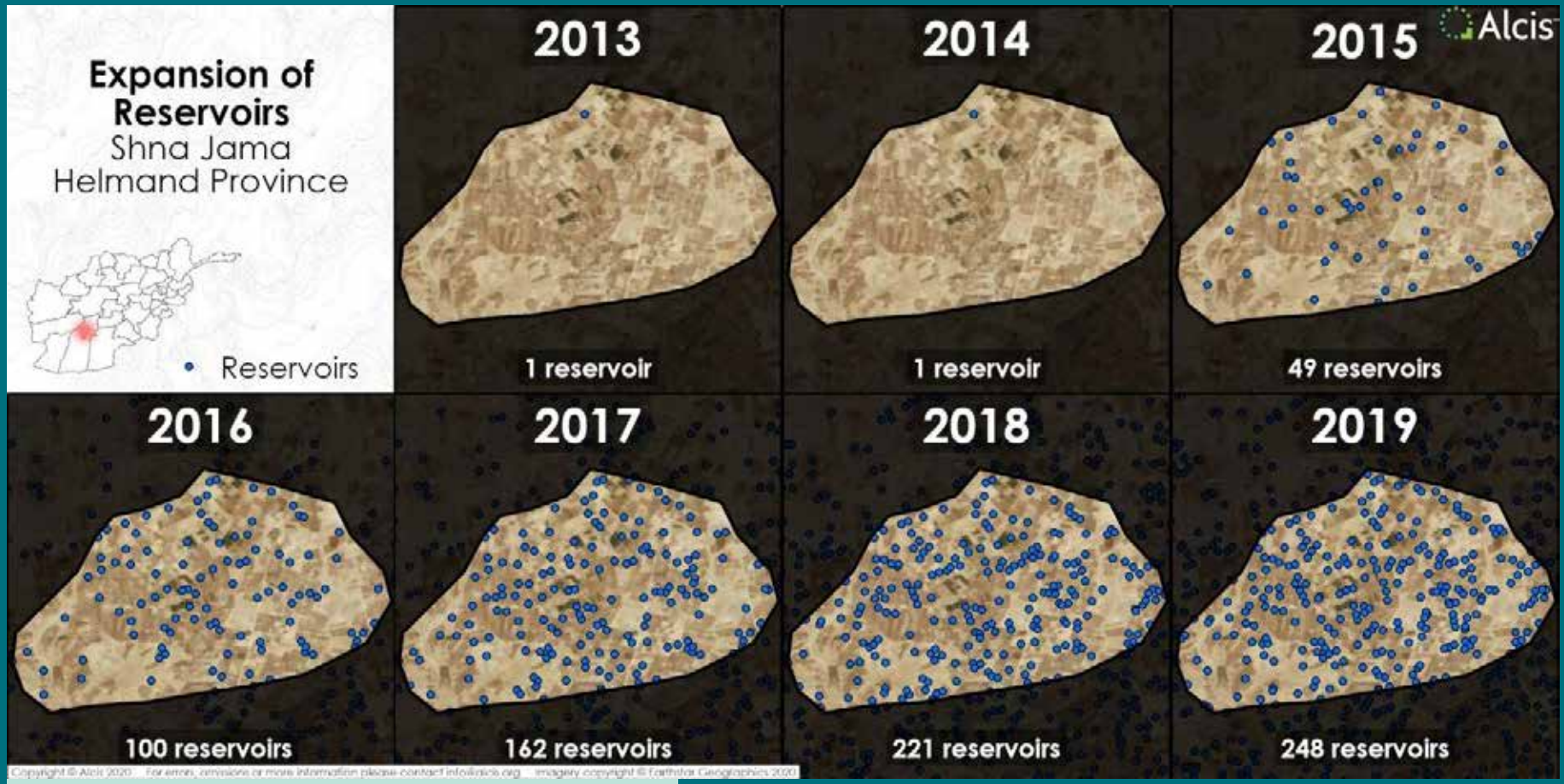


Figure 18: Geospatial analysis of the number of reservoirs used for solar powered deepwells in Shna Jama, north of the Boghra, Helmand 2013-2019

Source: Alcis.

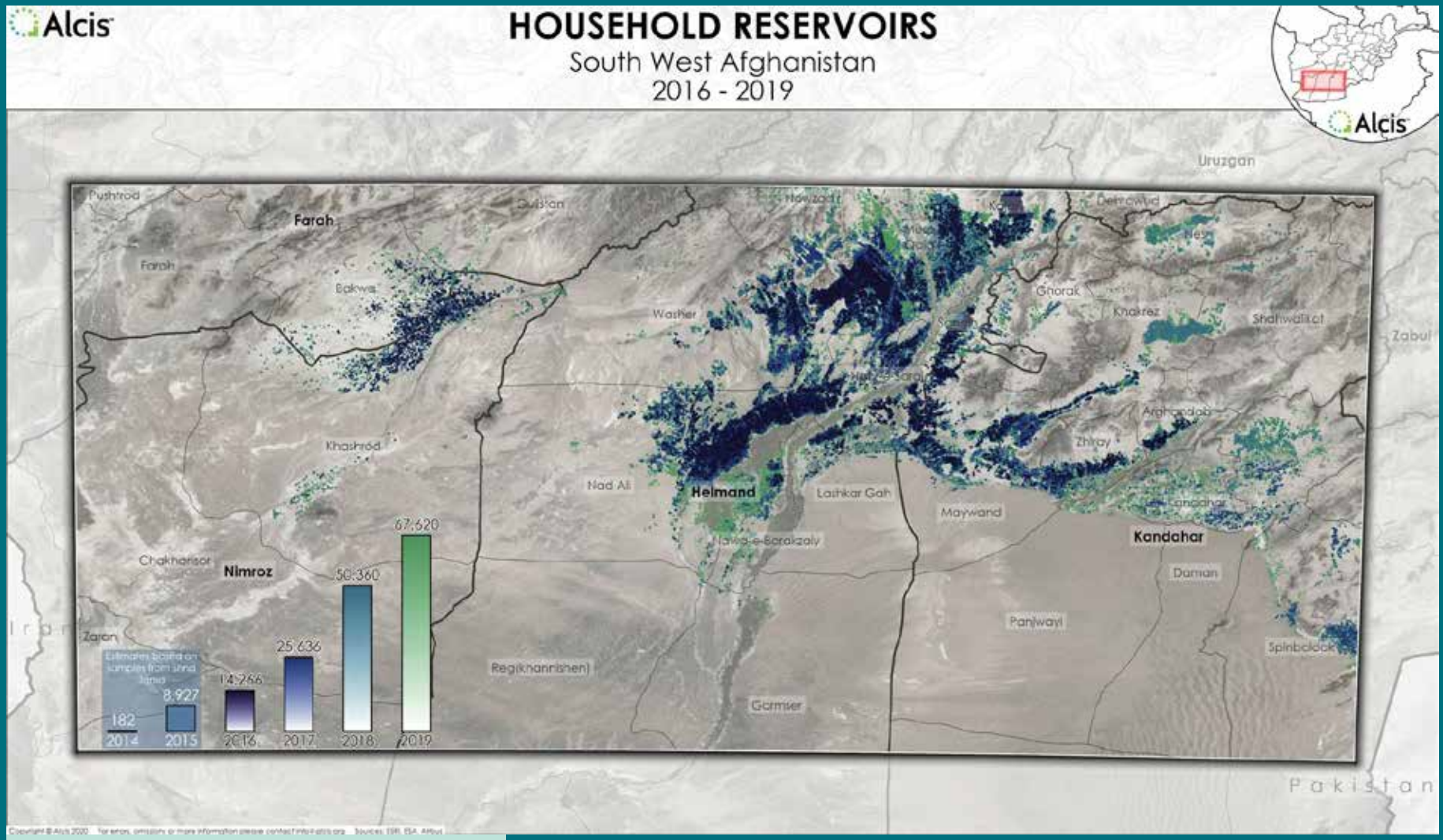


Figure 19: Geospatial analysis of the number of reservoirs used for solar deepwells in the southwest, 2013-2019

Further, innovation in solar power was also seen in 2016 and 2017, with the objective of increasing the amount of water that could be pumped. For example, when solar was first introduced, farmers used as many as 60 of the smaller 150 Amp (1.5 metre) panels to power their deepwells. By 2017, there were signs of much larger panels in use, typically 300 Amp (2.5 metre). Thirty of these panels generate more power and allow a greater amount of water to be pumped, an advantage given the falling water table.

Farmers have also looked to other ways to increase the power they could generate. One innovation was to mount the panels in metal frames, with some on brackets so that they could be rotated to maximise the exposure to the sun over the course of the day. Another example is the combination of solar and diesel to allow groundwater to be pumped constantly, with solar used in the daylight hours and diesel at night. However, more recent improvements in technology have also led to integrated systems, including the ability to store solar power in batteries, making solar a more attractive and reliable energy source than ever before. The result is, after an initial outlay of around $5,000 to $7,000 (depending on depth and the number of panels), solar technology can be used with very few recurrent costs (see Table 2).

In part, this rapid uptake of solar was due to the availability of improved Chinese technology, leading to the price of panels falling by more than half between 2013 and 2017.[22] There was also a proliferation of outlets selling solar systems to what were the more remote parts of Afghanistan (see Figure 20). While, in 2013, farmers in Helmand and Bakwa had to travel to Kandahar city to purchase solar technology, by 2017 traders were "selling them in the village," with experienced engineers available for installation. Alongside the availability of this new technology, changes in opium yields and prices have also influenced the uptake of solar power. The initial shift to solar was aided by the rise in opium prices in 2014, increasing from the equivalent of $75 per kilogram in 2014 to up to $190 per kilogram a year later, but also, as indicated above, motivated by rising recurrent costs and low opium yields, and the need for financial viability in what is a high-cost farming system.

4.2. INNOVATING TO KEEP LABOUR COSTS TO A MINIMUM

A further measure to improve the financial viability of opium production in the former desert spaces of the southwest—in particular, to reduce labour costs—has been the application of herbicides. This is not specific to the former desert areas as herbicides are also widely used on opium poppy in the canal command area; however, there has been a much wider uptake in these areas where landholdings are typically larger than they are in the canal-irrigated areas, and where there has been a much larger incidence of monocropping of opium poppy, particularly between 2012 and 2014 (see Figure 21).

Widespread cultivation of opium presents a challenge given its labour intensity and the relatively high rural wage labour rates in Afghanistan, particularly for weeding and harvesting opium poppy. Sharecropping has been one way of reducing the labour costs associated with opium production for those that own land. A further way of reducing labour costs to both those that own land and those that work the land of others has been the use of herbicides during the weeding season. By 2013, herbicides were used by 65 percent of farmers in the former desert areas, as well as by a growing percentage of those growing poppy in the canal command area, many of whom had first begun to use them in 2011 and 2012. By 2017, all of those farming opium poppy in the former desert areas north of both the Boghra and in Bakwa reported using herbicides on their crop.

The dissemination of knowledge about the efficacy of herbicides followed a similar path to that of deepwell technology. The main protagonists were a growing number of businessmen in the provincial bazaars of Gereshk, Lashkar Gah, and Delarem who had imported herbicides from Iran, Pakistan and China over the last decade. Initially, herbicides were largely applied to wheat, as farmers sought to better manage weeds through the use of non-selective products such as 2,4D and Paraquat that kill a wide range of crops, and therefore required any crop that farmers wanted to retain to be protected by some kind of cover, such as the lid of the bottle of herbicide.

22 This is based on a price of 8,000 Afs for a 150 Amp solar panel in Bakwa in 2013, compared with 7,500 Afs for a 300 Amp solar panel in May 2017.

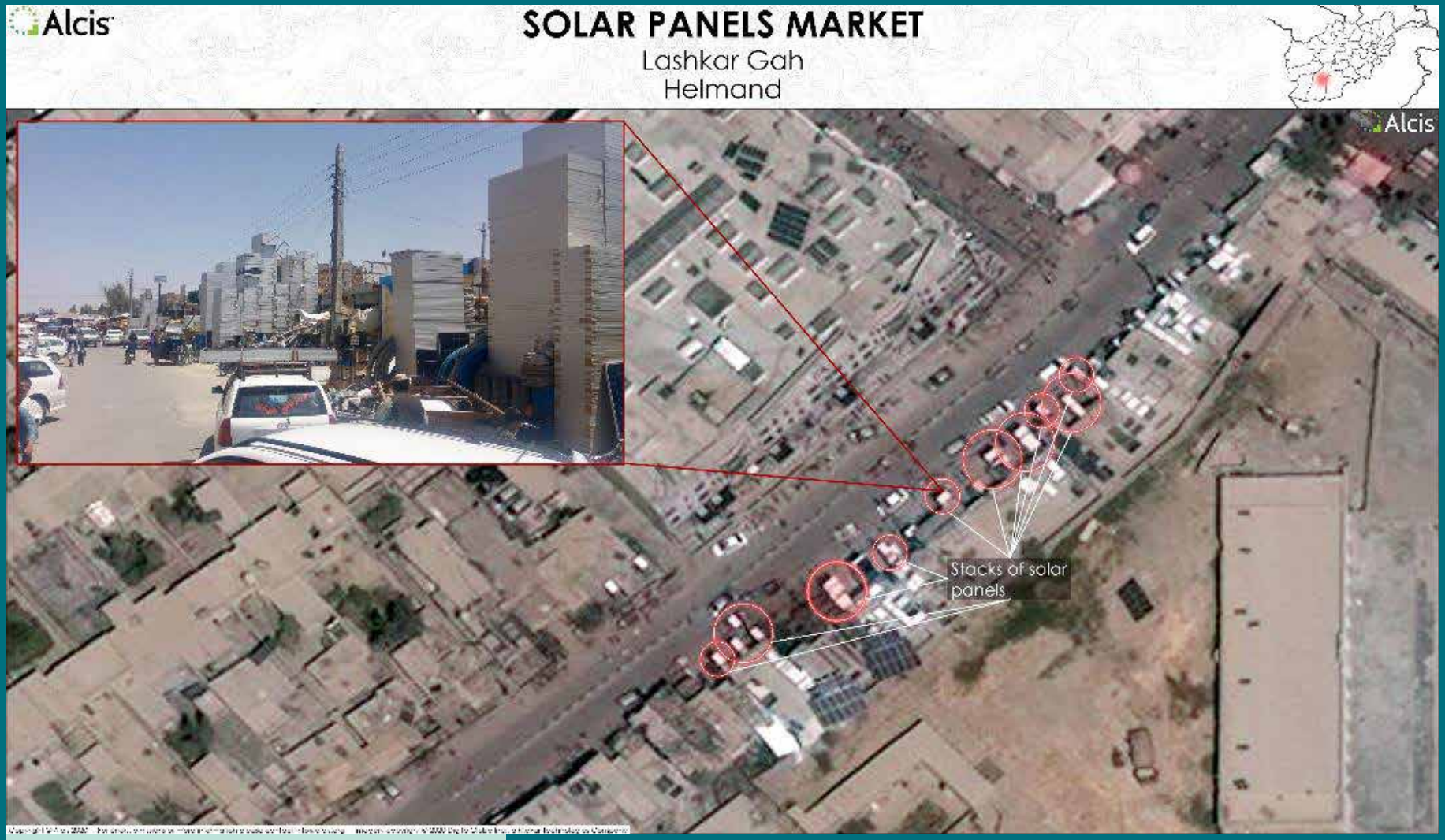


Figure 20: Imagery and ground photos showing solar panels on sale in Lashkar Gah, Helmand

Source: Alcis.

Figure 21: Geospatial analysis of the different crops cultivated in the former desert areas of Shna Jama, north of the Boghra, Helmand, 2008-2018

Source: Alcis.

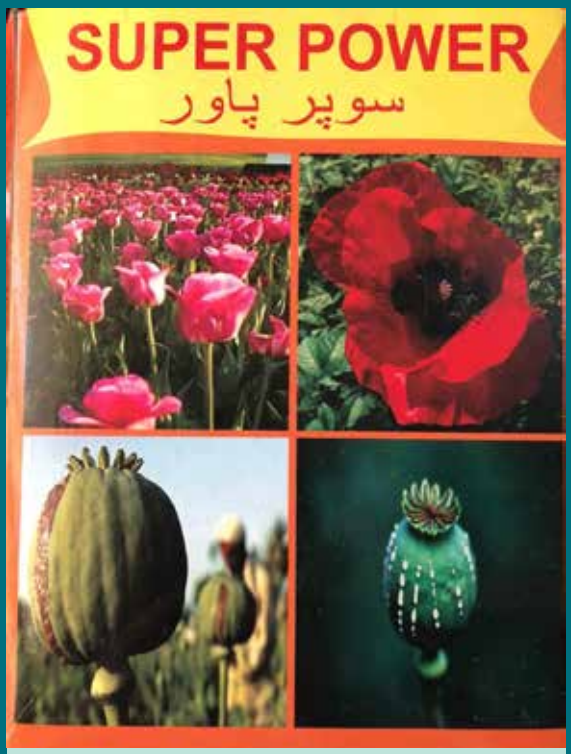


Figure 22: Photograph of pesticide sold in Lashkar Gah, Helmand, used for treating diseases on opium poppy

Figure 23: Photograph of pesticide sold in Lashkar Gah, Helmand, used for treating diseases on opium poppy

These herbicides came to be known as *pata dawar*—literally "covered medicine".

As a further example of experimentation and innovation, these non-selective herbicides were replaced by selective ones over time. Selective herbicides included products like Topik that do not kill a broad-leafed crop like opium poppy and therefore do not require farmers to cover the plants they want to keep. These products, known collectively as *loosah dawar* (literally "uncovered medicine") typically came from China and greatly reduced the preparation time required for weeding. Some were made under the name of specific Afghan trading companies such as Durukhshan Agricultural Social Association, Farahi Trading and Sahrai Limited Kandahar.

In 2016, pesticides were also introduced in Helmand and Bakwa. Many of these products were tailored to the local environment and sold with labels in Dari and Pashto. Some were named to appeal to local consumers, such as "Gandam Kush" (wheat killer), "Cruise" (as in Cruise Missile) and "Zanmargai" (suicide bomber). A number also include images of opium poppy on the label and specifically referred to the disease or insects that the pesticide would treat (see Figure 22 and 23). In fact, such was the proliferation of pesticides and herbicides that farmers reported that, "each year a new chemical arrives on the market."

Farmers believed that herbicides were an effective part of plant husbandry for opium, reducing the need for hired labour and the demands on family labour during the spring. In the past, opium typically required weeding on three separate occasions, and drew heavily on both family and hired labour, the latter at a cost of up to $4 per day. With herbicides, the crop only required treating once before being thinned and the fields cleared of any dead plants. This significantly reduced the burden on the family—one farmer reported that his children were happy to be freed from the task of weeding—and the cost of hired labour which could reach as much as $400. Farmers viewed pesticides with much more scepticism. Many doubted the efficacy of the products and their appropriateness to poppy, but argued that, in light of consecutive years of poor opium yields, they, "would spray anything that said it would make the capsules bigger."

Table 3: Herbicides used on opium in desert areas north of Boghra and in Bakwa

Brand	Chemicals	Manufacturer	Country of Manufacture
Paraquat	1,1 Dimethyl -1-4,4 bipyridinedium dichloride	Sahrai	China
Paraquat	1,1 Dimethyl -1-4,4 bipyridinedium dichloride	Behavar	Iran
Power Puma	Fenoxaprop-p-ethyl	Farahi	China
Topic	Clodinafop propargyl	Syngenta	China
Tapek	Clodinafop propargyl	Durukhshan Agricultural Social Association	China
Pujin	Fenoxaprop-p-ethyl	Target	Pakistan
Gramoxone	1,1 Dimethyl -1-4,4 bipyridinedium dichloride	Syngenta	China
Diclofop methyl	2,4 Dichlorophenoxy penoxy propionic acid	Agroxir	China
U 46 Combi Fluid 6	2,4 Dichlorophenoxy penoxy propionic acid	Sahrai	China

4.3. MARKET DEVELOPMENT

Access to improved agricultural practices, such as deepwell technology, solar power and herbicides in these former desert areas is indicative of the transformation that has taken place in these once remote parts of Afghanistan. What were once products that were not easily available to those living north of the Boghra, or in Bakwa in 2012 and 2013 could be bought locally in 2017. In the past, farmers from these areas would have to travel to the provincial centres of Kandahar, Lashkar Gah or Farah; any local markets were only temporary markets, known as *mela*, where only a few items might be sold. In 2019, all of these goods can not only be purchased in district bazaars near to the desert areas, such as in Delarem, Nad e Ali, but also in the growing number of permanent markets that have been established in the former desert areas.

Nawabad Shawal was one of the first markets to develop north of the Boghra, but this was always somewhat of an anomaly, as it straddled the canal but stretched into the former desert area and thereby had customers from both the canal-irrigated and the deepwell-irrigated parts of central Helmand. Over time, as the area north of the Boghra prospered and grew, so did the bazaar. Other bazaars were also established much deeper into the former desert areas, including Kazam and Tariyak bazaars in Nad e Ali (see Figures 24 and 25). Where there was once only desert land, bazaars of 80 to 100 shops were established, many selling goods and services that farmers had previously had to travel to Lashkar Gah to obtain.

The same could be seen in Bakwa. While the district centre—Sultani Bakwa, located along the main highway to the provincial capital of Farah—was abandoned by the government in 2015 and subsequently fell into disrepair (Figure 26), other markets were established in the surrounding desert areas. One bazaar, Abdul Wadood, located to the east of the research site of Gurz in Bakwa, expanded exponentially from June 2018 until March 2019, driven by the concentration of methamphetamine labs in the area and the bazaar's function as a wholesale market for ephedra that was produced in the central highlands (see Figure 27).[23]

23 David Mansfield, Alex Soderholm and the Organization for Sustainable Development and Research, https://blogs.lse.ac.uk/usappblog/2019/09/30/long-read-the-unknown-unknowns-of-afghanistans-new-wave-of-methamphetamine-production/

Figure 24: Imagery showing the growth in Kazam bazaar, Nad e Ali, 2008-2018

Source: Alcis.

Figure 25: Imagery showing the growth in Tariyak bazaar, Nad e Ali, 2008-2018

Source: Alcis.

Figure 26: Imagery of Sultani Bawkwa, 2010-2017
Source: Alcis.

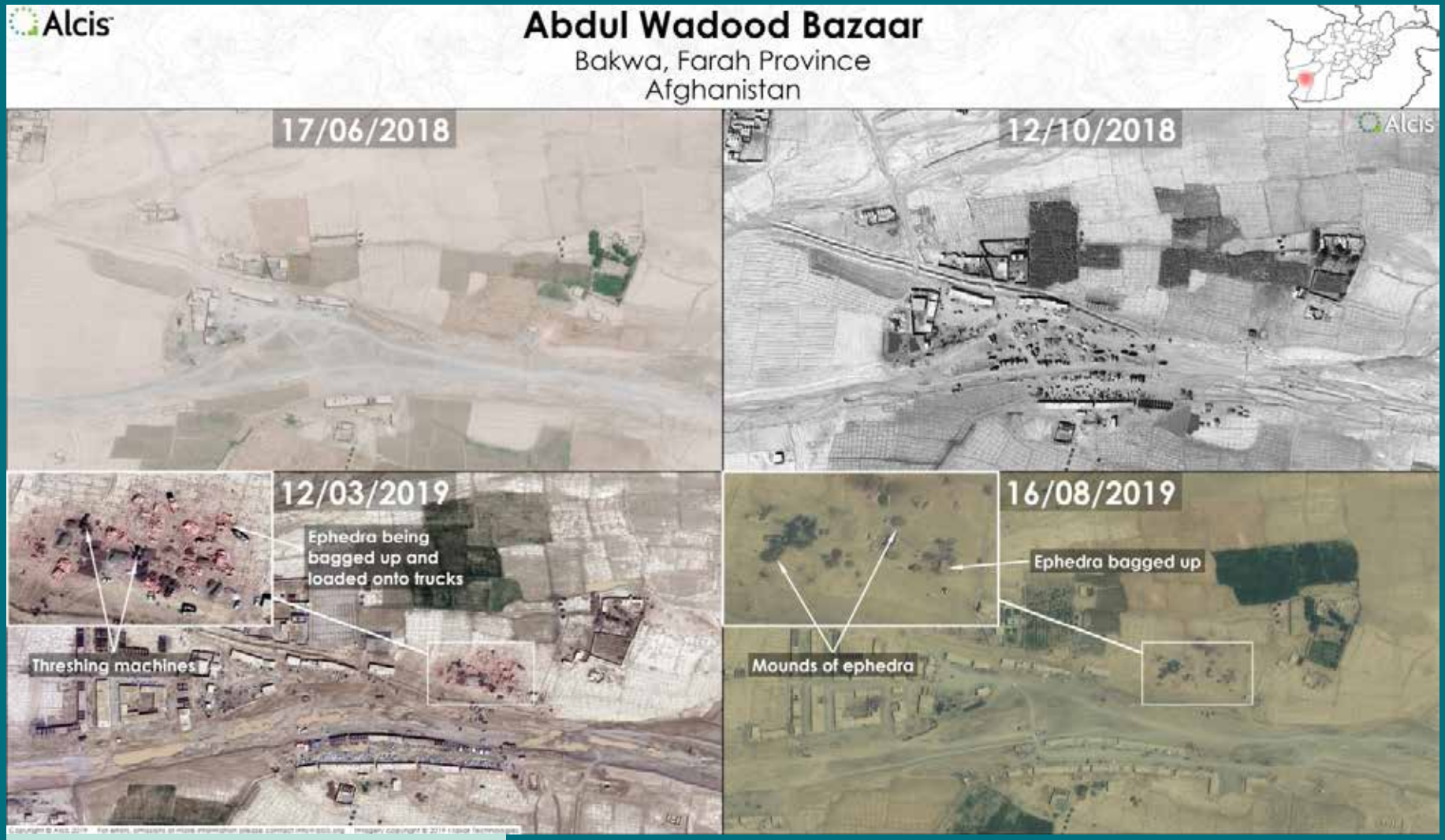


Figure 27: Imagery showing the growth of Abdul Wadood bazaar, Bawka, 2018-2019.

Source: Alcis.

The development of these permanent markets in these desert spaces, as well as the availability of new products, like solar panels, herbicides—even the chemical inputs for heroin and methamphetamine production—tell us much about these areas.

First, it is apparent that these former desert areas are well integrated into the national economy and global markets. The local bazaars have a wide array of consumer goods from across the country and the region. What is more, the local population uses solar technology from China, agrochemicals from Pakistan, Iran and China, and knowledge from a range of different countries to produce an increasing array of illegal drugs that are sold on the global market. As such, it is hard to view these desert areas as remote and distant from development processes just because the central and provincial government is absent, delivering neither services nor physical security.

Second, claims that it is simply drug traffickers that are behind the establishment of bazaars or the dissemination of new technologies would appear to be ignorant of the agency of local communities and their members. Evidence suggests that these former desert areas are in fact dynamic and vibrant places, where both the farming population and local traders are responsive to new technologies, products and market opportunities, including illegal drugs new to Afghanistan. The local population was exposed to improved farming practices in neighbouring countries during the 1990s; further, its ongoing migration since 2001 prompted a dramatic increase in the availability of new products and agricultural technologies in Afghanistan. The farming population in particular seems adept at experimentation, constantly looking for ways to counter the environmental and economic challenges they face, and to better manage the financial viability of an agricultural system that to date has been highly dependent on opium production.

Third, the settlement and transformation of these former desert areas is not as disordered as many might assume. The initial encroachment into desert areas by those claiming traditional rights was followed by land improvements and sales, with disputes resolved by community elders and, as needed, the Taliban. Similarly, the development of permanent markets in these areas has been shaped by those same understandings of land rights and ownership. Most of these markets sit astride multiple landholdings, each with different landowners, and have required collective decision making and the mediation of respected elders and Taliban commanders where agreement could not be reached. Bargains have had to be reached that accommodate the interests of all the parties involved to avoid conflict and violence, which, to date, seems to have been achieved. Local rules and understandings, including those regarding mutual and collective benefits, have had to be adhered to despite the absence of formal government systems.

There are, however, questions over how sustainable are the lives and livelihoods of those in these former desert areas. Although settlement and growth has not been completely unfettered, can these communities continue on this trajectory without socio-economic, political, and ecological repercussions? Surely there is point where there simply is no room for any more settlers, or perhaps a situation where the resources available in these former desert areas can no longer support the existing population, even with the technologies that they have made good use of. The next section will examine the potential threats to the livelihoods of those in these former desert areas and the wider implications.

5. UNSUSTAINABLE DEVELOPMENT? THE THREAT TO LIVELIHOODS IN THE FORMER DESERT

5.1. POISONED WATERS: FALLING AND CONTAMINATED WATER AND ITS LONG-TERM EFFECTS

Perhaps the biggest threat to the livelihoods of the 1.4 million or more people in these former desert areas is the water table. Currently, little is known about the aquifer north of the Boghra and in Bakwa, or, indeed, whether they draw on the same underground water supply.

Attempts to measure the water table systematically proved difficult due to the prevailing security situation and the suspicions such an initiative might provoke. While local knowledge about the aquifer and its recharge is limited, farmers do have some insights about the water table due to the regular maintenance done on their deepwells, in particular replacing their pumps and pipes. There was consensus of a notable change in the water table since the increase in the uptake of solar technology. For example, while farmers reported that the water table was falling from one-half to one metre per year when diesel was the primary method for pumping ground water, they report that the water table fell by as much as two to three metres per year in 2018. There was little doubt that the fall in the water table was a direct function of the significant uptick in the number of farmers using solar technology and prompted concerns that the water would run out.

There is a local perception that that with solar power “water is free,” and there are few incentives to avoid wasteful practices. The reservoirs associated with solar deepwells are as large as 1,200 square metres. They are not lined and water losses are high due to seepage (albeit back into the water table) and evaporation. Farmers often run their solar deepwells continually through the day to fill their reservoirs. As noted, some farmers even supplement their solar deepwells by running a diesel pump during the night, further increasing the amount of water extracted. Concerns were such that in 2018 it was reported that the Taliban imposed a ban on running diesel pumps at night in the area north of the Boghra. This attempt at regulation is indicative of a broader concern about the dramatic uptake of solar deepwells; as a farmer in Bakwa put it, “the solar will finish the water and our lives here.”

According to farmers, the water table north of the Boghra in 2018 was between 25 and 30 metres, down from 10 to 15 metres in 2010. In Bakwa, the water table is around 40 to 60 metres and falling dramatically. In fact, some farmers complained of having to drill new wells because theirs had run dry. Currently the incidence of wells running dry appears to be infrequent, but there is a need for a much more systematic review if there is to be a proper assessment of the risk across these former desert areas.

Aside from the falling water table, there is also evidence that the groundwater in these desert areas is contaminated. For example, chemical testing of the groundwater in the area north of the Boghra indicated nitrate levels exceeding the World Health Organization's recommended rate of 50 milligrams per litre, with some tests documenting more than 100 milligrams, greatly increasing the risk of "blue baby syndrome".[24] This condition known as methemoglobinemia is closely associated with the use of agricultural fertilisers and can lead to death if untreated. Other contaminants included fluoride, sulphate and chromium; further, the biological content was not pure in almost all samples, meaning the groundwater required disinfecting before drinking.

The groundwater was not as contaminated in Bakwa. Nitrate levels were above recommended levels but only just, reflecting reports of better soils than north of the Boghra and the lower use of chemical fertilisers.

Further, environmental risks and the possible contamination of groundwater lie with the extensive use of herbicides in the cultivation of opium poppy in the former desert areas. Fieldwork indicates that farmers use a wide range of herbicides and pesticides on their opium poppy crop, some of which are repackaged, making the chemical components and their associated toxicity hard to identify. Many of the non-selective herbicides—and some of the most toxic—initially used on opium poppy, such as paraquat,[25] have largely been largely replaced by selective herbicides, which, nonetheless, can still be harmful to human health (see Table 4).

Applied in the early spring when four leaves of the opium poppy plant are visible, a stage known as *chargulak*, herbicides are sprayed using a backpack known locally as a "bomba".[26] The standard measure for most of the fertilisers used is around 2.5 litres per hectare. Efforts are made to reduce exposure and inhalation by covering the face with a cloth or their *patoo*; however, face masks and gloves, even when provided, are rarely worn. Farmers have a negligible understanding of the health risks associated with these agrochemicals, resulting in exposure to both adults and children during preparation and application (See Figure 28). The long-term consequences of this exposure are likely to be deleterious to the health of those using these herbicides and their families, particularly given the population's high morbidity rates.

24 Medical News Today, "What is Blue Baby Syndrome?" https://www.medicalnewstoday.com/articles/321955.php

25 David Mansfield, "From Bad They Made It Worse: The Concentration Of Opium Poppy in Areas of Conflict in the Provinces of Helmand and Nangarhar," (Kabul: Afghanistan Research and Evaluation Unit, 2014), p. 64 https://areu.org.af/publication/1411/

26 These are made in either Korea or China and cost 3,000 Afs and 1,200 Afs, respectively.

Table 4: Herbicides and corresponding health issues[27]

Product Name	Chemicals	Health Issues							
		Respiratory Tract Irritant	Skin Irritant	Skins sensitiser	Eye Irritant	Carcinogen	Reproduction/ Development effects	Neurotoxicant	General Human Health
Paraquat/ Gramoxone	1,1 Dimethyl -1-4,4 bipyridinedium dichloride	Yes	Yes	No data	Yes	Possible	Possible	No	Potential liver, kidney, stomach, intestine, and respiratory system toxicant
Power Puma/ Pujin	Fenoxaprop-p-ethyl	Yes	Yes	No data	Yes	No data	Possible	No data	Possible liver and kidney toxicant
Topic/ Tapek	Clodinafop propargyl	No	Yes	Yes	Yes	Yes	Possible	Possible	Possible ovaries, prostate and blood toxicant
Diclofop methyl/ U46 Combi Fluid 6	2,4 Dichlorophenoxy penoxy propionic acid	Yes	No	Yes	No	Possible	Possible	No	Kidney and liver toxicant, may cause broncho- pneumonia or pulmonary oedema. According to the US Environmental Protection Agency, probable human carcinogen

27 Based on the University of Hertfordshire's Pesticide Properties database. https://sitem.herts.ac.uk/aeru/ppdb/en/atoz.htm#M

Figure 28: Ground photograph of farmer spraying his opium crop with herbicides while his son looks on, north of the Boghra, Helmand

5.2. FROM BOOM TO BUST: THE FAILURE OF THE OPIUM CROP

The opium crop has sustained the population in these former desert areas. It is the premium price associated with its illegality, particularly following the Taliban's prohibition when prices rose to as much as US$500 per kilogram, that made the encroachment and settlement of the former desert areas a viable financial proposition in the first place. Had the Taliban not banned the opium crop in 2000-01 growing season and opium prices remained at between $30 to $60 per kilogram as they were in the 1990s, the desert would probably have remained barren.

However, with the ban, and then successive efforts to prohibit the crop, the price of opium rose and stayed relatively high until the autumn of 2008. By then, the desert lands had already been encroached and parcelled up by key power brokers and tribal groups as described above. Since then, there have been several years where farmers have experienced low yields, and more recently dramatic falls in the opium price, most notably the harvest period of 2018 when prices fell to as low as $45 per kilogram. In Bakwa, the combination of low yields and low prices has been devastating, resulting in losses to many farmers in the former desert areas.

Tables 5 and 6 below highlight the scale of the losses that some farmers experienced in the 2018-19 growing season when yields were as low as 22.5 kg per hectare, and sometimes even lower. Both tables show net returns on opium and how these were distributed by land tenure system and according to whether the land was irrigated by a solar or diesel deepwell. These tables indicate that, after the initial outlay, those using solar power could improve their net returns on opium poppy, with a farmer who uses only family labour earning $450 per hectare when drawing water using solar, compared to only $55 per hectare using diesel. Similarly, landowners employing sharecroppers were able to reduce the scale of their losses through the use of solar, compared to diesel.

Clearly, delaying the sale of opium and waiting for prices to rise some months after the harvest season would increase net returns, perhaps by as much as two- or three-fold for better quality opium. However, delayed sales are rarely an option for sharecroppers who tend to sell immediately after harvest. They would have to contend with a net income of $670 for a family of ten. This would possibly be enough to feed a family the most basic of foods over the course of the year, if combined with the produce from their own fields and the household garden, but it would be insufficient to address an illness in the family—more probable given the poor quality and limited variety of food consumed—or meet social obligations, such as weddings or funerals.

The calculations in Tables 5 and 6 also show the points at which poppy cultivation becomes financially unviable even for those farmers who own land and use solar power. For example, were prices as low as $45 per kilogram, as they were during the harvest period in April/May 2018, a yield of 15.21 kilograms per hectare (the equivalent of which would produce 0.67 man per jerib) would allow a farmer with a solar deepwell to break even, whereas a farmer using diesel would lose almost $500 per hectare. These kinds of yields are not as unusual as might be thought. For example, in 2015, yields north of the Boghra were as low as one to two *charak* of opium[28] per *jerib*, the equivalent of 5.6 to 11.2 kilograms per hectare.

However, a return to a yield that was more typical in the former desert areas prior to 2012, of 67.5 kilograms (the equivalent of 3 man per *jerib*) farmers, would produce a net return of $3,324 per hectare using family labour, and $1,610 for a farmer using hired labour during the harvest period. These are net returns that are commensurate with the consumption of what farmers would consider "good food"—that is, meat and fruit a few times a week, and being able to look after the health problems that so often afflict household members in these areas—but are not at such levels that farmers could save, buy land or purchase healthcare for a family member with a serious illness. Even a rise in the price of opium to the equivalent of $100 per kilogram with yields of only 22.5 kilogram per hectare (the equivalent of 1 man per *jerib*) would provide a farmer using hired labour with a net return of little more than $90 per hectare, compared to $1,143 to a landowner exclusively using family labour.

A rise in both yield and price, however, would produce net returns of $5,305 for a farmer using household labour and $3,128 for a farmer using hired labour. Even at these higher returns, the net income per household member per day is only $1.45 and $0.86, respectively, suggesting a farmer would need to grow more than 2 hectares of opium to earn more than the $1.90 per day, widely recognised as the level of extreme poverty.

What these tables show is how vulnerable farmers are to shifts in both the price of opium and yields, and how important strategies for reducing labour and water costs are to the financial viability of agricultural production in these former desert areas. There is a particular challenge for farmers in these areas in that, for every good year, there are far more bad years when either yields or price, or both, are low. Indeed, in 2018, most respondents in Bakwa and north of the Boghra who had a history of farming in these desert areas, talked of the last good year having been at least 4 or 5 years ago.

There is a further problem in that the options for reducing the costs of opium production are limited. At this stage, it is difficult to see what further technological inputs might reduce costs and increase productivity. At the same time, the risks of further environmental degradation, including a falling water table, salination and water contamination, increase each year—dramatically so with the further uptake of solar power. Opium yields are already suffering from depleted soils, a failure to rotate, insects and disease, and the likelihood of further reductions in production is high.

It has become increasingly difficult to see how the situation in these former desert areas is going to do anything but deteriorate further, with the result being a growing number of people having to leave. This may not happen all at once. It may start with population groups most affected by an inability to sustain themselves—most notably sharecroppers, tenant farmers and those with particularly poor soils—but it may well come to a point where the water table in these former desert areas is so depleted that all those farming in these areas are compelled to leave. The question is, where do these people go and what effect might they have on the areas they relocate to?

28 *A charak is a unit of weight and in southern Afghanistan is the equivalent of 1.125 kg. There are four charak in one man.*

Table 5: Returns on opium poppy on land irrigated by a diesel deepwell, Bakwa, 2017-18 (US$/ hectare) Source: Fieldwork

A: Capital	Amount	Units	Cost (PR)	Total (PR)	Afs	US$
Sink well	100	Metres	550	55,000	26,950	550
Water Pump	1	Unit	65,000	65,000	31,850	650
Generator	1	Unit	42,000	42,000	20,580	420
Pipes	1	3”-5”	55,000	55,000	26,950	550
				0	0	0
A: Total Start-up Costs			162,550	217,000	106,330	2,170
B: Inputs	**Amount**	**Units**	**Cost (PR)**	**Total (PR)**	**Afs**	**USD**
Seed	20	Kg	111	2,220	1,087.8	22.2
Farmpower	10	Hours	2,500	25,000	12,250	250
Manure	5	“Trailer”	35,000	175,000	85,750	1750
Herbicide	2.5	Litre	2,000	5,000	2,450	50
Pesticide	2.5	Litre	2,800	7,000	3,430	70
Diesel	400	Litre	88	35,200	17,248	352
Oil and Filter	12	Units	4,000	48,000	23,520	480
Fertiliser (DAP)	10	Bag (50kg)	4,800	48,000	23,520	480
Fertiliser (Urea)	10	Bag (50kg)	2,200	22,000	10,780	220
Hired Labour	0.25	Opium yield	30,000	7,500	3,675	75
Food for labourers	140	Person days	250	35,000	17,150	350
B (i) Subtotal: Ag inputs (hired labour)				409,920	200,860.8	4,099.2
B: (ii) Subtotal: Ag inputs (family labour)				312,420	153,085.8	3,124.2
C: Capital depletion						
Water Pump	0.5		65,000	32,500	15,925	325
Generator	0.5		42,000	21,000	10,290	210
Pipes	0.5		55,000	27,500	13,475	275
Total costs				81,000	39,690	810
Per jerib				4,050	1,984.5	40.5

D: Outputs						
Opium	5	Man (4.5 kg)	30,000	150,000	73,500	1,500
Straw	1825	Days	100	182,500	89,425	1,825
Seed	35	Seer (7 kg)	66	2,310	1,131.9	23.1
Subtotal: Gross returns				**33,4810**	164,056.9	**3,348.1**
E: Post harvest payments to institutions						
Mullah	5%		150,000	7,500	3,675	75
Taliban	2.5%		150,000	3,750	1,837.5	37.5
Taliban tax on solar	1		1,500	1,500	855	15
Subtotal: post-harvest payments				**12,750**	6,247.5	**127.5**
NET RETURNS: NO HIRED LABOUR						
Net returns to owner cultivator - Family Labour				**5,590**	**2,739.1**	**55.9**
NET RETURNS: HIRED LABOUR						
Net returns to Owner cultivator- hired labour during harvest				**-91,910**	**-45,035.9**	**-919.1**
Net returns to Sharecropper (1/5) and no costs				**66,962**	**32,811.38**	**669.62**
Net returns to Landowner (4/5) and pays all costs				**-158,872**	**-77,847.3**	**-1,588.72**
Net returns to Sharecropper (6/7) all costs				**-134,733**	**-66,019.4**	**-1,347.33**
Net returns to Landowner (1/7) no costs except capital				**42,823.4**	**20,983.47**	**428.234**

Table 6: Returns on opium poppy on land irrigated by a solar powered deepwell, Bakwa, 2017/2016 (US$/hectare) Source: Fieldwork

A: Capital	Amount	Units	Cost (PR)	Total (PR)	Afs	USD
Sink well	100	Metres	650	65,000	37,050	650
Water Pump	1	Units	70,000	70,000	39,900	700
Pipes	1	Units	55,000	55,000	31,350	550
Transformer	1	Units	22,000	22,000	12,540	220
Solar Panels	36	Units	11,000	396,000	225,720	3,960
Electric Wire	2	Bundle	3,000	6,000	3,420	60
Frame	5	Units	5,000	25,000	14,250	250
Installation	1	Technician	6,000	6,000	3,420	60
Reservoir	40	Hours	600	24,000	13,680	240
A: Total Start up Costs			**173,250**	**669,000**	**381,330**	**6,690**
B: Inputs	**Amount**	**Units**	**Cost (PR)**	**Total (PR)**	**Afs**	**USD**
Seed	20	Kg	111	2,220	1,265.4	22.2
Farmpower	10	Hours	2,500	25,000	14,250	250
Manure	5	"Trailer"	35,000	175,000	99,750	1,750
Herbicide	2.5	Litre	2,000	5,000	2,850	50
Pesticide	2.5	Litre	2,800	7,000	3,430	70
Fertiliser (DAP)	10	Bag (50kg)	4,800	48,000	27,360	480
Fertiliser (Urea)	10	Bag (50kg)	2,200	22,000	12,540	220
Hired Labour	0.25	Opium yield	150,000	37,500	21,375	375
Food for labourers	140	Person days	300	42,000	23,940	420
B (i) Subtotal: Ag inputs (hired labour)				**363,720**	**207,320.4**	**3,637.2**
B: (ii) Subtotal: Ag inputs (family labour)				**277,220**	**158,015.4**	**2,772.2**
C: Capital depletion						
Pipes	0.5		55,000	27,500	15,675	275
Total costs				27,500	15,675	275
Per jerib				**1,375**	**783.75**	**13.75**
D: Outputs						
Opium	5	Man (4.5 kg)	30,000	150,000	85,500	1,500

Straw	1,825	Days	100	182,500	104,025	1,825
Seed	35	Seer (7 kgs)	66	2,310	1,316.7	23.1
Subtotal: Gross returns				**334,810**	**190,841.7**	**3348.1**
E: Post-harvest payments to institutions						
Mullah	5%		150,000	7,500	4,275	75
Taliban on opium	2.5%		150,000	3,750	2,137.5	37.5
Taliban tax on solar			5,000	5,000	2,850	50
Subtotal: post-harvest payments				**11,250**	**6,412.5**	**112.5**
NET RETURNS: NO HIRED LABOUR						
Net returns to owner cultivator - Family Labour				**44,965**	**25,630.05**	**449.65**
NET RETURNS: HIRED LABOUR						
Net returns to Owner cultivator- hired labour during harvest				**-41,535**	**-23,675**	**-415.35**
Net returns to Sharecropper (1/5) and no costs				**66,962**	**38,168.34**	**669.62**
Net returns to Landowner (4/5) and pays all costs				**-108,497**	**-61,843.3**	**-1,084.97**
Net returns to Sharecropper (6/7) all costs				**-87,033.4**	**-49,609**	**-870.334**
Net returns to Landowner (1/7) no costs except capital				**45,498.4**	**25,934.09**	**454.984**

5.3. THE PEASANTS ARE HUNGRY: THE THREAT OF A HOSTILE AND MOBILE POPULATION

While the rapid uptake of new technologies, such as solar power and pesticides, reduce the recurrent costs of opium production, they also impact on the long-term viability of agricultural production in these areas and the health of those that farm there. The probability of a large number of people being displaced from these former desert areas in the next few years is high.

The most likely to leave the former desert areas first are those that work as tenant farmers or sharecroppers.[29] Some displacement of this population group occurred in 2015, although it was short-lived, largely as a consequence of the uptake in solar power and the recovery of opium yields north of the Boghra. At that time, yields had been low for four consecutive years and those sharecropping land could not meet their basic needs. Some left the area and relocated to the canal command area to places like Malgir, Shin Kalay, Loy Bagh, Marjah 2A and Zarghun Kalay. Others looked for land in their own villages where their extended family still resided.[30]

Many knew that their prospects of finding land in the canal command area were not good and considered the longer-term consequences of an increasing number of the land-poor from the former desert areas looking for land, and the likelihood that they might have to leave the country.[31] As one respondent in Dashte Ab Pashak commented: "I will move from this area back to the lower part. Other sharecroppers will also go. If every year our crop is the same as this year, we should migrate from this country."[32]

With 54 percent of respondents for this research either tenants or sharecroppers, and an estimated population of 1.4 million in the deserts of the southwest, a first tranche of migrants could be the equivalent of 761,400 people displaced and in search of land and/or work. As in 2015, it would not be easy for the main irrigated areas of the southwest, such as the canal command area of Helmand, to absorb these people, particularly without recourse to more widespread opium production, which would at least increase the demands for sharecroppers due to the labour- intensive nature of the crop. Absent land in the main irrigated areas, there is a strong possibility that some of these people would need to move onto the cities of Lashkar Gah, Gereshk, Kandahar, and Iran in search of work. The implications are of further crowding of urban areas, competition for services and resources and deteriorating living standards.

The second tranche of migrants are those that own land in these former desert areas: based on this sample, a population of around 648,600. These are the most likely to persevere in the former desert areas, hoping for the one good year that can subsidise the all too frequent bad years. This is a group that argues that they have nowhere else to go; they are embedded and have no desire to leave. To deal with any short-term crisis, this group will sell whatever possessions they might have, perhaps marry their daughters, or send family members elsewhere in search of land[33] or work, hoping that the money they received will forestall the need to move.[34] However, too many bad years and not enough good, and there comes a time when their possessions will be all gone and they have little choice but to move.

29 "Most people with no land will leave." (Dashte Ab Pashak #4); "If the same situation continues, no one will stay in the desert, as without poppy there is no opportunity in life" (Shna Jama #6).

30 "I will go back to Group 6 if I can find land." (Shna Jama#2); "Some people will move to the Watan, as there is no benefit in poppy here. In summer, I will go to my village." (Dashte Ab Pashak #10).

31 "I have plans to move from the area. I will go to the *watan*. I will search to find land. In summer, I will search for daily wage labour and land in the lower part." (Shna Jama #4); "My crop was very poor. I am not sure if I stay or I go, as I don't know where to go. If I find land in the lower part, I will never come back to the *dasht*." (Shna Jama #8).

32 Dashte Ab Pashak #2.

33 For example, in the spring of 2018, a farmer in Acheko Karez in Bakwa said that he had sent his brother to harvest the opium crop in Badghis in northern Afghanistan. He claimed that there were a growing number of farmers from Bakwa in the area leasing land to grow poppy.

34 "This year I married my daughter for 1,000,000 PR, but I have not yet received the Walwar. No one is happy from the government in this area as all the people lost money from poppy this year." (Dashte Ab Pashak #14).

Although slightly fewer in number, the landed in these former desert areas are more recalcitrant than those that sharecrop; they have much more to lose. They are also the most opposed to the Afghan government and, were it to reach a situation where the landed were compelled to move, there would be a risk of outright hostility to the government. After all, many of these farmers had left areas like central Helmand to come to the desert, fleeing conflict,[35] eradication[36] or having lost access to land due to the poppy ban imposed under the Helmand Food Zone.

When the opium poppy crop fails, these farmers still blame the Afghan government and its western backers. In fact, the government is seen as a direct threat to the livelihoods of those in these desert areas because they associate it with efforts to ban poppy.[37] Moreover, rumours of the opium crop being sprayed persist each time the crop fails, and it is a common view that the Afghan government is willing to give in to foreign interests and destroy the crop, rather than prioritise the welfare of the rural population.[38] As one farmer exclaimed: "The government accepts the order of the *kafir*. If the *kafir* says anything, the government accepts it. [The government] have sold the country to the *kafir*."[39] Many other comments were far more profane.[40]

The same kind of comments surface among this group during interdiction efforts. For example, the aerial bombing campaign of heroin labs launched in November 2017 provoked an outcry with many questioning the efficacy and purpose of this effort. The fall in opium prices—more a function of over production and the collapse of the Iranian rial under US sanctions—was directly attributed to this campaign and those in the deserts of Bakwa and north of the Boghra objected in some of the strongest terms.[41] It is hard to imagine how this group would settle were it compelled to leave the former desert areas due to a failing crop and worsening water table, if there were not economic alternatives in place.

35 One of the farmers interviewed arrived in the fall of 2014, leaving Trek Nawa to escape the fighting. He had taken 10 *jeribs* of land under *lekha*, an agreement where the tenant pays all the costs of production in return for a payment to the landlord of 1/6 of the final crop. He was one of the few respondents to monocrop opium, dedicating all 10 *jeribs* of land to poppy. He received a total yield of only 4 man of opium (Shna Jama #8).

36 Dashte Ab Pashak #8; Dashte Ab Pashak #10; Shna Jama #11.

37 "I am opposite with the government as they cannot improve my life, they just destroy my life." (Ghaziabad #3); "Who is the governor? From where is he? For the last year, I didn't go out of my village and he did not come here." (Takht #12); "We are just thinking of our family and our future life. We are not thinking about the government. Who are they and what do they do?" (Dashtak #9); "I have no interest in the government. The government is so weak. They are not able to bring justice to this area." (Spinkay #14); "I don't know which *dowus is governor here and who is in the government. We have two very important things here: one is poppy and the other is the Taliban." (Kamalan #13); "If the government comes here the people will fight them. They will not allow the government to destroy the crop." (Acheko Karez #7); "When we accept the government, we lose the poppy. This is difficult." (Dashtak #14).*

38 "I f*** the mother of this government. They are not a government, they are just slaves of the Americans. Because of this government our life is too hard and difficult." (Dashte Ab Pashak #5); "He is just by the name of governor. All decisions are made by the foreigner; he doesn't have any authority." (Shna Jama #2); "Allah will destroy the house of the government people because of them we have low yields." (Kalamada #5).

39 Shna Jama #5.

40 "I f*** the mother of this government. They are not a government they are just slaves of the Americans. Because of this government our life is too hard and difficult." (Dashte Ab Pashak #5); "Most of the sharecroppers lost everything this year. I f*** the mother of this government. The cause of poverty is this government!" (Dashte Ab Pashak #11); "First, I will f*** the wife of the governor then of the Waliswal." (Dashte Ab Pashak #13); "Our poverty is from this dowus governor and government. They created this problem." (Shna Jama #8).

41 "This is the government of the *kafir*. By the name of factory, they destroy the houses of the people." (Dasht e Shurawak #2); "I f**k the wife of the factory. Each day a lot of people in Helmand are killed and the government never asks who they are, they just look for the factory." (Dasht e Shin Kalay #8); "The foreigners bomb the factory in Musa Qala and Nawzad. It has no effect on me. I f**k their mother! If they are strong, they will capture the district and bring security to the people, but all the districts are in the control of the Taliban." (Dasht e Shin Kalay #3); "F*** the mother of the government! They start the bombing (of the factories) with no benefit. Allah will move the foreigners from the country. All these problems are created by them." (Shna Jama #7); "The US destroyed only two factories in Musa Qala; it has no effect on poppy. There is more poppy this year than last year and next year I will cultivate again. With this operation, we are most opposite with the government as they destroy the houses of the people." (Shna Jama #1).

Although not independent of landowners and sharecroppers, one group that would be pleased to leave the former desert areas are the women of the household. They have found life particularly hard in the desert. One of the most challenging aspects has been the restriction of their movements in the more atomised communities in the desert, separated from their extended families in the main irrigated areas. In the desert, a visit to the local bazaar is rare; calling on neighbours who were not family or possibly not even from the same tribe is unlikely as is travel to the canal-irrigated area to visit close family and relatives.

Some women even complained of not being able to attend the funerals of close family members,[42] including fathers,[43] due to limited communication, travel restrictions and insufficient spare time. The sense of isolation was such that some women referred to the restrictions on their mobility as "being in a prison."[44] Others talked of isolation, loneliness,[45] of having, "an individual life but no social life."[46] There were women who talked of, "too much sadness,"[47] of their own depression,[48]and that of others.[49] There were even reports of suicide.[50]

In the desert, women also found themselves exposed to an increased work burden and an absence of health and education facilities. The work effort was seen as a notable increase compared to their previous lives in the canal command area. Most of this work was related to looking after livestock, collecting firewood, but also weeding opium poppy and preparing the food for the labourers employed during the poppy harvest. Some women did not work on the land when they lived in the canal command area of Helmand and as such found the move to the desert area quite a shock: "[In the *dasht*], we work in the farm, in the *watan* [irrigated area], we do not work."[51]

The absence of clinics or hospitals in the desert areas meant there was little in the way of treatment for any health conditions without recourse to travelling to Gereshk or Lashkar Gah, with all the challenges that these journeys represented. One woman described her move to the desert: "When we arrived in the desert, I was under a lot of pressure. Life is never easy there. If you become sick, you stay at home, there is nothing for that."[52] Another talked of how, "life is not good. We don't have access to anyone. We can't go to the doctor."[53]

For women, life in the main irrigated areas of Helmand was much more preferable. Once there, they could travel to visit family and friends and even go shopping in Lashkar Gah; they could escape the intense desert heat of the summer months, and, even though the vast majority of the women had no land and rented properties in the environs of Lashkar Gah during the summer months, they were happy back in the canal command area.[54] As one woman, originally from Garmsir, but having had resided in the former desert areas for 7 years, explained: "now we are in the *watan*—everything is available here."[55] These women enjoyed their temporary release, conscious of the fact that they would return to the desert in the fall and that "because of our poverty, we accept all the problems of the *dasht*."[56]

42 F#34

43 F#1

44 F#1

45 "We were most alone there." F#4

46 F#3

47 F#47

48 F#10

49 "There is more depression among the people." #6; "I know there are some women in the desert who have depression." F#26

50 There was a report of a suicide in the former deserts of Nad Ali. It was claimed that a woman there had eaten opium in order to end her life.

51 F#1

52 F#13

53 F#27

54 "When we returned, we are happy here. We have access to a clinic, the children have access to schools. Here we can find good food for the family." F#4

55 F#6

56 F#23

Ultimately, this is the challenge for both men and women alike; while life in the desert is difficult, it has brought certain economic advantages,[57] but given a choice most would not live there. As one woman reported: "If we had a choice of life in any other location, we would not go to the desert. Because there is no choice, we accept this life; it is better than when we had no land at all."[58] Most have been compelled to relocate to the desert out of necessity; a function of poverty, violence and the absence of a viable livelihood in the irrigated areas where the Afghan government dominates. Marginalised by efforts to ban poppy, the type of development assistance offered and the way in which it was distributed, those in the former desert areas are angry with the government that they perceive as being responsible.

This desert population is also large in number. With 141,000 households in the deserts of the southwest and an estimated population of 1.4 million, it is difficult to imagine where these people will go once compelled to leave. While an outmigration from these former desert areas might be staggered rather than a mass exodus, with the landless leaving first and the more recalcitrant landed departing only when they have no other choice, there isn't sufficient land in the countryside of Afghanistan or jobs in the cities to absorb them. There is a very real prospect that most of this group, will move to other parts of Afghanistan, further increasing the demands on resources in urban areas and the pressure to migrate, while others will depart the country entirely and travel to Pakistan, Iran and onward to Europe. There is a need for a much closer analysis of just how vulnerable these desert populations are and a prognosis on just how long they have before the water eventually runs out.

57 F#12
58 F#49

6. CONCLUSION

The deserts of southwest Afghanistan have been transformed since the fall of the Taliban in 2001. Once barren land was captured, settled and cultivated, with over 344,000 hectares of agricultural land. It is an area that by 2019 was home to over 141,000 household compounds and a population of 1.4 million. As part of the national and global economy, permanent markets have been established across these former desert areas, where a wide array of goods can be bought, reflecting the size of the population and their disposable income.

In further contrast to the once empty and arid landscape, these former desert areas have seen a widespread uptake of new agricultural technologies, including solar technology for pumping underground water, and imported agrochemicals. These areas are, in fact, at the forefront of agricultural innovation.

Opium poppy cultivation has provided the economic means for this transformation to take place. With a highly inflated price following the Taliban prohibition in 2000-01, and after several attempts to ban opium by the Karzai government, it was opium production that made agricultural production in these former desert lands financially viable. Spurred on by further efforts at drug control, including the Helmand Food Zone, the population and amount of land under agriculture in these former desert areas burgeoned, despite the absence of government development efforts not because of them.

Growth has not been entirely unrestrained. Local traditions with regard to land rights, governance, and dispute resolution have largely prevailed in these areas, with some oversight by the Taliban. Access to these former desert lands is not open to all, and there have been some efforts by the Taliban to regulate the construction of local markets and the use of deepwell technology so as not to undermine the long-term viability of these areas. However, despite these efforts, solar technology continues increasing the rate at which the groundwater is falling in these former desert areas, and there is evidence of water contamination due to the excess use of fertilisers. Local concerns that the groundwater will disappear entirely prevail but do little to stop more deepwells, reservoirs and solar panels being installed each year.

There are further threats to the livelihoods of those in these former desert areas. Opium production has made an area with a harsh climate, high fixed and recurrent costs of production, and few market opportunities, economically viable. However, low prices and yields are regular occurrences in these former desert areas. Were the opium crop to become unviable, these former desert areas could not sustain their population, prompting migration into the better-irrigated areas that are currently largely under government control and where there is little capacity to absorb them.

It is possible that the better-irrigated places like central Helmand or Farah might only be the first port of call for this migrant population, as, unless these farmers and their families can find a viable source of livelihood there, they will undoubtedly have to turn to well-trodden pathways for economic survival, particularly migration to the cities, neighbouring countries and possibly even further afield, including Europe. Dispossessed and hostile to an Afghan government who they believe to have first driven them into the desert through neglect, corruption and drug control efforts,, and then undermined the economic viability of their new homes though continued efforts to reduce the yield and price of their opium crop, it is difficult to believe that this population will make for good neighbours wherever they end up.

Offering recommendations for the pending crisis in these former desert areas is challenging. There is still much that needs to be known about the area and its population, particularly given how dynamic the environment is, the proven capacity for innovation and the potential scale of any outmigration. There are some immediate measures that will develop a much better understanding of the scale of the threat of outmigration and its timing. Other interventions are aimed more at mitigating the effects of the burgeoning population in these former desert areas and the impact of the damaging farming practices, while a further set of recommendations is suggest how to prevent a repeat of the kind of policies and programmes that led to farmers migrating to the former desert areas in the first place.

Monitoring and Research Level

Undertake a systematic assessment of the groundwater across the former desert areas of the southwest to determine its depth and depletion, and model how long the water will last. Given the prevailing security conditions, it may not be possible to do this manually using a dipper or pressure transducer. A possible alternative is the use of satellite technology, particularly radar, which has proven an effective way to measure and monitor groundwater. Monitoring the uptake of solar technology in the former desert areas would be a key part of this assessment and help establish the relationship between the use of this technology and the fall in the water table so that mitigating actions can be taken.

Regularly monitor population movement in the former desert areas, both inward and outward migration. It will be particularly important to identify what population groups are on the move and why. Satellite imagery can assess the aggregate number of households in the desert area, but fieldwork will be required to determine which groups are relocating and the reasons. Continued longitudinal work in pre-existing research sites would provide an entry point into insecure areas, as well as offer a way of better understanding historical patterns of migration, and how they are changing. Further research with those who have left these desert areas, as well as people smugglers and migrants in border areas, particularly Nimroz and Helmand, would provide an understanding t of the impact outmigration from these former desert areas is having on wider patterns of migration within and from Afghanistan. and what impact it could have in the future.

Programme Level

To reduce the pressure on these former desert lands, consideration should be given to providing land to some of the settlers under some of the planned, large-scale irrigation projects in the southwest, including Bakhshabad in Bala Bulok, Farah, and Kamal Khan in Churburjuak, Nimroz. Each of these projects is expected to irrigate more than 80,000 hectares when finished and provide agricultural land to tens of thousands of people. Offering some of those lands to those residing in the deserts north of the Boghra and Bakwa would at least mitigate the pressure on the water table, assuming new migrants do not then occupy the abandoned desert lands, or ownership were not retained and the lands leased out to tenants or sharecroppers. Given the considerable experience those in the former desert areas north of the Boghra and Bakwa have with opium production, along with many other farmers in the southwest, every effort should be made to ensure that a comprehensive package of support, including market assistance is provided to migrants to these new project sites, if opium poppy cultivation is not to increase further.

Recognise that interventions that raise the opportunity cost of labour would have the greatest development impact on opium production and mitigate the risks of the land-poor relocating to grow poppy in former desert areas. Evidence suggests that rural communities transition out of opium production when they can realise broader livelihood and human security goals. These goals do not pertain only to the diversification of on-farm, off-farm and non-farm income, so that households can better manage risk and improve their economic situation; they also give rural communities access to a wider basket of goods (e.g. improved security and greater service, such as those provided through schools and health services) that denote a growing social compact with the state. In different parts of Afghanistan increased non-farm income has been a critical element in building household resilience to shocks such as crop failure and opium bans. The livestock sector has also supported a shift in cropping patterns, as well as improved income and social protection. Greater investment is required in these areas, and others, if reductions in cultivation in some areas are not simply to result in its relocation to former desert lands and other areas out of reach of the state. In fact, greater value-added agribusiness and increased trade in higher-value licit products that are part of the country's overall development strategy would contribute to this process.

Effective impact monitoring is critical for programming in conflict affected environments. Political pressure, military imperatives and short-term staff assignments prevail in stabilisation settings. These often lead to suboptimal programme design, where insufficient consideration is given to the prevailing

socio-economic, political and environmental factors that influence outcomes. The politically charged nature of stabilisation initiatives, the "need to do something" and the pressure to report success deters more systematic evaluation of programme implementation. Donors will lean toward more limited "annual reviews", often conducted by internal staff, that draw heavily on information from officials and other personnel directly involved in implementation and that are therefore subject to significant bias. More systematic impact monitoring is required that gives greater weight to the experiences of, and effects on, primary stakeholders, drawing on research on the ground and high-resolution satellite imagery in order that programmes can be realigned where possible, or even cancelled where they are failing or leading to costs that far outweigh the benefits.

Prioritise crop and income diversification rather than crop substitution. Empirical research shows that replacing opium poppy with wheat or other staples is typically a household's short-term response to coercion, and that farmers soon thereafter resume opium production. Experience demonstrates that enduring reductions in cultivation are possible only with livelihood diversification, movement into high-value horticultural crops (which allow reductions in staples like wheat and maize) and of the availability of non-farm income. There is a need to move away from measuring the success and failure of counternarcotics efforts based on the annual counting of hectares of opium poppy grown. It has not proven to be helpful, distorted policy discussions and left many blind to the coping strategies of the land-poor, including relocation to desert lands. Crop mapping using high resolution satellite imagery, and indepth research on the ground, offers a more viable option for assessing the sustainability of reductions in opium poppy cultivation.

Policy Level

Conduct a review of the solar technology imported into Afghanistan and determine the suitability of placing controls on the some of the equipment used for powering deepwells. Given the government's inability to regulate and police the former desert areas in situ, they might consider controlling the type of technology that can be imported into the country. One possibility is to restrict the import of the larger solar panels used to power deepwells. These do not seem to be used in the home and would therefore not impact on those households looking to illuminate their homes at night or power household electrical items. Barring the import of larger panels may not completely prevent further solar deepwells being installed in the former desert areas, but it may increase costs and slow the rate of uptake.

Assess all national, multilateral and bilateral development programmes for their impact on the production, trade and use of opium and of its derivatives. These counternarcotics assessments would not be onerous but should be a mandatory feature of the approval process for financial and technical assistance that lies with the Ministry of Finance. The format for these assessments should draw on the guidelines that were developed by the World Bank for counternarcotics mainstreaming in 2007, but have been largely ignored (see Annex 1).

Conduct a comprehensive counternarcotics review of the National Priority Programmes. This review will ensure that those responsible for these programmes understand the impact they might have on the illicit drug problem, and take steps to maximise positive impacts when conducting such activities. In particular, there is a need to build the synergies between different sectoral interventions through area-based planning in order to maximise both development and counternarcotics outcomes.

Strengthen the technical and strategic capacity of the line ministries so that they are better placed to integrate the causes of poppy cultivation into the design and implementation of their development programmes. In the past, the Ministry of Counternarcotics had the responsibility to support line ministries in developing a better understanding of how their programmes would impact opium poppy cultivation, but failed to deliver. With the abolition of the Ministry responsibility to ensure that development programmes at least do not encourage poppy cultivation, such as was the case with the Helmand Food Zone, should now lie with the line ministries. They will require technical support to do this.

Annex 1: Guideline Note to Treating the Opium Problem in World Bank Operations in Afghanistan

A. Strategic Approach

The opium problem

Reducing opium production is one of the greatest challenges facing Afghanistan. Opium is central to the macroeconomy, contributing one-third of the GDP and significant support for aggregate demand and the balance of payments. In the rural economy, opium is a key livelihood coping strategy for as many as 350,000 farm families, most of them poor. In the area of security, opium is fuelling warlordism and terrorism and in governance the illegal economy is capturing or undermining state building efforts at all levels.

Government strategy

The government's strategy to reduce and ultimately eliminate opium from the Afghan economy comprises essentially three elements. The first is to improve governance and the rule of law, thereby strengthening public institutions and mechanisms to control drugs together with the development of responsible governance structures and the "social contract" at all levels from the community up. The second element is to raise the general level of economic activity and services, improving living standards and providing social protection. The third element is to emphasise specific components in development programmes that can have a significant impact on farmer behaviour with a focus on poorer farmers, laborers and more vulnerable areas.

World Bank approach

With this background, the World Bank's working approach to the opium problem is:

- to factor considerations of the opium problem into analysis and dialogue at all levels, including the macroeconomic dimension;
- to support and engage in analytical work on the development dimensions of the drug problem in Afghanistan and associated options for addressing it;
- to help support the development elements of the government's strategy through World Bank-financed programmes as appropriate;
- to ensure that the activities supported by the World Bank do not inadvertently contribute in any way to the opium economy.

Screening

Under this approach, the World Bank proposes to screen all its activities in Afghanistan, both operations and analytical and advisory work, to ensure that counternarcotics aspects are treated consistently and in a way that can make the maximum contribution to the national effort against drugs. The screening process will demonstrate to what extent the operation or activity:

- contributes to the governance agenda;
- maximises synergies to deliver broad livelihoods impacts at the community and household level;
- maximises more specific counternarcotics impacts by geographical area coverage and by addressing the poorer target groups, with components which strengthen and diversify legal livelihoods;
- identifies risks and develops an approach to ensure that the World Bank support "does no harm" and does not create risks to the World Bank's reputation;
- contains a monitoring and reporting capability that can effectively track outcomes related to the opium economy.

B. Understanding the Role of Opium in Livelihood Strategies

and Devising Appropriate Development Responses

Reasons for the "success" of poppy cultivation in Afghanistan

In Afghanistan's current economic and political climate there are many advantages to cultivating opium poppy. It is a high-value, low-weight, durable commodity, for which there is strong demand. There are sufficient returns at each stage of the value chain and well-developed market linkages in terms of credit, purchase, transport and processing, all of which function well and flexibly despite Afghanistan's fractured infrastructure. Traders are willing to purchase at the farm gate for cash, often in advance of the harvest.

Opium poppy can be cultivated almost anywhere in the country, although it grows best in free draining sandy loam soils. It is so well-suited to Afghanistan's agro-climatic conditions that it produces higher than the global average yields of raw opium and morphine and maximises returns to scarce irrigation water. This latter attribute and its marketability have proven crucial to farmers with small landholdings and large families, particularly in remote areas where opium poppy cultivation is becoming increasingly concentrated. For small marginal farmers there is no other crop under current conditions that can provide the same returns. When opium declines in those areas, the opportunities for farm income for such households will also decline, driving people off the land.

With these characteristics – and despite law enforcement efforts – opium poppy is a relatively low risk crop in many areas in what is generally a high-risk environment – for both farmers and traders. The traditional credit system known as *salaam*, that provides an advance payment on an agreed amount of a future crop, has increasingly favoured opium poppy cultivation over other crops. In areas in which opium poppy has become entrenched, access to credit has become dependent on a farmer's willingness to cultivate this crop. This willingness and the possession of the requisite skills to cultivate opium poppy have increasingly determined sharecroppers' access to land. The rental value of land also has become determined by potential opium yields rather than by wheat productivity.

Uneven distribution of the considerable benefits of opium production

The economic advantages associated with cultivating opium poppy differ according to the assets that farmers have at their disposal. For the relatively few large landowners, opium poppy represents a high-value crop that can accrue even greater value if it is not sold immediately after the harvest season, but rather later on, when prices rise. As larger farmers have other income streams and liquid assets, they can realize higher prices by selling later in the year. Moreover, landlords who make sharecropping arrangements for opium production can do even better: some inequitable sharecropping arrangements allow the landowner to take two-thirds of the final opium yield, despite contributing only 20 percent of the total costs of production. Landlords may also make advance purchases of opium at rates considerably less than the harvest price, generating further considerable profits on the opium crop. These profits can then be reinvested in further diversifying assets and income sources or in the opium trade itself – an ascending spiral of wealth accumulation for the larger landowner.

The position for the land-poor is quite different. For this group, opium poppy is not just a source of income. Opium poppy cultivation increases the opportunity to obtain land on a sharecropping or tenancy basis and draws on the labour supply of the household. It provides access to both cash income from opium poppy and, in the typical mixed cropping system practised in Afghanistan even among poppy growers, to the means of producing food crops for household consumption. Without opium poppy cultivation, the opportunity to access land diminishes considerably, as happened in the province of Nangarhar in 2004/2005.

Opium poppy cultivation also creates a demand for itinerant labour to assist in the weeding and harvesting of the crop. Based on UNODC's estimate that 104,000 hectares of opium poppy were cultivated in the 2004/2005 growing season, the crop would have generated approximately 36.4 million days of employment,

of which one-third would have been daily wage labour opportunities. Where a household has more than one male able to follow the staggered weeding and harvesting seasons, the off-farm income generated from opium poppy can last up to five months and is typically higher than the on-farm income earned from cultivating the crop as a sharecropper.

Opium poppy also provides an important source of credit for the resource-poor. In areas where opium cultivation is entrenched, it defines the "creditworthiness" of the land-poor. Without it, access to basic food items, agricultural inputs, and funds for health care becomes severely constrained.

In addition to the above direct benefits, the cultivation and trade of opium has considerable multiplier effects in the rural economy. Some estimates even suggest that for every hectare of opium poppy cultivated, as many as five to six jobs are created in the rural non-farm economy.

Typology of opium farmers

For the purposes of this Guideline, rural households involved in the opium economy have been classified as (1) "better off" and not dependent; (2) less affluent, but not dependent; and (3) poor and highly dependent. As a general rule, Class (1) "better off" farmers have more diversified livelihood strategies. They reside in areas in close proximity to provincial or district centres, they cultivate a variety of crops including high-value horticulture and they have better access to land and irrigation, as well as commodity and labour markets. They are not dependent on opium for a decent living and could be considered to be "opportunist producers," for whom application of the law is the primary instrument of drug control. More marginal farmers (Class 2) and the poor (Class 3), are typically landless or have very small landholdings and considered to be the target group for development programmes that aim at contributing to the reduction of drug production. As such, poverty reduction and opium poppy reduction strategies are closely entwined. The characteristics of these three classes are summarised in Table 1A.

Appropriate development responses

Opium poppy cultivating households are diverse and dynamic, and their decision as to how much land to dedicate to opium is influenced by a range of different factors – not just price. Policies and programmes that treat opium poppy farmers as homogenous will not only be ineffective, they could prove counterproductive. It is necessary to work with the diversity that exists among opium poppy cultivators. Understanding the contribution of the different socio-economic groups involved in opium poppy cultivation and the multiple benefits (for example: social, economic and political) they derive from their involvement are critical to identifying the entry points in developing effective strategies for the sustainable elimination of the crop in Afghanistan.

Table 1A: Typology of Opium Producing Areas and Farmers within Them

	Class 1 Not Dependent	Class 2 Dependent	Class 3 Highly Dependent
Access to markets/ services/ governance	• Close to district and provincial centres • Government can impose will with minimum reaction	• Accessible, but limited physical infrastructure	• Remote • Government presence and service delivery limited • Government finds it difficult to impose will beyond district centre
Land cultivated (winter + summer)	• Larger cultivable land (>15 jeribs)	• Medium sized cultivable land (>7.5 <15 jeribs)	• Smaller cultivable land (<7.5 jeribs)
Irrigation	• Canal or main river	• Canal and river, but also *karez* and mountain spring	• *Karez* and mountain spring
Land tenure	• Landlord • Owner cultivator	• Owner cultivator • Tenant	• Owner cultivator • Sharecropper
No. of Crops	• Double crop	• Double crop, but limited in summer	• Single crop
Cropping	• Diversified • Poppy 30%-50% • Wheat • Vegetables for sale • Fruits/nuts for sale	• Poppy 50%+ • Wheat • Vegetables -some for sale • Fruits/nuts -some for sale	• Poppy 70%+ • Wheat 20%-30% • Vegetables solely for consumption
Population density	• 1-1.5 per jerib	• 2-3 per jerib	• 3.5 to 5 per jerib
Livestock	• Sale of dairy products and cattle	• Some sale of dairy products	• Goats/sheep • Dairy cow for milk products for household
Off farm	• Limited	• Daily wage labour - poppy during harvest	• Daily wage labour - mainly poppy throughout season
Non-farm	• Salaried (NGO, government), trade, transport	• Construction • Semi-skilled	• Limited
Credit	• Accumulated debt marginal • Variety of sources of credit • Gives loans	• Some accumulated debts • Variety of sources	• Accumulated debts significant as proportion of total income • Opium only source of loans
Opium sales	• Sometime after harvest	• Pre-harvest, but some surplus	• Pre-harvest

Development programmes that offer farmers real livelihoods alternatives would need to have as many characteristics as possible that "mimic" the attractions of the opium economy, particularly for smaller and poorer farmers and labourers (Classes 2 and 3), for whom choices are very limited at present. Programmes need to avoid adopting a strategy of simply attempting to replace the relatively high level of income from opium as derived by the resource-rich (Class 1 farmers). Interventions are needed that improve the access of smaller farmers (Class 2 and 3) to those assets that they currently have access to only through their willingness to produce opium poppy. Improving access to credit, land, and off-farm and non-farm income opportunities to the poor should be a priority. Table 2A lists some of the development responses that should be emphasised to address the situation of these Class 2 and 3 farmers. For those farmers who are not economically reliant on opium poppy cultivation (i.e. Class 1 farmers), greater emphasis should be given to applying social and legal pressure.

Table 2A: Development Responses to Counterbalance the Advantages of Opium for the Rural Economy

Asset	Advantages of the opium economy	Development responses
Land	• Preferential access to land for sharecroppers with experience of poppy cultivation • Only poppy can pay the high land rents: in areas where poppy is concentrated, the rentable value of land is inflated to such a point that farmers cultivating legal crops would not be able to meet their rent • High returns per unit of land; preferred crop for those with limited land holdings	• Increase agricultural land under irrigation (winter and summer seasons) • Promote high-value horticulture and cottage level agro-processing to provide value added • Increase income from livestock and by-products • Develop non-farm income opportunities (for example: through skills development and development of market linkages)
Water	• High return per unit of water, poppy (particularly attractive in single crop areas) • One of the few crops to meet capital and recurrent costs of tubewells	• Increase agricultural land under irrigation (summer and winter) • Integrated approach to improving value added in farming through water efficient techniques/technologies and high value-added production packages
Credit	• Advance payment on future crop facilitates purchase of agricultural inputs • Those who cultivate opium poppy, particularly the resource poor, are considered "creditworthy." They can access credit, including consumption credit, and are able to repay both seasonal and outstanding loans	• Advance payments on other crops (orchards, onions, cumin) are sometimes available, promote market linkages • Contract growing, including provision of agricultural inputs • Improve credit opportunities for consumption and investment through MISFA
Labour	• Labour-intensive crop, significant labour opportunities created during weeding and harvesting periods • Maximises use of unremunerated family labour, including women • Sharecroppers receive greater share of final crop when they cultivate opium than they do for legal crops • Food provided for those harvesting opium poppy	• Develop labour-intensive agro-processing opportunities such as in dried fruit • Raise opportunity cost of family labour through expanding potential income earning opportunities for women (including livestock, poultry, dairy, agro-processing, etc.) • Develop non-farm income opportunities • "Cash For Work" during periods of peak labour demand in areas where strong law enforcement against cultivation is occurring • Improve access to agricultural inputs for sharecroppers to allow greater share of larger final yield of legal crops

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