From the Mountains to the Fields

Dam Development in Bamyan, Afghanistan

An insight into a project enhancing the life of
20-plus communities 2,400 metres above sea level.

From the Mountains to the Fields

Dam Development in Bamyan, Afghanistan

An insight into a project enhancing the life of
20-plus communities 2,400 metres above sea level.

CHECK DAM: *A check dam is a structure constructed across a swale, drainage ditch or waterway to counteract erosion and hold back water for later use. Check dams are not new, but rather an ancient water management technique dating back to the second century AD.*

Prime CONSULTING INTERNATIONAL

NEW ZEALAND
FOREIGN AFFAIRS & TRADE
Aid Programme

UKaid
from the British people

Above: A father and his daughters on a potato farm. Bamyan produces 60 per cent of Afghanistan's potatoes.
Page 3, Top left: A road winds its way around the hills in Panjab District in southwest Bamyan. Top right: Prime horticultural expert Grant Wilcox speaks to potato farmers about their crops. Bottom left: A family working together during the wheat harvest. Bottom right: A paraveterinary worker visits a remote village to administer vaccines.

FOREWORD

Afghanistan is one of the world's poorest countries and has been beset by decades of war. As part of international peace building and reconstruction efforts, the New Zealand and British Governments allocated funds for a multi-million-dollar programme to modernise and improve agriculture practices in Bamyan Province.

Bamyan is a remote, mountainous area in the country's central highlands, where poverty rates are high and agriculture is the main source of livelihoods. The Check Dam Project formed part of a six-year Agricultural Support Programme (ASP), implemented by New Zealand company Prime Consulting International Ltd.

The Check Dam Project addressed acute water shortages in four districts, by overseeing the construction of 20 check dams and an irrigation canal, which allowed locals to hold back water during dry spells and introduce new crops.

Top: A check dam in Cheshmi-Alchii Village constructed from rocks and earth found in the vicinity.

Bottom left: Bamyan Provincial Veterinary Officer Dr Mohammad Haider.

Bottom middle: Prime horticultural expert Grant Wilcox inspects the quality of local potato crops.

Bottom right: A truck shrouded in dust on a remote Bamyan road.

WATERING THE FUTURE

Alan Pearson – Group Chairman, Prime Consulting International Ltd

When I first arrived in Bamyan Province, I was struck by the geography of the place and the challenges of that geography, particularly in relation to water.

Bamyan sits high in the Hindu Kush and whilst the region is privy to significant amounts of water released from snow-capped mountains in spring, each year farmers face severe water shortages for the rest of the agricultural cycle. On average the region receives less than 125mm of rainfall a year.

It is common knowledge that water-stressed crops yield low returns, which puts pressure on farmers' livelihoods and potential income streams.

Water availability – or lack of – can make the difference between having a reasonable harvest and total crop failure. Even in less extreme situations, it can have a large impact on crop yields, especially for wheat and potatoes, which are the main staple crops in Bamyan.

The Check Dam Project involved improving irrigation capacity amongst several farming cooperatives in Bamyan Centre, Yakawlang, Panjab and Waras Districts, through the development of small dams and irrigation structures.

Check dams are typically between two and five metres high and 10 to 40 metres long and allow water to be available at critical times when crops need irrigation and water would otherwise be completely unavailable.

While they do not usually allow water to be stored year-round, they enable farmers to store excess water released in the springtime for later use, rather than allowing it to escape, unused, out of the province and out of the country.

Everything our company has done as part of the ASP is based on the concept of a success model. In other words, even if it's small or limited in scale, each project is designed so that people can see how it works and replicate it.

We hope the 19 cooperatives involved in the Check Dam Project, which are now responsible for the ongoing operation and maintenance of the dams, will continue to benefit from them in future.

It has been a joy and a privilege working with the people of Bamyan. Like people everywhere, they simply want better lives for themselves and their families.

Page 6, Top left: A young girl on a potato farm in Bamyan. Top right: Children help with the wheat harvest.
Bottom left: More than 700 hectares of rainfed alfalfa was cultivated to aid rangeland rehabilitation across four districts as part of the ASP.
Bottom right: A man from the Durkshan cooperative provides feedback on a check dam near his village.

Above: Women and children use a check dam to gather water and wash clothes in Albashi Village, Bamyan District.

Above: Harvested wheat sold for cash provides the majority of income for many rural farmers in Bamyan Province.

DESIGNING FOR COLLABORATION

Alpha Kennedy – Project Manager, Check Dam Project

There has been a significant amount of aid delivered to Afghanistan over the last 14 years and consequently, several communities see aid as the only viable means of bettering themselves, or as a shortcut.

Some communities want projects to be high cost, high spec and entirely handled by foreigners. We addressed this challenge with a strong community engagement programme, which helped develop a sense of ownership.

We developed low-cost dams – between US$9,000 and US$14,000 each – that could be easily replicated. The cost is not a lot when compared to other aid and development projects in the Bamyan region.

Our approach involved building two test dams in 2013 to gauge the overall community response to the project – one in Sabzak Valley and the other in Dahane Shorab.
The response was overwhelmingly positive.

The remaining 18 check dams were built in 2014 using stones, gravel, cement and local labour. On top of this, the Khawal Downstream Irrigation Project – 3.6 kilometres of irrigation canal – was also completed in late 2014.

The canal's purpose was to improve water efficiency for the Komail cooperative, made up of six villages and 510 households which lacked an effective structure to deliver water along winding, difficult terrain.

Communities were required to invest in the Check Dam Project through manpower, time, problem solving and by giving up local resources. If there was a quarry nearby, they were asked to provide stones at no cost.

In total, 19 cooperatives were involved in the construction phase for the Check Dam Project and over 1,380 member households were beneficiaries, not including the canal.

In Afghanistan, a lot of projects don't finish on time. In fact, the vast majority run over time. The Check Dam Project was not without its own challenges. We had 20 dams spread across four districts and some of the sites were 7 to 8 hours apart by truck.

We also experienced challenging weather conditions. At one stage, we were building in temperatures of -5 to -12 degrees Celsius, which required innovative solutions to keep work on track.

Despite this, the project finished two months ahead of time – a testament to the team that worked on it and the locals' willingness to get involved.

Hopefully communities that were not able to participate in the Check Dam Project will see the demonstrated value of these check dams and replicate the process themselves.

Page 10, Top left: Inspection of earth-filled dam at Kharistan Village, Yakawlang District. Right: Villagers help to construct the concrete dam in Kig Village, Panjab District. Bottom left: Construction of the concrete dam in Dahane Nayeb Village, Panjab District.


"Site-specific design is really important because it means communities can easily replicate the structures in the future"

Waqar Ahmad,
Check Dam Project Engineer

"Without complete community buy-in, the Check Dam Project would not have been possible. The Check Dam Project team directly engaged with communities from the outset."

Alpha Kennedy,
Check Dam Project Manager

Images: Project communities participate in all aspects of dam construction as well as ongoing operation and maintenance.

"We selected sites where we could give immediate benefit to communities and engage them in the process. The sites can now also be used as demonstration sites to show how water, which is such a precious and scarce resource in this environment, can be better used in crop production."

Waqar Ahmad,
Check Dam Project Engineer

SITE SELECTION

The Check Dam Project began in Bamyan Province in 2013 with the survey of over 200 locations, from which 20 dam sites were chosen.

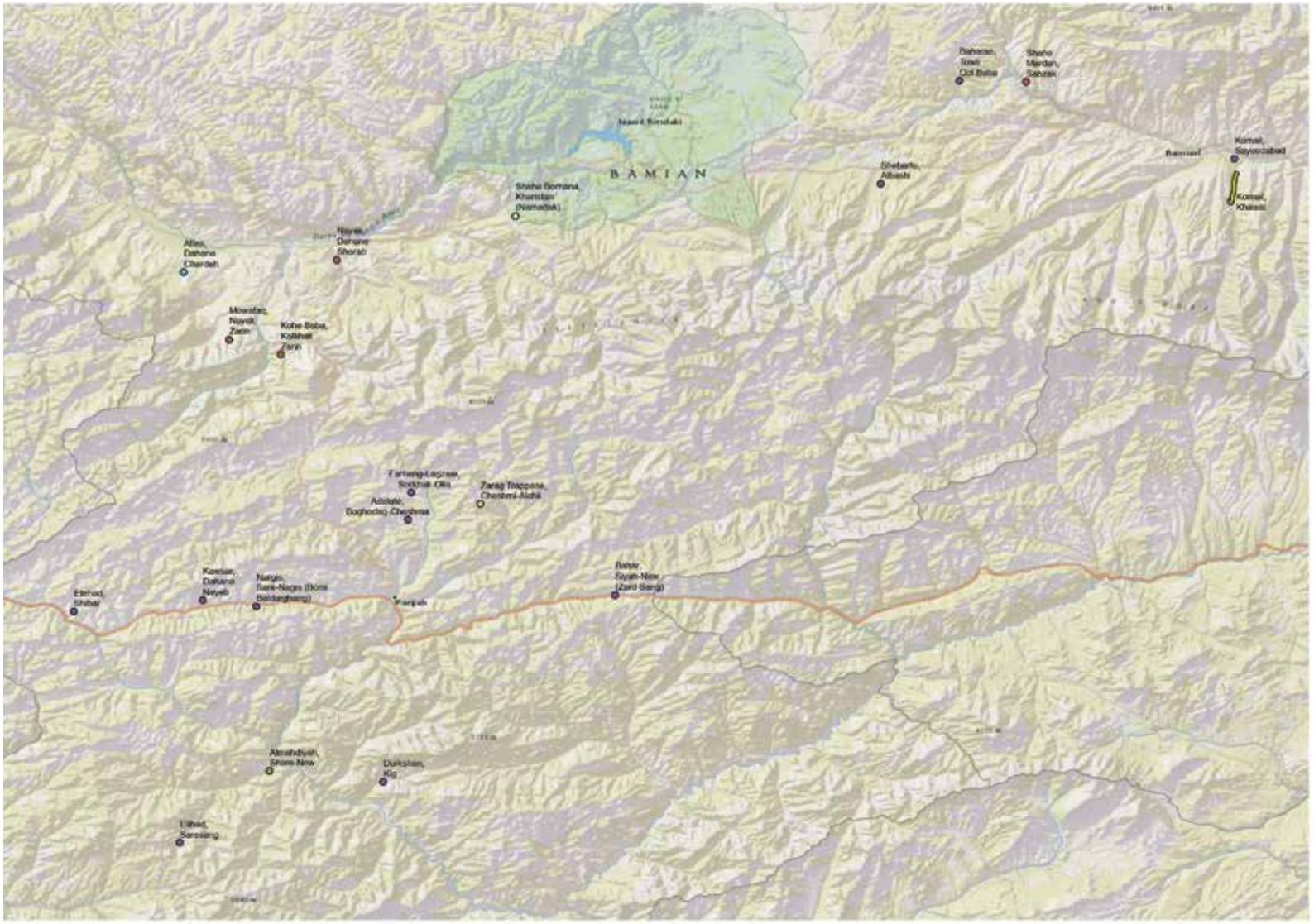
The project team considered technical, social and economic criteria, including the availability of local resources and the level of support from various farming cooperatives and communities.

Cooperatives suggested possible check dam sites based on their knowledge of the area, with guidance from project staff.
Local labour was utilised at each project site, which created a sense of community ownership.

Page 14 and left: Check dams were built using stones, gravel, cement and local labour.

CHECK DAM LOCATIONS

Bamyan Centre, Yakawlang, Panjab and Waras Districts



Legend

- Canal
- Concrete Check Dam
- Concrete Weir
- Earth Fill Check Dam
- Earth Fill Check Dam/Infiltration Galleries
- Stone Masonry Check Dam

Site Name	Cooperative	District
Towli Qol Bala	Baharan	Bamyan
Sabzak	Shahe Mardan	Bamyan
Khawal	Komail	Bamyan
Sayeedabad	Komail	Bamyan
Abashi	Shibartu	Bamyan
Nayak Zarin	Mowafaq	Yakawlang
Dahane Shorab	Nayak	Yakawlang
Kharistan	Shahe Borhana	Yakawlang
Kalkhak Zarin	Kohe Baba	Yakawlang
Dahane Chardeh	Atlas	Yakawlang
Boghodag-Cheshma	Adalate	Panjab
Sorkhak-Oliya	Farhang-Lagzaie	Panjab
Cheshmi-Alchii	Zarag Trappase	Panjab
Bomi Baldarghang (Sare-Nagis)	Nargis	Panjab
Dahane Nayeb	Kawsar	Panjab
Siyah-Naw (Zard Sang)	Bahar	Panjab
Shibar	Etehad	Panjab
Saresang	Etihad	Waras
Kig	Durkshan	Waras
Share-Now	Almahdiyah	Waras

KHAWAL DOWNSTREAM IRRIGATION PROJECT

A few areas of Bamyan possess plentiful water but lack the delivery methods to transfer the precious resource to the agricultural land that so badly needs it. In the case of Khawal Village and the Komail cooperative, which represents six villages and 510 household members, a 3.6 kilometre, hand-dug irrigation canal existed prior to the Check Dam Project, however, it was unlined and seepage losses were resulting in less than a trickle of water at the end.

Villagers lacked an effective structure to deliver water along difficult terrain, and crops just 1 kilometre from the intake were experiencing significant water stress. Community disputes ran high as water had to be rationed and only a few farmers could take water from the canal at the same time.

The Khawal Downstream Irrigation Project involved the construction of a 3.6 kilometre trapezoid concrete channel, with the capacity to transport more water and avoid seepage and evaporation losses. The project was completed in 2014 and the Komail cooperative is responsible for its ongoing operation and maintenance.

The channel's concrete turnouts allow efficient water use and its pedestrian crossing points protect the structure's integrity. It also features 22 dedicated washpoints along the length of the canal, which were included at the suggestion of local women who saw the need for a designated spot where dishes and clothes could be washed. These washpoints also serve as social enabler as they allow women to gather in a safe place to socialise informally. Previously, washing was carried out on the banks of the river.

Page 18 and Top left: Construction workers involved in the Khawal Downstream Irrigation Project, which was completed in late 2014.

Bottom left: The new canal provides Khawal Village and the Komail cooperative in Bamyan District with the water they need for domestic purposes like washing clothes and agricultural needs like irrigating crops.

"Before a check dam was built in Sabzak Valley, villagers were only planting wheat. Now they're planting wheat, potato and corn. This is because they now have water throughout the entire irrigation cycle. We've also found that increasing the water availability upstream has flowed down through the ground in some places and revitalized and recharged springs."

Alpha Kennedy
Check Dam Project Manager

AN ENDURING LEGACY

Angus Davidson – ASP Operations Manager

Both the Check Dam Project and Khawal Downstream Irrigation Project had several intended short-term outcomes – from improved crop yields, irrigation capacity and groundwater recharge to better management of salt leaching, increased living standards and social cohesion.

In all cases, the Check Dam Project delivered greater capacity to store water than already existed. In many cases, the cooperatives that benefited from the dams previously possessed no existing capacity to store water and relied solely on the natural ebb and flow of snowmelt and springs.

Increased irrigation capacity allowed some farmers to add new varieties of crop, such as potatoes, corn and sunflowers, which allowed them to generate higher cash returns.

Revenue increases from the addition of new crops and improved yields for existing crops translated into significant social and economic benefits for beneficiary cooperatives, with additional income improving overall living standards.

Throughout the duration of the project beneficiary cooperatives were also quick to utilise the finished sites for livestock watering.

But there was an even greater vision at play than simply achieving short-term outcomes.

The longer-term goal of the Check Dam Project, along with the Khawal Downstream Irrigation Project, was to develop and demonstrate methodologies that communities could use to build similar structures themselves – thereby replicating the benefits of better water management on a wider scale.

The full evidence of the dams' benefit will be realised in years to come but already it has shown that small irrigation structures can have an enormous impact on remote farming communities and truly represent value for money.

SPOTLIGHT ON SABZAK

The check dam in Sabzak Valley in Bamyan District has a capacity of 6,000 cubic metres and is used by members of the Shahe Mardan cooperative, who were involved in its construction. The dam was built using stone masonry, due to the local availability of large rocks which were broken down and incorporated into the structure. The Shahe Mardan cooperative is made up of about 100 families and 700 individuals. Before the dam villagers were planting only wheat. Now they are a growing a greater range of crops which is leading to better health and more income.

- Shahe Mardan cooperative
- Stone masonry construction
- Existing capacity – nil
- New capacity – 6,000 cubic metres

Page 22, Top left: Members of the Shahe Mardan cooperative who helped build a stone masonry check dam in Sabzak Valley.

Top right: Check Dam Project Engineer Waqar Ahmad specialises in water resources and rural infrastructure.

Bottom left: Check Dam Project Manager Alpha Kennedy inspects a stone masonry check dam in Sabzak Valley.

Bottom right: The Sabzak reservoir at full capacity.

Left: Alpha and Waqar standing on the check dam wall.

SPOTLIGHT ON CHESHMI-ALCHII

The check dam in Cheshmi-Alchii in Panjab District has a capacity of 20,000 cubic metres and is used by members of the Zarag Trappase cooperative, who were involved in its construction. The dam was built using earth fill construction. The Zarag Trappase cooperative is made up by about 60 families and 420 individuals. The dam allows them to have water available for livestock and to irrigate their precious wheat and alfalfa crops during drier periods. As one villager said, through a translator: “If we don’t have this check dam, we cannot irrigate our land. Our life is wheat, alfalfa and livestock. If there is no irrigation for the land, we don’t have food.”

- Zarag Trappase cooperative
- Earth fill construction
- Existing capacity – nil
- New capacity – 20,000 cubic metres

Left and bottom right: Cheshmi-Alchii dam during the application of top cover. Top: View of the Cheshmi-Alchii dam wall.

SPOTLIGHT ON SIYAH-NAW (ZARD SANG)

The check dam in Siyah-Naw (Zard Sang) in Panjab District has a capacity of 30,000 cubic metres and is used by members of the Bahar cooperative. The dam was built using concrete and replaced an existing one with a capacity of just 1,000 cubic metres. The Bahar cooperative is made up by about 80 families and 560 individuals. A member of the cooperative said, through a translator, that all members of the cooperative were involved in the dam's construction. He said having more water available had changed their lives. "The land needs water. Now we can irrigate our land. Everything we want, we can sow. We grow wheat, potatoes, barley, alfalfa and beans."

- Bahar cooperative
- Concrete construction
- Existing capacity – 1,000 cubic metres
- New capacity – 30,000 cubic metres

Left: The concrete check dam at Siyah-Naw (Zard Sang).
Left page, Top left and bottom left: A member of the Bahar cooperative stands on his community's new check dam. "This check dam has changed our lives."
Left page, Top right and bottom right: Workers completing the Siyah-Naw (Zard Sang) check dam.

Meet The Team

Dr Alan Pearson
ASP Director

Alan is an experienced company director, entrepreneur and business strategist with extensive involvement with business development in Southeast Asia, East Asia and the Middle East. Alan has a Bachelor of Veterinary Science from Massey University and professional and technical experience in the agribusiness and biological science sectors. His professional background includes senior management roles in public and private sector organisations, as well as hands-on work in the field. He is the Director and the Group Chairman of Prime.

Angus Davidson
ASP Operations Manager

Angus is a former chief executive within the Australasian food industry. He has experience in livestock production systems, quality systems and agriculture from farm to market. He has a Master of Agribusiness degree from the University of Melbourne and a Bachelor of Applied Science from the University of Adelaide. Angus combines strong operational management and governance expertise with hands-on field operations capabilities. He is also a Director of Prime.

Alpha Kennedy
Check Dam Project Manager

A former Royal New Zealand Army Infantry Officer, Alpha travelled to Afghanistan in 2009 as a Patrol Commander in Bamyan Province, and spent several subsequent years working on development and construction projects there. Alpha is skilled in delivering projects in challenging environments and is extremely familiar with the ground-level effects of international development policy. Alpha is currently Prime's Operations Manager Middle East and North Africa and managed the Check Dam Project for Prime in Bamyan.

Waqar Ahmad
Check Dam Project Engineer

Waqar has strong design skills in the planning, execution, monitoring and management of civil engineering projects. He specialises in water resources and rural infrastructure. Waqar was the lead engineer for the Check Dam Project in Bamyan. His role involved carrying out site-specific technical and environmental feasibility studies for several different hydraulic structures, including check dams and irrigation canals.

Sayed Dawood Mosavi
ASP Lead Local Manager

Dawood is an accomplished senior manager and has held several roles within the military and agricultural sectors, as part of the global effort to rebuild Afghanistan through the NATO-led security mission in Afghanistan. He is experienced in programme leadership, project management, management information systems, monitoring and evaluation design and implementation techniques and agricultural-based livelihood programmes. He is the President of Kohe Baba Consultancy Services. Dawood's role in the Check Dam Project was managing local team resourcing.

Mohammad Sarwar Mazuri
Technical Engineer and
Quality Control

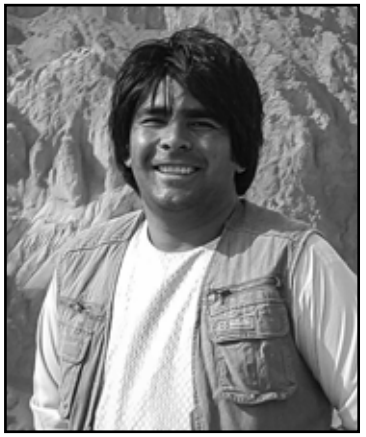
Sarwar is an experienced civil engineer who was responsible for the quality assurance on each check dam. He was also responsible for the design of the canal in the Khawal Downstream Irrigation Project and oversaw its construction as the senior engineer.

Amin coordinated logistics for the Check Dam Project and ensured that materials were in exactly the right place at the right time – a challenging job considering the geographical spread of the project and that fact that many locations had no formed roads.

Sayed Mohammad Amin
Logistician

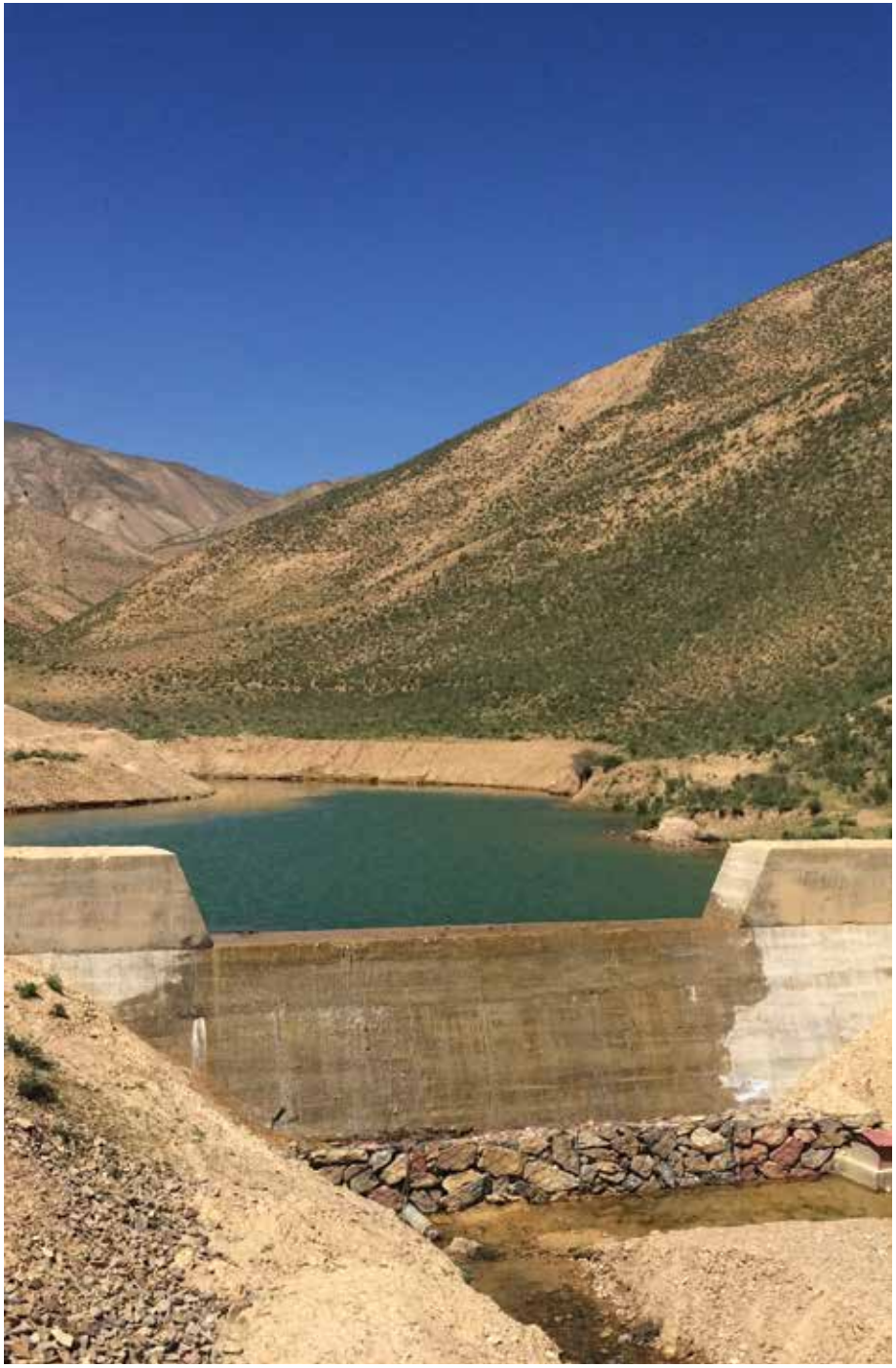
Mehdi was the senior driver and translator for Alpha and Waqar. He was responsible for getting the project team to site safely and ensuring smooth communication with communities involved in the project.

Mehdi Kazimi
Translator and Driver



Mohammad was the logistics assistant for the project working closely with Amin. Mohammad also undertook driving and translation tasks for Alpha and Waqar.

Sayed Mohammad Mosavi
Translator and Driver



ABOUT THE ASP

Prime Consulting International Ltd was awarded contracts to support agriculture development in Bamyan Province, Afghanistan through the Agricultural Support Programme (ASP) from 2011 to 2017.

Tapping into existing farmer co-operatives across four districts, Prime was able to grow farmers' average household incomes by 35 per cent within six years. Prime provided tractors and other implements, set up a beekeeping initiative for women, improved animal health services and managed the construction and start-up of a potato packhouse.

It also also upskilled several agriculture professionals, in partnership with Bamyan University and the Provincial Directorate of Agriculture, Irrigation and Livestock, to support ongoing development of the sector.

Phase one of the ASP was completed in 2014. The New Zealand Government allocated further funding for a Phase Two programme to build on the successes of Phase One, which was completed in 2017. Phase one of the ASP was funded by aid funds from New Zealand and the United Kingdom and completed in 2014. Phase two was supported by New Zealand.

The capacity built through the ASP was transferred to the Department of Agriculture, Irrigation and Livestock at the end of 2017 to ensure the sustainability of improvements made across the region.

Left: Shibar Check Dam, Panjab District.
Right: Poplar trees glow golden in the countryside near Band-e Amir National Park in Bamyan Province.

Thank you to the local communities and villages of Bamyan Centre, Yakawlang, Panjab and Waras Districts for your support. It was a joy and privilege to be part of the ASP in Bamyan, Afghanistan.