FINAL REVIEW REPORT

AFGHANISTAN AGRICULTURAL R4D PROGRAM

IMPROVED AND SUSTAINED PRODUCTIVITY OF AFGHAN FARMING SYSTEMS IN WATER SCARCE ENVIRONMENTS THROUGH ADAPTIVE RESEARCH

29 OCTOBER 2018

MAIL

Australian Government

Australian Centre for International Agricultural Research

Australian Aid

ICARDA

Science for resilient livelihoods in dry areas

CIMMYT

International Maize and Wheat Improvement Center

Acronyms

AACRS	Australia Afghanistan Community Resilience Scheme
AAIP	Afghanistan Agricultural Inputs Program
ACIAR	Australian Centre for International Agricultural Research
AH	Animal Husbandry
ARIA	Agricultural Research Institute of Afghanistan
ARTF	Afghanistan Reconstruction Trust Fund
CGIAR	International Centres for Agricultural Research
CIM	Crop Improvement and Management
CIMMYT	International Maize and Wheat Improvement Centre
CRP	CGIAR Research Program
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CSO	Civil Society Organisation
DAIL	District Agricultural Irrigation and Livestock
DFAT	Department of Foreign Affairs and Trade
DLFS	Dry Land Farming Strategy
FAO	UN Food and Agriculture Organisation
ICARDA	International Centre for Agricultural Research in Dry Areas
ICM	Integrated Catchment Management
KIT	Royal Tropical Institute, Netherlands
LWR	Land and Water Resources
M&E	Monitoring and Evaluation
MAIL	Ministry of Agriculture Irrigation and Livestock
NGO	Non-Government Organisation
NVRC	National Varietal Release Committee
PAIL	Provincial Agriculture Irrigation and Livestock
R4D	Research for Development
SWIM	Strengthening Watershed and Irrigation Management Program
WUA	Water User Association

Acknowledgements

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In particular, the program has benefitted from the often-enthusiastic collaboration of the *Ministry of Agriculture Irrigation and Livestock* (MAIL), including its provincial and district offices, as well as the *Agricultural Research Institute of Afghanistan* (ARIA). Thanks also to Eric Huttner, Werner Stur, and Robyn Johnston (ACIAR Research Program Managers), along with the rest of ACIAR's dedicated team, who provided open access to ACIAR information and assessments. Special thanks also to the CIMMYT and ICARDA teams and their collaborating partners for assisting with field visits and providing the data on which this review depends.

(Cover Picture: Afghan Green by Masashi Mitsui (https://500px.com/photo/27867095/)

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AFGHANISTAN AGRICULTURAL R4D PROGRAM (ROU 41)

IMPROVED AND SUSTAINED PRODUCTIVITY OF AFGHAN FARMING SYSTEMS IN WATER SCARCE ENVIRONMENTS THROUGH ADAPTIVE RESEARCH

Project 1. Sustainable wheat and maize production in Afghanistan

Project number: CIM/2011/026
Commissioned agency: International Maize and Wheat Improvement Centre (CIMMYT)
Project leader: Rajiv Kumar Sharma (rk.sharma@cgiar.org)

Institution	Lead Personnel
CIMMYT	Rajiv Sharma
MAIL	Mohammad Qasim Obaidi, Agriculture Research Institute of Afghanistan (ARIA)
DAIL	Four Provincial Directors

Project 2. Forage options for smallholder livestock in water–scarce environments of Afghanistan

Project number: AH/2012/021
Commissioned agency: International Centre for Agricultural Research in the Dry Areas (ICARDA)
Project leader: Mounir Louhaichi (ICARDA - Jordan) (Previous Project Leaders: Shinan Kassam (now CARITAS, Switzerland) and Serkan Ates (now Oregon State University, USA)

Institution	Lead Personnel
ICARDA	Mounir Louhaichi (ICARDA - Jordan); Aziz Niane (ICARDA - Lebanon); Sawsan Hassan (ICARDA - Jordan).
Other Institutions	Hayley Norman (CSIRO - Australia) Bradley Nutt (Murdoch University - Australia) Remco Mur (KIT - the Netherlands)
MAIL	Mohammad Qasem Obaidi (ARIA) Soofizada Qudratullah (ARIA/MAIL - Afghanistan)
PAIL/DAIL	Kabul, Herat, Nangahar, Balkh

Project 3:Integrated catchment management and capacity building for improving livelihoods in Afghanistan

Project number:	LWR/2008/047
Commissioned agency:	ICARDA
Project leader:	Yashpal Singh Saharawat

Institution	Lead Personnel
ICARDA	Yashpal Singh Saharawat (ICARDA -India); Nigamananda Swain, Md. Sharif Sharifi, Srinivas Tavva, Abdul Rahman Manan, Chandra Sekhar Biradar (ICARDA - Afghanistan)
MAIL	Mohammad Qasem Obaidi (ARIA); Mohammd Rafi Qazizada (NRM); Amanyar (Forestry); Hamdullah Hamdard (Extension)
DAIL	Balkh, Nangahar, Takhar, Bamiyan

Review team members:

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The Team Leader was restricted from travelling to Afghanistan due to insecurity. While the Afghan members of the team were able to travel on a limited basis, access was well below what would normally be expected for a *Final Review*.

Dates of review:

20 August to 31 October 2018

Referencing Note:

Most of the data mentioned in this *Final Review* is derived from the *Final Reports* prepared by the project teams [1] [2] [3], and no further referencing is used for these sources. If data or information is derived from other sources, however, it is fully referenced. All the documents that have informed the report are listed in Appendix 1.

Executive Summary

The *Afghanistan Agricultural Research for Development Program* comprised three research projects and was funded by the Australian *Department of Foreign Affairs and Trade* (DFAT). It ran from July 2012 to Dec 2018. This *Final Review* of the Program was undertaken by a three-person team between August and October 2018.

Program Relevance: Score 5

- The program aligned well with key Afghanistan Government policy and was especially relevant to the newly drafted *Dryland Agriculture Policy* and the associated *Dryland Farming Strategy*.
- The program was also a key investment of Australia's *Aid Investment Plan 2015-2018.*
- The integration of the three separately designed projects into a single program was not altogether successful. Program oversight, management, reporting and assessment have been enhanced by the integration, however more could have been done to facilitate the strategic and learning linkages between the three projects.
- The major benefit of the clustering was the improved appreciation by next users (which in this case includes Government, communities and civil society organisations) of the "tool box" of options that are available for local farming systems.

Program Impact: Score 4

- The importance of research for development work is found less in its immediate impacts, and more in its provision of a fertile foundation from which future development investments can grow.
- All three projects have successfully introduced logical and relevant technological options:
    - 30 new high yielding field crop varieties were released by MAIL;
    - The release of improved, disease resistant, high performing crop and forage varieties is no longer the constraint that it once was on improved production in Afghanistan;
    - Water conservation practices have been enhanced, and water conservation structures and other water productivity improvements have been developed and installed in 8 model watersheds.
- While results clearly indicate an interest in adoption, the evidence of actual adoption is mixed.
    - For Wheat and Maize, primary adoption has been promising (particularly for the irrigated wheat), with end-line and DNA surveys indicating that adoption of post-2002 varieties has increased markedly over the past six years.
    - For new forages, many more years of work will be needed before sufficient seed is available to widely test the adoption process.
    - While Integrated Catchment Management models are available, there is little understanding of household adoption of conservation practices.
    - Overall, the approach taken to understand adoption pathways has been disappointing given that this is an adaptive research program.
- Capacity improvements amongst government and other project stakeholders has been solid. The longer running *Wheat and Maize* interventions demonstrate MAIL's capacity to

assume professional capacity over time. For *ICM* and *Forages*, this process is in its early stages with some way to go.

Program Effectiveness: Score 4

- The *Wheat and Maize* project has achieved its planned activities and end of project outcomes.
- The success of *Wheat and Maize* has been largely enabled by the strong CIMMYT/ARIA partnership, with its established understanding of roles and expectations.
- The *ICM* and *Forages* projects have made significant progress, but have underperformed in a number of (well explained) areas.

Program Efficiency: Score 4

- Security concerns in Afghanistan have significantly constrained program efficiency and the rise in violent attacks during the program's life has led both ICARDA and CIMMYT to restrict their full-time international presence in Afghanistan.
- Evenso, CIMMYT and ICARDA have been able to operate in the country in a way that other 'international' collaborators could not have done.
- The use of annual third-country meetings has been a compromise that has allowed the teams to productively interact with the international stakeholders in ways that would not otherwise have been possible.
- Staff churn within both the project teams and MAIL has been an ongoing issue that has led to inconsistent delivery and relationships.

Program Inclusivity: Score 3

- The program has had limited success in its approach to gender inclusivity.
- The primary challenge lay within the teams themselves (the implementing agencies and their local partners) due to engrained norms and values.
- There is a significant need for attitudinal changes if the national research agenda is to benefit from a more nuanced and articulate approach to gender.
- The approach taken by the *Forages* project has been refreshing. The gender study led by KIT, identified both the challenges women face, and the opportunities they have to create space in which innovate, and to influence adoption decisions.

Program Sustainability: Score 3

- While MAIL/ARIA systems and processes around wheat and maize research are now well established, the inherently more complex systems associated with the ICM and Forages work need ongoing support and close coordination.
- MAIL needs to expand its on-the-ground partnerships and innovatively enhance these in future. The variety of mechanisms used by the R4D Program give some indication of what is possible e.g. the Wheat and Maize 'hubs', ICM's engagement with the WUAs and the CDCs, and Forage's NGO partnerships with local NGOs.
- The prevailing perception within MAIL of a linear approach to research, development and extension is neither helpful nor in line with best-practice. A more effective approach occurs when extension and research professionals form part of the same multi-disciplinary team from the very beginning.

The overall assessments of the three projects is summarised in the table below.

Program	Projects		
	Wheat and Maize	ICM	Forages
relevance 5	This was the major national research program contributing to Afghanistan's staple grain needs.	The need for effective community-based mechanisms to build ownership for watershed interventions in degraded catchments was significant. In an environment with unclear oversight, ACIAR's ICM project has had an equal profile to much larger engagements (e.g. SWIM).	Work on forages was critical if livestock fodder needs in both irrigated and rainfed farming systems were to be addressed.
impact 4	Improved post-2002 wheat varieties now dominate farmer plantings and the seed system. Improvements in yield, disease resistance, and agronomic practices have contributed to a steady increase in wheat productivity. The maize work has, however, had very limited impact.	The project's technological focus underplayed the parallel need for close community ownership and effective local delivery partnerships. Impact will take many years.	Germplasm has been tested and recommended. Delivery has, however, been compromised by limited seed production and the constraints on its broader distribution.
effectiveness 4	Improved varieties suited to national agro-ecological zones and incorporating high return agricultural practices have been developed. Adoption has, however, been slowed by the limited funding of the National Seed System to expedite delivery of the improved varieties.	Deliverables have been largely foundational, technical, and top-down in nature. Limited evidence of strong community ownership and adoption. The project has been significantly constrained by travel restrictions and the complex evolving nature of the delivery partnerships with Government, communities and NGOs.	A foundation has been delivered that is solid but well below aspirations. The challenges of interpreting the current seed regulations have been significant.
efficiency 4	A close operating partnership between CIMMYT, ARIA and the four regional Hubs has delivered an impressive array of research outcomes, while concurrently delivering demonstrable improvements in Afghanistan's research capacity.	A slow start and the need to focus the program delayed delivery. Significant progress has, however, been made in the last two years. Partnerships and relationships have required constant attention.	There were delays in getting the program off the ground; constant changes in leadership, and limited (if improving) engagement with MAIL. The forage work has not easily aligned with MAIL structures.
sustainability 3	ARIA has taken on the project's core activities; has the staff skills and resources to sustain project outcomes; and has a good appreciation of the associated opportunities and constraints. There remain, however, concerns regarding the availability and timeliness of budgets.	Some good demonstration sites and pilot sites have been established, but it is still very early days, and there is little evidence of adoption. The key will be the future coordination and oversight of Government – the current sustainability mechanisms seem more opportunistic than strategic.	The relevant MAIL departments need to integrate forage testing, distribution, and extension roles for both the rangeland and irrigated domains. The seed system for forages needs a more streamlined approach. Constructive engagement with NGOs shows their relevance. as a development partner.
inclusiveness 3	Despite CIMMYT having exceptional global capacity in women's inclusion, there is little evidence of gender-disaggregated or gender-focused adaptive research. .	Although some women have engaged in the WUAs, there is little other evidence of ICARDA adapting the program to incorporate the potential and opinions of women.	Some solid foundational studies were undertaken on the important role of women in forage production.

6 Exceptional 5 High 4 Good 3 Adequate 2 <Adequate 1 Poor

Recommendations

Number	Recommendation	MAIL	DFAT/ ACIAR	ICARDA/ CIMMYT	Page
Recommendation 1	ICARDA and CIMMYT need to place greater importance on the iterative measurement of adoption throughout the adaptive research cycle. The current practice of leaving adoption studies to the end of the intervention compromises understanding and the adaptation process. In addition, the approaches taken to studying adoption have been poorly designed, implemented and interpreted by the teams.			✔	23
Recommendation 2	After considered assessment, the Review Team would suggest to MAIL that a different, more streamlined process be used for the importation and testing of forage species that would expedite entry onto the National List of Varieties. A streamlined process that adequately ensures that standards are not compromised is considered sufficient. The subsequent distribution of forage seed should also consider using the "Commercial" and/or "True-Labelled" categories rather than the "Certified Seed" category.	✔			47
Recommendation 3	Dependable Government attendance by the same national project representatives at each third-country meeting is essential to ensure consistency.	✔			54
Recommendation 4	CIMMYT and ICARDA operations in Afghanistan need to take a more considered and serious approach to gender. The W&M and ICM project approaches to gender failed to take a professional approach and missed opportunities to tap into significant CIMMYT and ICARDA global expertise on gender.			✔	55

Number	Recommendation	MAIL	DFAT/ ACIAR	ICARDA/ CIMMYT	Page
Recommendation 5	MAIL systems, approaches, skills, and resources have taken time to develop, and will require ongoing mentoring, support and external advocacy if those changes are to be effectively institutionalised.	✔		✔	57
Recommendation 6	It is therefore recommended that ICARDA and MAIL conduct two further transition workshops (one for forages and one for ICM) in order to develop more detailed plans for moving forward.	✔	✔	✔	59
Recommendation 7	It is recommended that ICARDA and MAIL have a joint workshop with the SWaRMA implementing partners (ICIMOD and CSIRO) to discuss outcomes and consider future partnerships	✔	✔	✔	59
Recommendation 8	Integrated Catchment Management - Priority Sustainability Actions (See detail))	✔	✔	✔	60
Recommendation 9	Wheat and Maize Project - Priority Sustainability Actions (See detail)	✔	✔	✔	60
Recommendation 10	Forages Project - Priority Sustainability Actions (See detail)	✔	✔	✔	61

1. Background

In 2012, the Afghanistan *Ministry of Agriculture, Irrigation and Livestock* (MAIL), joined with Australia's *Department of Foreign Affairs and Trade* (DFAT), and the *Australian Centre for International Agricultural Research* (ACIAR), to collaborate on a four-year, $A17.735m program to improve and sustain the productivity of Afghan farming systems in water scarce environments through adaptive research[1]. This agreement included funding for ACIAR to run the three projects listed in Table 1.

Table 1: Projects comprising the four-year *Afghanistan Agricultural R4D Program*

Name	Lead organisation	Funding
Sustainable Wheat & Maize Production in Afghanistan *(referred to as the 'Wheat & Maize Project')* **[4]**	CIMMYT	$6,458,922
Integrated Catchment Management and Capacity Building for improving livelihoods in Afghanistan *(referred to as the 'ICM Project')* **[5]**	ICARDA	$5,375,893
Forage options for smallholder livestock in water–scarce environments of Afghanistan *(referred to as the 'Forages Project')* **[6]**	ICARDA	$3,644,392
Management and Oversight	ACIAR	$2,255,793
Total		**$17,735,000**

The largest of these projects – the Wheat and Maize project - is a veteran engagement, the fourth in a series of ongoing collaborations with CIMMYT in Afghanistan, the first of which commenced in 2002[2].

Initially, these three projects were envisaged to run in parallel. In practice, however, they commenced in a staggered fashion; the first two projects in 2012; and the third project in early 2014 (dark green in Table 2). Agreement was therefore reached in May 2015 for a no-cost extension to the first two projects to enable all three to end in December 2017 (light green). In 2017, DFAT and ACIAR agreed to further extend all projects to the end of September 2018 (blue in Table 2), leaving the three-month period until the end of 2018 for administrative closure of the overall program. These extensions were all justified by the slow pace and insecurity issues inherent to programs in Afghanistan.

During the six years of implementation, ACIAR's implementation partners have worked across seven provinces in the north of Afghanistan (Baghlan, Balkh, Herat, Kabul, Nangahar, Parwan and Takhar) (Figure 1).

[1] AusAID ACIAR Record of Understanding No 14376; Schedule 41.

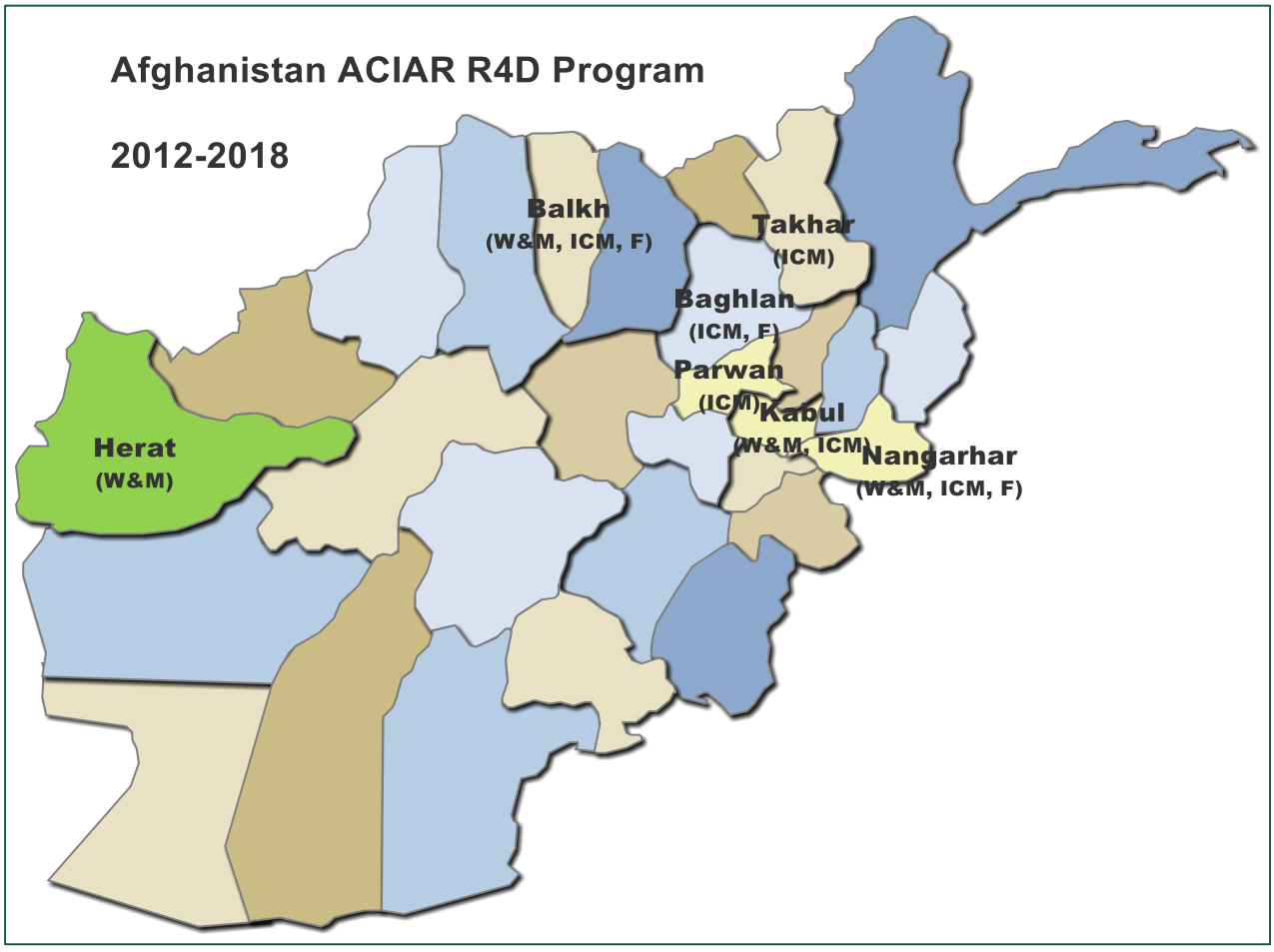
[2] The previous three projects were:

- SMCN/2002/028, Stress tolerant wheat and maize for Afghanistan: Seeds of Strength, a two-year project running from July 2002 to June 2004 (A$1m);
- CIM/2004/002 – Wheat and maize productivity improvement in Afghanistan, a three-year project running from Oct 2004 to September 2007 (A$1.1m); and
- CIM/2007/065 - Sustainable Wheat and Maize Production in Afghanistan, a four-year project running from October 2007 to December 2011 ($1.5m).

Table 2: Phasing of current ACIAR projects in Afghanistan

	2012	2013	2014	2015	2016	2017	2018
Sustainable Wheat & Maize Production in Afghanistan							
Integrated Catchment management							
Forage options for smallholder livestock							

Figure 1: ACIAR R4D Program supported research sites in Afghanistan



Context

Over 80 percent of Afghanistan's population, and 90 percent of its poor, live in smallholder farming households. Afghanistan's smallholder farming systems are inevitably complex and heterogenous. Livelihoods depend on variable combinations of irrigated, rainfed and rangeland activities with differing crop and livestock options for each. Cereals (particularly wheat) and livestock are, however, the staples of most Afghan households. Wheat is grown on about 2.5 million hectares, and more than 20 million rural people (or about 7 to 8 million households)

directly depend on the crop. On average, about 1.17 million hectares of irrigated wheat is grown each year, and up to 1.38 million hectares of rainfed wheat (depending on season, and mainly in the northern Provinces). These same households also depend on livestock (largely small ruminants) for meat, milk and income.

The potential scale and relevance of work to assist Afghanistan's crop/livestock systems is therefore enormous. The *Afghanistan R4D Program* aimed to integrate research work around three critical needs of these small-holder farming systems – improved grain productivity, improved year-round fodder availability, and improved management of critical watersheds [7].

A 'typical' smallholder household forms part of a village that has been strategically located to ensure its inhabitants can access sufficient land and water to sustain their subsistence and livelihood needs. The villagers typically depend on water from seasonal streams (usually dependent on intermittent snowmelt and rainfall), springs (often tapped using traditional Karez systems) or underground water (traditionally accessed through wells). This water is generally enough for the needs of household, livestock and some irrigation.

Within the village, each household will have access to areas of both family and communal land including:

1. **Irrigated Farming:** There will be a small area (usually less than 1 ha) of irrigated land. Informal (traditional) community-owned and managed irrigation systems account for about 90% of irrigation in Afghanistan [8]. However, water supplies vary from place to place, and over time. What is termed "irrigated" land often receives no more than supplementary irrigations (and is therefore usually dependent on rainfall and stored soil moisture for at least a proportion of a crop's requirements) [9];
2. **Rainfed Farming:** In the northern parts of Afghanistan, smallholders also have access to a larger area of rainfed land that is farmed opportunistically as precipitation and stored soil moisture allows; and
3. **Communal grazing areas and rangelands:** Rangelands provide fuelwood, grazing and forest products (largely almonds and pistachios). Herd sizes vary significantly, but are usually limited to less than 5 cattle and 20 sheep and/or goats. These animals graze on stover, communal pasture, and rangeland fodder plants, but require supplementary feeding during the winter and early spring [10].

The reason why the ACIAR program has integrated support across all three systems was to ensure that the complex needs of Afghanistan's smallholder families would be actively considered and integrated into the outcomes by the research teams (Figure 2). The integration of the three projects into a programmatic structure further provided synergies in governance, management and delivery.

The approach taken has appreciated that:

1. The watershed is the basic unit for adaptive research. Watersheds in Afghanistan are gradually being degraded as the previously existing rules and norms that guided household and communal access to resources are eroded by insecurity, displacement, poverty, and the loss of traditional systems [9]. Exploitation and destruction of fragile rangelands and woodlands for fuelwood, and by overgrazing and opportunistic cultivation have led to:

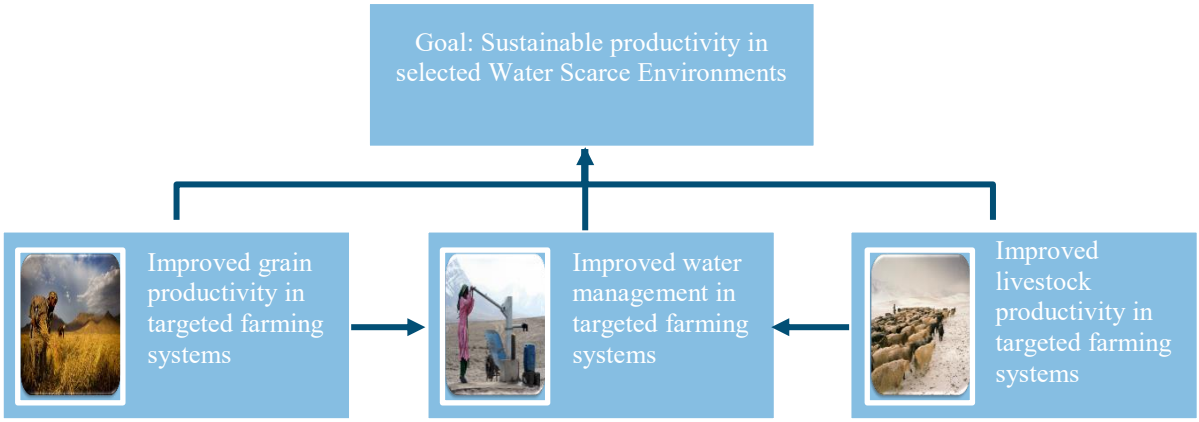
a. the denudation of many catchments;
b. significant increases in runoff intensity causing erosion and down-stream flooding; and
c. a decline in infiltration with subsequent reductions in spring yields and consistency.

These effects are being exacerbated by climate changes characterised by reducing snow falls and increasingly erratic weather patterns [11]. There is therefore a vital need to improve the community-based management of critical watersheds through improved community understanding, implementation, and ownership of simple conservation and production technologies.

2. Afghanistan's staple food production depends on wheat, yet the yields of the traditional varieties are very low. National consumption has been increasing rapidly at the same time that annual production has been declining, leading to an ever-increasing dependence on food imports. There is therefore significant opportunity to improve productivity and production for both irrigated and rainfed farming systems by introducing and testing germplasm to identify high-yielding varieties that are better adapted to Afghanistan's low-input systems.
3. Lastly, almost all rural households depend on livestock for food and income security, yet these animals often suffer significant feed shortages through the winter and early spring. This reduces productivity and fecundity, and leads to the overgrazing of the country's fragile ecosystems. Furthermore, the fodder seed that is available at the local markets is usually limited to poor quality lucerne and berseem clover. Improved forages for irrigated, rainfed and rangeland situations are desperately needed to improve feed availability and reduce the pressure of grazing.

These three priorities reflect those of MAIL's Dryland Farming Strategy that was released in 2015 [12].

Figure 2: Results hierarchy of the Afghanistan Research for Development Program (taken from the *Results Framework*)



2. Methodology adopted for review

This document is the *Final Review* for the *Afghanistan Agricultural R4D Program* and as such it complements the program's *Annual Results Reports* produced in 2014, 2015, 2016 and 2017 [13, 14, 15, 16]. Due to security constraints, this *Final Review* did not include an in-country mission by the whole team. Because of this limitation, and to ensure best possible practice, the team prepared a *Final Review Workplan* [17] prior to undertaking the assignment, core sections of which are reproduced in Appendix 3: *Final Review Workplan*. The Workplan ensured a common understanding of the key issues and questions, and also provided the opportunity for considered input from DFAT, ACIAR and MAIL before the review commenced.

This *Final Review*:

- focuses on cumulative results up to and including September 2018, however some production results were only available up until Afghanistan's 2017 growing season[3]; and
- summarises and consolidates the **program level** outcomes and impacts achieved by the individual projects. These are those outcomes proposed and agreed in 2014 by each project team and included in a *Program Results Framework* [18], against which each project has been annually assessed (the main tables from the *Results Framework* are reproduced in Appendix 4).

The *Final Review:*

- adopts a 'utilisation focused approach' [19] (meaning it is structured to improve the way in which the major stakeholders (MAIL, DFAT and ACIAR) can make use of the findings);
- assesses the program using the six core criteria for evaluation of development assistance - relevance, effectiveness, efficiency, impact, sustainability and inclusivity [20];
- has a layout which, while based on the standard ACIAR review format, deviates from it in both its sequencing and emphasis to ensure that the needs of all the partner agencies (MAIL, ACIAR and DFAT) are addressed - this was agreed in the *Final Review Workplan*;
- emphasises the scheme level achievements of the overall program, and does not focus on the detailed outputs and activities of the individual projects.[4]
- is underpinned by:
    - desk-based assessments
    - key informant interviews including key meetings in Mazar-i-Sharif and Kabul (undertaken by the Afghan team members) and Australia (undertaken by the Team Leader). Tele-conferencing was used as much as possible to bring the team and the key stakeholders together.
    - two workshops held on the 9th August and the 15th September in Afghanistan; and
    - two field monitoring visits to ICM sites conducted jointly by the Afghan review team members and MAIL (one site in Kabul and at two sites in Balkh Province).

[3] Results from the 2018 season are yet to be collated and analysed.

[4] Note that project level achievements against their proposed objectives are included *in Appendix 5: Review of Project Specific Outputs.*

Sampling of interviewees was purposive rather than random. The aim was to provide the *Final Review* with a meaningful overview of the program within the time/resource constraints it was facing. A list of interviewees is provided in Appendix 2.

The *Final Review* team presented its initial findings to a workshop of Program stakeholders in New Delhi in late September 2018. This provided all stakeholders with the opportunity to clarify the findings, correct misinterpretations, and add value to the review, prior to the report's finalisation.

A focus throughout this *Final Review* is on options to improve performance and build learning. It also included discussion with ACIAR on how the lessons might inform its future activities.

Figure 3: Farmer survey work provided essential information on farmer perceptions and adoption constrains for all three projects.

3. Program Relevance

The *Afghanistan Agricultural R4D Program* has been highly relevant to all stakeholders (Score of 5). Support for agricultural research in Afghanistan aligns with the priorities of the Government of Afghanistan and MAIL. In particular, the research contributes directly to:

- the four priorities of MAIL's Dryland Farming Strategy (DLFS) [12] - grain productivity; diversification of crop and livestock; watershed management; and Government capacity. The *DLFS Implementation Plan* [21] emphasises the importance of adaptive research across all four priorities, including the need to strengthen the Government's research capacity in its servicing of the needs of dryland farmers.
- MAIL's recently drafted *National Dryland Agriculture Policy* [22] and *National Irrigation Policy* [8], through its focus on the improved productivity and production of irrigated wheat, maize and forages; and
- the Government's *Food Security and Nutrition Strategy 2015-2019* [22] through a focus on "*measures to increase food production and availability*".

Originally, MAIL's leadership was keen to collaborate with Australia given its agro-climatic similarities and reputation for advanced innovation. Australia has, however, been only partly responsible for the program's successes. At the "Management" level, ACIAR's Australian Research Program Managers and M&E Specialists have guided the direction and emphasis of the work. In addition, Australia's CSIRO and Murdoch University have made important technical and germplasm contributions to the forages project. To be fair though, the majority of the innovation has originated from the CGIAR implementing partners (CIMMYT and ICARDA) who, through their global networks, have introduced technologies and innovations that have been appropriate for the Afghan context.

The original aspirations for deeper bilateral links have been limited by the security restrictions on Australians visiting Afghanistan, as well as the challenges that Afghan nationals faced in obtaining visas to visit Australia. All major interactions have occurred, in fact, during third-country workshops organised in India, UAE, Turkey or Jordan.

From an Australian perspective, the *Afghanistan Agricultural R4D Program* aligned with its *Aid Investment Plan* (AIP) [23] which required rural development assistance to be focused on building resilience, particularly of the smallholder farmers dependent on Afghanistan's water-limited farming systems[5]. Under this objective of the AIP, Australia funded three major investments:

- this ACIAR-led Agricultural R4D Program,
- an NGO-led *Australia Afghanistan Community Resilience Scheme* (AACRS), and
- the Government-led initiatives funded through the *Afghanistan Reconstruction Trust Fund* (ARTF).

Strategically, this was a coherent and linked suite of initiatives. Operationally however, it was less coherent due to the formidable and ongoing implementational challenges faced by all

[5] AIP 2015-16 Objective 3 - Building resilience and supporting at-risk populations.

development programs in Afghanistan. Nevertheless, the core stakeholders appreciate the relevant and focused nature of Australian support.

The three projects of the *Afghanistan Agricultural R4D Program* have been implemented by two research agencies belonging to *Consultative Group on International Agricultural Research* (CGIAR)[6] system - CIMMYT and ICARDA, all three projects having aligned with the CGIAR Research Programs (CRP).

The integration of the three separately designed projects into a single program has also not been altogether successful. The *Final Review* team received several comments from the both the Implementing Partners and their Afghan counterparts to the effect that more could have been done to facilitate the strategic, operational and learning linkages between the three projects. ACIAR would also have liked to have overseen more integration between the projects, but then the restrictions on travelling to Afghanistan combined with the high cost of third-country meetings limited the opportunities available. Overall, there has been limited opportunity for greater strategic coherence.

As seen in recent ACIAR reviews of similarly clustered programs (e.g. in Myanmar [24] and Pakistan [25]), the major benefit of the clustering of farming system research, is that it helps the next users (which in this case includes Government, communities and civil society organisations) appreciate the "tool box" of options that are available for local farming systems. Thus, it lessens

Figure 4: The Forages Project introduced innovative cereal/vetch mixtures to improve productivity and forage options.

[6] CGIAR is a global research partnership of 15 major research centres dedicated to reducing poverty, enhancing food and nutrition security, and improving natural resources. Both DFAT and ACIAR provide core donor support to the CGIAR.

the likelihood that those next users will become focused on single technology solutions. Community leaders, NGOs and Government have all acknowledged the benefit of this wholistic approach.

Yet despite the integration of the projects under a broad strategic framework having been less than optimal, there have nevertheless been some benefits. Dialogue, discussion and collaboration between the implementing partners have almost certainly been better than they would otherwise have been, as has the integration of work within and between MAIL, PAIL, and DAIL. In addition, the integration has helped forge links between Government, large civil society organisations (such as the Aga Khan Foundation and Action Aid), and the communities.

4. Program Impact

Improved and sustained productivity of Afghan farming systems in water scarce environments through adaptive research.

The *Afghanistan Agricultural R4D Program* has achieved an overall ranking of 'Good' (4). The importance of research for development work is found less in its immediate impacts, and more in its provision of a fertile foundation from which future investments can grow. In keeping with which, the measures of success during the *Afghanistan Agricultural R4D Program*'s life-cycle were kept simple and focused on:

- quantifying the changes in productivity and production;
- assessing the potential for/ the challenges faced by adoption - and thus how to stimulate adoption; and
- building improved capacity within MAIL and other 'next users' to sustain the systems introduced, and the benefits realised.

Potential productivity and production improvements

The aim of the three projects was to introduce promising technologies into the relevant farming systems, while ensuring that these were adapted to Afghan conditions. All three projects have successfully introduced logical and relevant technological options, as evidenced by the controlled testing on research stations and in farmer fields. Australia's collaboration with CIMMYT, ICARDA and MAIL has delivered:

- **New improved wheat and other staple crops varieties**: Since 2002, Australian support to CIMMYT, ICARDA and ARIA has resulted in the release of 25 wheat, 10 maize, 6 barley, and 2 chickpea varieties. The current phase of support (2012-2018) has contributed more than half of this overall output - 18 wheat, 6 maize, 4 barley and 2 chickpea varieties.

  What is now clear is that the release of improved, disease resistant, high performing crop and forage varieties is no longer the constraint that it once was on improved production in Afghanistan.

  The wheat lines released (mainly by CIMMYT but also by ICARDA) have included irrigated varieties with the potential to produce around 6T/ha on average, and rainfed varieties with the potential to produce 3.8T/ha (noting that yields vary from year to year and region to region). The improved varieties have outperformed the best available check varieties by an average of 15 to 16 percent, and have demonstrated the potential to exceed traditional and older varieties by 40 percent or more[7]. Yields across thousands of on-farm demonstration trials show improvements of 1.4 T/ha to 2.2 T/ha under irrigated

[7] The 2,700 farmer field demonstrations conducted in four provinces between 2012 and 2018 yielded 45 to 81% higher than farmer practice.

conditions, and 0.3 T/ha to 0.76 T/ha under rainfed conditions. Each extra tonne of production results in an additional income of US$300 for the farmer.

Significant improvements were also achieved with the other crops. The four open-pollinated maize varieties released in 2018 all delivered an average irrigated yield advantage of more than 50 percent compared with the current lines.

In addition, CIMMYT has undertaken significant rust screening for all new wheat varieties, and has catalogued susceptibility patterns over the past 5 years. All new wheat varieties show adequate field resistance to current yellow rust strains, while about two thirds are also resistant to the virulent stem rust, Ug99. Furthermore, close collaboration with MAIL has helped rationalise Afghanistan's seed system so that it now includes only those varieties with a low susceptibility to yellow rust.

The work on agronomic practices has complemented the varietal introduction. In particular, the introduction of row seeding (instead of broadcast seeding) has shown the potential to improve yield by about 20 per cent.

- **New forages:** The program identified 9 annual and perennial forage species, which are currently awaiting official release. Most of these forage species have been newly introduced, and hence direct comparisons with existing farmer practice has been limited. Some forages have been recommended in their own right, while others have been recommended as part of cereal/legume mixes.

  The program has also introduced several dryland shrubs, particularly *Atriplex* spp. (saltbush), and a spineless forage cactus. These have shown significant potential to improve and stabilise rangeland productivity.

  Overall, the project has demonstrated that these varieties can improve both the quantity and quality of available forage, particularly at times of seasonal scarcity - each of the recommended forages and forage mixes shows good yield and nutritional benefits, particularly for the winter/early spring period when feed shortages regularly occur.

- **Improved practices to manage fragile watersheds.** Water conservation practices have been enhanced, and water conservation structures and other water productivity improvements have been developed and installed in 8 watersheds[8]. The community-based watersheds are home to 4,688 households, living in 9 villages, spanning 5 Provinces.[9] Almost 686 conservation structures have been built in these communities, allowing for the capture (through storage or infiltration) of up to 8 megalitres of water, about 5 megalitres of which is available for consumption and irrigation, and 3 megalitres for renewal of soil moisture levels through infiltration and percolation. These structures have also served to lessen the severity of flooding, and to reduce erosion. This infrastructure has been complemented by productive innovations across a total of 170ha, the focus being on fruit and nut trees (primarily pistachio, but also mulberry, grape and pomegranate), the spice asafoetida (heng), and atriplex for fodder (in collaboration with the *Forages* project). The range and quality of the currently available species/ varieties

[8] 7 of which are community-based, while one (Badam Bagh) is at a MAIL Research Station.
[9] Overall the focus of the project has been on smaller micro-catchments specifically relevant to local communities.

have therefore been broadened, and improved agronomic and conservation practices for both irrigated and rainfed situations have been introduced.

These changes are important, but the current scale is limited given the research focus of the program. The challenge will be to identify effective mechanisms to scale these practices across watersheds.

Evidence of Adoption

One of the aims of the program was to ensure that the practices it was promoting were appropriately understood and adoptable, especially by the primary beneficiaries. Yet although at the end of the program results clearly indicate an interest in adoption, the evidence of actual adoption is mixed[10]. For example:

1. The *Forages* project provides anecdotal evidence of demand by its small number of direct farmer beneficiaries for specific forages (48). It is, however, struggling with the official varietal release process, and the resulting slow availability of improved seed. The overall consensus is that clear evidence of actual adoption will require more years of work. The onus is placed upon both ARIA and the Extension Service System to collaborate in demonstration trials and farmer awareness. The project has, however, done a particularly good job of documenting the perspectives of both women and men regarding the challenges faced in managing livestock in often difficult environments [26].
2. For the *Integrated Catchment Management* project, direct beneficiaries across the 7 community-based watersheds have been supported through the provision of both inputs and wages to establish water conservation infrastructure and productive assets. This has, however, been a slow and incentivised process. Currently there is solid anecdotal evidence that communities appreciate the work. However, the beneficiary and stakeholder comments generally focused on the value of specific infrastructure or crop options, with little apparent appreciation for the need to integrate multiple management mechanisms at the catchment level if the work is to be sustainable. Work in later catchment show a distinct evolution in team thinking with a more integrated approach. Given the relative sophistication of global approaches to integrated catchment management it is unfortunate that the team took such a limited 'technology' focused approach.
3. For the *Wheat and Maize* project, the demand for the new wheat varieties is both demonstrated and widespread. Primary adoption has been promising (particularly for the irrigated wheat), with end-line surveys indicating that adoption of post-2002 varieties has increased markedly over the past six years. The widespread adoption of the new varieties has also been evidenced by recent DNA assessments [27] of farmer seed collected in 2015/16 - this showed that the majority (78 percent) of farmers were growing post-2002 varieties, and that the majority (70 percent) of these varieties were CIMMYT lines[11]. Nevertheless, there was only one farmer (in Nangahar) growing a line released by the current (post-2012) phase of the project.

[10] Primary adoption is where direct beneficiaries are sufficiently confident/informed to continue and/or expand the practices AND can access the necessary inputs (e.g. seed, information etc).
[11] Most of this (90 percent) was Chonte 1 (released in 2010) and Muquawim 09 (released in 2009).

ACIAR's R4D program has therefore been able to demonstrate only modest levels of adoption for forages and ICM but better results for wheat (but not maize). Overall adoption has been constrained by reasons beyond the program's control:

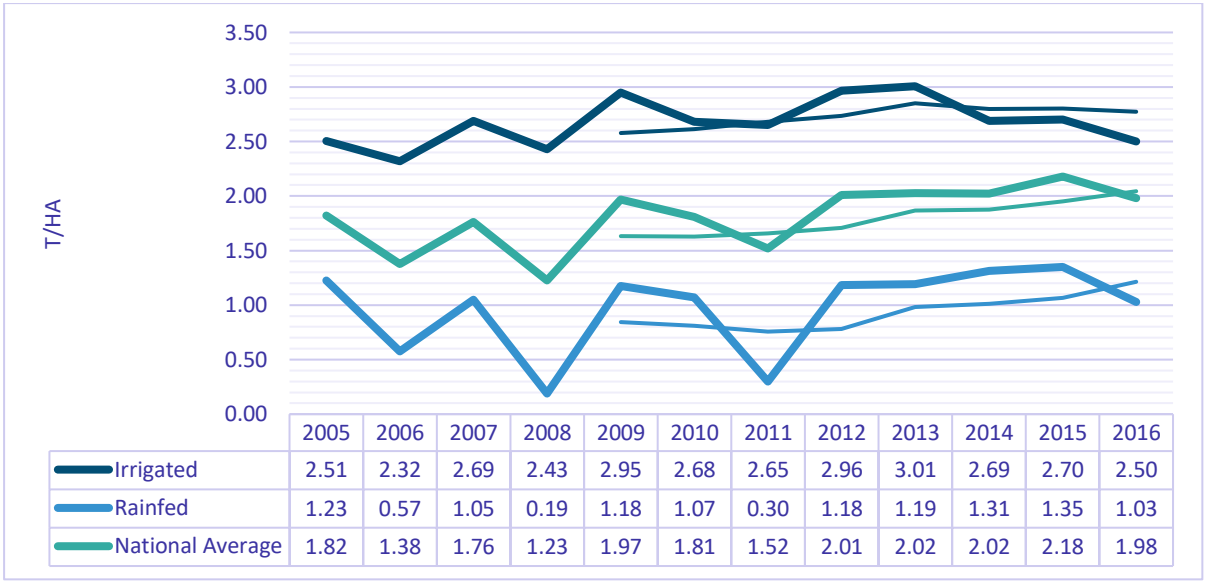
- Security constraints which have limited researcher interaction with collaborators, and access to communities;
- The need to nurture and integrate with nascent or developing Government systems and processes;
- The need to strengthen institutional ties between the research and extensions arms of MAIL, and
- The limited capacity of the current seed system (see Case Study).

However, it is also apparent that the program has been insufficiently focused on understanding and measuring the adoption process as an integral part of its adaptive research.

> ***Recommendation 1.*** *ICARDA and CIMMYT need to place greater importance on the iterative measurement of adoption throughout the adaptive research cycle. The current practice of leaving adoption studies to the end of the intervention compromises understanding and the adaptation process. In addition, the approaches taken to studying adoption have been poorly designed, implemented and interpreted by the teams.*

Another way of assessing the impact of the program is to look at the real increases in the average national production during the years of Australian support, the only available production data being for wheat (Figure 5). However, even the wheat data is only indicative, as it is derived from an amalgamation of local estimates published in the Government's *Annual Prospects Reports*.

Figure 5: Changes in Average national wheat productivity (MAIL Agricultural Prospects Reports)



	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Irrigated	2.51	2.32	2.69	2.43	2.95	2.68	2.65	2.96	3.01	2.69	2.70	2.50
Rainfed	1.23	0.57	1.05	0.19	1.18	1.07	0.30	1.18	1.19	1.31	1.35	1.03
National Average	1.82	1.38	1.76	1.23	1.97	1.81	1.52	2.01	2.02	2.02	2.18	1.98

With this caveat, a 5-year rolling trendline indicates:

- a gradual improvement in overall productivity from 1.6 to 2.0 T/ha;
- the growth and stabilisation of rainfed wheat productivity, primarily due to three seasons of good rain;

- a plateauing of irrigated wheat productivity, which cannot easily be explained.

Several factors could have contributed to these overall increases in productivity including: improved infrastructure, inputs, and knowledge. However, the gradual influx of higher yielding and disease resistant germplasm will have certainly accounted for a portion of the productivity gains. Even if we assume that improved genetics accounts for just a quarter of this, it would mean that the new varieties have improved production by almost 1 per cent annually – or 25,000T/yr (approximately US$8m/year).

Improved Stakeholder Capacity

All 3 projects have had a solid focus on the capacity building and support of MAIL. It has been the *Wheat and Maize* project, however, that has most clearly demonstrated the benefits of its long-term enabling approach in establishing the skills, practices, systems, and resourcing necessary for MAIL to sustainably manage its research services. MAIL now has the capacity to maintain a program of wheat and maize evaluation across Afghanistan's major agro-climatic zones. Furthermore, MAIL has adopted the agro-climatic zone approach, uses this as part of its annual research planning, and has also shown a willingness to respond to advice originating from the program. For example, the Ministry has made a concerted effort to address concerns in two areas:

- The withdrawal of yellow rust susceptible varieties from the certified seed system; and
- The need for the more expeditious introduction of newly released varieties.

It is, however, important to note that the level of improved capacity and influence achieved by the *Wheat and Maize* project has taken 15 years to mature.

Both the *Forages* and *Integrated Catchment Management* projects, on the other hand, are still in the early stages of a similar journey. Their early stage work is being challenged by limited policy clarity, constrained staff capacity (numbers, skills and resources), and uncertain systems and practices. The ICM project is nevertheless generating significant interest, with MAIL working to understand how it can roll out improved ICM practices on a national scale in order to meet goals under the MAIL's *Dryland Farming Strategy* which specifically calls for the rehabilitation of 100 critical watersheds across the country.

The *Forages* project, on the other hand, has found it more difficult to engage effectively with MAIL, partly due to the project's limited in-country resources, but also because of the fragmentation of responsibilities within MAIL for forage, pasture and rangeland management. It has therefore been challenging for the project to capture any one person's attention. It appears, however, that the situation has recently improved. Evidence of increasing traction within MAIL includes the recent reinvigoration of the forages Steering Committee, and the running of collaborative transition workshops to find ways of addressing critical issues (e.g. refining the systems for the release of forage varieties[12]). Scope therefore exists for ICARDA to work with MAIL over the coming years to improve the integrated delivery of the forage varieties.

[12] This workshop is scheduled for September 2018.

Finally, while wheat varietal selection has led the way, it has been the integration of research within the R4D Program that has revealed to all stakeholders the depths of the challenges being faced in seeking to address Afghanistan's complex issues. One important outcome has been the realisation by MAIL that it cannot act alone, and that success requires its active collaboration with communities, CSOs, NGOs, the Private Sector, other Ministries and development partners. Ongoing integrated support from the Afghanistan Government and its people will therefore be essential if the outcomes of the *Afghanistan Agricultural R4D Program* are to be attained.

Figure 6: The Wheat and Maize Project has established eight mobile seed cleaners (two in each "Hub"). These are managed by MAIL and used by farmers to clean seed before storage and ensure better germination and freedom from weed seed.

Case Study: Afghanistan's Seed System

Figure 7: Scientists take readings of rust disease at the Shishambagh Research Station, Nangarhar

Improving the seed of crops and forages is a challenge. Getting that seed to farmers can be an even greater challenge. Afghanistan's seed system, and the private sector organisations engaged in seed production, have been unable to meet the demand of farming communities for improved wheat seed. Moreover, the seed system has had almost no capacity to handle other crops (such as maize) or forages. With Australian support, CIMMYT, ICARDA and ARIA have therefore been constantly advocating for change, and working constructively with MAIL's Seed Department to make improvements, with the result that MAIL has now made significant reforms, including to the leadership and management of the Seed Certification Department. The collaboration of CIMMYT, ICARDA and ARIA has also resulted in a recent joint paper on wheat. [13]

More, however, is still needed, there being four key issues that need addressing simultaneously:

Re-establish the Seed Market

MAIL needs to re-establish the seed market by reducing the predilection of Government and donors to distribute large quantities of highly subsidised seed. Constant donor and Government provision of subsidised seed has compromised the market, undermined private sector competitiveness and, as a result, the seed market has contracted severely. Furthermore, there is no effective market for certified seed of crops other than wheat and the seed that is available is overly expensive.

MAIL has been actively addressing the issue by reducing the restrictions on seed production [14], and by opening up a market for "true labelled" seed. This has had some impact, with certified seed production expected to reach 30kT in 2018/19, and a noticeable reduction in the local price of seed.

However, for crops such as forages, which includes multiple species and varieties, the seed system is not able to cope. Forages will require an alternative more streamlined processes for release and distribution. The designation of "Commercial" and "True-Labelled" seed in the draft seed regulations [26] may help in achieving this.

Increase Certified Wheat Seed Production

MAIL needs to work both with its Improved Seed Enterprise (ISE) and with private seed

[13] Sharma, R., Nang, M. (2018). *Afghanistan wheat seed scenario: Status and imperatives.* International Journal of Agricultural Policy and Research Vol.6 (5), pp. 71-75, May 2018. https://doi.org/10.15739/IJAPR.18.008i

[14] The Government owned ISE can now produce Certified Seed and some PSE's can now produce Foundation Seed.

enterprises (PSEs) to increase the supply of certified wheat seed to ensure a minimum 10 per cent "replenishment rate" per year of the annual seed requirements. Over the first five years of this decade there was a rapid reduction in the volume of certified wheat seed produced each year in Afghanistan (24kT in 2010/11 to 10kT in 2017/18), resulting in the critically low current "replenishment rate", which now only averages 3.7 percent of the country's annual seed requirements (275kT in 2017/18) [15]. Ideal replenishment rates vary depending on the risks (e.g. disease pressure) but a preferred replenishment rate for Afghanistan would be a minimum of 10 percent. This would require at least 30,000T of certified wheat seed per year – two to three times what is currently available.

EXPEDITE THE AVAILABILITY OF NEW VARIETIES

MAIL needs to speed up the availability of the recently released varieties, be it through the certified seed scheme or other less demanding systems. Eight of the wheat varieties released during the project's most recent phase have entered early certified seed production [16], accounting for about 25 percent of breeder seed planned for 2017/18. However only two varieties from the most recent phase are yet available as certified seed, accounting for just over 16 percent of the volume planned for 2017/18. It is recognised that the multiplication of released lines takes time. It would, however, be enormously beneficial were MAIL to expedite this process as much as possible. As it stands, the current modest rate of inclusion could result in new strains of yellow rust compromising the resistance of the released lines before they are even made available (see below).

QUICKLY REMOVE VARIETIES THAT LOSE DISEASE RESISTANCE/TOLERANCE

Yellow rust testing indicated that many of the pre-2002 wheat varieties (e.g. Ghori-96, PBW-154, Daima-96 and Herat-99) were susceptible to emerging strains. Due largely to CIMMYT's strong lobbying, MAIL reduced the availability of these rust-susceptible varieties. The levels of yellow rust susceptible varieties in the certified seed system has therefore fallen from 48 per cent in 2010/11 to less than 4 percent in 2017/18. Overall, about 76 per cent of Certified Seed is now of the newer (post-2002) varieties, the bulk of which have resulted from Australian collaboration with CIMMYT and ICARDA. All these latter varieties show adequate field resistance to common yellow rust strains, and about half are also resistant to the more recent Ug99 rust strain. This shift alone has resulted in significant yield improvements, particularly in wet years during which losses from yellow rust can be very extensive. Nevertheless, vigilance is required, as yellow rust strains are constantly emerging. The NSDN testing during 2017/2018 has, in fact, indicated that half of the varieties with seed currently being produced are susceptible to a new strain. This is yet another reason for the seed system to be much more agile in moving newer varieties into the system. If this new strain becomes established, then these susceptible varieties will have to be quickly replaced in the certified seed scheme.

[15] The replenishment rate for irrigated varieties is 5.2 percent, while the replenishment rate for rainfed varieties is a disastrous 1.5 percent.

[16] Either as Breeder or Foundation seed.

5. Program Effectiveness

Overall the review has ranked the *Afghanistan Agricultural R4D Program* as being 'Good' (4). The *Wheat and Maize* project has achieved its planned activities and end of project outcomes. The *ICM* and *Forages* projects have made significant progress, but have underperformed in a number of (well explained) areas. The success of *Wheat and Maize* has been largely enabled by the strong CIMMYT/ARIA partnership, with its established understanding of roles and expectations. As mentioned, the *ICM* and *Forages* projects have needed to establish many of these relationships from scratch.

This Chapter reviews the achievements of each project against its longer term and end-of-project outcomes. More detailed information on outputs and intermediate outcomes can be found in Appendix 5: *Review of Project Specific Outputs*.

Program Outcome 1: Improved Grain Productivity in Targeted Farming Systems

Increase both the quality and availability of improved wheat and maize varieties adapted to the irrigated and rainfed farming systems of Afghanistan.

A	Outcomes	Score
A1	Skills and knowledge change	5
A2	Institutional and group practice change	4
A3	Communication, extension, dissemination	4
A4	Publications, scientific outputs	4
B	Best practice and impact	
B5	Governance	5
B6	Relevance / Appropriateness	6
B7	Efficiency	6
B8	Effectiveness	5
B9	Impact	5
B10	Sustainability / Legacy	5

Summary

Wheat: Since 2012, Australian support has resulted in the release of 23 wheat varieties by Afghanistan's *National Varietal Release Committee* (NVRC) (18 CIMMYT and 5 ICARDA selections[17]) – almost three times more than the program originally predicted. These included 15 varieties[18] suited for irrigated systems and 8 varieties, suited for rainfed systems. These varieties deliver both improved yield and disease tolerance.

Maize: CIMMYT has also exceeded its target for the release of maize varieties, the NVRC having approved the release of three maize hybrids [25] and four open pollinated (OP) maize varieties. [19] The national seed system is, however, currently unable to manage the hybrid varieties

[17] In 2013 ICARDA attributed the release of varieties to Australian support.
[18] Made up of four pasta (durum) wheats and 11 bread wheats.
[19] With open pollinated varieties farmers can save a proportion of seed for future crops, thereby reducing costs

due to its weak infrastructure, its inability to isolate seed production, and the poor participation/ lack of interest of private companies. There is, however, enthusiasm for the OP varieties to be integrated into the seed system, and good acceptance by ARIA and the ISE, and by private sector companies. It has therefore been unfortunate that the release of these OP lines was delayed until very late in the project's life.[20]

Improved wheat varieties arising from Australian support now comprise 90% of the certified seed distributed in Afghanistan.

Adaptation to Afghanistan's Agroclimatic zones

While the core outputs of *Wheat and Maize* have related to the development of the new varieties, work on agronomy and phenology have also had important results:

- in line with the experience of other countries, row seeding in Afghanistan has increased yields by an average of 20-25 per cent over the broadcasting of seed; and
- Phenology trials have confirmed that the wheat growth rates in Afghanistan's six agro-climatic zones are significantly different. Thus, blanket recommendations are inadequate, and recommendations regarding variety, planting time, management and pest control have been tailored to each agro-climatic zone. CIMMYT has refined its recommended planting times and seeding rates to reflect the six agro-climatic zones of the country, as shown below, and as summarised in local factsheets for each of the zones [30] [31].

Agro-climatic Zone	Winter wheat sowing time	Spring wheat sowing time	Rainfed wheat sowing time	Wheat Seed Rate kg/ha (broadcast)	Maize sowing time
Western		5 - 15 November	6-20 December		
Northern	10-30 November	10-30 November	15-30 November	125-140 sw/ww 70-80 rf	10-25 June
Eastern	15-30 November	15-30 November	-	125-140 sw/ww	20 June to 5 July
South Western	10-30 November	25 November to 10 December	1-15 December	125-140 sw/ww 70-80 rf	5-20 June
Southern		1-10 December			
Central	10-30 October	20 October to 10 November	20 November to 5 December	125-140 sw/ww 70-80 rf	1-15 May

[20] Demonstration plots were continually compromised by early harvest for immediate silage needs or the theft of cobs from sites.

Progress against agreed indicators

Indicator	Target	Final Achievements 2018
Number and productivity benefits of the new officially released wheat and maize varieties.	• Wheat: 8 new varieties (5 irrigated, 3 rainfed) (Minimum yield benefit: 5 per cent and/ or disease resistance). • Maize: 3 new varieties (average productivity benefit: 10 per cent and/or disease resistance).	Information on the improved varieties released between 2013 and 2018 is summarised below (Table 3). As mentioned, the release of improved varieties of wheat and maize is well above target.

Table 3: NVRC varieties released in 2013 and 2014 that arose from Australian support to ICARDA and CIMMYT

Year	Project	Crop	NVRC Name	Type	Farming System	Average yield T/ha	% over check variety	Rust Resist
2017/ 18	W&M	Bread wheat	No name	Spring	Rainfed & heat	6.6	13	All
	W&M	Durum wheat	No name	Fall	Irrigated	6.2	18	All
	W&M	Wheat	No name	Winter	Irrigated	6.9	16	All
	W&M	Maize	BOLAN 97	Open pollinated	Irrigated	8.3	59	NA
	W&M	Maize	KABUL 97	Open pollinated	Irrigated	7.9	52	NA
	W&M	Maize	CIMMYT 97	Open pollinated	Irrigated	8.1	55	NA
	W&M	Maize	ARIANA 97	Open pollinated	Irrigated	8.2	56	NA
2016/ 17	W&M	Bread Wheat	Lalmi 17	Spring	Rainfed all zones	3.68	11	All
	W&M	Durum Wheat	Durum 03	Facultative/ spring	Irrigated all zones	3.62	17	All
	W&M	Bread Wheat	Daima 17	Spring	Rainfed all zones	5.93	10	All
	W&M	Bread Wheat	Shamal 17	Facultative/ Spring	Irrigated north zone	6.09	Par	All
2015/ 16	W&M	Bread Wheat	Wahdat 15	Facultative/ Spring	Irrigated		15	
	W&M	Bread Wheat	Afghan 15	Facultative/ Spring	Irrigated all zones		26	
	W&M	Bread Wheat	Waafer 15	Facultative/ Spring	Irrigated all zones		14	
	W&M	Bread Wheat	Lalmi 15	Spring	Rainfed all zones		44	
	W&M	Bread Wheat	Bahar 15	Facultative/ Spring	Irrigated		17	
	W&M	Bread Wheat	Elhaam 15	Winter	Irrigated all zones		3	
2014/ 15	W&M	Durum Wheat	Durum 01	Spring	Irrigated	6.27	17	All
	W&M	Durum Wheat	Durum 02	Durum	Irrigated	6.09	21	All
	W&M	Maize	No name	Hybrid	Irrigated	9.21	37	NA
	W&M	Maize	No name	Hybrid	Irrigated	9.31	39	NA
	W&M	Maize	No name	Hybrid	Irrigated	8.61	28	NA

Indicator	Target	Final Achievements 2018								
		2013/14	W&M	Bread Wheat	Lalmi 04[21]	Spring	Rain fed	3.8	6	-
			ICM	Bread Wheat	Poza-e-shan 13	Facultative	Rain fed	2.14	-	-
			ICM	Bread Wheat	Herat Lalmi 13	Facultative	Rain fed	2.07	-	-
			ICM	Bread Wheat	Zarin 013	Facultative	Rain fed	1.96	-	-
			ICM	Bread Wheat	Shishambagh 13	Facultative	Irrigated	4.85	-	-
			ICM	Bread Wheat	Balkh Dehdadi 13	Facultative	Irrigated	4.50	-	-
			W&M	Bread Wheat	Kabul 13	Spring	Irrigated	6.2	29	-
			W&M	Bread Wheat	Bamyan 13[22]	Winter	Irrigated	6.6	8.2	-
			W&M	Barley	Takhar 13	Spring	Irrigated	4.4	60	NA
			W&M	Barley	Darulaman13	Spring	Irrigated	4.2	77	Na
			ICM	Barley	Shamal 13	Spring	Irrigated	4.04	-	NA
			ICM	Barley	Balkh 13	Spring	Irrigated	4.19	-	NA
			ICM	Chick Pea	Rabat 13	Winter	Irrigated	1.82	0	NA
			ICM	Chick Pea	Baghlan 13	Spring	Irrigated	2.3	1	NA
Number and percentage of farmers (men and women) incorporating new varieties in their annual planting.	• Over five years, 15 per cent (20,000 farm households) around research and demonstration sites incorporate the new varieties in	The varieties released during the current phase of the project have only just begun to be incorporated into the Government certified seed system, and thus they were not available to farmers during the life of the project. The adoption figures discussed below therefore relate to varieties released by CIMMYT between 2002 and 2011 (i.e. the previous period of Australian assistance). The project had little definitive data on the number of beneficiaries reached, the areas planted, or the productivity levels achieved. The primary information has been derived from a farmer survey conducted two years ago (2016) in the four 'hub' provinces (Kabul, Baghlan, Balkh and Nangahar). This showed that 88% of farmers who participated in demonstrations the previous year continued growing the seed chain varieties, compared with 68% of their immediate neighbours. Clearly, engagement with the project/extension staff influenced adoption. The survey, however, was challenged by the inconsistent or								

[21] http://www.shigen.nig.ac.jp/ewis/article/html/149/article.html;jsessionid=F691911C07F49C0BCF0FF7E2321A1A18

[22] http://www.shigen.nig.ac.jp/ewis/article/html/141/article.html

Indicator	Target	Final Achievements 2018
	their annual planting. • Over five years, 6 per cent (60,000 farm households) in the targeted provinces incorporate the new varieties in their annual planting.	incorrect use of variety names by farmers making it very difficult to distinguish between traditional and new lines. The project was hoping to see 20,000 beneficiaries (4,000ha) adopt the new varieties in the immediate vicinities of the research sites, initial adoption usually being undertaken by those who directly collaborate with a project. Cumulatively over the last 6 years, the project has conducted 2,766 on-farm demonstrations, totalling almost 550 ha[23]. On the face of it, this seems well below the anticipated target of 20,000 immediate beneficiaries, and 4,000 ha planted. However, the project postulates that: • if each of these on-farm demonstrations has occurred with a unique farming household; and • if each household multiplies their own seed and actively shares 25 kg with three unique neighbours in the first year; and • if each of these farmers properly cares for it and achieves a 0.5T/ha yield advantage; then over the last 6 years there may have been up to 19,683 farmers who have planted up to 7,551 ha of the new varieties, increasing their yields by about 3,775 T, and their returns by over $US1.1m. These, however, are significant assumptions that need verification. The 2015/16 farmer survey confirmed that farmers were indeed sharing seed with an average of three relatives/neighbours – although with no indication of how much seed was shared. This uncertainty regarding the adoption of new varieties has been partially resolved by recent DNA assessments of seed collected in 2015/16 that shows the general prevalence of the new varieties across 600 surveyed farms [27]. This showed that 78 percent of farmers were growing post-2002 varieties - even though 63 percent are growing just two varieties released in 2009/10 (Chonte 1 and Muqawim 09). There was only one farmer (in Nangahar) who was growing a line released by the most recent (post-2012) phase of the project (Balkh Dehdadi 013). It would have been far better if it had been possible for the
Area planted, and productivity benefits achieved by farmers incorporating the new varieties.	• 4,000 hectares in and around research and demonstration sites, productivity benefit 12 per cent. • 15,000 hectares in the targeted	

[23] The project shares 25 kg seed with each farmer (sufficient for 0.2ha). It also treats each of these farm demonstrations as unique 'farmers', which is questionable as many of the same collaborating farmers would be selected for demonstrations each year. Thus, the number of unique farmers may be closer to 540 (the average number of demonstration farms over the last three years).

Indicator	Target	Final Achievements 2018
	provinces, productivity benefit 12 per cent.	project to have included longitudinal studies on actual adoption levels and farmer experience, as this would, in the normal way of things, have formed a key feedback mechanism for the research agenda. The project also anticipated that by 2018, 6 per cent of farmers (equating to 60,000 HH and 15,000ha) in the 4 target Provinces would be producing the new varieties. As seen above, the majority of farmers are now growing post-2002 varieties – which more than achieves this target. As also seen above, the varieties released during the current phase of assistance cannot be said to be in circulation, although it can be safely assumed that over the next five years, farmer adoption will become significant as the seed becomes more readily available. Furthermore, the demonstration trials provide some confidence that farmers growing these varieties will experience well in excess of the 12 percent target anticipated.
Accessibility of new varieties to farmers.	• Proportion of new varieties included in seed chain - 50 per cent of the total amount of certified seed is of improved varieties. • 80,000 farmers using certified seed of the new varieties.	Of the total volume of certified seed available in Afghanistan, the improved wheat varieties produced since 2002 comprised 27 per cent in 2010/11 and 75 per cent in 2017/18. This is a hugely beneficial outcome. The project has thus achieved its target of post-2002 improved varieties comprising 50 per cent of certified seed. In fact, about 16% of the planned certified seed for 2018 will be comprised of two varieties from the most recent phase, one of which, Lalmi 4, is a rainfed variety. Based on current trends this percentage will continue to rise, and thus it is expected that post-2012 varieties will dominate the Certified Seed system within the next five years. It is clear from both the recent farmer survey and the DNA assessment that the total number of farmers using the improved varieties is now significant, and well above the 80,000 households predicted.
Policy commitment and improved capacity of	• Standard procedures established and operating for the testing and	MAIL now has the capacity to maintain a solid pipeline of varietal evaluation across Afghanistan's major agro-climatic zones, supported from its four regional research hubs for wheat and maize. MAIL clearly 'owns' the varietal testing work, as evidenced by its leadership and facilitation of the Annual Results Assessment and Planning Workshops for wheat and maize.

Indicator	Target	Final Achievements 2018
Afghan agencies to run their own varietal testing program.	release of new varieties of major cereal crops, including wheat and maize, in Afghanistan.	MAIL has also fully adopted the four wheat climatic zones (Northern, Central Highland, Eastern and South Western), with evaluation of varieties now considering the different requirements of the different zones, resulting in better adapted planting material being released to farmers. The impact of on-going training and mentoring is visible in the way the experiments are being conducted and reported. For example, the quality of MAIL research has increased substantially - of the hundreds of varietal trials conducted by ARIA every year, the number in which the data was deemed unacceptable fell from almost 18 per cent in 2012/13 to about 1.0 per cent in 2015/16. MAIL/ARIA is now leading the multi-location assessment trials, with CIMMYT and ICARDA continuing to assist MAIL by selecting and delivering potential progeny lines for further testing. ARIA in taking a considered approach to its future work (i.e. without ACIAR/CIMMYT support), has scaled back some trial work, but maintained the core varietal assessment. The training and capacity building support provided by CIMMYT has been responsive and significant. Over the past six years, 65 Afghan researchers and MAIL staff have been sponsored to attend trainings or workshops abroad, and 640 have attended in-country trainings or workshops during the life of the project.

Program Outcome 2: Improved Water Management in Targeted Farming Systems[24]

Improve the use of water resources by households dependent on dryland agricultural production through integrated watershed development and capacity building.

A	Outcomes	Score
A1	Skills and knowledge change	4
A2	Institutional and group practice change	3
A3	Communication, extension, dissemination	4
A4	Publications, scientific outputs	4
B	Best practice and impact	
B5	Partnership / Governance	3
B6	Relevance / Appropriateness	5
B7	Efficiency	4
B8	Effectiveness	4
B9	Impact	3
B10	Sustainability / Legacy	3

Summary:

The *Improved Catchment Management Project,* which commenced in 2012, involved the integration of a number of ICARDA's activities in Afghanistan. As a result, the project's focus was particularly broad, and thus the progress made against its key outcomes was initially limited. In 2013/14, the Program Oversight Group requested the project to remodel its approach, by more narrowly focusing its objectives onto community-based approaches to watershed management. This was in line with the release of MAIL's Dryland Farming Strategy which prioritised improvements to 100 critical watersheds. The project team responded well to the challenge, and put considerable effort into the identification, mapping, and characterisation of watersheds. Most recently, the ICM project has involved eight model watersheds in six provinces (numbers 1 to 8 in Table 4), the project having withdrawn from four watershed sites (Kharuti in Takhar, and Koskak, Qul Roba and Surkhdara in Bamyan) due to intractable issues with insecurity and/or local conflict (numbers 9 to 12 in red Table 4).

It will require many more seasons (well beyond the life of the project) to effectively bed-down these model watersheds, and for the integrated outcomes to be fully understood, and applied more broadly.

[24] Data inconsistency in the Final Report and between project documents is significant. This is mainly caused by poor editing and failure to update figures when sections are copied from earlier documents. This Final review has used the higher numbers where inconsistencies occur. However, the regular inconsistency and errors reduce the confidence of the review team in the veracity of the data reported. Finally, the inclusion of data on structures established by a previous USAID project in Sayyad is misleading particularly as this program was much more substantial than the typical community sites.

Of the eight most recent sites, Badam Bagh is a MAIL Research Station and, as such, community engagement has not been its focus. Nonetheless, the site has implemented check dam, reservoir, and water harvesting techniques that are being used for training, environmental public awareness, and data analysis.[25] Initial runoff and infiltration data, although modest, is helping to build models that can be used more widely. Data variability is, however, a concern, and care must be taken to identify the cause of this variability, and to minimise error.

The other seven sites have all involved local communities. These seven community watersheds have been home to 4,688 households (over 33,000 people) living in 9 villages, spanning 5 Provinces. ICARDA engaged with DAIL and community leaders to develop plans for interventions aimed at significantly improving water availability and water use for both household and agricultural needs. Around 686 significant structures have been constructed in these communities to store water, improve infiltration, divert water, or reduce erosion. These structures have increased the capacity of the target villages to capture (through storage or infiltration) up to 8 megalitres of water - about 4.9 megalitres of fresh water for consumption and irrigation, and 3 megalitres for renewal of soil moisture levels through infiltration and percolation.

While it is understood that interventions at each site are different and tailored to the need, there is significant variation evident in the scale of the infrastructure work between sites, but little explanation as to why. For example, the very large Otran Catchment in Dar-e-Noor, Nangahar includes three villages and 2,400 households, has received one diversion canal, one large pond, and 4ha of Atriplex; whereas the much smaller Dasht Gowhar Khan Catchment in Pawan which supports 150 households has received a plethora of 47 structures, 1.5 km of contour bunds, as well as forest, pasture and horticulture options. There are clearly huge variations in beneficiary experience across the project, and over half the 4,688 claimed beneficiaries have apparently received minimal contact. While there may well be very good reasons for the choices, a more rigorous analysis of the differences would be helpful for stakeholders.

The water conservation infrastructure has been complemented by production innovations covering almost 170ha at the 8 sites[26]. The focus has been on improving the water availability for staple crops, as well as the introduction of fruit and nut trees (primarily pistachio, but also mulberry, grape and pomegranate), the spice asafoetida (heng), and atriplex for fodder. The reported impacts include:

- an extra 28ha of wheat and maize being irrigated in Otran [27]; and
- project-supported dryland cultivation of asafoetida in Khwaja Al Ghor and Sayad apparently returning US$742 per kg.

[25] These ACIAR supported structures were built downstream of check dams built under the Kabul Green Built scheme by the NRM Department of MAIL. During major rainfall events the overflow from the check dams will be channelled to the water reservoir and percolation tank.
[26] Data on productive innovations in the Final report is particularly variable and needs a solid edit.
[27] Data is quoted as either 28 or 29ha in the Final Report, but previous Annual Reports only quote 20ha.

There should have been significant opportunity for the ICM project to introduce innovations sponsored by its sister R4D projects - and there was in fact good collaboration on atriplex - however the collaboration for other forages and grains was lacking.

The project has, however, engaged with Government, NGOs and the communities themselves to use the sites as model watersheds to demonstrate both the technologies, and the benefits of community-based catchment planning and management. The project may be finished, but the team is continuing its work, and now aims to publish local language watershed management guides, and to work closely with MAIL in escalating watershed approaches and coverage as part of the DLFS targets.

Table 4: Summary of Integrated Catchment Management watersheds and activities as of August 2018.

	Watershed Name	District	Province	Area (km^2)	Villages	Pop	House-holds	Check dams and gully control (ha)	Percolation Tanks & Water storage (m^3)	Production established	WUA
1	Badam Bagh	Kabul	Kabul	2.20	Research	Research	Research	1 weir (40m); 1 diversion canal (70m); 0.0075ha	1 tank (1,000m^3); 1 pond (2,100m^3)	Atriplex 1.0ha; Horticulture 5.0ha	Research
2	Khwaja Al-ghar	Khulm	Balkh	29.47	Khwaja Al-ghar	200	28	8 contour bunds (80m); 2 diversion canals (15m); 5 weirs (213m) totalling 1.25ha	1 pond (120m^3)	Atriplex 1.3 ha; Horticulture 1.0ha; Forest 5.0ha	Yes (12 members[28])
3	Sayyad	Khulm	Balkh	3.32	Sayad	1,750	250	Major bunds (60km) previously established under USAID support; 1 diversion canal (15m)	1 tank (58m^3); 1 reservoirs (21m^3) 1 well	Atriplex 20.0ha; Horticulture 50.0ha; Forest 50.0ha	Yes (21 members[29])
4	Qarasay	Pole-Khomri	Baghlan	10.00	Qarasay	420	60	8 contour bunds (80m); 2 diversion canals (390m); 26 weirs (260m) totalling 1.5ha	1 tank (400m^3)	Atriplex 1.25ha; Horticulture 1.0ha; Forest 0.5ha; CBFM[30] 200ha	Yes (11 members[31])
5	Otran	Dara-e-Noor	Nangarhar	26.34	Otran; Sutan; & Machgandoi	16,800	2,400[32]	1 diversion canal (30m)	1 pond (2,500m^3)	Horticulture 4.0ha; CBFM 700ha	Yes (13 members[33])
6	Amlah	Dara-e-Noor	Nangarhar	5.00	Amlah	2,400	300	1 weir (5m); 1 diversion canal (75m)	1 tank (540m^3)	Forest 1.0ha; Atriplex 4.0ha;	Yes (16 members[34])

[28] 2 women and 10 men producing both rainfed and irrigated crops on 53ha.
[29] 9 men and 12 women.
[30] Community-based Forest Management.
[31] 10 men and 1 woman with 112ha of rainfed production.
[32] 800, 1000, & 600 respectively
[33] 4 men from Machgandoi village, 6 men from Otran village, and 2 men and 1 woman from Sutan village growing rainfed and irrigated crops on 203ha.
[34] 15 men, 1 woman.

	Watershed Name	District	Province	Area (km²)	Villages	Pop	House-holds	Check dams and gully control (ha)	Percolation Tanks & Water storage (m³)	Production established	WUA
										Horticulture 6.0ha	
7	Aq-Masjeed	Talaqoan	Takhar	5.43	Aq-Masjeed	10,500	1,500	200 contour bunds (1 km); 4 diversion canals (40m); 36 gully controls(138m); 31 weirs (194m) totalling 3.5ha	2 tanks (600m³)	Forest 12.0ha; Atriplex 3.0ha; Horticulture 1.0ha	Existing CBFM (23 members[35])
8	Dasht Gowhar Khan	Jabaluseraj	Parwan	5.45	Dasht Gowhar Khan	1,100	150	300 contour bunds (1.5 km); 1 diversion canal (200m); 26 gully controls (88m); 13 weirs (95m)	2 tanks (540m³) 1 pond (104m³) 4 springs	Forest 0.25ha; Atriplex 1.05ha; Horticulture 0.3ha	Yes (17 members[36])
9	Qul Roba (dropped)	Bamyan Center	Bamyan								
10	Kharuti (dropped)	Talaqoan	Takhar								
11	Khoskak (dropped)	Bamyan Center	Bamyan								
12	Surkhdara (dropped)	Bamyan Center	Bamyan								
				87.21	**9**	**33,170**	**4,688**	**516 contour bunds (2.7km); 62 gully controls (226m); 78 weirs (807m) . 13 diversion canals (835m)**	**8 percolation tanks (3,138m³); 5 water storages (4,845m³); 4 springs 1 well**	**Atriplex 35.55 Ha Forest 68.75ha CBFM 900ha Horticulture 64.3ha**	**113 (79♂; 34♀)**

Overall, the project appears to have satisfactorily managed the technical issues, although early yield data shows considerable seasonal and site variability, making it difficult to draw any firm conclusions. The project was also challenged by travel restrictions, which limited the engagement with some of the communities, and thus its full appreciation of these community's dynamics, engagement, ownership and livelihood opportunities. Although ACIAR support is now complete, and the infrastructure works fully commissioned, the process of adoption is still in its early days. It will therefore be many more seasons before these model watersheds are effectively bedded-down, and the integrated outcomes fully understood and applied more broadly. ICARDA is therefore looking to the USAID SWIM project to help support at least some of the ongoing needs[37].

[35] 11 men and 12 women.

[36] 12 men and 5 women.

[37] USAID Strengthening Watershed and Irrigation Management (SWIM) https://www.usaid.gov/news-information/fact-sheets/strengthening-watershed-and-irrigation-management-swim (accessed 20 September 2018).

The overall reality is that the original goals of the project were somewhat ambitious, given the constraints imposed by the project's limited resources, and by a security situation that has necessarily resulted in intermittent and insufficient engagement with the communities.

Progress against agreed indicators

Indicator	Target	Final Achievements 2018[38]
Improved natural resource management through the promotion of better catchment management options.	• Improved natural resource productivity at each catchment site from the adoption of promoted options. (Target water productivity increment: 20-30 per cent; soil/land productivity increment: 15-20 per cent).	Hydrological modelling demonstrated the potential productivity improvements that could be achieved within each watershed. For example, the hydrological model run for the 72 ha Kharuti Watershed in Takhar[39] showed that on average over the last four decades about 20 per cent of rainfall occurred at times and intensities that would have made it suitable for harvesting, but was lost as runoff. It could therefore be anticipated that introducing water harvesting structures would capture up to 110 megalitres, allowing, for instance, for almost 70 additional hectares of irrigated land. The project has completed important water conservation and storage measures at all eight sites, and adapted existing structures were needed. For example, damage to diversion structures in Qarasy resulted in improved design guidelines for specific slope categories. Overall, both the water conservation structures, and the newly introduced crops appear to have been well accepted by the communities, with benefits that have included: reduced erosion, improved soil moisture, improved tree survival, the delivery of supplementary irrigation, and increased access to drinking water for many households. However, the community response to these improvements is mostly only anecdotally positive, but thus needs to be confirmed. Nevertheless, there is some evidence of communities expanding both the structures and their repertoire of practices, and of neighbouring households and/or villages being inspired. Clearly, the project has needed a stronger focus on understanding the gains being made in each beneficiary village in terms of both productivity (livestock and annual

[38] Note there is data inconsistency between the Final Report's text, its watershed data tables (Annex 2-4), and its watershed descriptions (Annex 12).

[39] It is unclear why hydrological data for other catchments is not quoted.

Indicator	Target	Final Achievements 2018[38]
		cropping), and conservation. Such an evidence base would have been invaluable for further discussions (with communities, government and development partners) on the efficiency, effectiveness, and sustainability of the approach, and its potential for scale.
Number and percentage of farmers (men, women) of Water Users Associations (members and non-members) adopting the recommended catchment management options along with enhanced skills in making watershed management decisions.	• ICARDA working with Water Users Associations, at five watershed sites. (Target: each WUA with 30-40 farmers (150-200 beneficiaries))	Water Users Associations (WUAs) are now functional in all seven community watersheds, include 113 members in total, of whom 34 are women. The team is still in the process of building the capacity of these WUAs and the Community Development Councils (CDCs) to maintain operations. These groups average 16 members, and thus are much smaller than originally envisaged, the initial thinking being for 30 to 40 members per WUA (or about 10 per cent of the target households in the smaller villages (excluding Otran)). One of the main roles of the WUA has been to support implementation and to mobilise other community members - an essential task given that the team's engagement with the communities has been limited to infrequent and relatively short visits. Yet while this important foundational role of the WUAs appears to have worked well, the groups will need significant strengthening if they are to effectively complement the role of the CDCs, become truly self-sufficient, and effectively facilitate the community planning of watershed development and management. Thus, their relatively slow formation, limited size, and low representation of women represent a challenge for the WUA's sustainability.
Accessibility of farmers to tested conservation options (crops, forages, soil and water conservation structures).	• More than 3000 farmers (men and women) from 5 target provinces and 1 model site will directly benefit from improvements to their skills and knowledge regarding conservation options to maintain natural	Overall, ICARDA estimates that there are about 4,688 households – just over 33,000 people – in 9 villages across the 7 populated catchments (i.e. excluding Badam Bagh). It is unclear from the current data how many of these households are directly benefitting from the project. More than half these households come from Otran, where the coverage would appear to be limited. However, the smaller size of the other catchments (300 households) probably means more significant coverage – as already noted, the 150 households in Dasht Gowhar Khan Catchment in Pawan have certainly been supported with a plethora of water conservation structures and

Indicator	Target	Final Achievements 2018[38]
	resources at target sites; a further 10,000 farmers (men and women) will indirectly benefit. • Field days, demonstration plots, and other communications (SMS, radio broadcast, cross learning visits, study tours, etc.) promote the adoption of natural resource management options tested for the different watershed sites. • Data base on technology development and knowledge generated from the watershed sites available in the public domain.	productivity options. It is unfortunate that the project has such a limited grasp of the level of household engagement, and the relative flow of benefits, and hence if the work in these catchments is to be consolidated and advanced, development partnerships are needed that can actively and consistently support the communities. Formal and informal training activities have so far targeted 1,336 people across 45 events and seven field days. Twelve of these events focused on training of trainers, while 13 focused on the WUAs and the household members in the 7 watersheds (over 400 individuals) - a level of contact that, while modest, is understandable given the security constraints. A range of farmer publications has been produced, and Facebook, SMS[40] and other communication methods have been in limited use. The project has also made available 5 products in the local language to help households appreciate the need for improved watershed management, the techniques involved, and to demonstrate some case studies. Nevertheless, the quantity and quality of the documentation currently available in the public domain is modest.
Improved capacity and policy commitment of Afghan agencies in the running of their own catchment management and	• Young workforce, with a better understanding of the available natural resource management options, ready to contribute to the sustainability of those options in target and non-	Lack of capacity in agricultural research, along with a shortage of personnel specifically trained in community-based approaches to watershed and on-farm water management, remain serious constraints on agricultural development in Afghanistan. The 45 field-based trainings mentioned earlier involved both MAIL and DAIL, as well as NGOs and members of the WUAs and CDCs (17.5 percent of whom were female). Over the past 5 years the project has also facilitated:

[40] While technologies such as SMS are of interest, and up to 2,500 numbers have been registered, only 4 messages have been sent.

Indicator	Target	Final Achievements 2018[38]
conservation options programs.	target dryland regions. (Target: 20 men; 10 women). • Enhanced confidence of key farmers and other stakeholders in watershed management options. (Target stakeholders: 300 men, 50 women, and 30 youth). • Economically feasible options with high Benefit/Cost Ratios convince others to adopt. • A better understanding of the available options for managing watershed catchments by policy makers creates an enabling environment for policy changes. • Programmed visits for MAIL and other government agency staff help key policy makers identify what measures work best in the Afghan context, and thereby formulate improved policies.	• 4 international trainings in India and 2 in Jordan for 85 MAIL and ICARDA employees/interns, 7 percent of whom were female; and • The training of 10 graduate interns (1 female) in 2016, included a 6-week intensive training on Watershed Management at Punjab Agricultural University. 8 of these interns have since found employment with Universities, NGOs or ICARDA. A baseline characterisation of communities has also been undertaken [9], a local language booklet on water and soil conservation measures has been produced [32], and a review publication on 'Watershed Development in Afghanistan: Lessons from South Asia' has been planned. Given the circumstances, the trainings and publications represent an adequate program of support that escalated appreciably in the last two years of the project. This support had the potential to deliver a cadre of influential thinkers across the project sites, yet again there has been very little indication of the outcomes. However, there is little discussion of the learning outcomes – whether the key messages were correctly targeted and effective, whether the capacity development of the key decision makers was likewise effective. What is clear – and also very welcome - is that the ICM project generated significant interest from DAIL and MAIL, as evidenced by the Ministry now working to understand how it can roll out improved ICM practices on a national scale under its Dryland Farming Strategy.

Indicator	Target	Final Achievements 2018[38]
Improvement in the livelihoods of women, men and youth in the watershed sites through adoption of different catchment options.	• A choice of better options increases the productivity of dry land crops and forages, and enhances both the employment opportunities and the income of households at the various watershed sites. (Target: 150-200 households).	Activities to increase productivity are now well established, and some data on economic productivity/ improved livelihoods is now available. This includes: • Some increases in staple crop production (e.g. the additional 28 ha of maize area in Otran); • Confidence that pistachio, fodder, mulberry, and asafoetida production is adding to livelihoods. As mentioned, the yields of asafoetida in Sayad have generated around US1.2m for the community over the past three years. These largely anecdotal reports are supported by research that indicates the survival and growth of perennials and forages has significantly improved in recent times. Nevertheless, the intent of the project was not to identify isolated technical successes, but to demonstrate the integrated benefits of combining well-planned infrastructure and productivity interventions. What is lacking is data that demonstrates the integrated impact of the packages that have been selected for each of the 7 communities. The project's Final Report also emphasises the benefits that paying for project labour has brought to communities - project funds have apparently been used to employ local farmers in construction, planting and maintenance. The project argument has been that this compensates farmers for their time, and establishes a model for further scaling up. According to the project, community-based labourers have received just over US$170K[41]. Interestingly, however, this money has not been equitably spread across watersheds, two thirds having been spent in just one watershed (Aq-Masjid). This approach to community-based ICM is however questionable, carrying as it does a significant risk of creating dependency, and reducing ownership and sustainability. Furthermore, if paid labour is one of the mechanisms which the Government intends

[41] Figures vary through the Final Report - AFN10.32m on p 9; AFN13m on p32;

Indicator	Target	Final Achievements 2018[38]
		to use when rolling out watershed management more broadly, the project's approach provides it with little understanding of an appropriate funding model.

Program Outcome 3: Improved Livestock Productivity in Targeted Farming Systems

Increase the availability of feed resources adapted for low water use as supplementary feed in the crop-livestock systems of Afghanistan which are increasingly constrained by water.

A	Outcomes	Score
A1	Skills and knowledge change	4
A2	Institutional and group practice change	3
A3	Communication, extension, dissemination	4
A4	Publications, scientific outputs	5
B	Best practice and impact	
B5	Partnership / Governance	3
B6	Relevance / Appropriateness	5
B7	Efficiency	4
B8	Effectiveness	4
B9	Impact	3
B10	Sustainability / Legacy	3

Summary

The *Forage Options for Smallholders* project commenced late (early 2014), but since then has made some progress, with the 'research' and 'capacity building' agendas reasonably on track. However, the team is struggling to deliver the expected 'outreach' agenda. The adaptive research has not been able to engage with its target of 1000 farmers, and it will be many years before even those farmers who have been reached, properly understand the ways in which they can effectively integrate the new forages into their existing farming systems.

The three reasons that underlie these setbacks are:

- The frequent leadership/management changes in the ICARDA team;
- Afghanistan's declining security which has limited mentoring by international scientists, and reduced the coverage and scope of the in-country trials; and
- The very limited resources for in-country activities available during 2017 and 2018.

Such challenges are, however, understandable as Afghanistan re-establishes its national capacity, and development partners strive to work in a very constrained environment. Knowing this, the Forages Project has, with patience and persistence, found creative ways to manage the challenges it has faced, and to move forward. Forages have been introduced, the outcomes of research trials have shown great promise, and a foundation has been established that at the

Significant delays in the release of improved fodder lines has compromised the development aspirations of the project. Ongoing support from the Afghanistan Government and NGOs will be essential if the foundation established by the project is to be expanded on.

end of the project makes the significant hurdles to adoption seem less intimidating. To compensate for the insecure environment, mirror trials in analogous environments in Western Australia and Turkey have allowed for more intensive measurements of the productivity and adaptability of the tested genotypes. In addition, these mirror sites have hosted about 445 Afghan partners (private, public, civil society)[42] for approximately 20 training and orientation sessions[43].

Introduction and testing of new forage lines and forage mixes was new territory for MAIL and ARIA, and has raised many challenges:

1. MAIL and ARIA systems and processes for managing forage crops were split across multiple Departments (ARIA, Seeds, Livestock, NRM, Extension). MAIL therefore needed new skills, staffing, budgets, systems and processes to manage the *Forage* project. However, MAIL's resources to develop and institutionalise these were limited, and forage 'needs' had to be balanced with other priorities. Initially MAIL and ARIA were unsure of their project roles and responsibilities, as many of the staff had broad duties, and few had skills directly related to forage production. Consistency was therefore a challenge and changes in staffing were frequent. This caused frustration for both MAIL/ARIA staff and the project teams. It has taken some time for the situation to clarify, for communications to improve, for roles to be better defined, and for the project to be engaged and guided more effectively;
2. Because budgets and resources for forage research were limited, the allocation of resources (e.g. land on research stations) was often challenging. This initially led to only limited production of the seed that was essential for ongoing varietal assessment. It appears, however, that sufficient seed is now available for immediate needs;
3. Afghanistan's Seed Regulations are new. While processes and procedures for the introduction and release of "certified" seed for staple crops (e.g. wheat) are now in place, it is beyond the capacity and resources of the current system to deal with forages which include many different species of cereals and legumes. The exception has been the shrub forages (such as salt bush – *Atriplex* spp) which have been exempted from the need to undergo official release, and the seeds of which have therefore already been widely distributed. The release of a single forage species on the other hand would require:
    a. its evaluation using DUS[44] and VCU[45] criteria; and
    b. a comparison to the performance of local varieties (which in the case of forages do not always exist) over two to three seasons.

[42] 12 percent of whom were women.
[43] Figures vary from 18 to 20
[44] Distinctiveness, Uniformity and Stability.
[45] Value for Cultivation and Use.

Hence systems for the review and release of forages and forage mixtures remain unmanageable, and the vast majority of farmers are yet to access the improved germplasm. This limitation has undermined all project expectations for distribution and adoption. What is clear, however, is that MAIL needs to find a simpler, more streamlined process for release and distribution of forage seed – possibly analogous to that of the vegetable sector which faces similar challenges.

> ***Recommendation 2.*** *After considered assessment, the Review Team would suggest to MAIL that a different, more streamlined process be used for the importation and testing of forage species that would expedite entry onto the National List of Varieties. A streamlined process that adequately ensures that standards are not compromised is considered sufficient. The subsequent distribution of forage seed should also consider using the "Commercial" and/or "True-Labelled" categories rather than the "Certified Seed" category.*

While the project team is disappointed that its aspirations have not been achieved, the following have in fact been delivered:

- Data on superior field performances and nutritive values that can be used to underpin efforts to have nine of the forages included in the National List of Varieties;
- A modest seed stock of the promising lines to use for further verification trials, for demonstrations, and for multiplication and dissemination;
- Public awareness initiatives that have created demand for the forage seed, which may well facilitate and speed-up adoption upon varietal release;
- Scientific publications to inform both policy and the research community. This includes important work on the status of forages in Afghanistan [26] [27], as well as the role of women in adoption [28].

Beyond 2018, however, ongoing support from the Afghanistan Government will be essential if the sustainability of the project is to be ensured.

Progress against agreed indicators

Indicator	Target	Final Achievements 2018
Number, type and productivity benefits of newly promoted forage	• At least three new cereal/legume and two shrub forage options promoted. • Expected increase in forage production of 25 per	ICARDA is now proposing 9 annual and perennial forage species based on performance, adaptation, ease of seed production, and farmer preference. These are higher performing varieties of:

Indicator	Target	Final Achievements 2018
and fodder options.	cent through the promotion of high yielding forage species with an extended season of availability. • 1000 new households growing the promoted forage species (increased forage production with high nutritive value - particularly in early spring - helps decrease lamb mortality by 15-20 per cent; increase weaning weights by 3kg per lamb; and increase ewe prolificacy by 15 per cent in the short term). • Feed costs are reduced when compared with more intensive shed-feeding systems (higher forage production will enable livestock holders to rely less on concentrated feeds, and ultimately reduce feed costs by 10-15 per cent).	1. Alfalfa/ lucerne (*Medicago sativa*) – the specific cultivar (Sequel) has demonstrated yield benefits of between 10 and 20 per cent over local varieties; 2. Narbon Vetch (*Vicia narbonensis* cv Velox); 3. Common Vetch (*Vicia sativa* cv Morawa); 4. Grass Pea (*Lathyrus sativus* cv Alibar); 5. Forage Pea (*Pisum sativum* cv #40-10) 6. Sainfoin – a legume (*Onobrychis sativa* cv Ozerby) 7. Triticale - a wheat/rye hybrid (× *Triticosecale* cv Alperby); 8. Oats (*Avena sativa* cv Yeniceri); and 9. Berseem clover (*Trifolium alexandrinum)*. These recommendations are based on a solid research program[46] that has assessed 68 improved annual and perennial forage legumes, and 11 cereal species, as well as 18 rangeland shrub species[47] and 20 cactus accessions (*Opuntia sp.)* as alternative feed sources - making a total of 117 genotypes. These forages were evaluated for their adaptation and productivity (dry matter and nutritive value) in Baghlan and Nangarhar provinces (irrigated environments), and in Balkh (rainfed environments). The 9 recommended species, plus the 18 shrub forages, show good yield and nutrient benefits, particularly for the winter/early spring period when feed shortages regularly occur. Moreover, similar undertakings elsewhere suggest that the expected productivity (+25 per cent) and extended season benefits are achievable targets. Despite the limited farmer exposure and experience, and the minimal adoption, on-farm trials in Nangarhar and Baghlan have resulted in strong farmer interest in the new varieties and mixes. Rafiuallah, for example, is a farmer from Adil Sha village in Nangarhar, who is on the record as stating that in 2017 he achieved good fresh

[46] Including station-based trials in Nangahar and Baghlan, eight on-farm trials, and mirror trials in Turkey and Western Australia.
[47] Primarily *Atriplex* (salt bush) but also including *Maireana* (blue bush), *Achnatherum*, *Astragalus* and *Bassia* species.

Indicator	Target	Final Achievements 2018
	• Overall benefits from increases in forage/ animal production should be reflected in household income increases of approximately 10 per cent.	biomass production across multiple cuts, that he increased his overall forage production and the performance of his animals, and that he was keen on planting the same mix again with the seeds he had set aside. This reflects the comments of many other farmer co-operators, many of whom, like Rafiuallah, also kept seed for replanting.[48] Nevertheless, despite the promise, it seems that by the end of the project less than 100 households have trialled the new forage options. The review considers that despite the challenges, more could, in fact, have been done – for example, there were no farmer field days held in 2017 or 2018, which is disappointing given the success of the field days held in 2015 and 2016. The future sustainability of this investment will depend on MAIL/ARIA and the NGOs taking the lead in the release and multiplication of the new varieties. Encouragingly in this regard, there is a pending tri-partite agreement between ICARDA, ARIA and the AKF which will oversee demonstration and multiplication trails on ARIA research stations in Bamyan, Baghlan, Takhar, and Badakshan, as well as with private farmers.[49]
Number and percentage of farmers (men and women) incorporating new forage and fodder options in their farming systems.	• A total of 1000 farmers (80 per cent male, 20 per cent female) engaged in the new forage production options.	The project has not engaged with the expected 1,000 farmers. Overall, only 24 farmers in Nangarhar and 24 in Baghlan were directly involved in the trials, with restrictions in place to prevent these farmers from reserving or sharing seed until its official release. As such, farmer to farmer dissemination has not taken place. Furthermore, it will be many years before even the farmers involved in the trials properly understand the ways in which they can effectively integrate the new forages into their existing farming systems.

[48] Note that current regulations prohibit the retention of seed that has not been officially released.

[49] Under the agreement the collaborators will be given 196kg of seed or the high performing forage lines.

Indicator	Target	Final Achievements 2018
		On the other hand, a number of demonstrations for Atriplex (salt bush) have occurred through partnerships with the AKF, Action Aid and the ICM project, the latter alone distributed Atriplex to 7 villages, resulting in about 36 ha being planted. One highlight of the work has been the collaboration between ICARDA and the Royal Tropical Institute (KIT) based in Amsterdam, with the aim of better understanding the systemic constraints on fodder production being faced by men and women farmers in Afghanistan. One key lesson has been that the social and cultural norms related to female access to knowledge and learning opportunities in Afghanistan are often more flexible than the rigid stereotypes portrayed in the media. This deeper assessment of the gender roles in fodder value chains should significantly help the future targeting of forage adoption.
Area planted, and productivity benefits achieved by farmers incorporating new forage and fodder options.	• Area planted with new forages at research and demonstration sites in each Province is expected to total 10 ha. 200 ha of land at the provincial level to be dedicated to the new forage production options.	The areas planted to the improved forages are currently modest. In Nangarhar, in which security has been better than in many other provinces, the project has demonstration sites totalling 12 ha. In Baghlan, however, insecurity and limited oversight have meant that only 1,000 M^2 have been established for demonstration. As mentioned, the distribution of the forage shrub Atriplex has been broader, with an average of 6 ha in 6 Provinces (36 ha total).
Accessibility of new forage and fodder options by farmers.	• Forage seeds and planting material to be available through 2 Village-Based Seed Enterprises, and 4 community-based plantations.	The availability (both quantity and access) of seed and other planting material for wider distribution and testing, is the critical constraint on both the project achieving its targets, and its sustainability – a fact that has been highlighted again and again in the project reports. As such, VBSE and private sector players have thus far been unable to engage with the project. The Final Report states that seed availability for wider distribution has been enhanced in 2018 through multiplication plantings in Dare-e-Noor and Farm-e-Jadeed Districts of Nangarhar, and in Baghlan. Unfortunately, even as more seed becomes available, there will still be no opportunity to support the VBSE's and private sector players to

Indicator	Target	Final Achievements 2018
		incorporate the forage seeds into their enterprises until the protocols for the release of these varieties are agreed. In 2015, specialized threshing and aspiration machinery was purchased from Kimseed (an Australian seed machinery enterprise) to improve the quality of the seed being produced. After considerable delay, this equipment was commissioned in 2017. Training has now been completed, and the equipment has been handed over to MAIL.
Improved capacity and policy commitment of Afghan agencies to the running of their own testing programs for new forages and fodders.	• Provision of technical backstopping to improve the capacity of Afghan institutions and agricultural services. Training and professional development programs in Australia and Afghanistan for Afghan scientists, students and researchers - this will strengthen participating Afghan institutions in the running of their own forage testing programs.	While project initiatives have been aimed at fostering a more enabling environment for fodder research, the ownership and longevity of the research initiated under this project remains fragile. Five departments within MAIL have been targeted to improve their understanding, ownership and engagement with forages research and development. This is a complex undertaking but the Forages Steering Committee/ Working Group within MAIL has begun to function more effectively. Data related to on-station and on-farm trials has been handed over to ARIA, as part of the ongoing transition and handover phase. The project also organised twenty events to build both the depth and breadth of its engagement with its Afghan stakeholders. In the early stages of the project many of these events focused on training ICARDA staff, which generated some criticism. However, this was probably necessary at start-up. Fortunately, subsequent trainings later in the project cycle focused on ARIA and representatives from local areas. Innovative events included: • Two transition workshops which increased the capacity and planning capabilities of national stakeholders to manage further activities. • In September/October 2016, two young male ICARDA national research staff attended a 6-week training course on forage agronomy, animal nutrition, and nodulation surveys in Australia (at CSIRO and at Murdoch University). • In early 2018, 6 women (including private farmers, and INGO and ICARDA staff) received training in shrub propagation and nursery management practices in Amman Jordan [29]. On their return to Afghanistan, it is anticipated that the

Indicator	Target	Final Achievements 2018
		AKF will support the women farmers to develop local small enterprises (SMEs), and • A significant 2017 workshop was held in Dubai on forage value-chain innovation and gender roles. This was facilitated by KIT, and involved stakeholders from across the project. The focus on women farmers for these trainings is commendable, both for their own sake, and because it will provide significant case study insights into the opportunities and boundaries that these women are facing, both as individuals, and as members of households and groups, in what amounts to a challenge to what are generally regarded as immutable gender norms.

6. Program Efficiency

The *Afghanistan Agricultural R4D Program* has achieved an overall rating of 4 for efficiency (Good). This considers the challenges posed by the security concerns in Afghanistan which have significantly constrained program efficiency through:

- limiting the access of international researchers and consultants to Afghanistan;
- visa restrictions on Afghan nationals visiting Australia;
- the difficulties the Afghan teams have faced in traveling within Afghanistan; and
- the high cost of security services both in money and time.

Given these challenges, it is significant that the three projects have achieved the efficiency they have. The program has, however, been enabled by a number of factors:

1. **Direct collaboration with the CGIAR centres within Afghanistan:** CIMMYT and ICARDA have been able to operate in the country in a way that other 'international' collaborators could not have done. This has allowed the projects to be managed competently, and to maintain at least a reasonable degree of interaction with the major agency-based partners in Kabul and the regions. Most other bilateral programs in Afghanistan cascade their funding through a managing contractor with associated marginal costs, whereas the direct engagement of ICARDA and CIMMYT has comparatively delivered solid value for money. The *Forages* project has also benefitted from the generous approach taken by its Australian collaborators (CSIRO and Murdoch University) to the sharing of funds.
2. **Third Country Meetings**: The use of annual third-country meetings has been a compromise that has allowed the teams to productively interact with the international stakeholders in ways that would not otherwise have been possible. This, however, has not been without some concerns (see below).
3. **Mirror trials in Turkey and Australia:** As we have seen, the mirror trials have not only enabled important research work, but have provided a venue for hands-on training.

Nevertheless, the toll exacted by the insecurity and the difficult working environment has at times been very personal - one of CIMMYT's leading gender specialists (Paula Kantor) was killed in Kabul in 2015. Unfortunately, the rise in violent attacks during the program's life has led both ICARDA and CIMMYT to restrict their full-time international presence in Afghanistan. The dedication and commitment of all those working in Afghanistan - national and international - is to be commended.

Staff Churn

One concern is the issue of staff churn within both the project teams and MAIL. For example: the *Forages* program has had three team leaders, as well as other management changes during its four years on the ground. Although both of the former team leaders have maintained helpful research links with the project, these changes have nevertheless had a significant impact on the continuity and momentum of research, and on the nurturing of relationships with MAIL and other counterparts. Within MAIL, the frequent changes in staff responsibilities also compromise relationships, planning, and the maintenance of focus. This is especially so in areas such as watershed management and forage research, where MAIL is still to bed down its internal systems and processes for research, extension, and service delivery.

Third Country Meetings

Another concern is that the third country meetings have not always been as productive as they should have been, the attendees having not always been the most appropriate people. Overseas trips have been seen as a bonus to national staff, and there has been a tendency to spread the benefit. This practice has undermined the effectiveness of the project meetings, which have included different national attendees at many events, and where some key people who should have been at the meetings have been overlooked.

> ***Recommendation 3.*** *Dependable Government attendance by the same national project representatives at each third-country meeting is essential to ensure consistency.*

Program level efficiency

The final concern is that despite the issues of security and access, and despite the program approach having led to some efficiencies in oversight, management, reporting and assessment, the integration, cross learning, and delivery efficiencies have been less than expected. There have been two reasons for this:

1. The program initially lacked an overall design logic to guide the three individual projects. While significant work was subsequently put into developing an overall program logic and M&E Framework, this occurred after the projects were designed and the teams were already on-the-ground, by which time, the potential to guide and influence the project designs was limited. This inevitably led to missed opportunities in cross project collaboration, such as synergies in site selection, and the integration of the three project outcomes within model villages. Whatever synergies have occurred have been largely serendipitous.
2. The slow and staggered design and approval processes for the individual projects had two unfortunate consequences:
    - the projects did not have the opportunity to work together during design to iteratively adjust their approaches; and
    - the veteran engagement, *Wheat and Maize,* kept doing what it had been doing in the previous phase for the 18 months before the other two projects were operating effectively. Consequently, attempts to build links (e.g. by measuring stover production as part of wheat varietal assessment; or integrating research at specific sites etc) never gained traction. Each of the projects was therefore effectively a standalone engagement, and while the teams have collaborated and communicated much more could have been achieved. ACIAR could do more in the future to build synergies and improve the integration of outcomes for similar Programs.

3. Program Inclusivity

The program has had limited success in its approach to gender inclusivity. Overall, the Final Review has ranked the program as 3 (Adequate), considering that despite the very conservative norms in Afghanistan, more could have been done.

The Final Review considers that the primary challenge lay within the teams themselves (the implementing agencies and their local partners). A general lack of interest/ enthusiasm to take on a stronger gender-based approach was evident, as was a lack of vision regarding the important role that gender-based adaptive research can play. Part of this was because the teams tended to see adaptive research as an ontological undertaking – about *things*, about *science and technologies* - whereas successful adaptive research is, in fact, an epistemological undertaking – about *understanding* men and women and their *motivations* for change. Once this is realised, adaptive research becomes more focused, and adoption trends start to rise.

> ***Recommendation 4.*** *CIMMYT and ICARDA operations in Afghanistan need to take a more considered and serious approach to gender. The W&M and ICM project approaches to gender failed to take a professional approach and missed opportunities to tap into significant CIMMYT and ICARDA global expertise on gender.*

A good example of this can be seen in the significant global GENNOVATE [31] study undertaken by CIMMYT that included studies in Afghanistan. This work occurred in parallel with the *Wheat and Maize* project and yet there was little mention of its findings, nor evidence that the *Wheat and Maize* team adjusted their program to maximise benefits to women. The GENNOVATE study conclusively showed that the introduction of the better wheat varieties could significantly reduce women's work burden. Local varieties are tall and prone to falling, difficult to thresh, and more susceptible to diseases such as smuts and bunts, which require special cleaning measures - tasks that are normally undertaken by women. Carefully selected varietal introductions could capitalise on these benefits. Furthermore, the larger harvests from the improved varieties are leading some farming households to use mechanical threshing, which not only further reduces the work burden on women, but ensures cleaner/ healthier grain for household consumption. Finally, the inclusion of women in training and adoption was essential as women's opinions and influence have clearly accelerated the adoption process.

Part of the challenge lies with the engrained norms and values of the individual team members. Some managers and most national staff are reluctant to challenge the established gender norms, no matter how liberal their own attitude to gender issues might be. There is therefore a significant need for attitudinal changes if the national research agenda is to benefit from a more nuanced and articulate approach to gender. Opportunities are more common than taken. The Forages project has shown, for instance, that where women have been specifically targeted for seed training, they have not only embraced the opportunity, but have diligently followed through on that training. The women trained now provide a potential nucleus for seed/seedling production enterprises that could significantly improve the availability of forages.

Another part of the challenge is that there are so few women on the research teams at either the operational or the management level, while even the women who have been engaged have been almost entirely focused on the gender and social roles. And yet even this has shown what a

difference inclusivity can make, with the women team member's involvement in the surveys having drawn out a broader, more nuanced, more accurate appreciation of the challenges to adoption than is usually the case – the usual case being dominated by an often-polarised male rhetoric.

For example, data from the *Wheat and Maize* project shows that the household decision on adoption of new varieties is much more democratic than is sometimes perceived – across the four provinces it now seems evident that men consider that they lead this decision between a third and a half of the time, meaning that in the majority of cases men consider that the decision is made after family discussions, primarily with their wives [30].

This, however, is not to downplay the social position of women in Afghanistan, which can be bleak. The *Forages* project's analysis of the socio-cultural context of the project showed, for instance, that women have limited direct access to formal sources of information and knowledge, such as MAIL, DAIL, NGOs or ICARDA. Instead, women largely depend on their social network - family, neighbours and other farmers - to indirectly access information that can be directly accessed by men. Furthermore, due to gender norms that restrict their mobility, women are prevented from interacting with men outside of the family. Data therefore shows that women farmers mostly work inside the house, or on lands in close proximity to the house. One conclusion from this is that special efforts will be needed if research and extension endeavours are to effectively engage with women farmers. Yet this is vitally necessary – it is the women in most households, for example, who are primarily involved in animal husbandry. In which case it will be the women who should be the key influencers on the adoption processes associated with forages.

The approach taken by the Forages project has been important. The gender study led by KIT, identified both the challenges women face, and the opportunities they have to create space in which innovate, and to influence adoption decisions. The study demonstrates that it is imperative for gender norms, roles and relations to be taken into consideration when attempting to innovate in Afghanistan's farming systems. In the case of the adoption new forage varieties: if women's roles in animal husbandry were not taken into consideration it would be very likely to seriously inhibit adoption.

4. Program Sustainability

The *Final Review* has highlighted a number of opportunities and challenges that will need to be managed if the outcomes of the ACIAR R4D Program are to be sustained. Currently there are many challenges (Score 3).

Sustainability needs within MAIL

> ***Recommendation 5.*** *MAIL systems, approaches, skills, and resources have taken time to develop, and will require ongoing mentoring, support and external advocacy if those changes are to be effectively institutionalised.*

While MAIL/ARIA systems and processes around wheat and maize research are now well established, the inherently more complex systems associated with the ICM and Forages work need ongoing support and close coordination between:

1. The MAIL Departments in Kabul - ARIA, Livestock, Seeds, Extension, and Natural Resource Management;
2. MAIL Kabul and its regional agencies - the ARIA Research Stations, PAIL and DAIL;
3. The various Government Ministries engaged in community level service provision, especially the Ministry of Rural Rehabilitation and Development;
4. MAIL and the non-government agencies involved in servicing the needs of rural communities - the Private Sector and NGOs.

This level of coordination is challenging for any state agency, and strong incentives are necessary if it is to happen. Without incentives, ministries, departments, and regional agencies tend to focus on internal priorities, with little motivation for collaboration. To service the future complex research and development needs of Afghanistan's farming systems in dryland areas MAIL needs:

1. Strong inter- and intra-agency coordination and oversight. MAIL is a ministry encompassing disparate agencies that will require strong leadership/ oversight to achieve integrated service delivery. The Dryland Farming Coordination Unit is one example of the resourcing needed to drive the necessary level of coordination.
2. Bipartisan policy agreement to ensure a common and consistent focus, in which case the DLFS and the proposed Dry Land Farming Policy and Irrigation Policy are a good place to start.
3. Funding mechanisms that channel a proportion of operational funds into farming system needs thereby forcing collaboration between researchers, the seed system, and extension personnel (such as a contestable funding mechanism).
4. The establishment of a centre/centres that integrate service delivery around farming system/community needs. In this regard, the Northern Dryland Farming Centre and the Farmer Resource and Learning Centres are sound initiatives. The focus must, however, always be on networks and relationships, and not just on infrastructure.
5. The identification of individuals at various levels within MAIL (Management, Technical, Regional) who can act as champions for the integrated approach, and who can be consistent point persons for projects to interact with. As it stands, the constantly shifting

roles and responsibilities within MAIL have sometimes confused the lines of communication.

Furthermore, in situations of ongoing conflict, the outreach of Government agencies to rural communities is challenged. Post-conflict, the first opportunity for Government to engage with communities is often through the provision of agricultural services/ support. Agricultural research and development services are therefore critical for the functioning of the Government-community partnership, and the elevation of a Government's profile.

The ACIAR R4D Program and other initiatives (such as MRRD's Rural Development Program, and the new Women's Economic Empowerment RDP Program) have not only confirmed for MAIL that effective outreach is essential, but have demonstrated the benefits of complementing the Ministry's capacity with that of Civil Society and NGOs, whose reach is often greater. MAIL needs to consider these experiences and innovatively enhance these partnerships in future. The variety of mechanisms used by the R4D Program give some indication of what is possible e.g. the Wheat and Maize 'hubs', ICM's engagement with the WUAs and the CDCs, and Forage's NGO partnerships with the AKF and AA.

Extension

The prevailing perception within MAIL of a linear approach to research, development and extension is neither helpful nor in line with best-practice. This perception amounts to a research/extension divide that compromises the quality of both MAIL's research, and any impact that research has on farming systems through its extension services. Modern approaches do not see extension solely as a one-way 'messenger service' to convey wisdom from the researchers – the haves - to the have nots, but as a two-way feedback mechanism in which extension and research are integral components of a learning cycle. Extension personnel help with communications, messaging, training, adult learning, and inclusivity while feeding needs, adaptation, farmer innovation and on-the-ground challenges into adaptive research. A more effective approach occurs when extension and research professionals form part of the same multi-disciplinary team from the very beginning.

Planning for the Future

During the final workshop in New Delhi the three project teams considered the initial findings of the review and prepared recommendations for "priority sustainability actions". The outcomes of these three planning meetings are reproduced at the end of this section.

In the case of *Wheat and Maize*, MAIL has the capacity to continue varietal selection and adaptive agronomy work. However, there are still some technical gaps (e.g. statistics) where ongoing support is needed and MAIL needs access to agencies that can readily fill these needs.

MAIL's capacity in water and forages management is, by contrast, yet to make headway. For both the ICM and Forages projects ICARDA has held transition workshops. A review of the minutes of these workshops shows, however, that much of the attention has been on the transfer of assets and project closure, with very little focus on planning for the future. During these meetings, ICARDA and MAIL have speculated that resources from programs such as CLAP

(IFAD)[50], SNAP (IFAD)[51], GRAIN (USAID)[52] and SWIM (USAID) will sustain the core interventions. Yet while these other donor programs already have strong overlaps with the ACIAR R4D Program, close discussions will be needed to ensure important work does not fall through the cracks.

> ***Recommendation 6.*** *It is therefore recommended that ICARDA and MAIL conduct two further transition workshops (one for forages and one for ICM) in order to develop more detailed plans for moving forward.*

In addition, the ICM project could develop closer ties with Australia's investments in *Strengthening Water Resources Management in Afghanistan* (SWaRMA).

> ***Recommendation 7.*** *It is recommended that ICARDA and MAIL have a joint workshop with the SWaRMA implementing partners (ICIMOD and CSIRO) to discuss outcomes and consider future partnerships*

If these do not occur, then it is very likely that the interventions will remain isolated partial-success stories, with no potential for scale-up to other parts of the country. These workshops must focus on developing a Government plan for further work. An important contribution to the development of these plans will be the recommendations for sustainability in ICARDA's Final Reports. MAIL should, however, take the lead in the process. MAIL is particularly encouraged to consider the implications of the gender work for future planning.

Another area of concern is that the funds available for a number of core services need critical attention. The speed with which the seed system can accommodate, multiply and distribute the seed of new varieties is a continuing bottle neck that is undermining the impact of the significant research work in staple crops and forages. MAIL needs to give attention to improving resources for the seed unit, or risk losing the benefits of years of research.

Yet while seed production is one critical bottleneck, the seed system has another, if related, internal challenge. There appears to be a tendency to want to exercise too much regulatory control, in a situation that requires flexibility and agility if Afghanistan's farming systems are to be enhanced. In particular, the seed regulations need to more carefully consider consequences – where the risks are minimal or low, exemptions should be the norm.

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[50]CLAP focuses on support to dairy and village-based seed enterprises (VBSE) and includes on-budget support as well as off-budget technical assistance delivered through ICARDA. While CLAP ostensibly is in 9 districts across 3 provinces, ICARDA reaches more broadly.

[51] SNAP II (Support to the National Agricultural Priority Program II) focuses on institutional reform of extension and the devolution of MAIL services. It was approved during the Brussels Conference and is now underway in five Provinces (Nangahar, Balkh, Parwan, Kandahar, Herat). It initiated MAIL's extension reform including Farmer Resource Centres (FRC or Farmer Resource and Learning Centres) at the District and regional/Provincial level. The NHLP and the GIZ FARM programs are instrumental in supporting this initiative, but are still struggling to clarify the role and setup of each FRC.

[52] USAID have two initiatives that can potentially sustain the R4D work - GRAIN and SWIM. Both projects are imminently awaiting final approval and announcement. Unfortunately, although both programs originally had the rainfed components, these seem to have been de-emphasised. SWIM's primary focus now seems to be on infrastructure rehabilitation for community irrigation schemes within selected critical watersheds, and the formation and effectiveness of WUAs.

Finally, all government agencies struggle with the timeliness of fund releases from the Ministry of Finance, and MAIL is no exception. This is, however, a particular challenge for MAIL as it's work is very seasonal and time sensitive. Untimely fund release can significantly constrain research and service delivery at critical times. Although the projects during their lifetimes were able to fill small operational funding gaps, a more responsive system is now needed if MAIL is to capitalise on its gains.

Recommendation 8. *Integrated Catchment Management - Priority Sustainability Actions*

THE ICM PROJECT DECIDED TO MAKE FOLLOWING RECOMMENDATIONS FOR SUSTAINING THE GAINS AND FOR NEXT STEPS:

1. MAKE BEST USE OF SEVEN EXISTING PILOT SITES FOR DEMONSTRATION AND TEACHING
2. COMPLETE KNOWLEDGE TRANSFER FROM ICARDA TO MAIL, PARTICULARLY DOCUMENTATION AND TRAINING RELATING TO:
   - METHODS, DATA AND CRITERIA FOR IDENTIFYING PRIORITY WATERSHEDS, INCLUDING DOCUMENTATION OF THE CRITERIA AND PROCESS OF IDENTIFICATION OF CURRENT SET OF 100, AND TRAINING IN METHODS TO ENABLE MAIL TO REVISE SELECTION USING DIFFERENT CRITERIA.
   - METHODS, DATA AND CRITERIA FOR PRIORITIZING INTERVENTIONS WITHIN WATERSHEDS, INCLUDING MANUALS FOR BEST PRACTICES IN SPECIFIC TECHNIQUES (IN LOCAL LANGUAGES).
   - PRIORITY ISSUES AND AREAS IDENTIFIED BY ICARDA TEAM DURING THE PROJECT, BASED ON THEIR EXPERIENCE – FOR EXAMPLE, RESTORATION OF KAREZ SYSTEMS.
3. COMMUNICATE AND PUBLICISE RESULTS FROM THE PROJECT (ICARDA AND MAIL)
   - NRM CONFERENCE IN DECEMBER (MAIL)
   - INFORMATION UPLOAD TO MAIL WEBSITE
   - RADIO OR TV ARTICLE (MAIL / ICARDA)
   - DEVELOP MATERIALS ON NRM FOR INCLUSION IN UNIVERSITY CURRICULA FOR AGRICULTURE AND LAND MANAGEMENT, USING PROJECT EXAMPLES (MOHAMMAD SHARIF SHARIFI)
4. CLARIFY THE STATUS OF THE WATERSHED USER ASSOCIATIONS
   - SEEK FORMAL REGISTRATION OF GROUPS UNDER THE EXISTING LEGAL STRUCTURES OF COMMUNITY DEVELOPMENT COMMITTEES (CDCS) AS EITHER FOREST, RANGELANDS OR IRRIGATION MANAGEMENT GROUPS. DESIGNATION OF SPECIFIC GROUPS TO BE DETERMINED THROUGH CONSULTATION WITH DAIL IN REFERENCE TO THE MAIN ISSUES IN THE NRM MANAGEMENT PLAN FOR THE AREA. BE FLEXIBLE IN NAMING GROUPS, TO REFLECT CURRENT STRUCTURES.
   - IN THE LONGER TERM, MAIL MAY CONSIDER INCLUDING WATERSHED MANAGEMENT GROUPS AS A SEPARATE CATEGORY
5. LINK TO FORAGE COMPONENT OF THE PROGRAM THROUGH CLAP PROJECT
   - PROMOTE FORMATION OF FORAGE SEED ASSOCIATIONS, LED BY WOMEN TO BRING WOMEN'S PERSPECTIVES INTO NRM
6. MAIL TO PROMOTE UPTAKE OF PROJECT RESULTS IN NEW INITIATIVES INCLUDING:
   - DRYLAND FARMING SYSTEMS PROGRAM
   - ICIMOD/CSIRO WATERSHED MANAGEMENT AND PLANNING PROJECT
   - AACRS
   - GEF LAND MANAGEMENT PROGRAM

Recommendation 9. *Wheat and Maize Project - Priority Sustainability Actions*

THE W&M PROJECT DECIDED TO MAKE FOLLOWING RECOMMENDATIONS FOR SUSTAINING THE GAINS AND FOR NEXT STEPS:

1. MAINTAIN STATUS QUO IN RESPECT OF ACTIVITIES TO SUSTAIN GAINS AT PRESENT LEVEL.
2. INTENSIFY DISSEMINATION OF AGRONOMIC INTERVENTIONS.
3. INCREASE MECHANIZATION.
4. STRENGTHEN SEED SECTOR WITH A TARGET OF 20% REPLACEMENT RATE.
5. FURTHER REFINE AGROCLIMATIC ZONES.
6. INITIATE AND MAINTAIN RUST SCREENING UNDER ARTIFICIAL EPIPHYTOTIC CONDITIONS.

7. Explore, collect, maintain and utilize local germplasm.
8. Initiate and strengthen basic breeding research.

Recommendation 10. *Forages Project - Priority Sustainability Actions*

The Forages project decided to make following recommendations for sustaining the gains and for next steps:

Forages in Afghanistan are in an infant stage of development. The capacity of ARIA to develop forage varieties is limited. Consequently, fast track variety evaluation and introduction from other countries is the best way to move forward. A total of 9 dryland forages have been identified as superior species/genotypes. Three of these (Oat, Vetch and Triticale) can be handled like traditional field crops – an area in which ARIA has adequate strength.

Work on the other 6 forage species will be done in parallel.

Action points:

- Validation of the data analysis of the forage trials to identify the superior genotypes (could be 3 or 4 species/genotypes out of the 9). undertaken simultaneously by ARIA and ICARDA
- ICARDA to contact commercial providers in Turkey to get a catalogue for the selected species. ICARDA task
- There is a need to provide ARIA with manuals/factsheets covering description and best agronomic practices (basic guidelines) of the selected superior species/genotypes. Delivered by ICARDA and Australian partners
- It is urgent for ARIA to continue maintenance of the perennial shrub species and cactus planted within ARIA research stations in Baghlan and Nangarhar. ARIA responsibility

Recommendation from ARIA:

- Request to extend project for 2 years until this new forage department can stand on its feet.

Signature:

Name: David Swete Kelly

Designation: Final Review, Team Leader

Date: 19/10/18

Appendix 1: Documents Reviewed

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Appendix 2: List of Persons Contacted

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Appendix 3: *Final Review* Workplan

1. Introduction

Purpose of this appendix

This appendix provides the conceptual, methodological, and operational guidance used to undertake the *Final Review* of the Australian-funded Research for Development (R4D) Program in Afghanistan. The *Final Review* of *Afghanistan Agricultural R4D Program* was commissioned by the Australian Centre for International Agricultural Research (ACIAR).

- Section One of this *Final Review* Plan describes the scope and focus of Afghanistan R4D Program, the objectives of the *Final Review* and introduces the *Final Review* questions.
- Section Two proposes the approach and methods to be used by the *Final Review*.
- Section Three clarifies the management process for the *Final Review*.
- Section Four presents the stakeholder engagement and communication plan.

Final Review Objectives

This *Final Review* assessed the *Afghanistan Agricultural R4D Program* using the five core criteria for evaluation of development assistance[53] - relevance, effectiveness, efficiency, impact, and sustainability. The *Final Review* focused on the scheme level achievements of the overall program rather than the detailed activities of each project. The *Final Review* includes a:

1. **Background Analysis:** This summarises the broad understanding of the social, economic and development context in which the *Afghanistan Agricultural R4D Program* is situated. Through this analysis the *Final Review* assessed the extent to which *Afghanistan Agricultural R4D Program* remains a priority for its beneficiaries, its partner organisations, Afghanistan, and to Australia (Relevance).
2. Review of the achievements: Including:
    a. An assessment of the progress made in achieving the *Afghanistan Agricultural R4D Program* objectives, as well as its short and medium-term outcomes of its composite projects (Effectiveness).
    b. A review of the cost effectiveness of the *Afghanistan Agricultural R4D Program* and its potential to reach future scale (Efficiency).
    c. An assessment of the *Afghanistan Agricultural R4D Program's* current achievements as evidenced by the changes wrought in the lives of its beneficiaries, and by improvements to the capacity of its research partners in Afghanistan (Impact).
    d. An assessment of the likelihood that the *Afghanistan Agricultural R4D Program* will deliver sustainable outcomes (Sustainability).
    e. An assessment of the *Afghanistan Agricultural R4D Program's* management and governance arrangements.

[53] OECD Development Assistance Committee

The above tasks involved synthesising the available/relevant secondary data, verified by the primary data provided by the projects and the key informant interviews.

3. **Consideration of implications:** Based on these assessments, the *Final Review* identified the strengths and weaknesses of the *Afghanistan Agricultural R4D Program*, described the lessons it has learnt, and drew any relevant conclusions. Where necessary, the *Final Review* offered suggestions for the future structure, approach and priorities for Australia's ongoing assistance to Afghanistan.

The results of this *Final Review* are of use to the following groups to inform decision-making:

1. MAIL/DAIL:
    a. MAIL Research (ARIA): To inform research priorities and the ongoing research support needed; and
    b. MAIL/DAIL Development: To inform development activities needed in dissemination of results, agricultural extension and seed systems.
2. DFAT:
    a. To inform management of the Afghanistan-Australia Community Resilience Scheme;
    b. To inform evaluation of aid effectiveness; and
    c. To inform consideration of future development activities.
3. ACIAR:
    a. To provide accountability; and
    b. To draw out the lessons in implementing a complex Program in a difficult environment.

The achievements of *Afghanistan Agricultural R4D Program* might also be usefully communicated to other development partners, stakeholders, and the general public.

The following elaborates the key questions used to explore the dimensions outlined above, following which Section 2 outlines the approach and methods employed by the *Final Review*.

Final Review questions

The broad focus of the R4D Program was explored through the specific questions outlined in Table 1. The methods used to obtain answers to these questions are discussed in Section 2.

These questions were not only informed by the Terms of Reference for the *Final Review*, but by the Annual Results Reports undertaken as part of the ongoing M&E system for the *Afghanistan Agricultural R4D Program*.

Table 8: *Final Review* questions.

Question Subject	Key Question	Specific Questions
Relevance: Does the Afghanistan R4D Program intent and design remain relevant?	To what extent are the original outcomes of the Program and each component Project still valid and relevant?	
	Is the Afghanistan R4D Program relevant to Afghan and Australian policy priorities?	
	Is the Afghanistan R4D Program relevant to ICADA, CIMMYT and other stakeholders in the Afghanistan Agriculture Sector?	
	Is Afghanistan R4D Program relevant to the beneficiaries and their livelihood context?	
	What is Australia's value add and can this be enhanced?	
Effectiveness: Is the Afghanistan R4D Program effective in achieving its short and medium-term outcomes?	What are the outcomes and where have the outcomes been demonstrated?	
	Are there any unintended outcomes (either positive or negative)?	
	Are these outcomes in line with the design expectations?	Have innovations in the design contributed to its success?
	Are women and men evenly engaged in the program?	How can women's active participation and agency be enhanced?
	What were the major factors influencing the achievement or non-achievement of the outcomes?	
How efficient has Afghanistan R4D Program been?	Has the overall management and governance of the Afghanistan R4D Program been appropriate?	
	Have ICARDA and CIMMYT efficiently collaborated together and with others?	How has the profile and status of CIMMYT/ICARDA helped? Is the Government on board? Have ICARDA/CIMMYT effectively engaged with other development programs?
	Is Afghanistan R4D Program adequately resourced by ACIAR and DFAT?	
	Does ICARDA/CIMMYT delivery reflect good VFM?	Are there cheaper or more efficient alternative approaches?
	Is the Results Framework realistic, appropriate, and properly measured?	

Question Subject	Key Question	Specific Questions
Will the Afghanistan R4D Program deliver impact, and will this be sustainable?	Are the impacts even or do they benefit certain groups?	What could be done to increase inclusion or reach farmers?
	What Actions are to be taken by key stakeholders (MAIL, DFAT, DFAT-supported Non-Government Organisations, international development partners, etc.) to: Sustain the Afghan dryland agriculture research capacity which has developed substantially as a result of the Program; Disseminate at scale the benefits (including agronomic practices) of the improved wheat and maize varieties released by MAIL as a result of the Wheat-Maize component Project; Disseminate the new forage species which the Forages component Project has validated; Disseminate the knowledge, designs and institutions tested and validated by the Watershed component Project	
	Is there any evidence that activities could improve adaptation to adverse climate conditions?	
	What achievements will be sustainable and why? And which won't and why?	What can be done to improve sustainability?

Final Review Design

Approach

The *Final Review* team adopted a 'utilisation focused approach' [19] — such an approach is based on the belief that a *Final Review* should be judged by the extent to which it is useful for its intended users. As outlined by Patton *"…the systematic collection of information about the activities, characteristics, and outcomes of the programs to make judgments about the program, improve the program effectiveness, and/or inform decisions about future programming. Utilization focused program Final Review (as opposed to program Final Review in general) is Final Review done for and with specific, intended primary users for specific, intended uses*" [19]. Key principles that have informed this approach for the Afghanistan R4D Program *Final Review* include:

- **User involvement**: there has been extensive consultation with stakeholders in Australia and Afghanistan to ensure clarity of purpose. The involvement of DFAT, of key team members from ICARDA, CIMMYT and MAIL, and of the ACIAR team in Canberra has been key to ensuring that the focus of the *Final Review* meets the management and strategic needs of ACIAR and DFAT.
- **Methodological pragmatism**: the methods used in the *Final Review* are practical and focused on efficiently obtaining only the data needed to inform decisions, while applying good practice, and noting that aid *Final Review*s take place in resource and time-constrained contexts. Due to significant security restrictions there is no scope to undertake a detailed review mission. As such the review team has been carefully selected based on their long-term understanding of the achievements of the program and/or their critical role in helping to communicate and sustain the outcomes of the program within Afghanistan.
- **Efficiency**: the time and resources used in the *Final Review* are proportionate to the scale of the program and the nature of information required.
- **Developmental appropriateness**: The *Final Review* team comprised professionals with long-standing experience in international development, and specific experience in Afghanistan. The team was committed to respecting the cultural norms of Afghan people, and proactively sought and reflected the perspectives of both genders.
- **Impartiality and independence**: The *Final Review* team was independent of ACIAR and other Program stakeholders, and had no vested interest in the outcomes of the *Final Review*. The Team Leader however has been involved in the annual assessment of ongoing progress and the preparation of an Annual Results Report. The leadership of the *Final Review* is a logical culmination of this work.

Method

The *Final Review* Team undertook desk-based assessments and key informant interviews between the 9 August and 15 September. This included key meetings in Mazar and Kabul (undertaken by the Afghan team members) and Australia (undertaken by the Team Leader). In addition, tele-conferencing was used as much as possible to bring the team and the key stakeholders together.

Data collection:

The broad methodology for data collection was qualitative and 'agile'. The *Final Review* predominantly involved a range of qualitative research methods as detailed below but also assimilated available and meaningful quantitative data.

- **Document reviews**: A review of key documents produced by the Afghanistan R4D Program(e.g. Annual Reports, Interim Reports, published papers, conference proceedings, the Mid-Term Review, the Annual Results Reports, etc.) and literature relevant to Afghanistan's development and its agricultural sectors (e.g. reviews or studies commissioned by other donors/agencies) helped to identify key issues for further investigation during interviews and informed the basis for the factual data presented in the report. ACIAR made the full list of review material available to the team in the week commencing 20 August 2018.
- **Key Informant Interviews (KII)**: Interviewing purposively selected individuals constituted the bulk of the desk/field work. These interviews enabled probing and triangulation of stakeholder perspectives concerning the program. To understand the progress and challenges faced by the program, the *Final Review* team met with ACIAR, the leadership of the ICARDA and CIMMYT teams, their core Afghanistan R4D Program team members, as well as with their MAIL, DAIL and provincial counterparts. Furthermore, the views of MAIL on the sustainability and scale of R4D achievements in wheat, maize, forages and catchment management were essential to understanding the sustainability options.
- **Observation**: General observations and experience gleaned during the review, and previously, confirmed or challenged preliminary conclusions arising from the other methods used. These other methods included assessments of the interactions/relationships between classes of stakeholder, the degree of professionalism of implementation, the quality and appropriateness of deliverables, and the general attitude/engagement of the various stakeholders.
- **Reflective presentation of preliminary findings**: Because security constraints meant sub-optimal engagement the *Final Review* team presented its initial findings to a workshop of Program stakeholders in New Delhi in late September. This provided partners and other stakeholders the opportunity to clarify findings, correct misinterpretations, and add value to the review where needed. The *Final Review* team considered the reactions and comments and re-drafted the review report in areas where it considered appropriate arguments have been made.

The above generic methods were applied in an agile way insofar as they evolved and became more focused as the work progressed, and as additional and increasingly relevant key informants were identified. the *Final Review* team presented its initial findings to a workshop of Program stakeholders in New Delhi in late September. This provided partners and other stakeholders the opportunity to clarify findings, correct misinterpretations, and add value to the review where needed.

The significant security risks associated with working in Afghanistan reduced the rigor of the Review. The Team Leader was not allowed in-country and depended on:

- The two Afghan counterparts to gather information, and
- Teleconferencing with selected key informants.

This proved adequate and was combined with 1:1 discussions during the preliminary presentation in Delhi in late September 2018.

Sampling:

Sampling of interviewees was purposive rather than random. The aim was to provide the *Final Review* team with a meaningful overview of the program within the time/resource constraints of the work. The purposive sampling of interviewees considered logistical constraints and the

importance/relevance of stakeholder perspectives to the *Final Review* questions. A detailed list of interviewees is provided in Appendix 2 and informed the selection of key informants. The *Final Review* team developed a draft meeting and participant agenda for field work in both Mazar-E-Sharif, Kabul and Canberra. In Mazar-E-Sharif and Kabul, the team organised meetings with activity stakeholders directly. In Canberra, the team liaised with ACIAR and DFAT to organise meetings. The main categories of key informants include:

- Category 1: Bilateral Partners (ACIAR, DFAT and GoA)
    a. Embassy aid management staff;
    b. ACIAR and DFAT Activity Managers in Canberra; and
    c. MAIL directors and advisers.
- Category 2: Delivery Partners
    a. ICARDA and CIMMYT staff involved in the implementation of the Afghanistan R4D Program – including their research partners in Australia and globally (as relevant).
    b. MAIL and ARIA counterparts in Afghanistan;
    c. Provincial and community level stakeholders involved in demonstration farms (if possible);
    d. NGO and Private Sector partners involved in the program;
- NB: Direct engagement by the review team with community level beneficiaries was not possible.
- Category 3: Informed third parties
    a. Other development partners (NGOs, bilateral donors, multilateral agencies) involved in the same sectors, or more broadly in development in Afghanistan;

Relevant private sector actors; and

    b. Relevant civil society actors.

The sampling process involved iterations as more nuanced insights into the activity are developed, resulting in a need for clarification, or a need to discuss any emerging issues.

Data analysis:

Final Review team members compiled their own notes of interviews and discussions. Regular team discussions throughout the fieldwork phase were undertaken to assimilate the emerging trends against the *Final Review* questions. Interview notes, along with summaries of reviewed literature/documents, were processed to identify common and exceptional themes coded against the *Final Review* questions. The *Final Review* team synthesised the views of the various stakeholders, applying professional judgement to interpret any divergent perspectives. Summative observations concerning sampled aid activities were interpreted against the DAC *Final Review* criteria[54].

The *Final Review* team adopted a 'consensus approach' to conclusions. Where there was a diversity of views on issues within the team, this diversity is documented in the report.

Final Review Management

[54] Relevance, effectiveness, impact, efficiency, sustainability, cross-cutting issues.

Roles and Responsibilities

The *Final Review* involved a team of people, supported by ACIAR as well as embassy staff in Kabul.

David Swete Kelly – Team Leader

The *Final Review* was led by David Swete Kelly who had responsibility for implementing this *Final Review* plan, directing the work, and overseeing the drafting of the *Final Review* report. David prioritised areas of focus during the fieldwork, and worked with ACIAR, DFAT, ICARDA and CIMMYT to finalise the sampling of interviewees for the mission. He also continued to liaise with ACIAR in line with the utilisation focused approach to *Final Review*—thereby ensuring that the product best meets its primary needs. David also lead the presentation of *Final Review* findings to Program stakeholder in New Delhi in September.

Najib Malik – MAIL Specialist

MAIL's Deputy Minister Hamdullah Hamdard appointed Dr Najib Malik as a member of the review team. Dr Malik is eminently suited to the role as he is currently advising the Ministry on its implementation of the country's Dry Land Farming Strategy (DLFS). The DLFS objectives encapsulate much of the work undertaken within the Afghanistan R4D Program. Dr Malik helped the team to understand the quality and effectiveness of the Program's outcomes through interviews and visits with the Afghanistan implementing partners. He also was instrumental in considering the issues of sustainability given that MAIL needs to absorb many of the outcomes and ensure that these are inevitably integrated into the overall DLFS.

Sayed Hussain Mousawi – ACIAR M&E Enhancement and Impact Manager

Sayad Mousawi has been engaged by ACIAR to assist with the monitoring and evaluation of progress in the Afghanistan R4D Program since late 2015. He worked on the program's Mid-Term Review and has provided monitoring reports from the field consistently. His understanding, links and organisational skills, along with his appreciation of the program complemented the work of Najib Malik.

Schedule

The *Final Review* was implemented in three phases:

1. **Inception:** the inception phase informed the development of this *Final Review* plan, and as discussed, involved consultation with stakeholders in Australia and Afghanistan during August 2018.
2. ***Final Review* Meetings and Interviews**: The *Final Review* Team met with Canberra-based stakeholders for one day prior to the commencement of the work (Thursday 9 August 2018). This meeting discussed the proposed Work Plan, and the experience of ACIAR staff associated with managing both Afghanistan R4D Program and related programs. In addition, a phone link to Kabul occurred during this visit to jointly discuss the planning requirements. Work in Kabul was undertaken between the 11 August – 5 September 2018. The extended timeframe was needed to accommodate Independence Day (19 August) and Eid al-Qurban (21-24 August) which resulted in most Afghan nationals being unavailable for a week. Work commenced with a detailed reading of the End-of-Program reports, and other documents, prepared by the project teams and ACIAR and made available to the team on the 20 August 2018. Subsequently detailed interviews and visits occurred, and the results were shared and discussed amongst the team in the week

commencing 3 September 2018. After this the Team Leader undertook more specific key Informant telephone interviews.

3. **Documentation and communication:** following this work, data was processed and synthesised into a draft report by 21 September 2018. The Team Leader took a primary role for the whole document but the Afghan members of the team(led by Dr Malik) prepared the draft analysis of the issues relating to partnerships and sustainability. The keys steps in the communication plan are presented in Section 4.

Limitations

The following challenges have an influence on this *Final Review*:

- **Clarity of strategic intent**: the clarity and value of a *Final Review* is influenced by the 'evaluability' of a program's strategic intent. An unambiguous assessment of progress, quality and effectiveness can only be made insofar as the basis for measuring such parameters has been unambiguously defined. This is reflected in the truism: 'if you don't know where you're going, any road will get you there'. In the absence of defined objective measurements, a *Final Review* team can only rely on stakeholder opinion and their own professional judgement. It is nevertheless appreciated that to some extent, the dynamic context in Afghanistan may have caused ACIAR and its implementing partners to shy away from an ideal level of definition.
- **Security, time and resources**: the rigor of the data gathering and analysis processes for this *Final Review* were constrained by the security restrictions and the time available. The delays due to a series of Eid holidays and the delayed delivery of project-level final reports also constrained a fuller appreciation of outcomes. These issues were raised with ACIAR.
- **Poor Quality Project Documentation**: The final project documents received by the review team were quite variable and generally considered to be drafts. In particular the final report of the ICM project was very fragmented with large sections cut and pasted from source documents with little attempt at ensuring consistence of arguments or assessments.
- **Judgements:** this *Final Review* primarily involved rapid qualitative methods of inquiry and relied on the professional judgement of the evaluators to interpret stakeholder perspectives.
- **Access:** since the program covered a significant geographic area, and the *Final Review* team was only able to undertake limited in-country travel, and validation was based on a limited range of stakeholders/locations.
- **Measurement:** most human changes are amorphous and difficult to measure in any absolute sense. There is no consensus on the units of measurement of the phenomena that underpin the program, such as 'capacity', 'empowerment' or 'quality of life'. This reality poses a clear challenge to the task of judging the performance of any aid activity.
- **Attribution:** all research for development initiatives are implemented within 'open systems' such that multiple factors contribute to, and/or detract from, the anticipated changes. This renders the definitive attribution of changes to particular interventions challenging at best.

While acknowledging these typical limitations, this *Final Review* plan provides the basis for addressing each of these as far as possible, and thereby ensuring a high-quality *Final Review* product. The focus of the *Final Review* was carefully discussed with key stakeholders to ensure that reasonable time and resources have been allocated, commensurate with the scope. The *Final Review* team worked with ACIAR and the program staff to purposively sample the most relevant

key informants. Security considerations were monitored during all in-country engagements. The pervasive issues of measurement and attribution in aid *Final Review* are addressed by following international good practice in the application of research methods.

Stakeholder Engagement and Communication

Stakeholder engagement and communication of *Final Review* findings involved two steps:

1. **Draft Report 27 September 2018:** following the fieldwork phase, the *Final Review* team applied content analysis methods to synthesise the findings from the field. A draft report was prepared generally in line with the ACIAR Template and the *Final Review* team presented the initial findings to a workshop of stakeholders in New Delhi, informing them of how thinking is progressing, gauging reactions, and discussing areas that may need improvement.
2. **Final report 20 October 2018:** Once consolidated comments from ACIAR, ICARDA, CIMMYT, MAIL and DFAT were received, a final draft was prepared. Feedback on the draft report was reviewed, addressed and assimilated before the preparation of a final publishable version of the report.

Throughout the *Final Review*, options to improve performance and build learning was a focus, and included discussion with ACIAR on how these might potentially be used to improve the activity.

Appendix 4: Program Level Results Framework

Table 5: Results framework – Goal level indicators

Overall Goal	Objectively Verifiable Indicators (What will success look like?)	Means of Verification (How do we measure it?)	Risks and Assumptions
Sustainable productivity in Water Scarce Environments: Improved and sustained productivity of Afghan farming systems in water scarce environments through adaptive research	**Potential**[55] increased **productivity**[56] of target farming systems that can reasonably be expected within the next five, ten and fifteen years.	Project analysis of potential and actual productivity improvements, number of beneficiaries (men and women), and adoption rates achieved (direct and indirect). POG Reviews of annual progress and integrated team workshops. Mid-term and *Final Review*s. Adoption and impact surveys.	Inability to effectively monitor project activities in Afghanistan due to security risks. Difficulty in forecasting and attributing productivity increases due to the myriad factors influencing productivity and subsequent adoption. Difficulty in integrating the outcomes across the projects.
	Potential number of **beneficiaries** (men and women) who can reasonably be expected to attain the proposed productivity increases within the next five, ten and fifteen years.		
	Potential increase in total production and value of production that can reasonably expected within the next five, ten and fifteen years.		
	Actual[57] increase in **productivity** of target farming systems resulting from Project interventions.		
	Actual number, and ratio of, target beneficiaries (men and women) who achieved the productivity increases in target farming systems as a result of Program interventions.		
	Actual increase in total production and value of production attributable to Program interventions.		
	Evidence of policy or institutional reform directly influenced by the program	Number and impact of institutional or policy changes influenced by the projects.	Difficulty in attributing changes to the influence of the projects (as opposed to the personal influence of individuals and/or CGIAR centres)

Table 6: Results Framework – Purpose-level Outcomes – Sustainable Wheat and Maize Production.

[55] Potential increases are in relation to the estimates for outputs and outcomes provided by each project's research.

[56] Productivity should not just be measured based on land area. Water productivity will provide the *de facto* indicator of improved sustainability in water scarce environments. Another important element of productivity will be labour productivity (men and women).

[57] Actual increases are developed by projects from baseline and ongoing adoption surveys. Extrapolation of these figures must be based on defensible logic.

Component Goal	Objective Verifiable Indicators (What will success look like?)	Means of Verification (How do we measure it?)	Risks and Assumptions
Improved Grain Productivity in Farming Systems: Increase both the quality and availability of improved wheat and maize varieties adapted to the irrigated and rainfed farming systems of Afghanistan.	Number and productivity benefits of the new officially released wheat and maize varieties: • Wheat: 8 new varieties (5 irrigated, 3 rainfed); minimum yield benefit: 5 per cent and/ or disease resistance. • Maize: 3 new varieties; average productivity benefit: 10 per cent and/or disease resistance.	Project baseline and ongoing assessments incorporated into annual reports. Technologies developed; Actual adoption levels by target communities; Actual yield attainment by target communities Capacity development of both beneficiary communities as well as Government service agencies; POG Reviews of annual progress and integrated team workshops. POG Implementation, mid-term and final reports ACIAR Adoption and Impact Surveys	Difficulty in monitoring varietal uptake when farmers traditionally use a largely informal system of seed storage and dispersal. Assumes each farmer passes on seed to five others each year. Inability to effectively monitor project activities in Afghanistan due to security risks. Difficulty in forecasting and attributing productivity increases due to the myriad factors influencing productivity and subsequent adoption. Dependent on the effectiveness of the Government distribution program.
	Number and percentage of farmers (men and women) incorporating new varieties in their annual planting: • Over five years, 15 per cent (20,000 farm households) around research and demonstration sites incorporate the new varieties in their annual planting. • Over five years, 6 per cent (60,000 farm households) in the targeted provinces incorporate the new varieties in their annual planting.		
	Area planted, and productivity benefits achieved by farmers incorporating new varieties: • 4,000 hectares in and around research and demonstration sites, productivity benefit 12 per cent. • 15,000 hectares in the targeted provinces, productivity benefit 12 per cent.		
	Accessibility of new varieties to farmers: • Proportion of new varieties included in seed chain - 50 per cent of the total amount of certified seed is of improved varieties. • 80,000 farmers using certified seed of the new varieties.		
	Policy commitment and improved capacity of Afghan agencies to run their own varietal testing program: • Standard procedures established and operating for testing and release of new varieties of major cereal crops, including wheat and maize, in Afghanistan		

Table 7: Results Framework – Purpose-level Outcomes – Improved Livestock Productivity.

Component Goal	Objective Verifiable Indicators (What will success look like?)	Means of Verification (How do we measure it?)	Risks and Assumptions
Improved Livestock Productivity in Farming Systems: Increase the availability of supplementary fodder resources adapted for low water use.	Number, type and productivity benefits of new forage and fodder options promoted. At least three new forage cereal/legume and two shrub species promoted. • Expected increase in forage production of 25per cent through the promotion of high yielding forage species with an extended season of forage availability. • 1000 new households growing the promoted forage species (increased forage production with high nutritive value- particularly in early spring -will help decrease the lamb mortality rate by 15-20per cent; increase weaning weight by 3kg per lamb; and increase ewe prolificacy by 15per cent in the short term) • Feed costs are reduced when compared with more intensive shed-feeding systems (higher forage production will enable livestock holders to rely less on concentrated feeds, and ultimately reduce feed costs in targeted systems by 10-15per cent) • Overall benefits from these increases in forage and animal production should be reflected in higher household income by approximately 10per cent.	Project baseline and ongoing assessments incorporated into annual reports. Technologies developed; Actual adoption levels by target communities; Actual productivity improvements by target communities Actual livelihood improvement in target communities. Capacity development of both beneficiary communities as well as Government service agencies; Linkages and synergy POG Reviews of annual progress and integrated team workshops. POG Implementation, mid-term and final reports ACIAR Adoption and Impact Surveys	Inability to effectively monitor project activities in Afghanistan due to security risks. Difficulty in forecasting and attributing productivity increases due to the myriad factors influencing productivity and subsequent adoption.
	Number and percentage of farmers (men and women) incorporating new forage and fodder options in their farming systems: • A total of 1000 farmers (80per cent male – 20per cent female) to be engaged in the new forage production options.		
	Area planted, and productivity benefits achieved by farmers incorporating new forage and fodder options: • Area planted with new forages at research and demonstration sites is expected to total 10 ha in each Province. 200 ha of land at the provincial level to be dedicated to the new forage production options.		
	Accessibility of new forage and fodder options to farmers: • Forage seeds and planting material to be available through 2 Village-Based Seed Enterprises, and 4 community-based plantations.		

Component Goal	Objective Verifiable Indicators (What will success look like?)	Means of Verification (How do we measure it?)	Risks and Assumptions
	Improved capacity and policy commitment of Afghan agencies to the running of their own testing programs for new forages and fodders: • Provision of technical backstopping to improve the capacity of Afghan institutions and agricultural services. Training and professional development programs in Australia and Afghanistan for Afghan scientists, students and researchers - this will strengthen participating Afghan institutions in order to run their own forage testing programs.		

Table 8: Results Framework – Purpose-level Outcomes – Improved Water Management.

Component Goal	Objective verifiable indicators	Means of verification	Risk/ Assumptions
Improved soil and water management in farming systems: bridge knowledge gaps on watershed management by developing community-based watershed management model sites.	Improved natural resource management from the promotion of better catchment management options. • Improved natural resource productivity at each catchment site from the adoption of promoted options. Expected water productivity increment (Target: 20-30 per cent); Soil/Land productivity increment (Target: 15-20 per cent) Number and percentage of farmers (men, women) of water users associations (WUA) (members and non-members) adapted the recommended catchment management options with enhanced skills in taking watershed management decisions. • ICARDA working with WUA each with 30-40 farmers (Men and Women) at five watershed sites. (Target: 150-200 beneficiaries) Accessibility to tested conservation options (crops, forages, soil and water conservation structures) to farmers • More than 3000 farmers (men and women) from 5 target provinces and 1 model site will directly benefit from improvements to their skills and knowledge regarding conservation options to maintain natural resources at target sites; a further 10,000 farmers (men and women) will indirectly benefit. Field days, demonstration plots, and other communications (SMS, radio broadcast, cross learning visits, study tours, etc.) promote the adoption of natural resource management options tested for the different watershed sites. Data base on technology development and	Project baseline and ongoing assessments incorporated into annual and semi-annual reports. Technologies tested and promoted; Actual adoption levels by target communities; Actual productivity improvements by target communities Actual livelihood improvement in target communities. Capacity development of both beneficiary communities as well as Government service agencies; Linkages and synergy POG Reviews of annual progress and integrated team workshops. POG Implementation, mid-term and final reports	Difficulty in identifying the merits of individual technologies in systems-based interventions. Inability to effectively monitor project activities in Afghanistan due to security risks. Difficulty in both forecasting and attributing productivity increases due to the myriad factors that influence productivity and subsequent adoption. Capacity built remains available at watershed sites to continue to achieve sustained outcomes Extension services have capacity, time and resources to promote project outputs Ownership of project and technologies by national system Normal rainfall and no natural disasters

Component Goal	Objective verifiable indicators	Means of verification	Risk/ Assumptions
	knowledge generated from the watershed sites available in the public domain.	ACIAR Adoption and Impact Surveys	
	Improved capacity and policy commitment of Afghan agencies to the running of their own catchment management and conservation options programs. • Young workforce with better understanding of NR management options ready to contribute in the sustainability of promoted options in target and non-target dryland regions of the nation. (Target: Men 20; Women 10) • Enhanced confidence of key farmers and other stakeholders in watershed management options. (Target stakeholders: 300 men, 50 women, and 30 youth). • Economically feasible options with high Benefit/Cost Ratios convince others to adopt. • A better understanding of the available options for managing watershed catchments by policy makers creates an enabling environment for policy changes. • Programmed visits for MAIL and other government agency staff help key policy makers identify what measures work best in the Afghan context, and thereby formulate improved policies.		
	Improvement in the livelihoods of women, men and youth in the watershed sites through adoption of different catchment options. • A choice of better options increases the productivity of dry land crops and forages, and enhances both the employment opportunities and the income of households at the various watershed sites. (Target: 150-200 households).		

Appendix 5: Review of Project Specific Outputs

Wheat and Maize

Objective 1: To identify new high yielding and disease resistant wheat and maize varieties adapted to local conditions, support their release, and produce basic seed.

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
1.1	**Introduction of advanced wheat and maize lines from CIMMYT-Mexico and wheat lines from ICARDA and TURKEY/CIMMYT/ICARDA. Maize OPVs and hybrids will be introduced from CIMMYT maize programs in Africa.**	Irrigated wheat: 5411 new lines were introduced. Rainfed wheat: 2484 new lines were introduced. Hybrid maize: 83 new lines were introduced. OP Maize: 78 new lines were introduced.	All these lines were tested at several locations throughout Afghanistan and promising ones were promoted to next stage of testing.	2017
1.2	**Multi-location testing of introduced wheat and maize germplasm at key ARIA research stations representing different agro-climatic zones.**	Irrigated wheat: 483 yield evaluation trials. Rainfed wheat: 102 yield trials. Hybrid maize: 16 yield evaluation trials. OP Maize: 19 yield evaluation trials.	The data generated over years were analysed and better performing genotypes were used to constitute advance trials.	2018
1.3	**Based on performance in the multi-location trials, introduced genotypes will be advanced to next stages of testing in national trials viz., preliminary (PYT) and advance yield trials (AYT).**	Irrigated wheat: Total 13051 lines tested. Rainfed wheat: 3316 lines tested. Hybrid maize: Total 220 lines tested. OP Maize: Total 193 lines tested.	Results of these trials were used to compile information on new promising genotypes for release as commercial varieties.	2018
1.4	**Conduct National Wheat Rust Screening Nursery (NRSN) at key Afghan locations and Njoro, Kenya, to proactively screen the new identified superior genotypes, seed chain varieties and check varieties of different yield trials, and to immediately gauge any shift in the race profile in the country.**	1396 genotypes were included in six national rust screening nurseries (NRSN) constituted in each of the six project years from 2012-13 to 2017-18. The lines included all seed chain varieties and all AYT and NUT entries.	The NRSN served as a common platform to screen all the important wheat lines of Afghanistan, and provided crucial information for varietal release process.	2018

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
1.5	**Based on at least three years‟ multi-location testing, superior wheat and maize genotypes will be identified and proposed by ARIA to the ministry for release as commercial varieties.**	A large number of release proposals were submitted to Ministry of Agriculture, Irrigation & Livestock (MAIL) of Government of Islamic Republic of Afghanistan (GoIRA) during the project life.	Irrigated wheat: 15 new varieties released including 2 barleys. Rainfed wheat: 5 new varieties released. Hybrid maize: 3 hybrids released. OP Maize:4 varieties released.	2018
1.6	**Demonstrate newly identified or released wheat and maize varieties on research farms and farmers' fields.**	452 wheat demonstration plots of new varieties were conducted at research farms between 2012-13 and 2017-18. Similarly, 23 plots of maize were also planted during the same period. Additionally, 2766 farmer field demonstrations were conducted in the four provinces of Kabul, Nangarhar, Balkh and Herat.	Demonstration cum seed production plots were conducted at research farms of ARIA.	2018
1.7	**Produce high quality basic seed of newly released wheat and maize varieties at ARIA research stations for further multiplication as breeder seed by ARIA and FAO.**	24 plots of maize as well as 452 plots of wheat were raised at ARIA research farms to produce basic seed of newly released varieties.	The seed produced was handed over to ARIA to produce breeder seed of the new varieties.	2018

Objective 2: To reorganize the varietal testing, release and crop management in line with the wheat agro climatic zones identified in the previous phase of the project.

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
2.1	**Conduct National Phenology Nursery at key Afghan locations to further fine-tune the Afghan wheat agro-climatic zones for the purpose of varietal releases.**	NPN conducted during project life led to the creation of four wheat climatic zones viz., Eastern, Northern, South-Western and Central Highland.	ARIA has integrated this information in its varietal testing system and even varieties have been released based on this information.	2017
2.2	**Conduct crop management trials in different agro-climatic zones and production conditions to develop specific locally relevant recommendations.**	104 agronomic experiments on winter wheat, 144 on spring wheat, 63 on rainfed wheat and 96 on maize were successfully conducted during the project life across the length and breadth of the country.	18 extension messages and new revised agronomy fact sheets of maize and wheat were developed based on these experiments.	2017

Objective 3: Accelerated adoption of new improved wheat and maize varieties and crop management practices under local conditions.

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
3.1	**Establish and support informal local technical information working group hubs in four agro-climatic zones of the country at Jalalabad, Mazar, Herat, and Kabul. Involve local staff of agriculture department, farming community members, regional NARS researchers, and private sector.**	The four informal groups were formed in the four provinces of Kabul, Nangarhar, Herat and Balkh.	The hubs started working with effect from 2012-13 season. and accomplished 2766 farmer field demonstrations during the project under report.	2012
3.2	**Disseminate and demonstrate the new varieties and available system independent production technologies through the technical hubs with active involvement of participating partners.**	Project accomplished 2766 farmer field demonstrations during the project under report. Also, produced about 18 new extension messages and/or fact sheets. Interviewed and collected more than 588 samples from farmer fields.	Hub staff also organised field days and trainings for farmers and other stake holders in the region. 4779 Afghans attended these events.	2018
3.3	**Demonstrate line sowing for crop establishment. Include reduced- or no-tillage options if possible.**	More than 80% farmer field demos were line sown during 2016-17 and 2017-18	The seed drills kept with the project will be donated to provincial DAILs to enable them to continue to demonstrate advantages of line sowing to farmers.	2018
3.4	**Procure, install and commission 8 mobile seed cleaners in selected villages. Train seed cleaner operators. Process one crop of wheat seed.**	The four provinces received eight seed cleaners. The harvest of 2016-17 demo farmers was cleaned at their doorstep. Seed cleaners transferred to MAIL at the end of project.	441 farmers cleaned 200 MT of wheat seed at their doorstep. 1925 farmers benefited from this cleaned seed.	2018

Objective 4: Build capacity for wheat and maize improvement in Afghanistan.

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
4.1	**Conduct in country trainings in various subject fields by involving in-country and external consultants, taking care that more women are trained than in the previous phase.**	640 Afghan researchers benefitted from in country trainings organised by the project.	All trainings topics were identified in consultation with ARIA.	2018
4.2	**Provide training opportunities in the region and in international agricultural research centres involving CIMMYT and ICARDA,**	65 ARIA and other Afghan researchers were trained abroad by the project.	The trainings were organised in Mexico, Turkey, India, Nepal and other neighbouring countries.	2018

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
	ensuring that there is greater participation by women than in previous phases.			
4.3	**Provide field manuals and technical information in various operational areas of wheat and maize improvement research.**	18 new extension messages/ fact sheets were developed and disseminated among target beneficiaries.	The topics covered included agronomic recommendations, plant protection and weed management etc.	2018
4.4	**Conduct annual crop (wheat and maize) workshops to analyse results and plan a technical program for the next season. The workshops will also attempt to make technical recommendations to the government ministries on consensus research results including those for varietal releases.**	Five wheat and five maize workshops were organised during the project life.	Workshops have become platforms for wheat and maize researchers to discuss results of previous season and plan for the coming one.	2018

Objective 5: Verify project success and opportunities for scaling out

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
5.1	Undertake a baseline socio-economic survey of targeted wheat maize farmers in hub regions, including the role of women and children in wheat- and maize-based systems.	The adoption of local varieties are higher than improved varieties. Major seed sources are other farmers, CIMMYT, own seed and seed companies. Sources of irrigation varies according to region. Main sources are river, Kariz, Canal and tube well. The constraints faced by the farmers are many and the major ones among them are problems related to seed availability and quality, access to information, credit availability and input availability Women mainly control livestock management but utilization of produce is controlled by man. Women have no role in agricultural technology adoption. The main profession is farming and there is no secondary occupation. The level of varietal adoption is high in Kabul and Balkh.	399 households were surveyed in four provinces. The survey revealed that 76% of HH heads have agriculture as primary occupation and 60% of HH heads contribute 100% of their time to family labour. Wheat was reported as main winter crop and only Nangarhar reported growing maize. The broadcasting was reported to be the most common sowing method.	2014
5.2	Design impact assessment questionnaire and conduct the survey	40% of farmers in each province received improved variety in 2014-15. The % of farmers growing seed chain varieties in 2015-16 were 53% in Herat, 75% in Kabul, 64% in Balkh and 100% in Nangarhar.	600 farmers were surveyed in four provinces. 60 treatment farmers and 90 control farmers in each province.	2018

SN.	Main Activity	Outputs and/or Milestones	Comments	Completion date
5.3	Phenotype and genotype 1,000 wheat lines from the Afghan gene bank	The phenotyping revealed that days to maturity ranged from 188 to 214 and height ranged from 30 cm to 135 cm. 1019 genotypes were genotyped and reduced to 761 to represent a reference library for Afghanistan. Screening for resistance at Mexico revealed several lines resistant to various diseases. Ten lines including a land race viz., Nish Shotor were identified to be a donor for multiple disease resistance.	1277 wheat genotypes comprising of all that was available with ARIA were characterized at Kabul during 2014-15. The genotyping revealed the genes present in Afghan collection.	2018
5.4	Establish genetic identity of the wheat varieties grown by a random sample of farmers with reference to the Afghan wheat gene bank	94% of samples could be identified using the genotyping tools. Large number of improved varieties were grown by farmers and 60% of them correctly predicted their varieties. Local landrace stocks and the Afghan wheat collection are diverse and valuable resources for the country and deserve to be maintained.	A total of 588 farmer field samples were analysed to ascertain identities. A group of 761 lines was used as a reference set for ascertaining the identities.	2018

Integrated Catchment Management

Objective 1: To align GIRoA Ministries and other stakeholders in providing ongoing support for soil and water productivity improvements in watersheds

SN.	Main Activity	Outputs/ Milestones	Comments	Date of Compl., & % Achv.
1.1	**Partnerships, working groups formation and establishing relationships for project implementation, coordination and management**	Functional partnerships and working groups involving concerned stakeholders established a. Technical working group (TWG) formulated b. Project Management Committee overseeing the project management, coordination and implementation	- Partnerships with community, WSUAs, CDCs, DAILs, MAIL, NRM, ARIA and donor agencies; - Regular joint field visits and reviews with all stakeholders; - Stakeholders demand (by province governor, DAIL directors & community etc.) for continuation of WS/NRM activities in the project villages, and neighbouring villages;	July 2018, 100%
			- Technical working group (TWG) meetings conducted; reviewed progress and work plans; action taken on various suggestions e.g. intensive community capacity building and training so that community is skilled to manage the structures/project; TWG approved of DAIL recommendations for taking up project sites; TWG approved feasibility reports and micro plans.	July 2018, 100%
			- PMC meeting held on regularly, reviewed the project activities and progress; PMC had participation of donor (ACIAR), ICARDA, MAIL, ARAIA, DAIL, field partners and community representatives; PMC reviewed work progress and suggested for improvements in impact documentation and knowledge sharing;	Sep 2018, 100%
1.2	**Developing project management and coordination, implementation plan**	Annual work plans (AWP) developed	- AWP reviewed by PMC; AWPs discussed activities for project years that are prepared in discussion with community/WSUAs, DAIL, CDC etc. in matters of site feasibility, micro-plan, treatment plans, trainings etc.;	Sep 2018, 100%
1.3	**Contracts signed, engagement, communications, monitoring and evaluation, governance and training plans developed (Responsible: ICARDA will be overall responsible for M&E).** a. *Memorandum of Understandings (MoU) with different stakeholders will be signed*	Stakeholder engagement plan and M&E plan developed Memorandum of Understanding with different stakeholders signed Training plans developed in consultation with stakeholders PMC and TWG involved in M&E	- As per stakeholder engagement and M&E plan, action-oriented work plans and MOUs agreed with MAIL, AA, faculties of agriculture in Kabul, Baghlan, Nangarhar and Balkh university, and WUAs in Balkh, Baghlan, Nangarhar, Takhar and Parwan provinces;	July 2018, 100%
			- M&E team formed involving members from PMC, TWG and others; M&E team undertaken trainings in different provinces	Apr 2017, 100%

SN.	Main Activity	Outputs/ Milestones	Comments	Date of Compl., & % Achv.
	and M&E put in place a system to monitor progress of the coalition, *b. Identify capacity-building and training needs for project implementation and sustainability*.	Improving capacity within MAIL (ARIA, DAIL, DLF, WUAs, local staff and stakeholders) is a high priority. The coalition will need to identify and prioritise the training needs.	during Jan – Apr, 2017 (ACIAR Impacts Manager led the trainings); - Project officer and field support staffs monitored and documented the achievements, & assessed community perception of impacts due to project activities (in Nangrahar, Balkh, Takhar, Baghlan, Parwan and Kabul);	
			- The DAIL representatives, and NRM employees regularly visited watershed sites in all provinces. - DAIL colleagues participated in various ToT trainings conducted at province level in Parwan, Bamyan, Kabul, and in provinces under AA operation such as Jawzjan, Bamyan and Balkh; - DAIL colleagues attended many in village abased trainings, and attended cross learning exposure trips to various watershed sites in Takhar, Baghlan, Parwan, Nangarhar, and Kabul; Regular capacity building of DAIL, MAIL staff under watershed/other projects done as per training need assessment (TNA) by PMC and TWG;	Aug 2018, 100%

Objective 2: To improve capacity and confidence of project partners e.g. MAIL, Universities, ARIA, NGOs to conduct watershed management research and extension

SN	Activity	Outputs/milestone	Achieved/ in progress	Date of Compl., & % Achv.
2.1	**In-country and out-of-country training activities for stakeholders conducted to build capacity for integrated watershed management**	Capacity of stakeholders on watershed management interventions build through suitable modules developed	- Total 45 in-country trainings (including 24 TOTs) organized for 1336 participants involving 236 females; TOTs organized for participants from WUA, NGOs, DAIL and MAIL; - 6 out country trainings organized by the project for 85 participants involving 6 females; - 6 FFDs organized where 410 people participated including 27 female members. - Various publications in local language and English e.g. 2 project summary leaflet both in English and local language (1000 copies), 2 Watershed brochures (English/ Local language, 1000 copies), WS Project Impact Poster (English/Local language, 1000 copies), Sayad	July 2018, 100%

SN	Activity	Outputs/milestone	Achieved/ in progress	Date of Compl., & % Achv.
			WS case study (English/local language, 500 copies) 1 revised WS manual in (local language (WS Management), and WS review document (English) prepared/ published; Distributed to community, offices, organization and donor;	
2.2	**Study tour and field trips held for MAIL officials to study abroad through international exposure on watershed policies**	Enabling policy environment created	International training/ exposures organized for senior staff and policy persons; Exposure-cum-training on Geo-applications use in watershed management organized in 2016-17 in Jordan for 2 MAIL staffs, 1 lecturer from Kabul Univ., and 3 ICARDA staffs; MAIL and Univ faculties wished to induct this subject to learn and apply GIS tools and techniques for watershed and NRM in their institutes; In 2015-16, two international exposures done for policy makers (to Telangana in Andhra Pradesh, India, and meeting at Delhi, India; one on watershed policy issues and another on watershed approaches; for 39 MAIL/DAIL and ICARDA staffs including 2 female participants)	Nov 2017, 100%
2.3	**Creating a young workforce in Afghanistan on watershed management**	Capacity of young workforce on watershed management interventions built through project fellowships in collaboration with different universities.	- 10 interns (including 1 female) were selected from faculty of Agriculture of Balkh, Baghlan Kabul and Nangarhar universities, and underwent one-month training (2015-16) at Punjab Agri University, India on watershed management; 8 students got job in 2016-17 (two are engaged in ICARDA-ACIAR watershed project).	Dec 2017, 100%

Objective 3: To increase understanding of soil and water conservation practices integrated with production systems, livelihoods (baseline data) and other factors influencing adoption of dryland technologies

SN	Activity	Outputs/ milestone	Achieved/ in progress	Date of Compl., & % Achv.
3.1	**Review existing literature and reports on watershed management and production systems to summarize soil and water conservation practices integrated with current production systems in the target provinces.** An International consultant will be hired to conduct the review of current status and constraints in watershed management in Afghanistan and a review will be published as a review report as well as a peer-reviewed journal paper. The compilation will be widely distributed among stakeholders	Review report on watershed management in Afghanistan is published	- Review report completed; report shared with donor by International consultant. One review paper submitted in peer review journal.	Jun 2017 100%

SN	Activity	Outputs/ milestone	Achieved/ in progress	Date of Compl., & % Achv.
	including policy makers, MAIL/DAIL, Universities, NGOs, research centres, etc.			
3.2	**Compile baseline information of key watershed sites with communities to document livelihoods, identify vulnerable groups, and identify constraints and needs.** Based on baseline survey and local knowledge and needs, TWG will identify the key constraints of vulnerable groups and prioritize the entry points on NRM and best bet technologies. This will be supplemented with the identification of key indicators and technologies in reference to project objectives and goal; and design the key community-based entry points in all five selected watershed sites.	Baseline survey undertaken, indicators and entry points identified.	- Completed baseline survey, report published in Feb 2016. Indicators and Entry point activities (EPAs) suggested.	Feb 2016 100%
3.3	**Gender responsive plan (GRP) and steps for collecting sex disaggregated data for project interventions developed.** Based on the baseline data collected on gender, a gender responsive plan will be developed indicating the procedures to be adopted to engage gender in project activities.	Gender responsive plans developed for different project activities.	- Activities suggested in GRP (prepared in 2014) taken up; - Three female community facilitators assigned and working with women and girls' mobilization which resulted increment of the women member in WSUAs (34 women took membership in 7 WSUAs); - Women and girls are trained and facilitated to participate in various relevant activities like irrigation of plantation sites (hing/ mulberry/ pistachio/ pomegranate etc);	Jun 2018, 100%

Objective 4: In participation with WUAs develop, disseminate and analyse impact of soil conservation technologies, water harvesting practices, and best-bet production technologies for sustainable watershed management

SN	Activity	Outputs/ milestone	Achieved/ in progress	Date of Compl., & % Achv.
4.1	**Implement research to delivery watershed business model by establishing community-based organisations (CBOs) and self-help groups (SHGs) or common interest groups (CIGs) to disseminate and sustain the best bet practices in particular watersheds**	Research to Delivery Business model in target catchment sites developed	- All L&W research components are tested for efficiency under different designs and dimensions, and standardized for Afghanistan context. Such designs are recommended for out scaling as best practices to new locations and sites (based on observations by project experts and community; more research evidence/ data will be gathered in remaining period of project);	Jul 2017 100%

SN	Activity	Outputs/ milestone	Achieved/ in progress	Date of Compl., & % Achv.
	Dissemination of the soil and water conservation technologies and best bet practices will be the key aim of project. The business model from research to delivery and its impacts will be developed for watershed-based technologies. This will be achieved by focusing on the formation of community-based organisations (CBOs) and Self- Help Groups (SHGs) to disseminate and sustain the best bet practices in particular watersheds. Innovative WSA/ farmer group of at least 10 participating farmers in each of the selected sites formed to adopt and disseminate the technologies in collaboration with different NGOs, MAIL, DAIL, ARIA and other stakeholders. Further discussions will be held in TWG and PMC for developing the business model.		Important techniques found efficient and recommended (discussed in section 7 below)	
		Watershed User Associations (WUA) established at each project watershed site.	- Out of eight WS, Badam bagh is a research site. In remaining 7 watersheds, WUAS are formed involving 113 members (34 females, 79 male).	Sep 2017, 100%
			In all WSUAs, the WS and user association concept, role and responsibilities discussed in regular community meetings; WSUAs are established who are involved in planning and supervision of physical works; the associations are now capacitated to implement the physical works in the site, and maintain required records - on works and expenses, and do reporting.	June 2018, 100%
			- As per PMC and TWG suggestions on ws project results, project transition, etc., meetings with WSUAs discussed for furthering the effort in a sustainable manner; discussed ws activities, results of research on best-bet practices.	Jul 2018 100%
4.2	**Research and testing of farming, land and water system-based approaches conducted** One pond in each target catchment found suitable/ necessary with a capacity 500-1000 cubic meter on a snow-covered hill top. The new research interventions will include: basic, strategic and applied research on land use and land cover, hydrological research on surface and sub-surface water flow and water harvesting techniques, and Irrigation (techniques). Runoff plots in each watershed will be developed for measuring the runoff and sedimentation. Infiltration rate will be measured in each selected watershed site. Overall the aim will be to develop farming system-based approaches at each watershed site.	Water, soil, crop and forage options assessed and reported for project watersheds.	- In all 8 watersheds, options for suitable L&W conservation measures are assessed for appropriateness to do water recharge; assess the harvest locations - considering the terrain features and community experiences. - Various structures like contour bund/trenches, percolation tanks, ponds/ tanks, gully reclamation, check dams, diversion canals, protection wall, etc. and production measures like pasture, forest, and horticulture plantation/protection done in different pit designs; - the numbers/ measurement of structures, and quantification of impact due to structures discussed in summary section and section-7 below] - Convergence with forage & other component projects; trials done for forage trial; - Research data shared with TWG/ POG/ PMC in review/AP meetings, and with WUAs and community.	Apr 2018 100% July 2018, 100%
4.3	**Use participatory processes with communities (Key farmer and women farmers), MAIL and NGOs to prioritize the soil and water conservation watershed structures, and developing dry land farming systems)**	Identified options prioritized with the participation of all stakeholders	- All catchments sites, ongoing (8)/ dropped (4) were suggested, identified, surveyed, planned and implemented in coordination with all stakeholders such as MAIL, DAIL, NGOs, Community, and WUAs	Sep 2018, 100%

SN	Activity	Outputs/ milestone	Achieved/ in progress	Date of Compl., & % Achv.
	Community involvement in work plan, implementation, management and agreement to leading the action research is therefore crucial. Finding suitable entry points around incentives, which may be associated with degradation, soil and water conservation, water for irrigation or greater crop or livestock production. Partners have experience with social processes and mobilisation, and use various 'models' to build capacity and implement social change at existing sites where they work. The work will involve the prioritization of macro catchments as: (pond, water spreading, stone wall, and ground water harvesting) at each watershed site; as well as micro catchments as: (cistern, semi-circle, and contour bund) at each watershed site involving key farmers and women farmers of established WUAs at each catchment site. Overall it will include finalization of Watershed development (planting different plants, shrubs, trees, vegetables, cereal crops) work plan in collaboration with all stakeholders.		- WS project activities are integrated with other ICARDA projects that include the forage project funded by ACIAR, and CLAP funded by IFAD to improve production and productivity of agriculture and livestock - Completed project activities in all watersheds, and sites are handed over to the community and WUA in joint meetings of DAIL and ICARDA. - Due to insecurity and social conflicts (unresolved despite efforts of ICARDA and DAIL team), the watershed site in Takhar and Bamyan are dropped.	
4.4	**Dissemination of watershed "best bet practices" through collaborations and partnerships and Innovative ICT tools for faster communication of information about interventions with WUAs and other stakeholders.** Dissemination of soil and water conservation technologies and best bet practices is one of the important objectives of the project for a sustainable watershed management in Afghanistan. This will be achieved through a collaborative and farmer participatory evaluation of technologies for better capacity development to disseminate technologies to wider number of stakeholders. Innovative ICT tools will be used for faster communication of information on tested and proven technologies to WUAs and other stakeholders. The cross-visits of stakeholders from each catchment for mutual sharing and learning for widely conducted.	Instruments to improve adoption according to the watershed site developed. Farmers received extension advice on soil and water conservation	- KLM (Knowledge and Learning Materials) developed and distributed to disseminate project knowledge to wider stakeholders - Project summary in Local language and English reviewed and updated (2 leaflets), 2 Watershed brochures (English/ Local language, WS Project Impact Poster (Eng/Local lang.), Sayad WS case study (Eng/local lang); WS manual in (local language (WS Management), and WS review document (English) prepared/ published; distributed to community, offices, organization and donor); 4 learning material developed on watershed, potato production, livestock rearing, and dairy processing prepared for AA trainings; - Project information SMS (2500 sms) sent to community/WUA members; Facebook of ICARDA-Afg is accessible and informative; - WS project site info are uploaded on Google map by ICARDA GIS Unit.	Aug 2018, 100%

Objective 5: To utilise spatial and other information management systems for prioritisation of investment for catchment management planning.

SN.	Activity	Outputs/ milestone	Achieved / In progress	Date of Compl., & % Achv.
5.1	**Produce topographic survey and geo-referenced map of catchments; high-resolution remote-sensing maps to establish historical and current status of natural resources (baseline and changes).** The field visits and reconnaissance survey for selection of the potential watershed locations will be conducted of all the watershed sites, this will be used for characterizing watershed site by integrating biophysical, edaphic and climate variables such as land use, land cover, terrain complexity, soil, hydrology and climate parameters.	Topographic survey and geo-referenced map, catchment plans produced. Scaling up potential of successful watershed management approaches identified.	Topographic survey and geo-referenced catchment maps developed for 8 WS projects (Khwaja-Al-Ghor, Saiyad, Otran, Amlah, Badam Bagh, Qarasay, and Aq-masjid, Dasht Gowharkhan in Parwan), and also for 4 dropped sites (Kharuti in Takhar, and Khoskak, Qul Roba, and Surkhak Hessar in Bamyan); Various maps developed are - HRI (high resolution imaging) for two sites; - Topographic features like contour, slope, drainage order, drainage density, land cover maps for 8 sites; Metrology data for the last seven years for target provinces obtained, to be used in hydrological and GIS applications. Field vegetation data from the watershed with pictures collected and sent to GIS section of ICARDA head quarter for analysis; Elaborate research data collection from 2 sites, e.g. Khwaj-al-Ghor in Balkh and Otran in Nangarhar province (ttemperature, precipitation, and run off data from three sites for all years collected). Scaling up potential of successful watershed management approaches advocated with govt. and policy makers (MAIL/NRM/DLFS under DFAT support for DLF, Watershed project works under SWIM/USAID, and NRM/Climate change resilient program under WB/EU etc.).	Jun 2018, 100%

Forages

Objective 1: Assess the main climatic, edaphic and agronomic constraints leading to nutritional gaps and identify appropriate technologies (new species, varieties and/or management practices) to overcome or reduce constraints.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
1.1a	Review existing literature and reports on forage and livestock production to summarize feeding systems in each province. Review biophysical characterization of target areas.	• Updated knowledge of small-scale crop/livestock systems documented for each target Province. • Biophysical environment and existing forage and livestock production are characterized and documented. • Reports published and become available to stakeholders.	Completed: Two reports were completed and shared with ARIA in early 2018: Status of forage production in Afghanistan http://repo.mel.cgiar.org/20.500.11766/8307 - Characteristics of Baghlan and Nangarhar Provinces http://repo.mel.cgiar.org/20.500.11766/8314	The status report describes the dynamics of seasonal forage supply and demand and the gap in supply. It highlights constraints, solutions and opportunities to improve forage production. The second report provides an updated status of the biophysical environment targeted by the project.
1.1b	Field observation of current endemic forage/range species and nodulation (legumes)	• Endemic forage/range legumes documented and existence of nodulation.	Completed: Data was acquired on endemic forage/range legumes and the most commonly used local forage legumes included into the varietal comparison trials with newly introduced forage crops. A study on root nodulation of the legumes as an indication of N fixation potentials was carried out including local and introduced varieties	The nodulation study was carried out by one of the national Afghan trainees who visited Australia in 2016 for a six-week training course implemented by CSIRO and Murdoch University partners. Having an Afghan national undertaking this work also serves as capacity development. Extra material (seed, inoculants etc.) as well as technical backstopping to support to the study were provided by Murdoch University.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
1.1c	Survey of feed base for baseline production data (forage, shrubs, trees and concentrates). Study fodder and forage seed and ID constraints & opportunities.	• Feed base for and fodder technologies baseline production data is documented. • Papers published and become available to stakeholders.	Completed: - 210 farmers' selected using multi-stage random sampling method were surveyed to characterize the current status of crop-livestock production systems in Baghlan and Nangarhar provinces was conducted and report is available, also proceeding paper was submitted to present the data http://repo.mel.cgiar.org/20.500.11766/8305 http://repo.mel.cgiar.org/20.500.11766/8304 http://hdl.handle.net/20.500.11766/4910 - One paper based on survey results was submitted (PDF copy is shared)	The survey included Afghan farmers' choice of forage seed sources and the factors affecting their choice. A manuscript titled "Factors affecting farmers' choice of seed sources: case of Afghanistan farmers" was submitted to the Agribusiness Journal (under review). Information from this survey has supported engagement on gender within forage production systems in Afghanistan. In addition to that, it has been closely linked to mapping out forage value chains in the provinces of direct project engagement (Baghlan, Nangarhar) providing a baseline for future work.
1.1d	**Activity 1.1d:** Study on seed markets within the project catchment area and Afghanistan more generally	• Report identifying the multiple channels for seed acquisition and distribution • Catalogue of main actors within the seed value chain (report) • Uncovering of options for how to more effectively introduce forage seed varieties and shrubs through public, private and civil society institutions (report)	Partly completed: A study initiated in September 2016 was completed in December 2016 http://repo.mel.cgiar.org/20.500.11766/8242 Report from Niane on variety introduction: http://repo.mel.cgiar.org/20.500.11766/8241	
1.2a	Identify sites with potential to collaborate with other programs that are addressing livestock production constraints. Participate in joint	• A well-established collaboration with other programs and ongoing projects	Achieved through: Collaboration with Aga Khan Foundation (AKF) through an agreement between ICARDA, ARIA and AKF to support the demonstration of forage seeds and develop capacity of AKF staff. - 8 species were cultivated through AKF in Baghlan, Bamyan, Takhar and Badashan provinces:	The partnership with AKF has opened new avenues for the scaling up and out of varietal development and distribution systems for forage seeds; large scale uptake will take some time given

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
	training, workshops and field days		1. Sainfoin (Onobrychis sativa) cv: Ozerbey 2. Oat (Avena sativa) cv: Syedisehir 3. Common vetch (Visia sativa) cv: Baraka 4. Norbon vetch (Vicia narbonensis) cv: Velox 5. Berseem clover 6. Common vetch (Vicia sativa) cv: Rasina 7. Forage pea (Pisum sativum) cv: #40-10 8. Triticale (Triticosecale) cv: Alperbey - 3 AKF ladies (Lana Roish, Bomani Afzali, Sayli Khusravbekova) participated in the Jordan training and enhanced their knowledge about social and cultural norms of females.	regulations on varietal introduction/release. • Larger quantities of seeds are available for multiplication • Farmers in provinces outside of Baghlan and Nangarhar are knowledgeable on production practices for forages and have been introduced to improved forage species. • Capacity development of 3 AKF female staff will support increasing the capacity of women within Afghanistan, providing hope for a future cadre of women to receive technical training, gain experience, and be well positioned to take a role in agriculture in the country.
			Collaboration with Action Aid NGO: 13 Action Aid staff in Mazar (2 females, 11 male) and 15 staff in Bamyan (2 females, 13 male) were trained on Atriplex plantation and seed production.	Capacity development of staff of NGOs will help to speed up uptake of innovations.
			Collaboration with ACIA-funded watershed initiative in Mazar-e-Sharif: 1200 Atriplex saplings were dispatched for planting in the research site and to evaluate various shrub propagation techniques including direct seeding, cuttings, and transplantation of seedlings on shrub performance under semi-circle water conservation technique.	The Atriplex saplings were obtained from the Dhadadi farm in Mazar to which Atriplex seeds had been provided earlier by the project. This trial was added in 2017 to the project. Mr. Safi (field coordinator based in Mazar under the ACIAR watershed project) is monitoring shrub establishment and growth. The evaluation of perennial species (shrubs) needs more time than annual forage crops so ARIA needs to continue monitoring these plantations.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
1.2b	Monitoring and Evaluation	• The impact of the activities is monitored	Achieved through: An M&E framework was developed by R. Telleria and S. Ates soon after the inception workshop in March 2014 Specialized training in M&E with specific attention to ACIAR reporting requirements was undertaken in late 2016, through the engagement of a Kabul based ACIAR consultant, and in collaboration with other ACIAR initiatives Monthly progress reports were submitted to ACIAR M&E as well as to ACIAR focal point. Regarding phasing out of the project: A working committee within the Ministry of Agriculture was established in 2017 to take over monitoring of the forage project involving all concerned departments. In late 2017 and 2018 Reviewing transition plans and monitoring progress transition workshops were conducted involving ARIA and ICARDA scientists. Mr. Moussaoui (ACIAR M&E) attended these workshops. http://repo.mel.cgiar.org/20.500.11766/8315 http://repo.mel.cgiar.org/20.500.11766/8302	By establishing the M&E framework early in the process, providing training, and setting up the appropriate committees to monitor the work, ARIA capacity to undertake and continue the project activities beyond the project lifetime has greatly improved. It is hoped that this will have provided a foundation for future projects and work.

Objective 2: Evaluate forage and fodder production options for smallholder livestock systems

No.	Activity	Outputs/ Milestones	What has been achieved?	Comments
2.1a	Assemble germplasm and initial screening of potential legume species **at mirror trial sites (Perth and Turkey).** Mirror sites selected to match climatic/edaphic/systems constraints in-country (aridity, frost and opportunistic cropping in summer).	• New forage/range species, technologies and systems established. • Native forage/range species collected and/or purchased.	Completed: Konya, Turkey: A total of 5 experiments were conducted in the mirror trial site in Konya, Turkey testing selected forage species suitable for Afghanistan as well as dual purpose use of cereals and feeding systems incorporating these fodder sources:	The mirror trials sites in both countries were very important in providing a good research environment for training of National Afghan research staff; they received technical training on alternative forage production systems and are applying lessons learned in the field as best as possible (given resource constraints). A series of papers resulted from testing new technologies and feeding systems in the mirror trials in Turkey: - One peer reviewed paper was published: Biomass yield and feeding value of rye, triticale, and wheat straw produced under a dual-purpose management system. Journal of Animal Science, 95(11), 4893-4903.

No.	Activity	Outputs/ Milestones	What has been achieved?	Comments
			- Effect of planting sainfoin either with forage legumes or cereals at different seeding rates on establishment and subsequent production of sainfoin. Completed in June 2016. - DM production and feeding value of cereal crops under dual purpose management. Completed in March 2016. - Determination of the dual-purpose potentials of cereal crop varieties for integrated crop livestock farming in irrigated and rainfed conditions. Completed in June 2016. - Determination of the fattening performance, meat quality of the weaned Anatolian merino and Akkaraman lambs under different feeding systems. Completed in August 2017. - Dual purpose grazing of triticale-legume mixtures. Second year data is being collected in 2017/2018 Perth, Australia: - Yield and forage quality of mixtures of vetch and cereal mixtures	http://dx.doi.org/10.2527/jas2017.1888 http://hdl.handle.net/20.500.11766/8317 - One peer reviewed paper is in press: Bio-economic analysis of dual-purpose management of winter cereals in high and low input production systems. Field Crops Research. http://onlinelibrary.wiley.com/doi/10.1111/gfs.12291/full http://dx.doi.org/10.1111/gfs.12291 - One abstract titled "The effects of forage-based and a concentrate feeding system on lamb production" was submitted to 2018 ASAS-CSAS Annual Meeting & Trade Show in Vancouver, Canada (an oral presentation). - First draft of the sainfoin paper is ready. Three species of vetch, common (*Vicia sativa*), purple (*V. bengalensis*) and woolly pod (*V. villosa*) were sown alone or in 1:1 mixture with forage oats or barley.
2.1b	**On station screening** of the most promising forage legumes, shrubs and dual-purpose crops IN Afghanistan. Test simple fodder conservation techniques.	• Native and exotic forage/range species and food-feed crops tested.	Completed. Forage trials in 2 provinces were completed in June 2017: Evaluation of 97 improved genotypes (68 legumes, 11 cereals, 18 shrubs) obtained from ICARDA, Australia, the USA,	The trials led to recommendations to introduce one nine (9) cultivars proven to give the highest yield. 1. Alfalfa (cv. Sequel), 2. Common vetch (cv. Morawa) 3. Grasspea (cv. Alibar) 4. Triticale (cv. Alperbey)

No.	Activity	Outputs/ Milestones	What has been achieved?	Comments
		• Appropriate agronomic practices to increase forage production from cropping systems developed.	Canada and Turkey was undertaken at ARIA research stations in both target provinces. Three winter cereals-forage legume mixtures and sowing rate experiments were established in the research stations of Mazari-Sharif, Sheshambagh (Nangarhar) and Poza-i-Eshan (Baghlan). A database from all forage trials was created and shared with concerned partners; the data were cleaned and analysed.	5. Oat (cv. Yeniceri) 6. Narbon vetch (cv Velox) 7. Forage pea (cv.#40-10) 8. Sainfoin (cv. Ozerbey), 9. Berseem clover ARIA and AKF have endorsed these varieties through putting it into the varietal introduction/release process or further testing in their own research stations This database will help guide future research. At least one ISI paper is planned to be published together with the Afghan colleagues.
2.2a	Test promising forage options in **on-farm trials** to test commercial potential and to aid adoption. Data supports case for national variety release	• Ten promising forage species and forage crops are tested on farm	Completed: Nine promising forage species/varieties were identified through the on-station trials. otal of 8 Forage trials for the 9 promising cultivars were established in collaboration with 16 farmers in each of the two target provinces (Baghlan and Nangarhar (32 farmers in total). Farmers who have shown keen interest in producing these varieties once officially introduced/released.	While testing the most promising species also in combinations on-farm the on-farm trials also demonstrated effective (contemporary) practices in forage and forage seed production.
2.2b	Establish seedlings of perennials for demonstration of shrubs and trees with the utilization of technologies for water harvesting (in collaboration with another project in Afghanistan).	• Appropriate agronomic practices to increase forage production from cropping systems developed.	Partly completed: Three different techniques for establishing shrubs in Mazar Sharif are being evaluated under semi-circle water harvesting as a joint activity with the ACIAR Watershed Project. Out of the 3 techniques, 2 have responded positively.	Trial is still ongoing: due to the fact that we are dealing with perennial species. Shrubs needs at least 2 years to be fully established); preliminary data is already available; it is expected to lead to best practices for shrub establishment under Afghan conditions. At the same time an effective source of seed multiplication for future rehabilitation efforts has been established at the research station.

Objective 3: Expand the scope of existing community-based seed enterprises to include feed and forage seeds, vegetative propagation of shrubs and planting materials

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
3.1a	Forage innovation system analyses	• Quantitative and qualitative data on forage seed system collected, analysed and synthesized • Local knowledge of forage seed production system documented. • Papers, flyers and leaflets on forage seed system published.	Partly completed: Opportunities and constraints in Afghan forage innovation systems including local knowledge were identified and accessed; regulations on varietal introduction and release were documented, key value chains were recorded, the roles of different stakeholders (public/civil society/private organisation) within current forage production system were recognized and the gender roles was analysed and documented http://repo.mel.cgiar.org/20.500.11766/8242 The findings from the analysis of secondary data and the survey were verified in a multi-stakeholder workshop was held in Dubai. 3 factsheets of the main forage species were developed. Furthermore, information was disseminated via Blogs: Blog entitled: Improving forage value chains in Afghanistan blog was published: http://ttps://www.icarda.org/update/improving-forage-value-chains-afghanistan http://hdl.handle.net/20.500.11766/8303 Blog entitled: Ulufa* – "From Seed to Feed" was published https://www.kit.nl/sed/news/ulufa-seed-feed/ http://hdl.handle.net/20.500.11766/8312 Blog entitled: Fodder seeds: empowering women and closing gaps in Afghanistan was published https://www.kit.nl/sed/project/fodder-seeds-empowering-women-and-closing-gaps-in-afghanistan/ https://www.icarda.org/update/fodder-seeds-empowering-women-and-closing-gaps-afghanistan http://hdl.handle.net/20.500.11766/8316	The workshop in Dubai on 3 July 2017 was conducted and was facilitated by Dr Remco Mur and Dr Yngve Braaten from KIT in collaboration with Dr Shinan Kassam from ICARDA. Participants of the workshop included farmers, seed enterprises, government representatives (research, extension), development practitioners. (PDF copy of the factsheets).
		Analyse and document intra-household dynamics related to forage production.	Completed: 68 surveys for women (female headed of HHs) and for men (male headed HHs) were conducted in Nangarhar and Baghlan provinces.	A collaborative research agreement between ICARDA and the Royal Tropical Institute (KIT) was signed to support this additional activity. The knowledge of the NARS involved in this study was enhanced.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
		Describe cultural and social rules related to forage systems knowledge transfer	A total of 12 Focus Group Discussions / Mini-Workshops in 2 selected villages in Nangarhar and Baghlan provinces took place in March 2018 (Report in progress by KIT). The intra-household dynamics related to forage production were analysed and documented. Dataset is available (with KIT) Gender norms, roles and relations related to forage systems knowledge transfer among women farmers were documented (report in preparation by KIT) Six Afghan women, together with KIT, wrote several research diaries over a period of 8 months in which they shared their life stories and reflections on gendered opportunities and challenges for innovation in the forage system (report in preparation by KIT).	
3.2a	Establish mother shrub/tree species in research station for seed or vegetative multiplication	• Five most promising shrub/tree species collected, established and disseminated.	Completed: Seedlings were transplanted in 2015 at Sheshambagh (Nangarhar); planting was delayed to April 2016 at Poza-i-Eshan (Baghlan) Research Station due to security concerns. Of the 18-shrub species sent to Afghanistan, 5 have survived: four Atriplex: (1) *A. nummularia*, 2) *A. canescens*, 3) *A. halimus* and 4) *A. lentiformis*; and 5), *Brasica prostrata*; the fifth showing significant potential. In Baghlan two Australian species (*A. nummularia* # 48 and #13) recorded the highest survival rate of 42 and 38%. respectively (see final report) In addition, a total of 140 cactus cladodes of various accessions were dispatched to Afghanistan (7 cladodes each from 20 accessions) in late April 2017 and planted first on Hadda farm at Nangarhar but had to be taken to the research station. This activity has double purposes: 1) evaluate adaptation of the 20 accessions and 2) multiply cactus pads which will be transplanted later on to farmers' fields.	The performance of the introduced shrub options was documented. The resources for seeds or plant material of the introduced options for further dissemination were assured Forage cactus accessions were evaluated under Nangarhar conditions. The imported cactus pads were planted on Hadda farm in Nangarhar. Unfortunately, after successful transplantation and establishment, 40 % were damaged by grazing animals as well as environment effects. Therefore, the remaining live pads were moved to Nangarhar research stations. This trial is still on-going, and the remaining accessions are being monitored/evaluated. Preliminary results show that 2 accessions are performing well.
3.2b	Assemble and multiply seed and planting materials of adapted forage varieties	• Limited seed of adapted promising forage/range seeds identified in previous and new projects multiplied and supplied	Completed: Seeds of promising annual and perennial forage crops were multiplied at Baghlan and Nangarhar research stations: 1,151 kg of foundation seeds were produced in 2016 at Dare-e-Noor and Farm-e-Jadeed Districts of Nangarhar for further multiplication (see internal report on seeds production)	Two pathways were pursued for seed multiplication: - Controlled environment at the research stations in Nangarhar - Propagation through NGO partners (AKF)

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
			Based on Agreement between ICARDA, ARIA and Aga Khan Foundation (AKF) to support the demonstration of forage seeds, 8 varieties (were cultivated in Baghlan, Bamyan, Takhar and Badashan provinces:	
3.3a	Establish a breeder seed multiplication system in Baghlan and Nangarhar agricultural research centers	• Sustainable source of forage seed supply to VBSEs, PSEs and other suppliers attained.	Data on multi-location adaptation trials consisting of two sites in Afghanistan namely Nangarhar and Baghlan is available to be used in future breeding program.	The adaptation trials succeeded in identifying 9 genotypes of common vetch, triticale, oat and sainfoin with high potentials for forage and pasture production. Source seed of these varieties have been produced and used for demonstrations and large-scale verification jointly carried out by the Agriculture Research Institute for Afghan (ARIA) and the Aga Khan Foundation NGO. Further multiplication and out scaling is pending formal variety release and registration which as a pre requisite for any variety to enter into the formal seed production, certification and commercialization chain
3.3b	Initiate forage seed and planting materials production and distribution with existing VBSEs, PSEs and other suppliers in target sites	• Sustainable supply of quality forage seed to farmers through VBSEs, PSEs and other suppliers attained.	Partly completed???: VBSE and PSE forage seed/planting materials system and markets for the forage products were studied and identified. Source seed production of the 9 genotypes with high potential for forage and pasture production identified through crop adaptation trials was established in Dare-e-Noor and Farm-e-Jadeed Districts of Nangarhar as well as in Baghlan. (see final report). In addition to this, small scale seed processing facilities have been purchased from Kimseed. The equipment was handed over to ARIA though a deed donation. (PDF copy)	The process of distributing seed to VBSEs has to be delayed until formal release of some or all of the promising genotypes. Due to compliance requirements of Afghan policies, all new varieties must undergo a formal introduction procedure, which is being undertaken at ARIA research station. This activity will secure foundation seed for further multiplication by VBSEs and PSEs once varieties have been released. Some seed was used for large scale demonstrations to create public awareness and effective demand for forage seed to speed-up the technology dissemination when the varieties are formally released. Capacity of ARIA staff was enhanced toward further steps in varieties releases strengthened (see under objective 4).

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
				A training Course on Data Collection, Experimental Design & Data Analysis in Forage Trials was conducted for 15 ARIA participants from 16 – 18 April 2018 in Kabul.

Objective 4: Develop capacity of Afghan researchers in forage and livestock systems research

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
4.1a	Capacity building in measurement, monitoring and assessment of forage production and nodulation surveys	• Afghan scientist are trained on experimental design, methodology and sampling techniques in forage trials	The capacity of the 20 staff (16 males and 4 females) from Animal health program of MADERA (NGO based in Afghanistan) and MAIL on forage production and forage experiments strengthened. Capacity of 10 Afghan scientists from ARIA (9 Males and 1 Female) was enhanced on forage production and forage experiments (Course agenda, list of participants and images taken during the course). Practical knowledge of Atriplex plantation and effective seed production practices of Action Aid in Mazar and Bamyan Staff (NGO) enriched for 28 (4 males and 24 females) in Kabul. The capacity of 13 professionals from MAIL on forage production and forage experiments was strengthened (Turkey). Capacity of 22 ARIA staff (16 male and 6 females), farmers, stakeholders and NGOs staff were enhanced on themes related to measurement, monitoring and assessment of forage production and nodulation surveys (a testimonial provided by Munir Seddiqi (member of the forage working committee) was published as a blog). https://www.icarda.org/update/reflections-afghanistan-forage-initiative-event	Course on forage production and forage experiments was given to the Animal health program team of MADERA and MAIL was conducted on 13-15 January Kabul 2015. A one week theoretical and practical training course on forage production and forage experiments was undertaken on 18-22 May 2015 in the mirror trial site in Konya, Turkey. *Atriplex* plantations and effective seed production practices training course conducted in 2016 at ICARDA offices in Mazar conducted by ICARDA project coordinator. A 5-day theoretical and practical training course on forage production and forage experiments was delivered on 30 May-3 June 2016 at the mirror trial site in Konya, Turkey. A 6-day practical and theoretical training course on forage biomass and seed production, alley cropping and water harvesting techniques, and the design and management of basic forage experiments was undertaken for NARS staff on 28 April- 3 May Amman 2017, Jordan and Cairo, Egypt. A group training course on “Data Collection, Experimental Design & Data Analysis in Forage Trials” conducted during 16-18 April 2018. (http://repo.mel.cgiar.org/20.500.11766/8302) Recently added activity after the request of ARIA.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
			http://hdl.handle.net/20.500.11766/8313 The capacity of 16 ARIA staff (15 male and 1 female) to Data Collection, Experimental Design & Data Analysis in Forage Trials was increased (Kabul, Afghanistan) http://repo.mel.cgiar.org/20.500.11766/8302) The capacity of 4 ARIA staff will be enhanced through a review of the forage project experiments, their design, statistical analyses and interpretation. The workshop will take place in New Delhi on 24-26 September 2018.	
4.1b	Capacity building in seed production and seed business management	• Capacity of the seed enterprises and stakeholders involved in seed business is strengthened.	Partly completed Capacity of the one 1 (male) NARS staff on seed production and seed business management strengthened through a training provided by ICARDA's seed system specialist Aziz Niane. A workshop on seed processing focussed on assembling, testing and use of the Kimseed machines was conducted in Nangarhar. Capacity of ARIA staff (13 male) on seed processing with the new seed processing equipment was strengthened (Kabul, Afghanistan).	A mechanic Mr. Ibrahim demonstrated assembling, testing and use of the Kimseed machines purchased through project funds which was donated to ARIA. A specialized group training course on seed processing (use of the new equipment) was conducted for ARIA staff on 13 March 2018 in Kabul. (see PDF report).
4.1c	Capacity building in socioeconomic survey techniques and survey data analysis	Afghan scientist were trained on socioeconomic survey techniques and survey data analysis.	Capability of 10 NARS (males) was enhanced in terms of how to conduct the baseline surveys and data analysis. Through the collaborative engagement with Royal Tropical Institute (KIT), national researchers and ICARDA staff were trained on concepts related to gender as well as intra-household survey design and implementation. This training was integral part of a multi-stakeholder WS in Dubai.	A 2-day training course on the baseline survey and survey data analysis was conducted by Dr Roberto Telleria and Dr Serkan Ates from 20-21 October 2014 in Kabul, Afghanistan. A workshop on assessing the systemic and gendered opportunities and constraints for innovation in forage value chains in Afghanistan, with a focus on Baghlan province was held in Dubai on 3 July 2017. This workshop was facilitated by Dr Remco Mur and Dr Yngve Braaten from KIT in collaboration with Dr Shinan Kassam from ICARDA. The workshop has brought together 20 stakeholders, including Afghan government officials, researchers, development practitioners, cooperative members, private seed and input suppliers, as well as farmers.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
		• Specific training on monitoring and evaluation, with specific attention to ACIAR defined indicators was provided in Dubai to project partners in Afghanistan		It outlined the different functions within the forage value chain, with a focus on innovation, and roles of stakeholders, with a focus on gender, and more specifically on the role of women given prevailing social and custom norms related to female engagement. It also identified the main drivers affecting the development and adoption of new knowledge, technologies and seed varieties within forage value chains, as well as how these drivers affect women and men differently
4.2a	Capacity building for 2 national researchers on scientific methodology, seed production, rhizobiology, plant evaluation and basic nutritive assessment.	• 2 trainees are trained on experimental design, BNF, seed increase, rhizobiology and basic NV analyses.	2 Afghan citizens (Abdul Haq Farhang and Himat Sahil) were trained in Perth, Australia on forage agronomy, animal nutrition and nodulation surveys in October 2016 for one month in Perth Australia.	This training was aimed towards better project implementation through enhancing the professional capacity of partners.
4.3a	Capacity enhancement for next users **(development partners and farmers)**	• Field days are organized • Communications are established, and results are disseminated. • Training of women farmers/agricultural labourers on effective propagation techniques for forage shrubs was undertaken in Jordan.	One field day was organized with the participation of 80 farmers, extension officers, agriculture student and ICARDA staff in the ongoing trial sites in Baghlan region on 3 May 2015. One field day was organized with the participation of 65 farmers, extension officers, agriculture student and ICARDA staff in the ongoing trial sites in Nangarhar region on 5 May 2015. One field day was organized for 79 farmers, extension officers, agriculture students and ICARDA staff at the ongoing trial sites in Nangarhar on 27 March 2016.	The 3 field days organized for demonstrating forage trials reached 224 farmers, extension officers, agriculture student and ICARDA staff and increased awareness of different stakeholders of new forage technologies was increased. Blog was published on Forage options for smallholder livestock in water-scarce environments of Afghanistan was published https://livestock.cgiar.org/2017/07/05/forage-options-afghanistan/ http://hdl.handle.net/20.500.11766/8297) Radio broadcasting was posted on YouTube. https://www.youtube.com/watch?v=kDlD9t3soKc&feature=youtu.be Six Afghan female farmers/extension attended a course on seed propagation, nursery management and enterprise development during 7 to 12 April in Amman.

No.	Activity	Outputs/ milestones	What has been achieved?	Comments
			Information about the project and the Gender role was published. Information and key findings of the forage project were broadcasted on the national radio in Kabul (local language). The capacity of 6 Afghan women was enhanced to a level to train other people (Training of Trainers) through a training workshop was held in Jordan during 7 – 12 April 2018 on "Plant propagation, nursery management, pasture production and enterprise development training" with a strong component of gender "Gender initiative and systemic constraints and opportunities to forage systems in Afghanistan and specifically in Baghlan and Nangarhar provinces through an Agricultural Innovation System analysis".	Upon their return to Afghanistan, one of the ladies conducted a training for Afghan farmers using the tools and skills she acquired during her training in Jordan. List of participants, training agenda, and blog from the 2018 training event still to be prepared and posted. http://repo.mel.cgiar.org/20.500.11766/8280 https://www.kit.nl/sed/project/fodder-seeds-empowering-women-and-closing-gaps-in-afghanistan/ https://www.icarda.org/update/fodder-seeds-empowering-women-and-closing-gaps-afghanistan http://hdl.handle.net/20.500.11766/8316

Forage options for smallholder livestock in water-scarce environments of Afghanistan

Meeting on forage variety evaluation, registration and release in Afghanistan

28 September 2018
Imperial Hotel,
New Delhi, India



Rational: The ACIAR forage project aims to improve the livelihoods of smallholder livestock farmers in the mixed crop-livestock areas of Afghanistan that have limited access to water. In particular, the project will increase the availability of feed resources through providing seeds of improved forage varieties and developing technical options for better integration and management of forage legumes in current cropping systems.

Moderator(s):
Dr Abdoul Aziz Niane (ICARDA, Lebanon)
Dr. Mounir Louhaichi (ICARDA, Jordan)

Objective: The objective of the meeting was to discuss the constraint and challenges of incorporating forages into the national variety registration and release system in Afghanistan, and to provide technical information to ARIA staff/researchers to enhance varietal release.

Introduction:

In Afghanistan, the regulations related to formal variety release are complex, lengthy and fraught with difficulties in an environment with both limited national capacity and budgetary resources. However, when it comes to forage crops there is a high need to treat them differently from cereal crops – specifically within the framework of national regulations for varietal introduction and release.

Participants

1. Dr Mounir Louhaichi (ICARDA, Forage Project)
2. Dr Aziz Niane (ICARDA-HQ Beirut, Seed specialist)
3. Mr Qudratullah Soofizada (Director Adaptive Research, ARIA)
4. Mr Eric Huttner (ACIAR)
5. Dr Brad Nutt (Murdoch University, Australia
6. Dr Werner Stur (Research Program Manager for Livestock)
7. Dr Hayley Norman (CSIRO, Australia)
8. Mr Hasibullah Ahmadi (ex-ARIA / forage project focal point, Afghanistan)
9. Mujiburrahman Arifi (Research Specialist, Germplasm Department, Kabul)
10. Shahidullah Sapi (Forage specialist, Forage department, Kabul)
11. Mohammad Ismail Yousuf Zai (Research Specialist, Kabul)
12. Dr Adbur-Rahman Manan (ICARDA-Afghanistan, Forage Project)
13. Mr Rahmat Gul Stanikzai
14. Mr Abdul Bashir Shariati
15. Mr Mohammad Rafi Qazizada (Director General, Natural Resource Management, MAIL)
16. Dr Sawsan Hassan (ICARDA-Afghanistan, Forage Project)
17. Mr Noor ul Hak Hakimi (ICARDA-Afghanistan, Provincial Coordinator)
18. Mr Assadullah Haqjoo General Research Manager of Baghlan province
19. Mr Mohammad Navin Safi (ICARDA-Afghanistan, Forage Project)
20. Mr Sayed Mousawi
21. Mr Mahboobullah Nang (Director of Seed Certification, MAIL)
22. Dr Yashpal Singh Saharawat (ICARDA, Water Project)
23. Mr Sayed Bahuadin Latoon (Director of Cereal, MAIL)
24. Mohammad Nabi Hashimi

I. Variety Introduction:

Variety introduction is a simple step by step procedure. The main step is to demonstrate adaptation and yield (biomass) merits for the genotypes to introduce **over the commonly existing ones in the country**. The performance trials implemented under the project were mostly on fixed genotypes from other countries. The lack/limitations of improved/local varieties of those crops (Oat, Triticale, Sainfoin and Vetch) from the national system to compare with the new genotypes tested under the project, makes the process of introduction much more difficult compared to crops such as Wheat and Maize for which reference data is available. There are two options to move forward:

- Use the summary data from the performance trials conducted under the project for comparison with data from ARIA on national varieties of the same crops, if available
- Use the summary of the data generated from the project as a baseline for future introduction of new varieties of these crops, if data on national reference varieties is not available.

Within ACIAR forage Project activities, a total of 9 dryland forages have been identified as superior species/genotypes. Three of them namely Oat, Vetch and Triticale can be handled like the traditional field crops like wheat and Mung bean for which, ARIA has adequate strength. Work on the other 6 species will be done in parallel.

This list is subject to finalizing the data analysis mainly by ARIA staff who were trained recently on data analysis of the forage trials. Therefore, colleagues from ARIA and ICARDA will validate the results.

- Use local oat as a reference since there is no local variety available in Afghanistan.
- If there is no data available in Afghanistan, we use this project data as a reference.

Action point: ICARDA to contact commercial provider in Turkey get catalog for these species through either Dr Serkan (ex ICARDA forage project leader) and/or Dr Messaoud (ICARDA country manager in Turkey).

II. Pre-release multiplication

To gain time it is recommended to multiply seed within ARIA research station so when the release is approved ARIA would have sizeable amount of seed for out scaling.

It was also suggested that seed multiplication carried out through collaboration with international NGOs such as AKF. Currently there is a tripartite agreement between ICARDA, MAIL and AKF. If needed an amendment can be done to continue this work.

Action point: ICARDA to provide a brief technical report which can be easily read by decision makers about the selected superior genotypes ready for introduction/release.

III. Procurement of pure seed

Options 1: ARIA to acquire limited quantity of seed (0.5 – 1 kg) of pure seed from ICARDA office in Afghanistan (Dr. Manan). ARIA will plant seeds in their research station.

Option 2: ICARDA will acquire 1 kg of pure seed from source commercial company in Turkey.

IV. Data collection

For those species/varieties which had great fluctuations from year to year, it would be advisable to continue trails and collect more data.

V. Challenges:

ARIA requested technical backstopping from ICARDA. Dr Manan (ICARDA) agreed to assist ARIA when there is a need.