COMPLETION REPORT: AFRICA TO ASIA – TESTING ADAPTATION IN FLOOD-BASED RESOURCE MANAGEMENT

(Grant Number: 2000000694)

Submitted by the CGIAR Research Program on Water, Land and Ecosystems (WLE) to the International Fund for Agricultural Development (IFAD)

Figure 1
Top-left: field visit at Toker spate irrigation scheme as part of the workshop in Sudan (July 2018; by Ahmed Abdalbagi)
Top-right: field visit as part of the Annual Course at Mekelle University in Ethiopia (August 2017; by Michiele Gebrehiwet)
Bottom-left: meeting with farmers in Wadi Zabid midstream area (August 2017; by Adel Zolail)
Bottom-right: procurement of 2 tons of seeds for distribution to farmers in Balochistan and Punjab, Pakistan (September 2017; by Allah Bakhsh)

Submitted by:

CGIAR RESEARCH PROGRAM ON Water, Land and Ecosystems

LED BY: IWMI International Water Management Institute

Donor:

IFAD Investing in rural people

In Partnership with:

World Agroforestry Centre

META

Flood-Based Livelihoods Network Foundation

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Disclaimer
The authors accept full responsibility for the contents of this report. The report does not necessarily reflect the views of IFAD.

Acronyms

DFID	UK Department for International Development
EC	European Commission
FBFS	Flood-Based Farming Systems
FBL	Flood-Based Livelihoods
FBLN	Flood-Based Livelihoods Network
FBLS	Flood-Based Livelihood Systems
GAS	Gash Agricultural Scheme
GIZ	Gesellschaft für Internationale Zusammenarbeit / German Corporation for International Cooperation
HRC	Hydraulic Research Centre
ICRAF	World Agroforestry Centre
IFAD	International Fund for Agricultural Development
IWMI	International Water Management Institute
KPK	Khyber Pakhtunkhwa Province
MM	MetaMeta Research
MNSUA	Mohammad Nawaz Sharif University of Agriculture
NARC	National Agricultural Research Center
PASIDP	Participatory Small-scale Irrigation Development Program
PN	Practical Note
RDF	Research and Development Foundation
SLM	Sustainable Land Management
SNNPR	Southern Nations, Nationalities and Peoples'
SPO	Strengthening Participatory Organization
TDAS	Toker Delta Agricultural Scheme
ToR	Terms of Reference
UNESCO-IHE	Institute for Water Education in Delft, also IHE Delft
WASH	Water Sanitation Hygiene
WEC	Water and Environment Centre
WB	World Bank
WLE	CGIAR Research Program on Water Land and Ecosystems
WUA	Water User Association
YAWEE	Yemen Association for Water & Environment & Energy

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SUMMARY

Agreement details	IFAD Grant 2000000694, April 2015 to March 2019, US$ 1.2 Million
Implementing Partners	International Water Management Institute (IWMI) CGIAR Research Program on Water Land and Ecosystems (WLE) Flood Based Livelihoods Network (FBLN), The Netherlands (formerly SpNF) MetaMeta Research (MMR), The Netherlands World Agroforestry Centre (ICRAF), Kenya Mekelle University (MU), Ethiopia Strengthening Participatory Organization (SPO), Pakistan Hydraulic Research Centre (HRC), Sudan Water and Environment Centre (WEC), Sana'a University, Yemen

Project Goal: to help develop Flood-Based Livelihood (FBL) policies and programs that invest in rural people, draw from research and South-South documentation of experience, prioritize long-term capacity building, and incorporate program multi-level program development.

Project Objective: to develop models and approaches on inclusive, gender-balanced growth in climate change-stressed areas which predominantly rely on FBL.

Project Components and Outputs

COMPONENT 1: FBL NETWORK ESTABLISHMENT AND STRENGTHENING
EXPECTED OUTCOMES • Networks in Ethiopia, Sudan, Yemen, Pakistan consolidated with membership increased to 30-40% • Network and communication maintained and developed
Output 1.1 Current country networks strengthened, membership increased
Output 1.2 Network mechanism and communication maintained and developed
Output 1.3 Knowledge promoted and program developed through national networks
COMPONENT 2: KNOWLEDGE DEVELOPMENT AND SOLUTION MANAGEMENT
EXPECTED OUTCOMES • FBL relevant research on three themes • At least 8 practical notes on cross-country relevant research collaboratively developed and disseminated • At least 8 quick-win solutions-oriented research programs linked to capacity building for young professionals
Output 2.1 Practical notes and other communications products (3 in 2016, 8 in 2018)
Output 2.2 Eight solution-oriented research programs conducted (4 in 2016, 8 in 2018)
Output 2.3 Prepare/conform knowledge products in the desired IFAD formats
COMPONENT 3: CAPACITY BUILDING
EXPECTED OUTCOMES • Existing MSc programs (Ethiopia, Pakistan and Yemen) consolidated; two new MSc programs created. • 50 young professionals trained in FBL at the short course offered annually by MetaMeta, ICRAF and partners • Short annual course for stakeholders, with satellite courses in key regions
Output 3.1 Three existing MSc programs consolidated
Output 3.2 Leadership program conducted
Output 3.3 Regional courses conducted
Output 3.4 Internship program conducted

COMPONENT 4: SUPPORT TO INVESTMENT PROGRAMMES AND POLICIES
EXPECTED OUTCOMES • 2 proposals for national or provincial investment programs, or development policies by national governments, IFAD or donors discussed and preliminarily accepted in stakeholder consultations • Technical support provided to IFAD investment programs active in the project areas upon request
Output 4.1 Two proposals for investment programs or development policies created
Output 4.2 IFAD projects under preparation supported upon request

Key achievements

This project has achieved some high quality results, many of which set the foundation for longer term and future engagement of partners. Full details are given in Section C, D of the main report, with an overview of progress against the Logframe in Annex 1. Key highlights include:

- Research on improving water productivity in the Gash Agricultural Scheme (GAS) in Sudan has demonstrated how on-farm water management practices can increase sorghum yields while reducing floodwater consumption. This has raised the interest of international partners; Plan International has already invested in furthering this work.
- Research in Yemen on the impact of war on food security in Tihama has drawn attention to the vulnerability of the spate irrigation-dependent areas in Yemen where attacks have made flood channels inoperable. Flood Based Livelihood Systems (FBLS) has been mainstreamed into the Irrigation Engineering course of the Faculty of Engineering of the University of Kassala, Sudan and the Water and Environment Centre of Sana'a University in Yemen
- Solutions for field water management, water distribution systems, and the use of roads for floodwater harvesting have been developed and promoted through practical notes and other channels
- Through its pioneering internship program, the project partners have helped to develop capacity of a cadre of young professionals across the project countries, most of whom continue to work in FBFS
- The project has organized FBLS capacity/ skills development events for practitioners, professionals and policy makers. These include four training courses on Integrated Watershed Management and Flood Based Farming in Arid and Semi-Arid Lowlands of the Horn of Africa hosted by Mekelle University, two leadership courses and a knowledge and experience sharing symposium
- Hundreds of farmers enhanced their know-how on floodwater management practices and techniques, through knowledge exchange events, targeted trainings and solutions-oriented research.
- The farmer network in Pakistan is a good example of a network which has not only increased in membership but it proactive in coordinating its own initiatives, such as seed exchange. Also in Pakistan, funding has been secured from the Ministry of Economic Affairs the Netherlands to introduce international good practice and better water distribution in two areas
- 12 young professionals have been supported in the FBLS research at BSc, MSc and PhD levels

Innovations

One key innovation has been in capacity development through horizontal learning, which deals with the exchange of good practices, knowledge and ideas between groups of peers, in which there is no monopoly on knowledge. It entails people coming together to see, observe, discuss and learn from people who have first-hand experience. Bringing groups together that have similar interests and challenges, such as farmers, can result in energy for mutual learning and create a self- evolving movement of new technologies and institutions. Farmers, practitioners and professionals were involved in various horizontal learning activities such as farmer exchange and knowledge sharing events as well as training sessions where professionals and practitioners interacted with farmers. As a result, in Sudan, intermediate technologies have been introduced with the objective of making FBLS rewarding and attractive to farming communities; in Ethiopia, simple road floodwater harvesting techniques have been widely embraced by farmers and local institutions, and in Pakistan, introduction of Chickpea, a drought resistant crop with high commercial value,

started with 8 model farmers and has quickly spread to 100 farmers. Youth engagement has continued to be a research focus; with social media used for sharing and exchanging knowledge, news and outputs.

International Public goods

International Public Goods developed by this project include eleven Practical Notes, monthly newsflash, 27 videos about flood-based livelihoods in Ethiopia, Sudan, Yemen and Pakistan, *Livelihoods from Floods* dossier on TheWaterChannel, blogs related to FBLS, Twitter account, FBLN Facebook plus Facebook pages for country chapters including Sudan (Arabic), FBLN website, country chapter websites (WEC, Mekelle University, HRC Sudan) and research reports. One journal article that draws from the research supported by the project has also been published: Castelli, Giulio, Elena Bresci, Fabio Castelli, Eyasu Yazew Hagos, and Abraham Mehari. "A participatory design approach for modernization of spate irrigation systems." Agricultural Water Management 210 (2018): 286-295.

Gender

Gender is key in understanding and improving local flood-based livelihoods. In FBLS, men are usually involved in fodder and food crop production, while women tend to favour livestock production and cultivation of short duration vegetables and fruits as second crop cycles on residual moisture. The project took this into account in technology promotion and solution-oriented research, also noting that for women, time-saving is important. For example, equipment like electric milk churners aims to reduce work load for women, whilst increasing income; and on-farm water management improvement has resulted in substantial residual soil moisture after the harvest of sorghum, bringing the potential for production of fruits and vegetables including watermelon.

Gender is a cross-cutting theme in all FBLS capacity development initiatives. Gender has been incorporated as an integral part of each topic in FBLS training programs, to ensure gender is discussed throughout the training, rather than singling the issue out into a specific module, with the purpose of fostering deeper understanding on the contributions, needs, priorities and challenges of women in the various aspects of FBLS. The program has successfully pursued an agenda to increase the number of female professionals active in flood based farming, an area in which, traditionally, few women work as experts.

Partnerships

Partnerships, networking, and developing capacity within networks are significant components of the program. In addition to maintaining existing partnerships, new partnerships were continuously forged. Examples of high quality. Productive and long lasting partnerships include:

- Plan International, an NGO active in livelihood improvement programmes in Eastern Sudan, is replicating the on-farm water management improvement field experiment in the Gash, Sudan Agricultural Scheme (GAS). This activity currently covers about 800 ha irrigated by 600 farmers and is being undertaken with the intention for further upscaling depending on results.
- The partnership nurtured with the Netherlands Embassy in Khartoum, Sudan, has resulted in the integration of the project initiative on 'field water management and crop productivity improvement' into the Embassy Eastern Sudan Multi-Year Investment and Development Strategy.
- Gomal University Dera Ismail in Khyber Pakhtunkhwa (KPK) province, Muhammad Nawaz Sharif University and Ghazi University Dera Ghazi Khan in Multan and Punjab provinces respectively have mainstreamed MSc-level research programmes into their curriculum. The universities have already supported the completion of two MSc studies on productivity and marketing of flood irrigated Guar bean, Sorghum and Pulses; and soil moisture and fertility improvement measures. The studies were undertaken by student interns who have obtained their MSc degrees.
- The road authorities in Ethiopia, particularly in the Norther region, have embraced the floodwater harvesting from road initiative and technically and financially supported the construction of many road side deep trenches.

Conclusions

The project has achieved a significant number of high quality and high impact results, for the benefit of farmers in Flood Based Livelihood Systems in eight countries in Africa and Asia. The practical and participatory nature of the research component has resulted in buy-in by farmers, and with it the potential for replication. Farmers in the pilot areas have directly benefitted from water distribution and field water management solutions, such as reduced water consumption and higher yields. The project has used these tangible examples for global learning as well as demonstration to decision makers and development partners the potential results of future investments. Partners like Plan International and the Netherlands Ministry of Foreign Affairs will continue to support FBLS initiatives.

Capacity Development has been a consistent theme in all project activities. A source of pride to project partners has been the development program for young professionals, which has resulted in a cadre of professionals who remain engaged in FBLS, either working directly with this project or with other organizations, across the world. Similarly, much of the solution-based research has been led by or has involved PhD and MSc students, who have benefitted from the support, training and networks of project partners. This reflects an overall youth focus, in particular through social media and horizontal learning to develop peer to peer networks for improvement of flood based farming. Investments in networking have shown success with more senior farmers as well, with the FBLS network in Pakistan a good example of an established network which not only grows and brings in new members, but also operates its own initiatives, such as seed exchange. More widely, hundreds of farmers enhanced their know-how on floodwater management techniques, through knowledge exchange events and targeted trainings; while a range of communications tools have been deployed to maintain an active and engaged global community of practice.

The co-mingling of funding from IFAD and the EC has had clear advantages in terms of the number of partners and stakeholders that the project has been able to engage and the transfer of learning and practices, and continued peer to peer exchange, across eight countries. This structure has presented some administrative challenges, ranging from the differing periods of operation of the two grants, to reaching clarity on audit requirements and subsequent delays in funding, all of which would be important to consider and plan for in any future joint donor endeavor. The other main challenge faced has been the security situation in countries like Yemen, where a different mode of operation had to be found, for the purposes of staff security. MetaMeta is proud to have been able to highlight the effect of the war on spate irrigation dependent areas in Yemen and the potential detrimental impact on food security

Through this initiative, knowledge and practical knowhow on using flood based farming systems to improve livelihoods has developed and been shared across eight countries and with a wide range of partners and professionals across the world. Partners and farmer networks themselves have secured investments to continue working on FBLS and to continue to develop capacities, improve benefits for farmers and continually improve flood management methods.

MAIN REPORT

I. PROJECT BACKGROUND

This is a completion report of the project 'Africa to Asia" testing adaptation in flood-based resource management' implemented during the period April 2015 to March 2019. The project achieved significant results in all four components.

This project contributed to the development of practical knowledge including national and local capacity, to systematically and comprehensively support the productive use of flood-based resources for poverty alleviation and inclusive growth in water-stressed regions of Africa and Asia with relatively short flood periods. The area under these systems in Africa and Asia is estimated at 20-35 million hectares. In spite of their widespread occurrence, Flood Based Livelihoods (FBL) are neglected in many countries, with most attention going to conventional perennial irrigation systems or to rain-fed agriculture. The extensive flood-dependent livelihood systems tend not to feature in national statistics, or in vocational or professional education and training curricula. Whereas floods are often associated with havoc and disaster, these floods are an asset to the people depending on them. The floods constitute their primary source of water. Floods serve and support crop production systems, fisheries and livestock, and are the sustenance of local ecological systems. As flood-based livelihoods are dependent on flood events, they are prone to climate variability and change. Yet, they have considerable unused economic potential, as evidenced by different flood-based livelihood experiences across Africa and Asia. FBL are, in essence, a resilience building block to smallholder climate change adaptation.

Project Goal: to help develop Flood-Based Livelihood (FBL) policies and programs that will meaningfully invest in rural people; that are based on action research and South-South documentation of practical experiences; and that are embedded in long-term capacity building, incorporating program development at various levels.

Project Objective: to develop models and approaches on inclusive, gender-balanced growth in climate change-stressed areas which predominantly rely on FBL. The specific objectives are:

- Strengthened farmer and knowledge network established in Africa and Asia: that builds on the Flood-Based Livelihoods Network Foundation, and on outreach of regional and national centers of ICRAF. The network is equipped with mechanisms for active engagement of farmer leaders and other practitioners (including policymakers, investors and educators) across selected countries in Africa and Asia;
- Human resources, local institutions, and FBL knowledge strengthened: strengthened knowledge base of male and female staff from local institutions contributing to water and food security in areas where FBL is practiced, taking evidence-based local practice in the eight target countries as the point of departure;
- Capacity-Building delivered: undertake capacity building, including mainstreaming of FBL in farmer learning centers and in higher education, and contributing to the development of a group of young male and female professionals;
- Investment programs and policies developed: that are informed and shaped by good FBL practices, supported by South-South shared documentation and evidence-based research.

II. IMPLEMENTATION PROGRESS

A. Project expenditure by year

Project Funds (USD)	2015	2016	2017	2018-2019	Total
Funds received[1]	360,000	0	0	780,612	1,140,612
Expenditure	185,347	565,194	291,409	158,050	1,200,000
Balance	174,653	-390,541	-681,950	-59,388	-59,388

B. Comments on expenditure

After the first transfer of funds in 2015, no further funds were received until early 2018. In order to proceed with the project workplan and maintain established relationships with local partners, the lead partners pre-financed activities as far as possible and to the best of their abilities. This created a risk for the lead partners, with pre-financing reaching over $680,000 by the end of 2017.

C. Progress summary

This grant operated in parallel to funding from the European Commission, also contracted via IFAD, with many activities run jointly. As far as possible, this report highlights those aspects of the project that were funded by the IFAD grant, which ran from 2015-2019. At the country level, the IFAD grant largely supported work in Pakistan, Yemen, Ethiopia and Sudan; with work in Kenya, Malawi, Myanmar and Afghanistan mostly supported by EC funds. Full details of progress in each component are provided in section D, together with a summary of key results against the original logical framework given in Annex 1, noting that the logframe covers all eight countries funded by both grants.

This project approached the strengthening of flood based farming networks in four main ways: farmer network development; generation of new knowledge; capacity development and policy and investment. The project partners in country have managed to use each of these components interchangeably with a view to shaping policy and improving the livelihoods of smallholder farmers, e.g. using results of cutting edge research to demonstrate specific benefits to farmers and seek out investments to upscale. Some of the highlights of the project funded by the IFAD grant include:

- Research on improving water productivity in the Gash Agricultural Scheme (GAS) in Sudan has demonstrated how on-farm water management practices can double sorghum yields while reducing floodwater consumption by 30%. This has raised the interest of international partners; Plan International has already invested in replicating the field experiment in 800 ha cultivated by 600 farmers, with the intention to further upscale should the results meet its standard for wider engagement. Small-scale farmers in the Gash Delta and the Eastern Lowlands are also the key target beneficiaries of the multi-year development and investment strategy of the Embassy of the Netherlands in Sudan.

- Research in Yemen on the impact of war on food security in Tihama has revealed the vulnerability of the spate irrigation-dependent areas in Yemen where attacks have rendered flood channels inoperable. FBLS

[1] Includes 2% CGIAR CSP

has been mainstreamed into the Irrigation Engineering course of the Faculty of Engineering of the University of Kassala, Sudan and the Water and Environment Centre of Sana'a University in Yemen

- The farmer network in Pakistan has not only increased in membership but has been highly proactive in coordinating initiatives such as seed exchange. Also in Pakistan, funding has been secured from the Ministry of Economic Affairs the Netherlands to introduce international good practice and better water distribution in two areas

- Promising results from two FBLS schemes in Ethiopia have shown ways to combine traditional and modern practices to improve irrigated area size and flood diversion efficiency for the benefit of more than 3000 farmers

- Research solutions were developed on field water management, water distribution systems, and the use of roads for floodwater harvesting, in collaboration with universities and farmers. These have been promoted through Practical notes, publications and local social media, as appropriate.

- More than 4000 farmers enhanced their know-how on good floodwater management practices and techniques and other topics, by actively participating in knowledge exchange events, targeted trainings and solutions-oriented research activities

- Through its pioneering internship program, project partners have helped to develop capacity of a cadre of eight young professionals across the project countries, many of whom continue to work in and champion FBFS, following their initial eight-week training and leadership course. Twelve young professionals have been supported in the FBLS research at BSc, MSc and PhD levels

- The project has organized FBLS capacity/ skills development events for practitioners, professionals and policy makers. These include four training courses on Integrated Watershed Management and Flood Based Farming in Arid and Semi-Arid Lowlands of the Horn of Africa hosted by Mekelle University, two cross-regional leadership courses and a knowledge and experience sharing symposium

D. Progress by component against objectives

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
COMPONENT 1: FBL NETWORK ESTABLISHMENT AND STRENGTHENING			
EXPECTED OUTCOME • Current country networks in Ethiopia, Sudan, Yemen and Pakistan consolidated and strengthened with farmer membership increased to 30-40%; • Network mechanism and communication maintained and developed (both external and internal communication lines)			
OUTPUT 1.1 FOUR CURRENT COUNTRY NETWORKS STRENGTHENED AND FARMER MEMBERSHIP INCREASED			
1.1.1 Prepare country database of WUAs active in spate irrigated areas	FBLN in Ethiopia, Pakistan, Sudan, Yemen, MM, ICRAF	1. Overview of WUAs and contact details (Ethiopia, Sudan, Yemen), preferably through apex organizations. 2. Local farmer networks established (Pakistan).	1. In Sudan, Ethiopia and Yemen, the country databases of WUAs (Water Users' Associations) were developed at the start of the project and continuously maintained, strengthened and updated. In Ethiopia, eight traditional WUAs from Alamata, Wereda and Oda spate irrigation systems have been actively involved. In Sudan, the 4 major FBFS (flood-based farming systems) in the country namely GAS, KAAS (Khor Abu Habil Agricultural Scheme), TDAS (Toker Delta Agricultural Scheme), and the Hud El Silem Agricultural Scheme. In Yemen, in spite of the war and security situation, many WUAs were visited for field-work (research), from which contact details and farmer networks were updated and added to the database. 2. In Pakistan, 4 provincial networks and an independently registered entity having a network in 15 spate irrigation systems were established and maintained, with an expanded membership among farmers and WUAs. The network currently consists of almost 400 members. The members are generally community leaders who chair their WUAs and local communities, while some are from civil society and ex-government officials.
1.1.2 Develop country network plans that engage farmer groups in network activities	FBLN in Ethiopia, Pakistan, Sudan, Yemen, MM	1. Vision on future position and organization. Each FBLN chapter will use the Business Model Canvas to create a summary linking the project activities, outcomes, impacts, partnership arrangements and the costs and benefit streams. 2. Prioritize step-wise engagement with geographical areas of work starting from current base.	1. In 2017, for all countries the canvas models have been finalized and reviewed and implementation started which continued in 2018 and 2019. The models were developed and implemented in collaboration with the interns who received a masterclass on business model canvas development during the internship program and applied this knowledge and feedback given during the course to develop/improve their country business model canvas. The Business Model Canvas, was very instrumental to guide Mekelle University, SPO, HRC and WEC through the identification of the value proposition for their beneficiaries, the key activities, partners and resources involved. 2. Every year new areas were added and engagement in the areas increased. In Ethiopia: spate irrigation schemes in Oda, Tsige'a in the Raya valley in Tigray and Amaro in Southern Nations, Nationalities and Peoples' Region (SNNPR); Pakistan: Sindh, Balochistan, Punjab and Khyber-Pakhtunkhwa; Sudan: Gash Agricultural Scheme (GAS), Khor Abu Habil Scheme (KAHS), TDAS and Hud Elsilem Agricultural Scheme (HEAS); Yemen: Wadi Siham, Wadi Zabid, Wadi Mawr and Wadi Rima. Visiting the Tihama region was difficult because of the war situation.

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
		3. Identify activities for farmer engagement in activities under component 2, 3. Develop self-evolving organization.	3. For all countries, the project developed farmer communication plans and farmer activities took place in the selected focus areas. In Ethiopia, farmers in the focus spate irrigation schemes have been actively engaged in research on improving water diversion and distribution. See section 1.1.3 In Pakistan, as a result of an awareness session with a large number of farmers from six WUAs, water distribution in six barrages was organized efficiently by farmers, the district administration and the irrigation department jointly in 2016. In 2017 a farmer training on disease control, crop water requirement, agronomy, irrigation techniques, soil and fertility-related issues and links to the market was held for the spate farmers of Balochistan and Sindh Province (28 in total). The country intern together with 3 RDF (Research and Development Foundation) staff members participated in this training. Publicity material, practical notes and handbooks on spate irrigation were sent to the farmers and line departments. Sizeable printed spate pamphlets and various practical notes were distributed and disseminated among the farmers' network. Farmers have been linked to learn from and support university research at DI Khan and DG Khan. Also, new seeds for the current season in Balochistan have been arranged and distributed and Balochistan farmers were prepared for strip cropping. Discussions were started on re-defining water rights and water distribution. At Barkhan, farmers were supported in distribution of dam storage. All core groups have been involved in contributing to the newsletter. There are more than 66 farmers, youth, academia and professionals in a WhatsApp group where spate-related videos and pictures, good practices and issues in their area are actively shared. Here, the seed plantation season and the timing and seed availability of different crops are discussed. The group is facilitated by the FBLN Pakistan. In 2018, FBLS farmers in Dera Ismail Khan and Dera Ghazi Khan have been actively engaged in the soil moisture conservation studies undertaken by Ghazi University and Gomal University. The farmers, research faculties and students have been in frequent contact with each other during the crop cultivation, germination, growth and harvesting stages. In Baluchistan, the farmers exchanged experience with and received relevant advice from the researchers of the Arid Agriculture Research Dera Ghazi Khan about good farming practices of chickpeas, as well as impacts of climate and rainfall variabilities including through WhatsApp groups (read a blog on this topic here). The Ghazi University in collaboration with FBLNF conducted a 1-day seminar on the potential and scope of FBLS in Pakistan and distributed pamphlets among donors, researchers, students and farmers. In Sudan in December 2016, eight farmers from three of Sudan's spate irrigated systems (Khor Abu Habil, Khotar and Gash) participated in the closing workshop of the WLE project 'Harnessing Floods' in Kassala State. Also a gathering for farmer engagement in Khor Abu Habil, being a remote spate scheme in western Sudan, was also held. This is a positive development, as most research has been focusing on the Gash spate scheme. In 2017, 22 farmers from four FBLS in the country joined the first knowledge and experience sharing workshop organized in July hosted by one of the major FBLS (Khor Abu Habil Agricultural Scheme) in western Sudan. Also, GAS farmers were engaged in the testing of agricultural tools in cooperation with the private sector. One of these tools is the Scythe which was received from the Centre for Environment Concerns in India. It has been introduced to farmers and tested during the harvest time of Sorghum in December. Cooperation with farmers took place on preparation works for the mesga water management experiment that took place on a

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			pilot farm in GAS. This includes consultation of modified design of mesga, selection of a pilot site, cooperation during construction and field measurements. Also a meeting with farmer leaders of the pilot farm was held, led by project staff where major challenges faced and means of solutions were discussed. In July 2018, 50 farmers (from different FBLS in the country) and 20 professionals and practitioners joined the national farmer-focused knowledge sharing and network gathering event in July in Toker and Port Sudan. A joint Sudan-Eritrea farmers' committee has been established to better manage and fairly share the water resources of the transboundary Baraka River that originates in Eritrea and ends in the Toker Delta Agricultural Scheme (TDAS) in Eastern Sudan.  *Figure 2: left: national FBLS workshop in Sudan, right: testing agricultural tools* In Yemen, WUAs and other farmer organizations were visited in the Tihama region's selected areas (Wadi Siham, Wadi Zabid, Wadi Mawr and Wadi Rima). Meetings and discussions were held with the following outcomes: (1) The project has been introduced to the WUAs and (its) farmers, (2) An assessment on traditional methods used by farmers to exchange knowledge and experiences with each other, (3) An assessment on adapting of the WUA and farmers on the use of modern communication tools between farmers, WUAs, FBLN team and other related organizations, (4) An assessment on several research topics (e.g. water rights, water distribution, groundwater crop patterns), (5) An assessment of organizations active in the Wadi, (6) An assessment of the challenges farmers face and the effect of these challenges, (7) An updated WUA and farmer contact list/network database, (8) Identification of focal points (upstream, midstream and downstream), (9) An assessment of the agriculture (and related) practices at the focal points including creative practice in agriculture and livestock production, manufacturing and handcraft, (10) An assessment of war and natural disaster damages on infrastructure like canals, diversion structures and public and private buildings, (11) Clarity and agreements on how photos and videos can be taken on flood-based practices among the focal points and how these are best exchanged. Also, ideas and knowledge from the research on soil mulching techniques, seed selection and dressing have been shared with WUAs and farmer leaders of Wadis Mawr and Zabid, the two largest FBLS covering 40,000 ha, serving close to 60,000 faming households. Benefiting from a narrow window (a few days) of relative peace, some WUA members and farmers visited the field research site and received explanation about the techniques, procedures and equipment used, as well as the results achieved. The Yemen chapter continued

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			actively promoting the sharing of ideas and knowledge related to FBLS via WhatsApp. A workshop for farmer groups of 4 wadis to improve communication and documentation skills has been prepared and postponed until the area is safer.  *Figure 3: Meetings with WUAs and farmers in Wadi Zabid, Yemen*
1.1.3 Establish 3-5 core farmer groups that are an integral part of project staff, in each country	FBLN in Ethiopia, Pakistan, Sudan, Yemen, MM	1. Farmer groups represent the priorities in capacity building, research and knowledge development programs for their respective communities. 2. Farmer groups actively collaborate with the project staff to implement programs and communicate the outcomes with their respective communities, local decision makers and other influential development organizations.	1. In Pakistan, Sudan and Yemen, farmer groups represented priorities and were actively involved in project activities, see section 1.1.2. In Sudan, farmers have been involved in the introduction of intermediate technologies and light mechanization. This is expected to make FBLS rewarding and attractive to farming communities, including women and young people. There has also been full involvement of the farmers in the on-farm water management improvement interventions in the GAS. 2. In all countries, project staff and farmers communicate closely with each other. Farmers and project staff are in close contact with relevant development organizations. In Pakistan, members from the network have been involving active farmers and representatives in their activities. (1) The Agronomy Department of Gomal University in Dera Ismail Khan conducted a two-day farmer training session in January 2016, where 25 farmers from various spate areas participated. In addition, four training programs on crop production were arranged by local WUAs in PKP, Punjab, Baluchistan and Sindh. (2) there are 5-10 farmer groups who represent the interest of the farmers in the management of their diversion and canals. Key members of these groups share knowledge they received through training with rest of the farmers in 2017. (3) Farmers participated in new seed trials and keep an active link with the FBLN Pakistan Chapter secretariat in Islamabad. Also, members are selected for different activities e.g. training, exposure visits and knowledge sharing activities, field trials, the operation and maintenance of their systems, acquiring machines for system rehabilitation, to keep and collect the cash for systems repairs annually, and to share videos and pictures with network. (4) The core groups actively represent the interest of their farmers, approach the government for earth-moving machines, and keep the records of system rehabilitation. They approach Provincial MPs for support funding. Farmers on Draban Zam, Khokhar and Koura in Dera Ghazi Khan have successfully acquired bulldozers for rehabilitation of their structures). Farmers of lower Nari in Bhag Balochistan successfully secured local funding for the construction of diversion bunds. The Abadgar Network, a group from Sindh and Balochistan assisted the University of Tando Jam in the completion of a study on "Water Governance and Conflict Settlement on Water Distribution" (see section 2.1.1 – jointly with RDF

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			support). They participated in the Flood Based Farming training arranged by FBLN and facilitated by the Agriculture University Tando Jam. (5) A core group of farmers was taken to the Hyderabad Grain Market, met with the President of Traders Association and discussed the marketing issues of local pulses produced by the Balochistan farmers. (6) A core group of farmers in Dera Ismail Khan was linked to Gomal University (soil department) that implemented the research study on soil fertility management. The research trial was carried out on a local farm identified and selected mutually by the University Research and local farmers. The outcomes were shared with farmers. (7) Faculty of Ghazi University and Muhammad Nawaz Agriculture University undertook a research study on "Soil Fertility Management through Alternate Strip of Inter-Crops in Spate Irrigated areas of Dera Ghazi Khan and Rajanpur''. The research areas identified and approved by the University and in consultation with farmers. Both universities are progressing towards land leasing / land preparation / identification for a research trial. The university faculty and farmers are monitored the cultivated crops and their growth pattern on a quarterly basis.  *Figure 4: with self-help farmers of Khatoor Ganda in Bhag Balochistan are de-silting their irrigation canal* In Ethiopia, farmers were key partners in the research on improving water diversion and distribution efficiency. The farmers evaluated three types of headwork structures (traditional, modern and hybrid). Focus group discussions with farmers were held and consultation of experts working within the districts took place. Farmers gave recommendations that have been incorporated and had positive contributions; e.g. the positive impact of hybrid systems on the availability of moisture, fair sharing of flood waters and increased area coverage. This country chapter documented the experience and produced a Practical Note. In addition to this activity, scholarships to farmers enabled them to incorporate their own ideas and share their experience with other farmers.

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			 *Figure 5: focus group discussions with farmers in Tsige'a (left) and Oda (right) hybrid spate irrigation systems* In Sudan, the project continuously involved farmers in the execution and planning of activities related to changing local water distribution practices (see section 1.1.2 for more details). In GAS, farmers availed their land for research work and made labor contributions to subsidize project activities. Core farmer groups were established and their existence communicated to WUAs in GAS. The research in Gash revolved around the effectiveness of the sub-division of the immense field blocks into smaller units that are supplied by field channels, rather than running water over the large unprepared block of land. In Yemen, farmers were actively involved in discussions and meetings (see section 1.1.2) where they shared their challenges, ideas, opinions and priorities. Although the country team made preparations for a two-day training for WUAs and Farmer groups in the focal points of the selected wadis to improve their skills in communication, documentation and sharing of practices, the implementation of this training had to be postponed due to conflict situation. As such, a dedicated FBLN Newsflash was sent out to report on "conflicts affecting lives of communities in the Tihama region''. The newsflash was developed in collaboration with farmers, and shared widely with different audiences in Yemen. The project lobbied to draw people's attention to a war, which until 2018 was largely forgotten. This effort was done by organizing meetings and sending out messages via various media. With regard to the MSc. Research on soil mulching techniques in Wadi Zabid, farmers were asked to share their ideas on this research experiment with WUAs and farmer leaders who in turn visited the experiment site and exchanged ideas with the researcher. In addition, the team prepared a short video explaining the experiment in Arabic, which was shared and shown to farmers in the area. It is has since been translated to English.
OUTPUT 1.2 NETWORK MECHANISM AND COMMUNICATION MAINTAINED AND DEVELOPED			
1.2.1 Website maintained and developed	MM	1. Create a system for clear country identity and country uploads in relevant sections.	The FBLN website is fully functional and frequently updated. The website features links to social media (Twitter and Facebook); descriptions on FBLS and its types and the FBLN and its projects; country pages (country identity) with information and links to country documents, websites and social media; resource documents and links to important media files (e.g. blogs, videos and reports); promotion material for sharing; pages with information and resource documents of the internship and leadership course held this reporting

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
		Enhance user interface further 2. Website membership expanded and website maintained to serve as an active platform for exchange of knowledge and experiences.	year; and the photo library. With the improve layout and design, website visits have grown, and news and materials (like e.g. the newsflash and newly created practical notes) have been shared via the website and frequently updated. The website is also linked to other media channels (Twitter, Facebook, Newsflash, TheWaterChannel and MetaMeta website). Additionally, the country chapter websites (WEC, Mekelle University and HRC Sudan) have been updated with recent research findings, activities and outputs.
1.2.2 Newsletter maintained and developed	MM, FBLN Chapters	1. Quarterly FBLN newsletter '*Managing Floods Matters for People, Livestock and the Environment*', including a section by the farmer groups. 2. Membership updated and improved 3. Effective communication mechanism on FBL identified for each of the network partners (farmer groups, WUAs, professionals, government, non-government organizations, and donors) by all FBLN Chapters through a communication plan.	1. The FBLN is regularly publishing a monthly newsflash based on inputs of the different project countries on FBLS-related activities. This newsflash has been widely spread across the global network via e-mail, social media and the website. In turn, this newsflash has been shared by the country teams with the specific country networks. Occasionally, an extra newsflash has been published for special promotion (e.g. report on the war impact in the Tihama region). In Pakistan, SPO has created a quarterly newsletter in the local language, with information on trainings, farmer visits and seed exchange activities. In Ethiopia, a newsletter entitled ''improving water diversion and distribution efficiency'' has been published explaining the positive effect of hybrid headworks in spate irrigation systems. Also, two newsletters on the 5th and 6th annual FBF courses have been published. In addition, a newsletter entitled ''impacts of rainwater harvesting on agricultural ecosystem services'' and one on ''improvements in the design of flood diversion structures'' have been published 2. In all countries, the database of members (depending on the country which specific information e.g. phone numbers, type of member, postal address) has been developed, categorized and frequently updated (after each project activity / event and engagement with farmers, WUAs, donors, institutions and organizations). 3. Farmer communication plans were developed in 2017 with the interns (who had training on farmer communication plans during the internship course). At each project activity, effective communication mechanisms are discussed with participants for agreement, and literature guidebooks and practical notes are shared. In Pakistan the sharing of ideas and knowledge related to FBLS via WhatsApp has been promoted actively. In Pakistan, Several Practical Notes were also re-published, with a better local language translation, to reach more farmers. This included notes on oil seed cultivation; pulses and beans under spate irrigation, and a note on truffle mushrooms. They were shared among farmer groups, and local civil society, universities and government offices. Translations have been made in the Sindhi language and Urdu. The Yemen chapter prepared short videos on issues that are relevant to farmers, such as livestock fodder banks, tradition fertilizers from livestock waste, biogas production and traditional plant medicine to cure livestock disease, which are shown to farmer groups. Furthermore, discussions were held with the WUAs and farmers on preferred and best communication mechanisms. As a result, modern communication tools (such

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			as WhatsApp) have been introduced to the WUA and farmers to facilitate exchange between farmers, WUAs, the FBLN team and other related organizations. Also, as described in section 1.1.3, a communication training has been prepared. In Sudan, communication mechanisms have been identified through a knowledge-sharing workshop, direct meetings with WUAs / beneficiaries and sharing project and communication products. There are updates on project activities on the project web page (www.hrc-sudan.sd).
1.2.3 Establish FBLN foundation	MM	1. Registration as a foundation. 2. Develop administrative procedures	MetaMeta had already successfully registered the Spate Irrigation Network Foundation in the Netherlands, but changed its name to Flood-Based Livelihoods Network Foundation in 2016. The latter allows the Foundation to work on a wider diversity of topics in flood areas. The core principle that defines the existence of FBL is to transform floods from a source of destruction into a source of livelihood for people and livestock, and to buffer the landscape and the environment from degradation. If well designed and managed, FBL can fulfil several important basin management functions that go beyond merely providing water for agriculture, rangeland and forestry. They include: preserving biodiversity; mitigating flood peaks; stabilizing river systems; and recharging groundwater. This much contributes to the approach of recharging, retaining and reusing water. Using floods for diverse livelihoods (crop production for fodder and consumption, storing drinking water for both people and livestock, and practicing fishing and aquaculture), will contribute to a more sustainable food security that can improve the diet and health of many people. Together with the name change, logos have also been designed for the Foundation and the different country chapters and these have been introduced as part of rebranding. The name 'flood based farming' has been adopted as it conveys the content better than 'spate irrigation'. In 2017, the first audit of the FBLN Foundation was completed and in 2019 the second audit was undertaken.
OUTPUT 1.3 KNOWLEDGE PROMOTED AND PROGRAMME DEVELOPED THROUGH NATIONAL NETWORKS			
1.3.1. Organize cross-country farmers' knowledge sharing	MM, FBLN-Ethiopia, Pakistan, Sudan	1. Organize field-based, targeted knowledge sharing activities. 2. Provide scholarships to farmers.	1. In all countries, field-based, targeted knowledge sharing activities took place of which most of them are described in section 1.1.2 and 1.1.3 In Ethiopia, two senior members of the country project team exchanged knowledge and ideas at the workshop "Assessing the Potential of Agriculture and Rangelands in Afar through managing floods for transforming livelihoods of (Agro)pastoral communities" in 2016. In 2018, a farmer to farmer knowledge sharing event took place in Kobo, Amhara in collaboration with IFAD PASIDP (Participatory Small-scale Irrigation Development Program), CASCAPE (Capacity building for scaling up of evidence-based best practices in agricultural production in Ethiopia), ICRISAT and GIZ (German Corporation for International Cooperation). This would include field visits to Oda, Tsige'a hybrid systems in Tigray, Gobu spate irrigation system in Amhara and Chifra flood spreading weir in Afar with participants from 6 regional states of the country. Furthermore, the event demonstrated simple agricultural tools to the farmers proven to be useful in spate irrigation schemes. In Sudan, planning to conduct cross-country farmer knowledge sharing started in May 2016. However, the actual sharing took place in December 2016, together with the 'Harnessing Floods' project's closing workshop. In addition to professionals, a considerable number of farmers from flood-based areas in eastern and western

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			Sudan gathered to share their experiences. In 2017, a cross-country knowledge-sharing workshop also took place. Experiences from different spate areas were shared and insights in the progress of ongoing research has been gained. It aimed to contribute to knowledge of efficient management and productive use of floods in Sudan. By the end of the workshop, sharing experiences from different spate areas and strengthening the FBLN in Sudan were achieved; this is in addition to identification of the major challenges that hinder better water management in the spate system of Khor Abu Habil in Western Sudan. In 2018, a national farmer-focused knowledge sharing and networking gathering took place in July in Toker and Port Sudan. The workshop aimed to build-up knowledge on efficient management and productive use of floods. Participants shared knowledge and experience, and the Sudan network on flood-based farming systems. Fifty (50) farmers and 20 professionals and practitioners participated in the identification of the major challenges that hinder water management in the Toker Delta Agricultural Scheme. The participants committed to continued engagement on the establishment of a joint Sudan-Eritrea farmers' committee and the introduction of intermediate technologies and light mechanization.  *Figure 6: national farmer-focused knowledge sharing and network workshop in Sudan, left: field visit to Toker spate irrigation system, right: group picture* In Pakistan, three farmer trainings took place during 2016. All farmers were requested to bring seeds of 'forgotten' crops that are growing in their respective areas, but not elsewhere. Examples of such crops are local varieties of red kidney beans, mooth beans, chickpea and sorghum. In Dera Ismail Khan, the training revolved around red kidney beans and mung beans, the latter being procured by the Dry Agriculture Development and Research Centre in Chakwal. In March 2016, another, joint meeting was organized at two locations in Punjab (Kot Kaisrani and Shadi Wala) with farmers from Baluchistan, Punjab and KPK. Here, farmer-to-farmer discussions on mooth beans, red kidney beans and chickpea, as well as soil moisture conservation after early floods were facilitated by the Quetta Agriculture Research Institute. During the joint meeting, Punjab farmers informed the other farmers about the cultivation of chickpeas, including seed application rate, ploughing methods, twig cutting, insect control, harvesting and threshing. In return, the Baluchistan farmers deliberated on the cultivation methods of mooth beans, a crop that was not used by the KPK farmers. The KPK farmers deliberated on the cultivation of kidney beans. The event ended with a visit to the irrigation structures built within the Kaura spate irrigation system. At the end of the discussion, 20 kg of

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			chickpeas and 20 kg of local sorghum variety were exchanged for trail in the spate irrigated areas like Bhag. It is found that the chickpeas in particular are now cultivated successfully here, fitting better in a changed climate with later rainfall. The sorghum seeds from Punjab were mixed with local Baluchistan varieties. While scholarships were not awarded to farmers, their transportation and accommodation for the trainings was covered from the given budget. In November 2016, another training was facilitated by Gomal University in Bhag, Baluchistan, for a group of 14 farmers from the Sindh network. In addition, 15 leaders from the Baluchistan network participated as well. Focus was placed on disease control related to mooth beans, introduction of new varieties of mung bean, red kidney bean, white bean, and white chickpea bean, as well as harvesting techniques, pest control using organic pesticides, crop marketing, production of Lobia beans from Sindh, and the grafting of Jujube tree. About the latter, a short video was made in which an expert farmer from Sindh demonstrates to farmers how the grafting of the tree takes place. In addition, the Sindh farmers handed out a small quantity of musk melon seeds and white Lobia beans for the Baluchistan farmers, as well as 50 kg of mung beans. They also requested castor oil seeds that are cultivated in Sindh at a large scale. This will be taken up in the future. Next to seeds, Bhag Narri bulls were introduced to the Sindh farmers, who showed interest to breed these as well. In 2017, a group of spate farmers from Sindh and Balochistan participated and visited the Darawat Dam site in Sindh and discussed the water and land distribution issues. The group has acquired the knowledge on FBLS in Sindh and Balochistan. The training was facilitated by the different department professors e.g. Agronomy, soil, plant protection and water management faculties of the Agriculture University Tando Jam Sindh. Also, the farmer networks of Sindh have participated in dialogue on drip irrigation. The dialogue was organized by University of Engineering and Technology Tando Jam Sindh. In 2018, a one-day seminar on hill torrents management-sediment challenges and options was held at Ghazi University, DG Khan. The seminar was attended by over 50 different stakeholders interested and involved in hill torrent management; engineers, ministers, government officers, university professors and farmers. FBLN Pakistan and local partner SPO were represented by the country coordinators. They presented the spate irrigation history and potential in Pakistan and initiated discussions on how spate irrigation is related to challenges and sustainable solutions for hill torrent management and the potential areas of hill torrent harnessing. Literature and publications by FBLN and SPO related to spate irrigation were distributed among the participants.

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			  *Figure 7: presentation by the FBLN Pakistan and SPO at the hill torrents seminar* 2. In Pakistan, one scholarship was provided to a local farmer from Sindh who is expert on Beer Grafting in 2017. The incumbent has knowledge in preparation of insecticide spray made out of local poisonous botanical plants to control insects. A video clip has been made and a final video guiding for preparation of this spray elsewhere by the local farmers has been disseminated.
1.3.2 Tailor-made training to selected farmer groups / WUAs	MM, FBLN-Ethiopia, Pakistan, Sudan,	1. Prepare hands-on training packages together with WUAs. Use videos and other material for discussion.	In Ethiopia, a video documentation of the farmer to farmer experience sharing event held in May 2016 was prepared and used in other farmer to farmer sharing events. In Pakistan, the team used videos and pictures for sharing knowledge with different farmer groups. A package of hands-on presentations and videos are used during awareness sessions with students and farmers. Literature is shared with NGOs, donors, professionals and line departments. Spate related literature such as practical notes and guide books on spate irrigation were shared with the attendees of presentations held at MNSUA Multan, Ghazi University and Gomal University. In Sudan, several videos were created that were shared with the network (see section 2.1.4)
1.3.3 Develop and disseminate knowledge products in local languages together with WUAs	MM, FBLN-Ethiopia, Pakistan, Sudan	1. Undertake quick needs assessment. 2. Translate and disseminate practical notes.	Practical notes, research outputs and flyers were shared wherever possible at project events throughout the project period. In 2016, Sudan chapter prepared two Practical Notes prepared in the Arabic language on water governance and gender issues in spate irrigation. In 2017, another practical note on "gender in spate irrigation systems in Sudan" was completed and shared with partners. The Pakistan network has prepared and published 16 Practical Notes of which some in the local languages Sindhi and Urdu. A set of Practical Notes was provided to network members and government officials from the four provinces. Also, copies of the guide book on spate irrigation were handed over to farmer leaders of Sindh. Farmers of Balochistan have asked for the provision of Mooth beans seeds Sindh Variety. Government seed institutions were contacted for supply of certified seeds, but all denied availability. Finally, 3 local traders were identified. 800kg of chickpeas of the NIFA 2005 seed variety were procured from Arid Zone Research Centre Dera Ismail Khan and sent to Balochistan Farmer Network on as 50% cost-sharing basis. The results and success ratio were monitored at the time of harvest in March 2018. The Pakistan chapter also sent guidebooks, pamphlets and spate-related charts to all executive engineers of Balochistan, and to relevant

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
			Irrigation department officials at Dera Ismail Khan, University of Peshawar, Faculty and students of Ghazi University, Nawaz Sharif University of Agriculture Multan, and Agriculture University Tando Jam Sindh. In collaboration with FBLN Ethiopia, two practical notes have been completed. One on ''improvements in the design of flood diversion structures'' and one on ''managing microclimate''
1.3.4 Country network secretarial support	FBLN Chapters	1. Coordination and administration of country programs.	The project kick-off workshop was organized in Addis Ababa in May 2015. Country plans were made in 2016 with the country coordinators as part of the Annual Training in Dusit Nairobi in February 2016. From 28-30 April 2016, a project meeting was held in Schenkenschanz, Germany, with project leaders from the four target countries (Ethiopia, Pakistan, Sudan, Yemen) and the three implementing partners (ICRAF, MetaMeta and FBLN). In all countries, quarterly progress reports, the annual progress report, revised budget expenditures, and project outputs and reports have been prepared and shared; activities and project teams have been coordinated; and project outputs have been disseminated. Each country has a country coordinator who is in close contact with MetaMeta/ FBLN (via mail, WhatsApp and skype) to discuss project progress (activities, outputs, expenditures) and provide support when needed. Furthermore, the interns are guided by their country coordinator and MetaMeta (via mail, WhatsApp and skype) on their activities and outputs. In 2017 the focal country persons met again for a coordination meeting in Wageningen. The country coordinators manage the country project teams and communicate frequently with partner organizations, universities and farmers. Support was also given to the country network in making the administrative records audit-ready.

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
COMPONENT 2: KNOWLEDGE DEVELOPMENT AND SOLUTION MANAGEMENT			
EXPECTED OUTCOMES • FBL relevant research undertaken on three themes. • At least eight practical notes on cross-country relevant research collaboratively developed and disseminated. These provide research insights and document actionable solutions related to FBL that are translated into key languages. An Africa to Asia exchange program on at least three themes is conducted. • At least three quick-win solution-oriented research programs linked to capacity building of young professionals			
OUTPUT 2.1 EIGHT PRACTICAL NOTES AND OTHER COMMUNICATION PRODUCTS ON CROSS-COUNTRY RELEVANT RESEARCH THEMES PREPARED			
2.1.1 Water governance and conflict mitigation	ICRAF, MM, IWMI, FBLN Chapters	1. Support solution-oriented research; literature review; engagement with implementers, policy makers and farmer groups. 2. Produce one thematic research report, including an executive summary for farmers, which will appear in	In Sudan, a study on Water Governance in GAS has been published, describing water regulation rules that govern use of Gash River water resources in the Kassala State. Field visits were executed and discussions were conducted with representatives of some authorities like GAS and several WUAs to get a clear image on the status of water governance in Gash area. The WEC in Yemen prepared one Practical Note on Groundwater Recharge and Saving, in addition to one Note of Water Rights in the Spate Irrigated Wadi Zabid. Also, data has been collected on war damage and its effect on food security. A report on the impact of the ongoing war on food security in the Tihama region has been published and shared with the network (with extra promotion via the newsflash, the water channel flash and social media) and 3000 more contacts.

ACTIVITY	PARTNERS	DESCRIPTION OF ACTIVITY	PROGRESS TOWARDS OUTCOMES
		the quarterly newsletter along with main research findings. 3. One article submitted to a peer reviewed journal.	 *Figure 8: left: taking questionnaires on food security, right: measuring effects of famine caused by war* In Pakistan, a study related to the Water Governance and Conflict Mitigation in Spate Areas was being implemented by RDF and Sindh Agriculture University Tando Jam, based on structured and semi-structured interviews with Sindh Irrigation Department and Irrigation Drainage Authority officials, and focus group discussions with farmer networks in the Dadu and Jamshoro districts. The study has been published and an executive summary for farmers shared in the newsletter. In Pakistan an assessment of the water distribution and the ecology of the spate irrigation systems in Bagh Nari was made. Together with the study in Sindh, this formed the input for a project proposal that was awared in 2018 – New Water Rights for Basin Management and Inclusion. A PhD student, Mara Getachew, started in July 2017 with a PhD on Water Rights and Water Conflicts in Flood Based Systems at Wageningen University. One of the convenors of the FBLN will be her co-promotor. Her PhD covers case studies from at least three countries – Ethiopia, Kenya and Pakistan. A peer-reviewed book chapter was published by Springer Verlag (2018): "The Promise of Flood Based Farming in in arid and semi-arid areas" in Leal and Trincheria "Rainwater-Smart Agriculture in Arid and Semi-Arid Areas - *fostering the use of rainwater for food security, poverty alleviation, landscape restoration and climate resilience."* An article was published in IntechOpen DOI: 10.5772/intechopen.85889: "Spate Irrigation: Impact of Climate Change with Specific Reference to Pakistan" by Qudrat Ullah Khan and Obaid Ullah Saya for a new book called *Irrigation - Addressing Past Claims and New Challenges* [Working Title]. All reports have been shared with the national/involved country networks and to a global audience via the FBLN newsflash, on the website and on social media channels. The PhD research will also synthesize main outcomes.

2.1.2 Management of soil moisture and fertility	ICRAF, MM, FBLN Chapters	1. Support solution-oriented research; literature review; communication between countries; engagement with implementers, policy makers and farmer groups. 2. Produce one thematic research report, including an executive summary for farmers, which will appear in the quarterly newsletter along with main research findings. 3. One article submitted to a peer reviewed journal.	 *Figure 9: left: sowing seeds for alternate strip cropping in spate area DG Khan, left: soil fertility management through alternate strips by Ghazi University* In Pakistan, a research study on soil fertility management through alternate strips of inter-cropping in spate irrigated areas has been completed by MNSAU Multan (Mohammad Nawaz Sharif University of Agriculture) in collaboration with Ghazi University (click here). Gomal University has also completed a research study on "the effect of tillage on enhancing soil fertility and moisture conservation under spate irrigation." A study on the ecosystem of the Kachi Plain with focus on spate irrigated areas of Bhag Narri Balochistan has also been finalized and published as a Practical Note.  *Figure 10: left: construction of mesga canal in GAS, right: soil moisture in GAS one month after irrigating is still high because of more equal water distribution caused by creation of mesga canals.* In Sudan, on-farm water management improvement measures were introduced in a 210-ha mesga (field) in the GAS. Under the traditional (i.e. no-intervention) on-farm water management practice, farmers adopt a standard irrigation duration that ranges from 15 to 25 days for a 210 to 420 ha mesga, irrespective of the crop type. Water is supplied through a single inlet from a secondary canal and left to travel on its own throughout a large irrigation field, often with undulating topography. The improvement interventions undertaken combined two measures: (a) dividing the mesga into two equal parts, and (b) constructing a 3.5 km tertiary canal with a weir, to abstract water from an existing secondary canal and irrigate the downstream half of the

			mesga. These interventions resulted in doubling of the yield of Aklomoy, a local sorghum variety used for food and fodder, from 0.8 to 2 tons/ha while simultaneously reducing the floodwater consumption by 30%. These results, along with the details of the field experiment, have been documented in a final report. A local NGO, Plan Sudan/International, has committed to partner with the Africa to Asia project team to replicate the interventions in 2019 in two mesgas, covering a total area of about 2000 ha. Several preparatory activities have already been completed: selection of the two mesgas in consultation with the GAS administration and farmers; topographical survey to determine the longitudinal profiles of the proposed mesga canal; construction of mesga canals. A technical report on phase IV of this research work has been finalized. A journal paper on "soil moisture and soil fertility management in GAS" and a short video documentation of the conducted research are also under development. In Yemen, research on groundwater recharge and saving has been finalized; a practical note on this research has been developed and published. An MSc student has also completed and published research on soil mulching. Furthermore, a proposal has been prepared on ''Dew water harvesting for coffee plants in terrace areas" (spate mid catchment).  *Figure 11: left: preparation of soil mulching experiment field; right: explanation of soil mulching techniques to farmers* Based on the country research, a thematic paper was prepared on soil water management in spate irrigation. A paper was published on the impact of intercropping: Jaad Amin. Khuram Mubeen, Matlob Ahmad, Mudassir Aziz, Muhammed Arif ' Strip cropping system of chickpeas, lentil, and arugula crop as a promising option in spate irrigated areas of Punjab. Asian Journal of Agriculture and Biology, 2019, 7 (2): 224-233. All reports have been shared with the national/involved country networks and on a global level by sharing it in the newsflash, on the website and on social media channels.
2.1.3 Improvement of water diversion and distribution efficiency	ICRAF, MM, FBLN Chapters	1. Support solution-oriented research; literature review; communication between countries; engagement with	In Ethiopia, Pakistan, Sudan, and Yemen, this topic is part of the research described in section 2.1.1 and 2.1.2. In Pakistan, two PhD students are conducting research at the Pakistan Center of Advance Studies in Water: Aneela Memon ''Impact of climate change on hill torrents and ground water using GIS Modelling in Kohistan Region of Sindh Province'' and Abdul Ghani "Hydrological assessment of Khirthar National Range Using Remote Sensing and Modelling Approach''.

		implementers, policy makers and farmer groups. 2. Produce one thematic research report, including an executive summary for farmers, that will appear in the quarterly newsletter along with main research findings 3. One article submitted to a peer reviewed journal	In Ethiopia and Kenya, ICRAF engaged two PhD students to develop new knowledge and publish at least four journal articles about FBLS. The students are sponsored by DAAD (German Academic Exchange Service) with supervisory support from the Africa to Asia project. One of the students, Liman Harou, is looking at "Managing biophysical risk in Flood Based Farming Systems in Eastern Africa and Southern Africa". This research identifies FBLS and documents how they are managed by farmers. The thesis proposes options for their intensification, including a low-cost remote sensing approach that could be replicated in other areas to improve farmer livelihoods. This study incorporates decision analysis approaches to explore ways to support farming decisions in near real-time with limited information, accounting for uncertainty about model characteristics and processes. The second student is developing a decision support tool for assessing investments in FBLS. In Ethiopia, Mekelle University has conducted research on hybrid (mix between traditional and modern) diversion structures in various spate schemes in Ethiopia's Raya Valley. This has resulted in the writing of a Practical Note that has been published. In addition, the Oda and Tsige'a diversion systems are modelled using DOSBASS, so that its sediment trapping and diversion efficiency is evaluated. To evaluate the water distribution efficiency, longitudinal and latitudinal moisture distribution have been evaluated using moisture monitoring techniques. For this, sediment samples for particle size distribution analysis and monitoring the moisture content at different positions of the command area have been collected and analyzed. The thematic field research report is under preparation and a journal article will be submitted after finalizing the field research report and modelling  *Figure 12: Hydrological data collection using drivers in Tsige'a* In Yemen, a research proposal has been written on ''floodwater use optimization to improve the livelihoods in spate areas'', to be implemented once the safety situation improves. The Yemen project team contributed to the implementation of a fog water harvesting pilot study implemented by YAWEE (Yemen Association for Water & Environment & Energy) in Manakha- Sana'a governorate. Also a special study was undertaken to review the impact of the war on the livelihood of farm families in the Tihama – drawing attention to the plight of the population dependent on these systems after the maintenance facilities were destroyed – leading to a siltation of the canals and encroachment of prosopis juliflora.

			In Ethiopia, one article (hydrological response evaluation between treated and untreated watersheds) has been submitted to the publisher and one article (The effect of climate and land-cover changes on runoff response in Guguf spate-systems) is under review by the Journal of Irrigation and Drainage. Many activities were undertaken to support the understanding of using road infrastructure for floodwater use and water management. This solution was discussed and introduced in Ethiopia and Kenya and explored in Pakistan and Sudan with various activities. Support was given to the preparation of Guidelines – both globally and specific for Ethiopia. A large number of illustrations were prepared for this purpose as well as tailored training. Three specific Practical Notes were prepared on this topics – using multi-country experience. All reports and findings are shared with stakeholders via the FBLN newsflash/ website/ social media channels.
2.1.4 One video based on footage from the IFAD countries	MM, ICRAF Ethiopia, Pakistan, Sudan, Yemen, IWMI	1. Document the research process, outline the outcomes and highlight testimonies on the relevance of research by farmer leaders, local decision and policy makers, as well as academics and influential bodies.	A total of 27 FBLS-related videos were published. Also, several blogs related to FBLS were uploaded on The Water Channel. See section *G. International Public Goods* for more details. All produced videos have been uploaded on The Water Channel and many of them shared/promoted on social media. During the internship course, all interns made a Camtasia video on the main aspects of FBLS in their country. As part of this initiative, new videos (16) on flood based livelihoods including six new blogs were uploaded on www.thewaterchannel.tv. The videos and other related videos have been uploaded on a special dossier on the water channel – that was widely promoted. (http://www.thewaterchannel.tv/dossiers/livelihoods-from-floods/475-videos) HRC in Sudan has documented flood-based livelihoods in the three spate-irrigated areas (Khor Abu Habil, Khotar and Gash) since September 2016. A documentary video on FBLS in Sudan has been completed. Furthermore, several short documentations of the research in Gash were made (named: harnessing floods to enhance livelihood and ecosystem services in the gash river basin, closing the unfairness gap in Gash flow distribution, towards improved field water management in Gash agricultural scheme and on-farm water management Gash). Also a short video on farmers' networking in FBFS in Sudan has been made. In Pakistan, many short videos have been produced covering the different issues (named: floodwater management in Bhaag, chickpea trial, cultivation techniques in spate regions, drilling of small boreholes for drinking water, farmers training on Mooth Beans disease control, monitoring the Moon Beans result, spate water management, knowledge exchange from farmer to farmer, flooding in Zhob District and mustard oil production) In Ethiopia, a short video has been produced on the 5th cycle training on FBF showing its activities and field visits. Also, a video has been produced showing the outputs of the research on improvement on water diversion and distribution efficiency. This video includes footage of farmer group discussions and shows the farmers view on the hybrid systems. On top of that, a video documentation of the farmer to farmer experience sharing event which was held in May 2016 has been produced.

			In Yemen, several videos have been produced (named: managing floodwaters through spate irrigation systems, the starving Tihama, Yemen's humanitarian situation- the impact of war, impact of war on Wash, health and infrastructure and Water and electricity in a time of war).
OUTPUT 2.2 EIGHT SOLUTION-ORIENTED RESEARCH PROGRAMMES CONDUCTED			
2.2.1 Coordinate and implement research	ICRAF, MM, FBLN Chapters, IWMI	1. fact-finding, ensuring farmer engagement in: soil moisture and fertility management; new crops; resolving water distribution conflicts; water governance; water use efficiency; command area development; tree management; managed regeneration.	1. The research activities have been implemented as described in section 2.1.1, 2.1.2 and 2.1.3
2.2.2 Organize exchange on one theme	MM, ICRAF	1. Coordinate communication between countries, and undertake exchange between countries 2. Measure impact and produce note.	Highlights from this work have been captured in a series of Practical Notes in particular, based on multi-country experience or which benefitted from review from member of other countries: 1. Fodder Production with Spate Irrigation and Road Run-off 2. Improvements in the Design of Flood Diversion Structures 3. Road Crossings for Water Harvesting in Seasonal Rivers: Non-Vented Drifts as Sand Dams 4. Simple mechanization for dug-out ponds construction 5. Constructing Roads in Low-Lying Floodplains to Optimize Ecological and Economic Functions 6. The Use of Trees and Shrubs in Spate Irrigation Areas The coordination of communication and exchange between countries received a considerable impulse during the internship course and leadership course in the Netherlands. Interns from different project countries worked together on outputs, exchanged ideas and had many discussions about several FBLS related topics. During the leadership course, several senior project partners and country coordinators joined and interaction and discussions between them and with the interns took place. So, a lot of exchange of knowledge and experience took place during these weeks in the Netherlands where all project countries were represented. Also, a WhatsApp group has been created where all interns frequently share ideas and outputs with each other. On top of that, frequent meetings of MetaMeta with country coordinators where ideas/project activities from other countries are shared. Experiences are also shared between countries via the website, TWC (The Water Channel) and social media channels. Project Countries and partners now interact frequently, share ideas and learn from each other's success stories and challenges.

2.2.3 Research by young professionals	MM, FBLN-Ethiopia, Pakistan, Sudan, Yemen. IWMI	1. Identify students and young graduates to do FBL research 2. Implement and supervise research, and prepare practical outputs.	The project has further contributed to enhancing the knowledge and skills of 20 young professionals across the project countries. In each country, the interns are actively involved in research. PhD research by a female young professional began in 2018 at Wageningen University. Covering FBLS in Kenya, Ethiopia and Sudan, the research aims at advancing the scientific knowledge on the effectiveness of traditional and modern floodwater governance systems and locally feasible options for optimizing floodwater allocations to meet competing upstream and downstream needs. Two young male MSc students have been supported in Sudan to conduct their research on groundwater and soil moisture management in GAS. They are on course to finalize their studies by mid this year. Three young undergraduates have been involved in research. In Pakistan, two MSc students have completed research on soil fertility and moisture conservation in spate irrigation; their thesis reports will be finalized and published this year. In addition, a female and a male young PhD researchers have benefited from the technical and financial resources of the project to develop their proposals on: (a) GIS-based modelling and analyses of varied options for conjunctive use of floods and groundwater to mitigate the impact of climate change; and (b) development of hydrologic database for a number of sub-basins with high runoff-off potential to inform better practices for conservation and multiple use of floodwater resources. In Ethiopia, two reports which are entitled “Socio-economic impact of a spate irrigation system, the case of Koba, Alamata” and “Assessment of water management in spate irrigation, the case of Oda” have been prepared by students, supervised by a team of senior and young lecturers at Mekelle University. Furthermore, three young professionals were financed to do performance evaluation of spate irrigation structures in Oda, with the objective to suggest potential structural and non-structural mitigation options. Three reports have been documented. The same young professionals were also involved in establishing the WUA network and preparing engagement plans. Also a supervised MSc research on the ‘’comparative assessment on institutional and productive performance of different spate irrigation systems: case study of Raya Alamata district’’ has been finalized and the draft thesis submitted. In Yemen, supervised MSc research on soil moisture conservation was undertaken by three young engineers with a specialized doctor as supervisor is ongoing.

COMPONENT 3: CAPACITY BUILDING			
EXPECTED OUTCOMES • Three existing MSc programs (Ethiopia, Pakistan and Yemen) consolidated and two new MSc programs started with comprehensive modules on FBL; • 50 young professionals trained to be competent future leaders and promoters of FBL at the short course offered annually by MetaMeta, ICRAF and partners. • Short annual course for key program stakeholders, with satellite courses in key regions. To benefit at least 240 practitioners and professionals and 40 policy makers. • 4 Farmer Learning Centers established with complete FBL training packages, including videos and practical notes (FBL mainstreamed into four vocational training centers), and equipped to provide paid-for local services. These centers will provide services to over 1600 male and female farmers. • Farmer to farmer exchange programs implemented involving at least five countries.			
OUTPUT 3.1 THREE EXISTING MSC PROGRAMMES CONSOLIDATED			
3.1.1 MSc Programs Pakistan	FBLN-Pakistan, MM	1. Support to programs at Arid Zone University, Gomal Zam University and DG Khan Agriculture College 2. Add new modules (ecosystem management/water allocation).	1. Two Universities offered the spate irrigation subject to their students through the syndicate approval. After completion of a year, none of the students has taken the spate subject for learning. The main reason could be knowledge gaps of professors and background literatures and visiting the remote spate areas. MNSUA, Multan has shown the interest to include spate irrigation in "Applied Conservation Agronomy" and spate publications have been shared for background literature. 2. A practical note on ecosystem for Kachi Arid Area of Balochistan is completed and published for use as case study in the training
3.1.2 MSc Programs Ethiopia	FBLN-Ethiopia, MM	1. Transfer MSc Programme from Haramaya to Mekelle University.	A delegation from Mekelle University consisting of the Academic Vice President and the Director of the Institute of Water and Environment travelled to UNESCO-IHE (Institute for Water Education in Delft). The discussion focused on resuming the double degree MSc. program in Irrigation Engineering and Management; the entry requirements by the two educational institutions; the course standards; and how the program should be run. Flood based farming is offered as part of the MSc course on Integrated Basin Management.
3.1.3 MSc Programs Yemen	FBLN-Yemen, MM	1. Upgrade with new modules on road water harvesting, conflict resolution, and water use efficiency.	The main MSc course at the Water and Environment Centre of the Sana'a University incorporated modules on spate irrigation and water use efficiency and conflict resolution. A short course on floodwater from roads was finalized with the help of three engineers and it will be given as part of the watershed management course of the MSc IWRM program at WEC, the Water and Environment Centre (course material here). The reading and science material and references for the training on communication and documentation skills have been prepared and revised.
3.1.4 MSc Programs Sudan	FBLN-Sudan, MM	1. Support to programs in Kassala, Gezira and Khartoum. 2. Invite core trainers to international leadership course. 3. Support and provide material as appropriate to the local context	The faculty of engineering of the University of Kassala introduced a course on the design and operation of FBLS supported by case studies from GAS, the largest single flood-dependent scheme of the Africa to Asia project. From Sudan, one senior HRC researcher and a senior lecturer from Kassala University joined in the FBFS leadership course in 2016. This enabled them to design training materials that can support the MSc. programs. In 2017, one researcher from HRC-Sudan participated in the leadership course (Ms Hana Eltom) and a young researcher (Mr. Abu Baker Mohamed) received training in the Netherlands on communication skills.

<table>
<tr><td colspan="4">OUTPUT 3.2 LEADERSHIP PROGRAMME CONDUCTED (IFAD)</td></tr>
<tr><td>3.2 Leadership program</td><td>ICRAF</td><td>1. Upgrade leadership in FBL

2. Combine with problem-solving research of young professionals

3. Mentoring of trained leaders.</td><td>1. The project aspires building capacity of leaders in Flood Based Livelihoods and Rainwater Harvesting across Africa and Asia. As the project is set out to establish networks of practitioners and farmers to manage and participate in field activities, developing a crop of professionals with the passion, vision and capacity to support not only project activities but also FBFS in their respective countries and regions at large is vital. The promotion of favorable policies and legislation for government and private sector investments in FBFS needs to be backed with evidence-based knowledge. Such knowledge generation, documentation and dissemination require strong leadership. ICRAF and partners anticipate that a new crop of leaders will emerge to support not only project implementation, but the development of FBL in the future as well.

ICRAF, in close consultation with MetaMeta, carefully selected participants from amongst practitioners and policy makers from the project target countries. The FBL Leadership Program took place in 2016, involving 25 program leaders from nine countries - Afghanistan, Ethiopia, Kenya, Malawi, Myanmar, Pakistan, Somaliland, Sudan and Yemen. Four participants were self-sponsored. The training was organized by ICRAF, in cooperation with MetaMeta, and consisted of one week of training and discussion in Nairobi, followed by fieldwork in Tanzania, in cooperation with Sokoine University of Agriculture, to showcase the application of FBL and rainwater harvesting in the Pangani River Basin. During the fieldtrip, the participants interacted with 20 farmers.

 

Figure 13: Group photo of the leadership course in Nairobi 2016(Photo: ICRAF)

In 2017, a leadership course with 10 participants took place from 15-24 May in Wageningen, The Netherlands. Presentations on different topics were given, country chapters were presented, joint work on</td></tr>
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project outputs was done, a strong network and trust between the country leaders has been created and a lot of knowledge-exchange took place.

Figure 14: Group picture FBLS knowledge and experience sharing symposium in Taita Taveta, Kenya 2019

From the 4-12 March 2019, the FBLS knowledge and experience sharing symposium: "Taking stock of a decade long evidence-based experiences of flood-based livelihoods systems (FBLS) in Africa and Asia" took place in Voi Wildlife Lodge, Taita Taveta County, Kenya. Approximately 55 people (practitioners, local and national governments, farmers, donors and NGOs) from ten different countries, including Malawi, Ethiopia, Sudan, Afghanistan and the Netherlands, joined the FBLS Symposium. The Symposium shared knowledge of, and targeted investment towards, highly rewarding and inclusive FBLS in arid and semi-arid regions in Africa and Asia. Findings of research on FLBS were shared and several technical innovations—such as small-scale farm ponds, road-water harvesting, the use of mapping and models to identify risks and uncertainties, and remoting-sensing imagery to identify crop performance in Gash, Sudan were discussed. Speakers included representatives from Kenya's State Department of Irrigation, county governments of Siaya, Kisumu and Busia, National Irrigation Board (NIB), International Water Management Institute (IWMI), CGIAR Research Programme on Water, Land and Ecosystems (WLE), MetaMeta, and farmers' representatives. The Flood-Based Livelihoods International Symposium was organized by World Agroforestry (ICRAF), the Flood-Based Livelihoods Network (FBLN), MetaMeta and the State Department for Irrigation of the Ministry of Agriculture, Livestock, Fisheries and Irrigation. It was funded by the International Fund for Agricultural Development (IFAD) and the European Commission (EC). Other bodies, notably, GIZ Kenya and the county governments of Siaya and Kisumu, supported World Agroforestry in financing participation in the Symposium. Here you can find a blog on the symposium. To see and download the presentations given during the symposium, visit our website.

			 *Figure 15: Activities during the FBLS knowledge and experience sharing symposium in Taita Taveta, Kenya* 2. The project involves PhD, MSc and BSc in research activities. Their outputs contribute to the generation of data that would be available for policy development and advocacy to government and other support agencies, knowledge and skill enhancement to extension agents and practitioners at community level, including farmers. The leadership course in 2017 was organized parallel with the internship program to make connection between interns and leaders. The leaders are also coordinating the research of young professionals in their own countries. 3. Since the leadership course in 2017, there has been close contact/ supervision between trainees.
OUTPUT 3.3 REGIONAL COURSES CONDUCTED (IFAD)			
3.3.1 Upgrade current regional course	FBLN-Ethiopia, MM	1. Develop material on ecosystems and gender and conflict resolution, for the existing regional course.	The "Annual International Trainings on Integrated Watershed Management and Flood-Based Farming Systems in Arid and Semi-Arid Lowlands of the Horn of Africa" were held in at Mekelle University. The course has been given for the first time in 2013 following extensive field research to Ethiopia's ASAL lowlands, and was designed to: reduce the acute shortage of FBL planners, designers, managers and researchers; support participatory planning, implementation and maintenance of FBL; and develop capacities in watershed approaches for the benefit of FBL. The course has been organized for five successive years since 2013 and has so far trained more than 200 professionals and policy makers from East and West Africa. The course is funded by IFAD and GIZ Ethiopia, and is jointly executed by Mekelle University, MetaMeta and the Ethiopia Chapter of the Flood-Based Livelihoods Network.

Figure 16: field work activities and participants discussion about the potential of FBF within their country as part of the 5th annual short course

In 2016, thirty young professionals (Ethiopia: 28 and Kenya: 2) were trained to become competent leaders and promoters of FBL in the 4th edition. The 5th and 6th editions of the international course on FBF hosted by Mekelle university took place in 2017. The courses lasted for 10 days and had respectively 35 and 20 professionals from Ethiopia, Ghana, Uganda, Nigeria and Somaliland. Field visits took place where research sites were visited and farmers from Oda, Tsige'a and Abraha we Atsbaha explained their benefits from the hybrid spate systems and integrated watershed management to the training participants. The 7th "Annual International Training on Integrated Watershed Management and Flood-Based Farming Systems in Arid and Semi-Arid Lowlands of the Horn of Africa" was held at Mekelle University in November. In collaboration with GIZ-SLM and German Agro-Action (Somaliland), GIZ Kenya and World Vision Somalia; 20 young and mid-career professionals from Somalia and Somaliland attended the training along with another 20 participants from Ethiopia and Kenya. A WhatsApp account has been created for the group for continuous knowledge and experience exchange.

			 *Figure 17: field work activities and presentations by participants as part of the 6th annual short course*  *Figure 18: 7th annual international training in Mekelle. Left: working on assignments, right: field visit to spate irrigation area*
3.3.2 Develop material for additional regional FBL course	FBLN-Ethiopia, MM, ICRAF,	1. Prepare course on flood recession and rise 2. Explore second course focused on other FBL systems	1. A compendium on flood based farming systems was prepared. 2. A concept note for a second regional course was prepared with a larger focus on both flood rise and flood recession agriculture and more attention to different technologies (e.g. flood-spreading weirs). Valuable experiences that can be scaled up relate to: WUA establishment; conflict management; water

		3. Include five new countries in the course.	rights, rules and regulations; efficient water management techniques; improvements in hybrid systems; agronomic practices; crop protection, fruit plantation and seed exchange. 3. Ghana, Uganda, Nigeria, Kenya and Somaliland have been included in the plans for this course.
OUTPUT 3.6 INTERNSHIP PROGRAMME CONDUCTED			
3.6.1 Develop a FBL internship program for young professionals	MM, ICRAF, IWMI, all FBLN Chapters	1. Employ one young professional who becomes an integral part of the Chapter project teams in Afghanistan, Ethiopia, Kenya, Malawi, Myanmar, Pakistan, Somaliland, Sudan and Yemen.	The internship program (nurturing young talent to become future leaders in FBLS) has been developed and kicked off in 2017. One intern has been selected by each partner organization and employed. After six weeks of working in the country chapter / national host organization on a number of specific assignments, the interns joined a two-month internship course from April 8th until June 3rd 2017 in Wageningen, the Netherlands. 8 interns were present whereas three unfortunately had their visa rejected, but were involved in the course from distance. The internship program was a highly successful and inspiring happening, creating a close group of motivated young professionals. The program was interactive and consisted of the following activities: - Interactive teaching on FBLS - Personal development (e.g. discovering your purpose and doing voluntary work) - Skills development (e.g. presenting and leadership skills) - Communication methods and tools (e.g. Camtasia video recording) - Research methods - Network meetings - Actual work on business plans, research proposals, blogs, guidelines, infographics, videos, presentations. - Interactive teaching and master classes on other useful topics like water productivity, drones, smart rural technologies, use of remote sensing data, infographics, presenting, time management, power writing, inclusiveness, proposal writing, budget preparation and roads for water - Excursions to three farms (e.g. to observe salt-tolerant crops and undertake visual soil assessments and create organic soil fertilizer) and several flood-related nature areas (e.g. the Biesbosch) - Fun and bonding activities/excursions The internship course has been integrated with the leadership course which gave the interns the chance to interact with their country coordinator/leader, creating a bond and providing opportunities to work on country chapter plans. After the internship course, the interns have stayed active in their own country organization, being an integral part of the project team that supports project activities. On top of that, they are periodically being coached by MetaMeta (technically and also on personal development) and supported in producing outputs. After the course, they have produced monthly progress sheets that have been discussed with their country coordinator and MetaMeta coach. They are motivated to be creative and initiate project activities themselves. Also, they are starting to become future leaders and are involved to guide other young professionals.

COMPONENT 4: SUPPORT TO INVESTMENT PROGRAMMES AND POLICIES			
EXPECTED OUTCOMES • 2 proposals for national or provincial investment programs, or development policies by governments, IFAD or donors discussed and preliminary accepted in stakeholder consultations; • African and Asian countries to exchange at least 2 proposals; • Technical support provided on request to IFAD investment programs active in the project areas;			
OUTPUT 4.1 TWO PROPOSALS FOR NATIONAL/ PROVINCIAL INVESTMENT PROGRAMMES/ DEVELOPMENT POLICIES CREATED			
4.1 Investment program on command area development in Pakistan and Kenya	FBLN-Pakistan, MM	1. Formulate proposal for command area development in Narri system and Naj Gaj system 2. Formulate proposal for Awaran district spate irrigation development 3. Formulate proposal on innovative soil diversion bunds 4. Formulate proposal on sorghum seed system development	1.A proposal for command area development in Narri and Naj Gak, has been accepted. The scope of work was identified by local farmers and the FBLN jointly through reconnaissance visits and surveys. It combined changing the water distribution system and introducing a large number of good practices, as documented in the Practical Notes. Implementation started in early 2019. 2.A proposal was made for the improvement of spate irrigation in Awaran (Balochistan). 3. A Proposal was made to introduce innovative soil diversion development, as common in Pakistan, in Kenya. The idea has been discussed with the Turkana county where a 70% failure of the traditional soil diversion bund is common. The innovation concerned porous stone spillways that avoid water pressure build up upstream of the bund, thus reducing failure. Investment options continue to be sought. 4. A proposal for exchanging sorghum varieties adapted to the requirement of spate irrigation systems was developed for Sudan, Kenya, Uganda and Tanzania, together with ICRISAT – also making use of the ICRISAT gene bank, to help develop seed systems in all countries. A project preparation workshop was held in Nairobi which yielded valuable contacts (also video documented). Investment options continue to be sought. A copy has been sent to the government of Balochistan for making investments on headwork.
OUTPUT 4.2 IFAD PROJECTS UNDER PREPARATION SUPPORTED UPON REQUEST (IFAD)			
4.2.1 Visit IFAD country offices	All FBLN Chapters	Country teams to liaise with IFAD country offices.	Project collaborators visited IFAD country offices and shared relevant literature. In Ethiopia, a meeting was held with the IFAD PASIDP coordination team to strengthen on-going collaboration - it was agreed to jointly work on farmer scholarships or a farmer to farmer experience sharing event and training of experts on spate irrigation and dam design, hydrology and bid document preparations. The country PASIDP coordinator attended the leadership course. Services were also offered for incorporating local technology improvements in PASIDP and an offer was made to give a tailored in country training. In Sudan, the IFAD representative of North Kurdofan State attended the knowledge sharing workshop. In Yemen, the IFAD country office remains closed due to safety reasons.
4.2.2 Support to IFAD project formulation	ICRAF, MM	1. Visit IFAD HQ (ASAP and regional units) 2. Support Madagascar project ASAP 3. Support combined NEN / West Africa initiative on water harvesting and irrigation	1. The IFAD HQ was visited, along with regional units in Ethiopia, Uganda and Kenya 2. After initial discussion, there was no follow up from the Madagascar Team. 3. Discussions were held for a combined youth employment and water harvesting program. A proposal on road water harvesting and flood-based irrigation was prepared for the Green Climate Fund with support of IFAD.

ADDITIONAL ACTIVITIES – POLICY AND OUTREACH
In Sudan, the successful on-farm water management improvement research findings have been taken up by the Eastern Sudan Development Program of the EU. These findings have also been incorporated into the Netherlands Embassy Eastern Sudan investment and development strategy and incorporated into a concept note. Additionally, the scythe (agricultural tool) has been introduced for testing, and the project outputs have been presented at the conference for Integrated and Sustainable Management of Non-Nile Waters in Khartoum, Sudan. Furthermore, FBLN Sudan has created its own Facebook page where project outputs such as videos and events are shared and promoted in Arabic for the benefit of local network members. In Yemen, several proposals to obtain funding have been developed: 1. Dew Water Harvesting to Support Soil Moisture Using Stone Mulching and Integrated System of Water Security in the Coffee Plantation Terraces submitted to ZOA International (a Dutch relief organization), February 2018 2. Roads Water Harvesting Project Proposal and presentation, submitted to ZOA, February 2018 3. Floodwater Optimization Use to Improve the Livelihoods in Spate Areas submitted to Kingdom of the Netherlands, Ministry of Foreign Affairs, August 2018 4. Proposal of Water Users' Associations Rehabilitation in Spate Irrigation Areas of Yemen Areas submitted to Kingdom of the Netherlands, Ministry of Foreign Affairs, August 2018 5. Dew Water Harvesting to Support Soil Moisture Using Stone Mulching and Integrated System of Water Security in the Coffee Plantation Terraces submitted to Kingdom of the Netherlands, Ministry of Foreign Affairs, August 2018. The FBLN has been registered in the WASH (Water Sanitation Hygiene) cluster, and a profile (of FBLN) has been prepared and handed over to the WASH cluster coordinators. An introductory lecture about FBLN has been developed for the WASH cluster. The faculty of Engineering undergraduate study has incorporated FBLS into the Irrigation engineering syllabusin Yemen. A lecture about FBLS Irrigation engineering was given to the students by the country coordinator. The information on the FBLN Yemen Chapter page on the WEC website has been updated. A female young professional supported the FBLN activities. Also in Yemen, support was given to the water security policy formulation by DFID (UK Department for International Development) – with a prominent place for a water security project in Tihama that would restore the heavily damaged spate systems. In Pakistan, spate irrigation was highlighted and consulted upon as part of Sindh Water Policy formulation in collaboration with RDF (Research and Development Foundation). In Ethiopia, several supplementary meetings and events took place: (1) a regional course of action meeting was held with GIZ. (2) Discussions were held with the team leader and Chief technical advisor of the Strengthening Drought Resilience (SDR 1 and 2) project funded by KFW. Possible collaborations, partnerships, involvement in the implementation of medium-scale FBF systems, and development of a design manual for Afar region have been discussed. (3) FBLN Ethiopia promoted the project at GIZ's “visit landscape, livestock, livelihood – resilience for Afar” event in October in Chifra Afas. (4) The FBLN Ethiopia team attended and contributed to the “consultative workshop on irrigation water users’ association” organized by the Tigray region Bureau of Agriculture, IWMI and IFAD in Mekelle in December. (5) FBLN Ethiopia is working with GIZ SDR ASAL (Strengthening Drought Resilience in Arid and Semi-arid Lowlands) on the “assessment and identification of appropriate soil and water conservation activities for Hadew and Goora Guba watersheds, Somali Region, Ethiopia,” in order to integrate the development of FBFS of watershed management activities. (6) The University of Florence and Mekelle University collaborated on an article titled “Impacts of rainwater harvesting and rainwater management on upstream-downstream agricultural ecosystem services in two catchments of southern Tigray, Ethiopia.” This article has been published in the Chemical Engineering Transactions Journal, Vol 58. A poster was also published with the same focus. (7) An article on “impacts of soil and water conservation and water harvesting on ecosystem services in wadi river systems: a case in Guguf catchment in Raya Valley” was developed. (8) A poster presentation of the project was presented at a knowledge product sharing event organized by Mekelle University.

E. Difficulties encountered and measures taken to resolve problems

The project has faced some challenges, to which to which solutions have been sought and preventive measures put in place. For the internship and leadership course, there were difficulties in obtaining visas for participants from certain countries. Anticipating this, the project team made every effort to compile the correct documentation in good time, and make direct contact with Embassies, but despite this, several visas were refused. It was also noted that there were limited markets for FBLS- produced crops; and as a result, efforts in 2018 focused more on linking farmers with markets.

In Pakistan, the transportation of seeds from one region to another has been difficult. As quantities were small, rather than hire a special vehicle for delivery, seeds were transported by local transport companies. The transporter however did not deliver them at the given address. Farmers had to take an active role in tracking the deliveries, informing farmers about collection and ensuring correct distribution.

International restrictions on transfer of funds to Sudan resulted in some delays in project activities, especially related to the capacity building component. HRC Sudan pre-financed the construction of the field interventions to ensure high quality of research results in the GAS and has sought financial support from other donors.

In Yemen, activities have been limited due to the war. This has made it difficult to access spate irrigation areas such as Tihama. As a solution to keep staff safe, local experts have led activities, with supervision by phone.

In Ethiopia, the political situation in 2017-8 led to the late delivery of the farmer to farmer experience sharing event, scaled down to one event in 2018 from the original two that were planned.

Overall, the slower than expected release of funds has presented challenges to planning, implementation and payment of activities. Following the first tranche of funding in 2015, no further funds were released under the IFAD grant until 2018, due largely to differing interpretations and limited guidance on audit requirements. Learning from this, the program team adopted several strategies. In terms of implementation, partners advanced time and costs, effectively pre-financing large parts of the country level activities, to ensure that planned results would be met without excessive delays. The project also operated in parallel with the matching EC Grant 2000000987. Keen to learn lessons and avoid delays in future, the team dedicated additional time and resources to ensure that the necessary documentation would be collected in a satisfactory way to meet audit requirements, as they have been clarified by the donor.

III. Innovations

Youth engagement has continued to be a research focus; with social media used for sharing and exchanging knowledge, news and outputs. One key innovation has been the focus on reaching impact via capacity development in horizontal learning. Horizontal learning deals with the exchange of good practices, knowledge and ideas between peers or groups of peers, in which there is no monopoly on knowledge. It entails people coming together to see, observe, discuss and learn from people who have first-hand experience. Bringing groups together that have similar interests and challenges (farmers for instance) can unleash much energy, both by learning from each other as well to create a self- evolving movement of new technologies and institutions. The project staff engaged farmers, practitioners and professionals from the target countries in joint development of various horizontal learning activities such as farmer exchange and knowledge sharing events as well as training sessions where professionals and practitioners interacted with farmers. These events had several tangible achievements: (a) In Sudan, intermediate technologies have been introduced with the objective of making FBLS rewarding and attractive to farming communities, including women and young people (b) In Ethiopia, simple yet effective road floodwater harvesting techniques such as deep trenches have been widely embraced and implemented by farmers and local institutions, and (c) in Pakistan,

introduction of Chickpea, a drought resistant crop with high commercial value that started with 8 model farmers has quickly spread to 100 farmers and the upscaling trend is expected to continue by the farmers themselves.

In Sudan, farms with a total area of 840 ha are common in the Gash Agricultural Scheme. The project researched an innovative approach to divide farms into smaller areas and introduce new irrigation scheduling for enhanced production and allowing for irrigation of additional areas.

Finally, an initiative has been started to introduce new, proven practical technologies, common in Asian countries, into African countries. Examples include electric milk churners, improved scythes and oil presses. A brochure has been prepared and an engagement strategy launched in several countries.

IV. International Public goods

Practical Notes

Ten Practical Notes were published:

- No. 26 - Codifying Water Rules and Rights (in Spate Irrigation)
- No. 27 - Managing the Microclimate
- No 28 - Fodder Production with Spate Irrigation and Road Run-off
- No 29 - Improvements in the Design of Flood Diversion Structures
- No 31 - Road Crossings for Water Harvesting in Seasonal Rivers: Non-Vented Drifts as Sand Dams
- No 32 - Groundwater Recharge and Saving in Spate Irrigation Areas. Case study, Wadi Zabid
- No 33 - Simple mechanization for dug-out ponds construction
- No 34 - Study on the Ecosystem of the Kachi Plain with Focus on Spate Irrigated Areas of Bhag Narri, Balochistan – Pakistan
- No 35 - Constructing Roads in Low-Lying Floodplains to Optimize Ecological and Economic Functions
- No 38 - The Use of Trees and Shrubs in Spate Irrigation Areas

Communication Materials

- Monthly newsflash
- 27 videos on flood-based livelihoods in Ethiopia, Sudan, Yemen and Pakistan uploaded on The Water Channel
    - *Mustard oil production - Pakistan*
    - *Testing the Scythe*
    - *Harnessing floods to enhance livelihood and ecosystem services in the gash river basin*
    - *Harnessing floods to enhance livelihood and ecosystem services in the gash river basin 2*
    - *Closing the unfairness gap in Gash flow distribution*
    - *Towards improved field water management in Gash agricultural scheme*
    - *On-farm water management Gash*
    - *Lifting water from a well in a hout*
    - *Farmers networking in Sudan*
    - *Floodwater management in Bhaag*
    - *Chickpea trial*
    - *Cultivation techniques in spate regions*
    - *Drilling of small boreholes for drinking water*
    - *Farmers training on Mooth Beans disease control*
    - *Monitoring the Moon Beans result*
    - *Knowledge exchange farmer to farmer in spate irrigation regions of Pakistan*
    - *Spate irrigation opportunities and groundwater in Balochistan*
    - *Flooding in Zhob District, Balochistan*

- *Spate irrigation in Sindh*
- *Mustard oil production*
- *5th cycle training FBF Ethiopia*
- *Managing floodwaters through spate irrigation systems*
- *The starving Tihama, Yemen's humanitarian situation- the impact of war*
- *Impact of war on Wash, health and infrastructure and Water and electricity in a time of war*
- *Mulching techniques for soil water conservation and its impact on groundwater conservation in spate areas- Yemen*
- *Floodwater management in Bhaag – Kachi Balochistan-Pakistan*
- *Spate irrigation: first floods*

- Livelihoods from floods dossier on TheWaterChannel
- Blogs related to FBLS (including. gash the traveler, king capillary: the miracle water buffer, freeing up her time with electric churners, eye on de dry, appeal to the negotiators at the Yemen peace talks in Sweden, and Chickpea success through WhatsApp)
- Twitter account
- FBLN Facebook plus Facebook pages for country chapters including Sudan (Arabic)
- FBLN website and country chapter websites (WEC, Mekelle University, HRC Sudan)

Research reports

- Gender and Governance of spate irrigation systems in the Raya Valley, Ethiopia by Aurora Righetti
- Soil fertility management through alternate strip of inter-crops in spate irrigated areas of Dera Ghazi Khan, Pakistan by Dr. Khuram Mubeen
- Spate irrigated crops in Sindh, Balochistan and the Punjab, Pakistan by Management and Development Foundation (MDF)
- Potential of road water harvesting in Afghanistan by Dr. A.Q.Karim

Journal articles/ book chapters

- Matthijs Kool, Frank van Steenbergen, Abraham Mehari Haile, Yasir Mohamed Abbas and Eyasu Hagos (2018). 'The Promise of Flood Based Farming in arid and semi-arid areas' in Leal and Trincheria *Rainwater-Smart Agriculture in Arid and Semi-Arid Areas*: F*ostering the use of rainwater for food security, poverty alleviation, landscape restoration and climate resilience*.'' Springer Verlag: 77-94.
- Castelli, Giulio; Bresci, Elena; Castelli, Fabio; Yazew, Eyasu; Mehari Haile, Abraham (2018). 'A participatory design approach for modernization of spate irrigation systems'. Agricultural Water Management. 210. 286-295.

V. Gender

Gender is key in understanding and improving local flood-based livelihoods. In FBLS, men are usually involved in fodder and food crop production (sorghum, maize, pearl millet among others), while women tend to favour livestock production and cultivation of short duration vegetables and fruits as second crop cycles on residual moisture. The project took this into account in technology promotion and solution-oriented research, also noting that for women, time-saving is an important consideration. For example, one of the aims in introducing electric milk churners and similar equipment has been to reduce the burden of women, whilst increasing income from work and making time available for self-development. The churners work well in Pakistan (where they originate) and in Sudan, reducing the time required to make clarified butter by 70%. The on-farm water management improvement research programme in Sudan introduced additional field canals and reduced the size of mesgas (fields), which led to a faster wetting front

reducing percolation losses and resulting in substantial residual soil moisture within the root zone after the harvest of sorghum, the major food crop in the area. This brings the potential for improvement of livelihoods of women who earn income from the production on residual moisture of watermelon and other fruits and vegetables.

Gender is a cross-cutting theme in all FBLS capacity development initiatives. Within the training programs, gender has been incorporated as an integral part of each topic, to ensure that gender-related issues are discussed throughout the training period, rather than singling the issue out into a specific module, with the purpose of fostering deeper understanding on the contributions, needs, priorities and challenges of women in the various aspects of FBLS.

The program has actively pursued an agenda to increase the number of female professionals active in flood based farming, an area in which, traditionally, few women work as experts. Young professional women who continue to play significant roles in FBLS work include: Celestine Kilongosi, supporting the Kenya program; Loes van der Pluym, who led on horizontal learning and communications; Madiha Kamal, taking responsibility for a large part of the training program; Palal Moet Moet, who coordinates the Myanmar work locally; and Mara Getachew Zenebe, a PhD research fellow.

VI. Partnerships

Partnerships, networking and developing capacity within networks is a significant component of the program. On top of maintaining the partnerships made, several new partnerships have continuously been created.

In Ethiopia, partnerships have been made with GIZ SDR ASAL, GIZ-LIP, GIZ-SLM, German Agro-Action (Somaliland), SomRep, Somali Ministry of Environment and Rural Development, Somali Reintegration Programme, Fish for Nutrition Programme, Drought Response and World Vision (Somalia) of which its members attended the annual trainings. On top of that, FBLN Ethiopia partnered with the University of Florence of which one PhD student and two MSc students did their research in spate irrigation schemes in Ethiopia and a joint article has been published. Also, six members of GIZ Kenya have undertaken an experience sharing visit to Afar and Raya valley on flood spreading weirs and flood based farming systems. The country project coordinator and director are working with GIZ SLM Somaliland on the "Identifying Potential Bright Spots for Flood-based Irrigation Systems and Establishment of Hydro-meteorological Network in Biji catchment, Somaliland" for the development of two flood based farming systems in the country.

In Yemen, several policy shapers (the TDA chairman, FAO and WUAs Union in Wadi Zabid) have been contacted and partnered with to support the implementation of project activities. On top of that, practitioners and professionals (of which mostly WUAs leaders), farmers and over 50 WUAs have been partnered with to be involved in and support project activities. Collaboration is taking place with Sana'a University and meetings with the FAO, NIP project, Spark organization and the Netherlands embassy have been held to discuss possible collaboration. the country chapter partnered with YAWEE on the implementation of a fog water harvesting pilot study.

In Pakistan, the FBLN has partnered with irrigation department officials of Dera Ghazi Khan and Balochistan; KPK policy shapers; universities, students, practitioners and professionals; male and female farmers, fishermen and livestock herders in the selected areas; the government of Balochistan, SIDA board and the water management department of DG Khan (all national government agencies); and national and international organizations (SPO, RDF Sindh, MDF, SIDA and PARC). All these partners are actively involved and invited for project activities. Outputs have been actively shared with them. FBLN Pakistan partnered with several universities (Agricultural University Jam Shoro Sindh, Gomel University Dera Ismail Khan, Muhammad Nawaz Sharif University of Agriculture Multan and Ghazi University Dera Ghazi Khan) that supported research activities, proposals and facilitated and joined trainings. Also, help foundation Rajanpur Punjab and RDF Hyderabad have been a partner in execution of several activities. Together with FBLN and the government department, they were involved in the development of new proposals. RDF Hyderabad keeps close

contact with the Abadgar group of spate farmers in Sindh and facilitated the Agriculture University Tando Jam for field visits and farmers interview during the research studies. NARC, Umer Kot Sindh was in close contact for consultation on the seed varieties availability, dry land agriculture and information sharing. In addition, the Engineering University Jam Shoro Sindh and MDF have been visited to get an insight in research funds that are offered and to work jointly on proposals. RVO meetings have been held with Sindh Irrigated Drainage Authority. FBLN Pakistan has been in contact with PPAF, Punjab Irrigation Research Department and has also participated in the provincial level workshop held at Ghazi University.

In Sudan, the successful on-farmer water management improvement research findings have been incorporated into the Netherlands Embassy Eastern Sudan investment and development strategy. The Embassy has planned a scoping mission to the region early next year to further crystalize its strategy and locate bright investment spots. Partnerships have been made with policy shapers, practitioners and professionals, farmers, 10 national government agencies and several national and international organizations. They are frequently updated on project activities and outputs and actively involved.

VII. Donor Visibility

The project endeavors to include donor acknowledgement in all media and communications materials. The project website and The Water Channel refer clearly to partners and donors, with reference to funding from the EU and IFAD. They are both frequently updated, and referenced regularly by the projects social media accounts.

VIII. Conclusions

Since its conception more than five years ago, the project has managed to achieve a significant number of high quality and potentially high impact results, for the benefit of farmers and communities who depend on Flood Based Livelihood Systems in eight countries in Africa and Asia. This report focusses largely on results at the global level and in the four countries supported directly by IFAD funding, namely Pakistan, Yemen, Ethiopia and Sudan. Work in Kenya, Malawi, Myanmar and Afghanistan continues with EC funding until early 2020.

The design of the research and knowledge generation component to be practical, field-based and focused on benefits to farmers has paid off. Farmers and communities have been involved in the design and implementation of research and pilot activities, which has had benefits in terms of buy-in and the potential for replication and long term use. Where results have proven successful, farmers in the pilot areas have directly benefitted from water distribution and field water management solutions, such as reduced water consumption and higher yields. Examples include yield increases of 30% in Sudan due to improved on-farm water management; uptake by 200 farmers in Pakistan of the high value Chickpea crop; and quadrupling of irrigated area from 200 to 800 ha due to combining indigenous and modern techniques, in Ethiopia. This action research has provided tangible examples of the benefits of flood based livelihoods, which project partners have been able to disseminate widely for broader learning, as well as to demonstrate to decision makers and development partners the potential results of future investments. Partners like Plan International and the Netherlands Ministry of Foreign Affairs will continue to support FBLS initiatives beyond this program, while the project team continues to work with partners for potential long term engagement under the EC grant.

Capacity Development has been an important individual component of the project, and also a consistent theme in all project activities. A particular source of pride to project partners has been the internship program for young professionals, which has resulted in an educated and networked cadre of professionals who remain engaged in FBLS, either working directly with this project or with other organizations, across the regions. Similarly, much of the solution-based research has been led by or has involved PhD and MSc students, who have benefitted from the support, training and networks of project partners. This reflects an overall focus on capacity development and participation of youth in

FBLS; in particular, through social media and horizontal learning to develop peer to peer networks and learning for improvement of flood based farming. Investments in networking have shown success with more senior farmers as well, with the FBLS network in Pakistan, a good example of an established network which not only grows and brings in new members, but also operates its own initiatives, such as seed exchange and organized machinery operation. More widely, thousands of farmers enhanced their know-how on floodwater management techniques, through knowledge exchange events, targeted trainings and direct involvement in field research; while a vibrant website and other communication tools have been deployed to maintain an active and engaged global community of practice.

The co-mingling of funding from IFAD and the EC has had clear advantages in terms of the number of partners and stakeholders that the project has been able to engage and the transfer of learning and practices, and continued peer to peer exchange, across eight countries. The co-funding arrangement also enabled bridge funding for countries such as Sudan, which required replication of experiments to increase confidence for upscaling. The project was able to adapt its research program to the unforeseen war situation in Yemen. New research quantified the negative impact of war on the food security of communities dependent on flood based livelihood systems in the coastal region of the country.

Overall, through this initiative, knowledge and practical knowhow on using flood based farming systems to improve livelihoods has developed and been shared across eight countries and with a wide range of partners and professionals across the world. Partners and farmer networks themselves have secured investments to continue working on FBLS and to continue to develop capacities, improve benefits for farmers and continually improve flood management methods.

Looking forward, the governments in the target countries now recognize FBLS as a viable means for improving the socio-economic well-being of citizens in flood based farming areas. Global funding agencies such as The World Bank, the Global Resilience partnership, GIZ, Plan International and DGIS actively support initiatives in Ethiopia, Pakistan, Sudan and Yemen. Farmer networks, particularly in Pakistan, have started to implement their own initiatives aimed at improving their flood based livelihood systems. Investment plans have been developed by country chapters to guide governments and their partners; the focus now is to mobilize human, institutional and financial resources to implement these. Having involved a number of PhD and Masters students in research studies, it is intended to mainstream FBLS in academia; an activity that has already started is expected to continue with more dynamism.

Annex 1: Results-based Logical Framework

The results based logical framework covers the full project across eight countries, supported by funding by both the EC and IFAD. The original end-date referenced in the logframe was due to be 2017; this was subsequently extended. Noting that that the EC component of the project is still ongoing, the below represents a high level summary of progress so far against planned objectives and results:

	Objectives-hierarchy	Objectively verifiable indicators	Means of verification	Assumptions
GOAL	To support flood-based farming systems, to contribute to food security, nutrition and build the resilience of local communities.	At least 4 policies and programmes developed in the target countries and 50 policy shapers with informed policy statements on basis of solutions oriented research by end of 2017. Activities having impact on incomes of 10,000 HH's each in Kenya, Sudan, Yemen, Pakistan, and Afghanistan, and 15,000 HH's each in Myanmar, Malawi, and Ethiopia to be increased by 5% by 2017	Project monitoring reports – Baseline and follow up household and individual surveys and analyses Policy and programme drafts for each target country Participatory monitoring surveys to complement household surveys Field observation reports by project members	Stakeholders in respective countries are fully invested in the development of policies and programmes Level of increase in HH's income levels are not offset by declining local economic conditions
PROGRESS	Interventions that have already shown tangible impacts contributing to this high level goal include: Improvement of on-farm water management in Sudan through a combination of internal field canals, embankments and weirs in 210 ha in the Gash Agricultural Scheme (GAS) has resulted in doubling the yield of sorghum, the main crop in the region, from 0.8 to 2.0 tons/ha while reducing water consumption by 30%. The Netherlands Embassy in Khartoum has integrated this initiative into its Eastern Sudan Development Strategy, and Plan International is supporting further work in this area. Upscaling this intervention to the whole of GAS irrigable land of 80,000 ha could lead to increasing the average cropped area by 20-30 % with the same amount of floodwater, potentially enhancing the livelihoods of close to 60,000 flood-dependent farmers. In Ethiopia, two schemes, Mersa and Oda have been systematically designed to be a hybrid of traditional and modern practices, optimizing the best aspects of both. Results have been promising: 85% flood diversion efficiency has been achieved; the irrigated area has increased by 400 ha in each scheme and the number of beneficiary farmers tripled to 3200. Collaborative arrangements between farmer organizations and local government in Pakistan has resulted in mechanization of the Balochistan and Punjab-Dera Ghazi Khan spate irrigation systems, benefiting 3000 farmers. Floods in these regions are of short duration and are destructive in nature. The mechanization programme supports the building of stronger structures and ensures timely maintenance when damages occur. An initiative to improve varieties of legumes, vegetables and fruit trees in Punjab, Sindh, Khyber Pakhtunkhwa and Balachistan, the four provinces where FBLS are the major sources of livelihoods for the rural poor, has contributed to enhanced food security and nutrition of about 4000 farmers. Improved road water harvesting practices have been adopted by 176 farmers (96 are women) in Malawi			

	Objectives-hierarchy	Objectively verifiable indicators	Means of verification	Assumptions
	Focussing on shaping policy, in Myanmar, rice suitability maps for the Department of Agriculture have been developed and used as entry points for discussions with donors funding major water sector policy and planning initiatives and the National Water Management Committee. A country-wide GIS map has been produced that provides evidence-based information on the suitability of various parts of Kenya to low-cost and high-return investments in FBLS. Kenya has close to 400,000 ha suitable for FBLS. Ninety percent of this area (367,574 ha) is distributed across 10 arid and semi-arid counties of Tana river (94,616 Ha). Marsabit (66,406 ha), Wajir (50,911 ha), Garrisa (46,185 ha), Isiolo (38,878 ha), Turkana (29,664 ha), Kajiado (12,020 ha), Lamu (11,687 ha), Mandera (9.006 ha), Kisumu (8,200 ha). The remaining potential is distributed across 25 counties with areas ranging 130 – 4700 ha or average size of 1145 ha. The project is preparing proposals for the development of 50,000 ha in Kenya. Interventions have been actively supported by over 60 policy makers; 25 of whom have participated in the development of investment proposals (see last section of Log frame. Refer to progress reports at http://spate-irrigation.org/special-projects/from-africa-to-asia-and-back-again-testing-adaptation-in-flood-based-farming-systems/ for details.			
Objectives	To develop FBFS policies and programmes to invest in rural people, based on action research and south-south documentation of practical experiences, embedded in long-term capacity building and program development at various levels. *The Objective is to* develop models and approaches focused on inclusive and gender-balanced growth of climate change-stressed areas supported, which predominantly rely on FBFS. *Specific objectives* - Human resources, local institutions and knowledge strengthened and enriched with research insights; - Investment programs and policies developed - Capacity building undertaken; - A strengthened network established within and across the target and other selected countries in Africa and Asia.	1 local institution in each country demonstrates improved knowledge/ thematic development of FBFS by 2017 At least 2 good practices based on solution-oriented research promoted in each country by 2017 1600 male and female farmers with increased knowledge on water security At least one capacity building and research activity developed and implemented for 1 institution in each country by Q4 2017 with 300 practitioners and professionals with enhanced skills and attitudes. Global strengthened network established by 2017, able to contribute to research and local capacity building and dissemination and sharing of improved practical experiences.	Reports from capacity building activities conducted Ex and post ante surveys on local knowledge capacity Report on formulation and establishment on the FBFS network Field observation reports by project members	Local government and institutional support for development of models and approaches Local institutions can be mobilized in each country for uptake of FBFS People and local institutions fully embrace key FBFS recommendations

PROGRESS	*Thematic areas and good practices:* Thematic areas developed and good practices documented and disseminated include: conjunctive use of floods and groundwater, and agroforestry (Yemen); road water harvesting, and climate change mitigation (Malawi); on-farm water management and local governance (Sudan); improved traditional floodwater governance and enhanced flood diversion and distribution infrastructure (Kenya); hybrid design that combines modern and traditional systems, and watershed management (Ethiopia); water governance and conflict mitigation (Afghanistan); command area development and mechanization, and high value crops (Pakistan); Rice crop suitability and Rice-fish suitability (Myanmar). These thematic areas have been the subject of solution-oriented research in the respective countries. *Male and female farmers with enhanced knowledge:* • Pakistan has led the effort in enhancing the knowledge of male and female farmers in floodwater management and security as well as other aspects of FBLS. 4100 farmers contributed to and benefited from knowledge and experience-sharing events as follows: 3000 in Balochistan, 300 in each DI Khan, DG Khan and Rajanpur and 200 in Sindh. • In Sudan, about 150 farmers acquired insights in floodwater management from three major tailor-made training activities organized in GAS, Khor Abu Habil and Toker Delta FBLS. Similar knowledge was acquired by 1500 farmers through direct involvement in the on-farm water management improvement intervention in GAS. • 200 Ethiopian farmers improved their know-how in better floodwater management by participating in various farmer-exchange programs as well as actively contributing to the planning, design and construction of the hybrid design of Mersa and Oda schemes. • 400 Kenyan farmers gained enhanced knowledge through engagement in the solution-oriented research on improving traditional floodwater governance led by a PhD student and the Land Reclamation Department of the Ministry of Agriculture and Irrigation in the Tana River flood inundation canal systems. • 176 farmers in Malawi developed practical skills in road water harvesting. *Professionals and practitioners with enhanced attitudes and skills in FBLS:* Major training programs conducted: • Annual regional training on FBLS and Watershed Management in Ethiopia. In four cycles funded by this project (seven in total), the training enriched the knowledge of 120 (220 in total) professionals and practitioners on the unique engineering, social and institutional challenges of FBLS as well as the indigenous knowledge that we seek to be integrated into development programs. • FBLS Leadership Course was organized twice, creating a platform for 100 practitioners and professionals to discuss scientific advancements, how to nurture young talent, and what leadership qualities are needed to implement robust evidenced-based policy advocacy to create recognition for FBLS at national, regional and international levels. • The Young professional program has attracted 20 young professionals to contribute to and harness knowledge from FBLS research activities. *Global strengthened network established:* The International Spate Irrigation Network (SpN) became the legally recognized foundation, the FBLS Network (FBLN). This shift is significant. Spate irrigation only covers 3.3 million ha while the cultivable land under FBLS, which besides spate irrigation also includes flood rise and recession, flood inundation canal systems and depression agriculture, ranges from 25,000 to 30,000 ha and provides livelihood to 50 to 60 million farmers inhabiting arid and semi-arid regions across Africa and Asia. This broader scope has expanded the footprint of the Network from 14 to over 40 countries. The legal status has opened the doors to the donor and international development communities, the opportunity to acquire and implement funded programs and using the vehicles of such programs to intensify network strengthening, research, capacity building and evidence-based documentation and dissemination of good practices.

Outputs and activities per work package	Network on FRBMS developed and strengthened in 4 countries - Strengthen existing country networks in Ethiopia, Sudan, Yemen and Pakistan with increased farmer membership - Establish new country networks in Afghanistan, Myanmar, Malawi and Kenya	- Four current countries strengthened with farmer membership increased by 20-30% by Q4 2016 - Four new networks established in Afghanistan, Myanmar, Malawi and Kenya each with a minimum of 50 members by Q4 2017 – with at least 10% female members	Membership reports from existing networks Network design and implementation reports for new country networks	Current and future environment allows for establishment of new country networks All stakeholders actively participate in development of notes Support from relevant governmental and institutional actors to facilitate exchange and engagement in research themes Institutional space exists in autonomous Universities to enable consolidation and development of FBFS curricula Existing Farmer Teaching Centres can be accessed, and have sufficient resources and capacity FBFS business case sufficiently convincing to practitioners and policy makers to participate in training courses
PROGRESS	*Existing networks strengthened with farmer membership:* This output has been achieved. In Sudan, the network operational area expanded from 100 members in GAS to the other major FBLS (Khor Abu Habil and Toker Delta) bringing an additional 55 farmers. The Pakistan country chapter established nodal networks in Sindh, Balochistan, Punjab and Khyber-Pakhtunkhwa provinces - this increased the farmer membership by 1500 to a total of 4000. There are also more than 20 farmers and 46 youth, academia and professionals in a WhatsApp group facilitated by the FBLN Pakistan where videos and pictures, good practices and issues in their area are actively shared. The five-fold increase in Ethiopia to 500 farmer membership came through the successful hybrid design intervention in Oda and Mersa spate schemes, which as explained in the above resulted in an additional 800 ha. While the difficult situation in Yemen prevented field activities in 2018, extensive knowledge and experience sharing events were conducted in 2017 in Wadi Siham, Wadi Zabid, Wadi Mawr and Wadi Rima FBLS that engaged about 300 new farmers, a 50% increase. *New country networks:* These were established with more than 50 members within the following host institutions: Ministry of Water & Irrigation Land Reclamation Department (Kenya), Afghanistan Technical Vocational Institute (ATVI), Rainwater Harvesting Association of Malawi (RHAM) and the Ministry of Agriculture & Irrigation and NEPAS. In Myanmar, links have been established with Myanmar Agriculture Network Community. To enhance the visibility and strengthen the communication ability of the existing and new networks, country chapter websites (http://spate-irrigation.org/spate-irrigation-network/) have been established and are in the process of being updated with recent research findings, activities and outputs. On social media and the FBLN newsletter, links to outputs on the websites are frequently shared.			
Outputs and activities	Knowledge generated and managed - Generate new and practical research insights on (1) water use efficiency (2) crop development for food/nutrition security/ drought tolerance and (3) local institutions/ cooperation/ conflict management. - Develop new practical notes on cross-country relevant research themes collaboratively	▪ New actionable research findings ready by Q4 2016 for dissemination and uptake in improved FBFS on seven subthemes related to the main three themes of water efficiency (i.e. efficient water and moisture use in flood recession and flood rise farming through bunding and water management; conjunctive use of flood and groundwater; field water management practices in spate irrigation systems), crop development for food/nutrition security (i.e. yield response and drought tolerance of main staples in flood	Draft research notes on cross-country main themes and subthemes – using cross country experience Literature review on quick-win solutions Report on research themes identified for exchange between Africa and Asia Draft guideline on FBFS, and final guideline document	

	- Link quick-win solutions oriented research programs to capacity building of young professionals - Establish exchange mechanism between Africa to Asia on Research themes - Develop Guidelines on FBFS using research results - IFAD knowledge products	based farming systems; nutrition value of wild varieties) and institutions/conflict resolution (i.e. conflict and cooperation between different users; access rights in different flood based farming systems) ▪ introduce and test at least three drought resistant crop varieties; one legume, two cereals ▪ 25% increase in crop yields under similar drought conditions ▪ At least 3 new food groups introduced in new areas; one food group based on local wild varieties. ▪ institutions/conflict resolution mechanism promoted and tested ▪ Six new notes on cross-country relevant research main/sub themes collaboratively developed and disseminated by Q4 2016 ▪ Eight quick-win actionable research outputs linked to capacity building of young professionals by Q4 2015 ▪ 1 Guideline on FBFS developed by Q3 2017 ▪ 2 knowledge products in IFAD format		
PROGRESS	• Actionable research findings available in eight thematic areas: On-farm water management improvement in Sudan; soil fertility management through alternate strips of inter-cropping in Pakistan; road water harvesting for improved agricultural productivity in Malawi and Afghanistan; hydrological and sediment analyses in Ethiopia; effectiveness of moisture conservation measures on yield optimization as well as improving traditional floodwater governance systems in Kenya; flood management needs and trends in farmer crop choices and their drivers in Myanmar; conjunctive use and soil mulching in Yemen. • Food legumes (Chick pea, lentil, mung bean and mash beans) have been tested and introduced in Pakistan. Sorghum varieties with varying degree of tolerance to drought have been documented. These varieties were introduced to hundreds of farmers during knowledge and experience sharing and training events. The grain yield of the most drought tolerant sorghum varieties in Eritrea and Yemen reaches up to 3.5 tons/ha, which is thrice the other varieties commonly grown in Pakistan and Ethiopia. ▪ Minor food crops that have been cultivated in smaller areas in Pakistan have been documented and disseminated within the country and beyond in Ethiopia and Sudan. These include Pearl Millet, and the wild crop varieties *Sanwak (Echinochloa colona / frumentacea), cheena (Panicum milliaceum) and smookha (Panicum coccineus*) that have similar characteristics and uses as Teff ▪ The extensive study conducted in Afghanistan on Codification of Water Rights identified causes and types of conflicts and suggested practical mitigation measures. The research findings have been widely shared through training, seminars and conferences as well as the FBLN website. ▪ Twelve practical notes on cross-country relevant themes have been published: see numbers 16 to 18, 24, 26 to 29, 31, 33, 35 and 38.			

	▪ Twelve young professionals (5 female) have undertaken solution-oriented research: four in Pakistan, two in each of Sudan, Kenya and Malawi and one in each Myanmar and Ethiopia. The topics covered include: GIS modelling and conjunctive use; climate change mitigation; innovations in agronomy and soil moisture management; soil fertility improvement; traditional floodwater governance; and improved road water harvesting techniques and practices. ▪ Draft FBLS guideline chapters have been prepared. This was intended to be completed by the closure of the project, hence it will be finalized by March 2020 with the completion of the EC Grant. ▪ The project team has responded to information requests by IFAD. In 2019, a blog and brief on the Sudan experience was requested, which has been prepared and will be reported under the EC Grant.			
Outputs and activities	Capacity building programs developed and implemented - Consolidate four existing MSc programs - Establish two new MSc program on FBFS - Train young professionals to be competent future leaders and promoters of FBFS at the short course annually offered by UNESCO-IHE, MetaMeta and partners in Delft, the Netherlands. - Train policy-shapers on FBFS. - Implement short international courses for key stakeholders in the programs annually with satellite courses in key regions, for practitioners, professionals and policy makers - Train young professionals in innovative FBRM technologies and practices through well-organized exchange program among Africa and Asia - Strengthen Farmer Teaching Centers	▪ Four existing MSc programs in Ethiopia and Pakistan consolidated by Q4 2015 – linked to the overall research agenda ▪ Two new MSc program each started up likely in Kenya and Malawi by Q4 2017 ▪ 50 young professionals trained on FBFS by Q4 2017. (at least 30% female) ▪ 10 policy-shapers trained on FBFS by Q4 2017. ▪ 240 practitioners and professionals and 40 policy makers undertake short international courses on FBFS by Q4 2017 – 25% of these female ▪ 10 young professionals trained on-site in innovative FBFS technologies and practices by Q4 2016 (30% of this female) ▪ 4 Farmer Learning Centers strengthened with complete training packages on FBFS by Q4 2017 ▪ 1600 male and female farmers access FTC's by Q4 2017	Draft modules on FBFS prepared for MSc programs Training reports on FBFS Workshop proceedings on FBFS Farmer Teaching Centers evaluation reports, both ex and post ante	

PROGRESS	Capacity Development is a major focus of this program. Highlighted achievements include: ▪ The spate irrigation module introduced in Pir Mehr Ali Shah Arid Agriculture University in Pakistan has been updated with insights from recent research and evidence-based documentation activities. ▪ The annual short course on FBLS and Watershed Management in Ethiopia has been regularly enriched with new and improved knowledge – it has continuously run for seven years attracting on average about 30 professionals and practitioners annually from Ethiopia, Kenya, Sudan and Somaliland. ▪ Modules on FBLS have been mainstreamed in Egerton University and KEWI training in Kenya, Lilongwe University of Agriculture and Natural Resources in Malawi and the University of Kassala in Sudan. ▪ The International FBLS leadership course and the Regional FBLS and Watershed Management short course in Ethiopia offered training opportunities for 30 young professionals. The Internship program organized in the Netherlands benefited eight young professionals Twelve young researchers led solution-oriented research that enhanced their know-how in various aspects of FBLS – the project team accompanied them in their field research, providing onsite guidance and supervision. ▪ The contribution of the project to capacity building of about 25 Policy makers came through joint development of FBLS investment programs, awareness creation seminars and conferences organized in Malawi and the international FBLS leadership course in 2016 which was attended a further 10 policy makers in 2017. ▪ While they may not qualify as full-fledged farmer learning centers, the project established practical sites with: (a) improved road water harvesting techniques in Malawi (b) hybrid design concept in Ethiopia (c) improved on-farm water management in GAS, Sudan through a combination of field canals, weir and embankments, and (d) successful mechanization scheme in Pakistan for better construction and maintenance of floodwater diversion and distribution structures. Lead farmers have been identified and nurtured in these practices and the sites regularly served as learning platforms for farmer-to-farmer knowledge and experience exchange events. ▪ More than 4000 farmers have benefited from varied training and farmer exchange visits.	

Outputs and activities	Investment programs and policy development supported - Prepare proposals for national investment programs through stakeholder consultation - Exchange proposals between Africa to Asia to increase understanding of FBFS investment strategies - Provide technical support to IFAD investment programs active in the project sites and suggest programs for pipeline	• 6 proposals for national investment programs prepared by Q4 2017 • Support provided to 8 country programs and policy initiatives by Q4 2017. • Contact established and discussion to help with IFAD portfolio managers in impact countries as well as representative of three other funding organization	Draft proposals prepared for investment programs Field observations by project staff on technical support Consultation reports	
PROGRESS	*Investment proposals:* ▪ On request from local Pakistan Government Authorities, an investment proposal has been formulated for the DG Khan region, tailored to improving an existing storage, diversion and distribution infrastructure that has not delivered optimum benefits due to factors including design, lack of supportive development interventions, governance and management systems and good farming practices. ▪ Two proposals have been prepared for Pakistan on command area development and innovation in agronomy respectively. They have been submitted to potential donors, namely Sustainable Water Fund FVO and DFID. ▪ In collaboration with the Dutch Embassy in Sudan, a proposal entitled *Smart Rain and Flood-fed Agribusiness* has been developed for Eastern Sudan drawing from the on-farm water management improvement action research in GAS. This proposal covers technical (governance and management), climate and water smart technologies as well as marketing and access to finance issues, to improve the food and nutrition security of smallholder farmers in the region. ▪ In Myanmar, Rice suitability maps have been developed for the Department of Agriculture, which will be used as entry points for discussions with key donors that fund major water sector planning and the National Water Management Committee. *Support to IFAD investment programs* ▪ A proposal on road water harvesting and flood-based irrigation was prepared for the Green Climate Fund with support of IFAD. *Africa to Asia Exchange* The International FBLS Leadership course provided the platform for an exchange of knowledge and investment strategies for over 100 professionals, practitioners as well as policy makers from across the eight African and Asian target countries.			