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Gulbali Institute
Agriculture Water Environment

Building and Scaling Out Knowledge: The Practice of Co-Learning with Farmers

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Research commissioned by the Australian Centre for International Agricultural Research (ACIAR)

Cataloguing in Publication provided by the Gulbali Institute – Charles Sturt University, Albury, NSW 2640.

Heaney-Mustafa, S., Ashraf, M. (2024). Building and Scaling Out Knowledge: The Practice of Co-Learning with Farmers. Gulbali Institute, Charles Sturt University, Albury, NSW.

1 volume, Gulbali Institute Report No. 11

ISBN: 978-1-86-467466-8

Project	Adapting to Salinity in the Southern Basin (ASSIB)
Funding Research Program Project No.	Australian Centre for International Agriculture Research, Australia Land and Water Resources (LWR) LWR-2017-027
Project Team	Charles Sturt University (CSU) Commonwealth Scientific Industrial and Research Organisation (CSIRO) Ecoseal International Center for Biosaline Agriculture (ICBA) International Union for Conservation of Nature, Pakistan (IUCN) Mehran University of Engineering & Technology (MUET) MNS University of Agriculture, Multan (MNSUAM) Murdoch University Society of Facilitators and Trainers (SOFT) University of Canberra

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Executive Summary

Building and scaling out knowledge is a necessary challenge to ensure sustainable practices emerge from research. Encouraging farmers to develop knowledge, skills, and attitudes to adopt or adapt to technologies requires strengthening a knowledge-sharing network to co-develop adaptation approaches and activities, which is vital for sustainability. This report discusses two approaches to building knowledge networks: Stakeholder Engagement for Research and Learning (SERL) and the Sun Satellite Model (SSM). SERL and SSM help link all stakeholders for continuous research and learning, emphasising learning together.

An approach such as SERL has three main characteristics. Firstly, it includes all stakeholders and takes time to build realistic and contextual interpretations of issues. Secondly, it gives ownership to the stakeholders of the emerging innovations, adaptations and solutions to those issues that are local and implementable by each community. Thirdly, all stakeholders can provide inputs to facilitate and support the application of the innovations and adaptations over a period long enough for change to occur.

The Sun-Satellite Model represents a dynamic and collaborative approach to knowledge exchange and capacity building within agricultural communities. In this Model, the ‘sun’ farmer embodies a wealth of experience, expertise and traditional knowledge in farming practices, often as a mentor or guide to the 'satellite' farmer. Notably, the Sun-Satellite Model emphasises a reciprocal exchange of knowledge with the intention that both 'sun' and 'satellite' farmers actively learn from each other.

SERL was used in the Adapting to Salinity in the Southern Indus Basin (ASSIB) project to develop and investigate adaptation options and strategies for people managing and living in salinity-affected agricultural landscapes in the southern Indus Basin. The SSM allowed farmers to experience and offer feedback on an alternative approach to farmer-to-farmer learning.

This report shows that there are strengths in both approaches. Using farmer stories and feedback, we ultimately determine that there is an advantage in using the SERL methodology together with the metaphorical framework of the SSM. It concludes by recommending strategies for scaling out the approaches through knowledge sharing. Such knowledge sharing depends on identifying and engaging champions for change who are passionate, knowledgeable, influential and able to convince crucial people in the right places to promote the notions embedded in SERL, particularly at a government and policy-making level. Knowledge sharing is also strengthened when stakeholder form their own peer-to-peer networks, including networks where agricultural service providers and extension services field assistants are enabled to work closely with farmers, as well as networks among farmers already skilled in farmer-to-farmer facilitation. Use of such knowledge-sharing and co-inquiry approaches should be championed and facilitated by organisations like the Pakistan Agricultural Research Council.

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Introduction

Co-development of knowledge skills and agency of farming communities, provincial government departments, universities and others was a crucial part of the Adapting to Salinity in the Southern Indus Basin (ASSIB) project. Fifty-four per cent of the southern Indus Basin is affected by salinity (Qureshi et al., 2008). The national and international organisations have developed various options to manage salinity. However, the affected communities did not adopt these management options for various reasons, including unrealistic and ineffective extension approaches. Thus, the ASSIB project aimed to research and develop adaptation options and strategies with people living in agricultural landscapes of saline distressed areas.

For sustainable practices to emerge from research, farmers must also develop knowledge, skills, and attitudes to adopt or adapt to the technologies. So, strengthening a knowledge-sharing network to co-develop adaptation approaches and activities is vital for sustainability. The knowledge and communication gap often existing between researchers and farmers has traditionally been bridged by top-down ‘extension' approaches, where a technological innovation or practice change is developed by scientists and technicians and communicated to farmers with the expectation that some will 'adopt' it, and others will gradually follow.

An essential extension challenge in Pakistan is scaling out the practical application of new technologies over vast agricultural areas (Heaney-Mustafa et al., 2018). Developing adaptive capacity among women, men and youth farmers is critical to Pakistan's continued economic growth, food security, environmental biodiversity, climate resistance, and resilience. Two approaches were used within the ASSIB project: the Stakeholder Engagement for Research and Learning (SERL) and the Sun-Satellite Model (SSM).

These approaches emerged from a history of agricultural training practices stemming back to Pakistan's independence in 1947 in attempts to increase farm production. Training and Visit Extension was adopted in 1978. Extension field schools aimed to disseminate low-cost, improved practices and use available resources. The contacted farmers were, however, large farmers capable of making significant investments to change practices. Farmer Field Schools (FFS) emerged in 2001 with claims of being cost-effective for small farmers and demand-driven (Heaney-Mustafa et al., 2018). However, Shabaz and Ata (2014) found the extension system to be top-down, focused on large farmers, and supply driven.

These developments in Pakistan have some similarities with developments internationally. For example, Waddington et al. (2014) detailed international review pointed out that scaling out the benefits to other farmers was not occurring. They considered this failure to be due to the experimental nature of FFS and farmers' desire to see benefits directly. The failure was also related to matters of recruitment and training of farmers to share knowledge. To overcome these issues, SERL (Heaney-Mustafa et al., 2023) drew on experiences where the focus was placed on training identified farmers in adult learning skills and techniques, making it is a farmer-led, farmer-facilitated, farmer-to-farmer scaling-out strategy. In contrast, SSM is a farmer-to-farmer model with the ‘sun’ farmer acting as a guide or mentor to the ‘satellite’ farmer.

While SERL was the key approach used in the ASSIB project, the ASSIB team was keen to invite a team from PCRWR to show the ASSIB team and farmers from the ASSIB ‘bright spot’ communities what the SSM approach entails. Participating farmers and Community Engagement Team (CET) members gave feedback on SSM and what the model means for the process we use in the SERL farmer-led, farmer-facilitated, farmer-to-farmer scaling out strategy.

The primary purpose of research is to generate knowledge, but knowledge is useless if it is not used for the welfare of society. It is a cyclic process that traditionally starts with academic research followed by applied research, demonstration and dissemination of the outputs and outcomes, diffusion and adaptation by the communities, leading to an overall impact on society (see Figure 1).

Research involves all stakeholders, including academia, researchers, professionals, extension workers, agriculture service providers (ASPs), and farmers/communities. As learning is a continuous process, it is essential to engage all these stakeholders. Traditionally, it has involved a two-way process – learning and knowledge transfer from the academia and researchers to professionals and extension workers with direct linkages and interaction with the ASPs and the farmers. Any questions raised or issues faced by the end users – i.e. the ASPs or the farmers – are communicated to academia and researchers through the professionals.

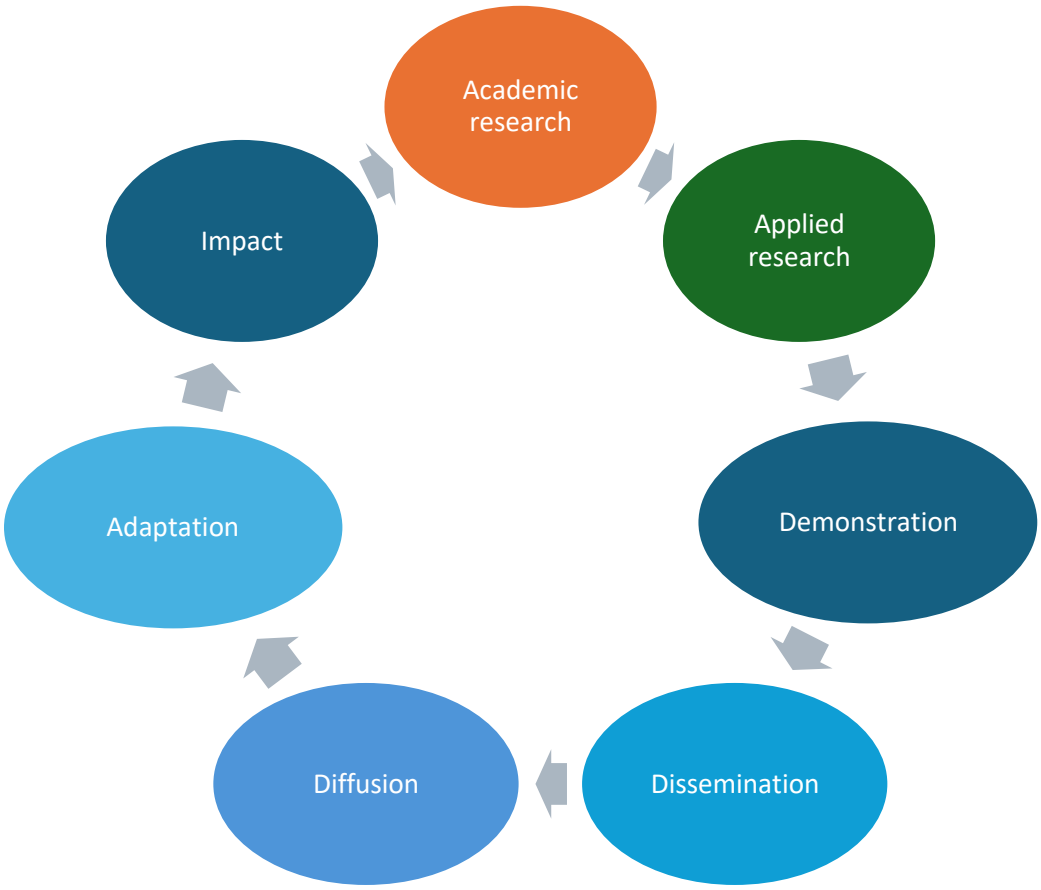

Figure 1. A cyclic process of research to impact

The Emergence of New Approaches

SERL and SSM help link all the stakeholders for continuous research and learning. With the emphasis on learning together, a new model emerged in the Developing Approaches to Enhance Farmer Water Management Skills in Balochistan, Punjab and Sindh in Pakistan (LWR-2014-074) project supported by the Australian Centre for International Agricultural Research (ACIAR) between 2015 and 2020 (Heaney-Mustafa et al., 2021). This model – the Farmer Integrated Learning Model (FILM) (Hussain et al., 2019) – helped achieve more sustainable water and irrigation management practices.

Not only did FILM enhance the understanding of irrigation and water management among farmers, but it also helped farmers learn about how they learned, thus enabling them to teach other farmers. This model also assisted with engaging multiple other stakeholders, such as representatives of the Government of Pakistan ministries and departments, NGOs, researchers and agricultural service providers. To emerge as SERL, FILM underwent two iterations during the ASSIB project (Heaney-Mustafa et al., 2023).

The emphasis on stakeholders in the title acknowledges that all those who have a stake in further improving agricultural practices and policies and rural livelihoods must be actively engaged in learning and teaching each other. Women, men and young farmers become researchers in their fields and enter into partnerships with all contextually relevant stakeholders as equal partners. SERL builds on the traditional research cycle shown in Figure 1 above by explicitly engaging with multiple stakeholders, with the farmer now as a researcher and subsequently as a Farmer-to-Farmer Facilitator (F2FF), having been taught how to facilitate, not simply to demonstrate (Figure 2). The F2FF now understands how they learned and are prepared to co-learn with other farmers in their context to enhance adapted practices on their farms.

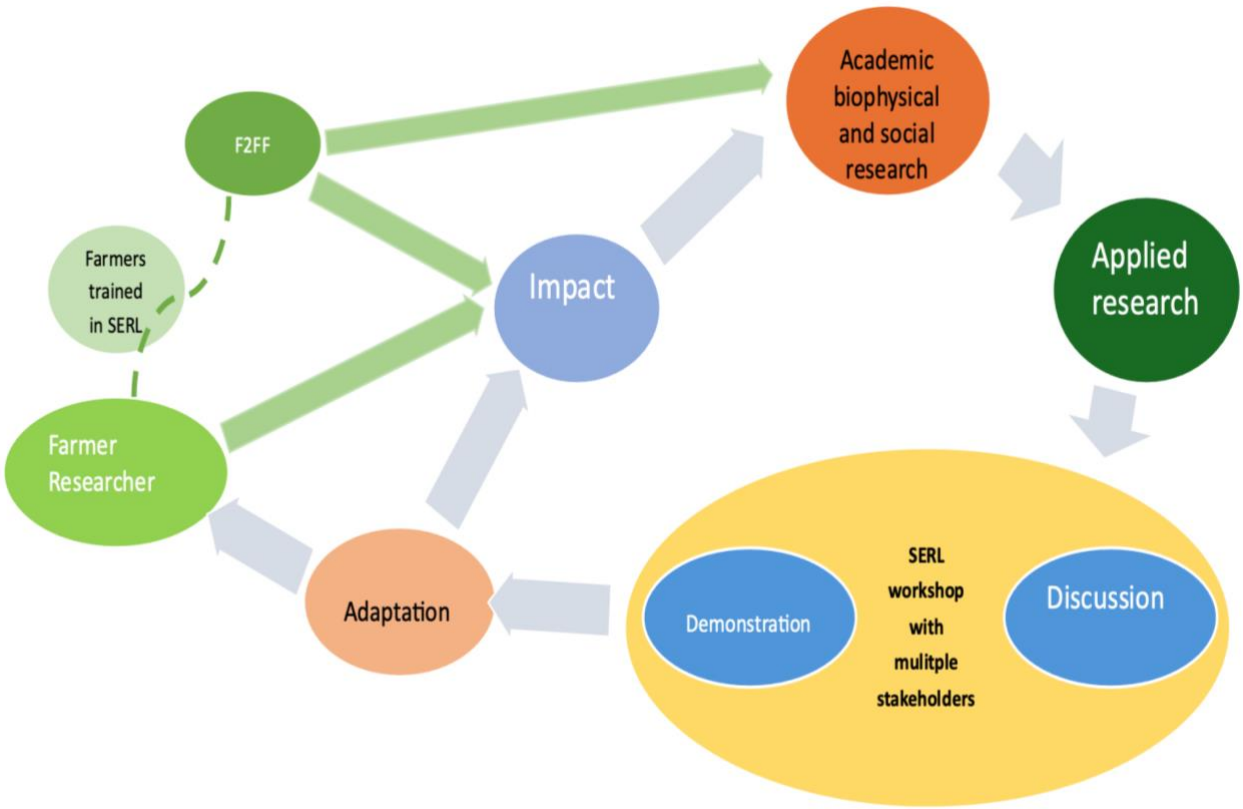

Figure 2. An adapted cyclic process of co-inquiry research and learning to impact using SERL

An approach such as SERL has three main characteristics. Firstly, it includes all stakeholders and takes time to build realistic and contextual interpretations of issues. Secondly, it gives ownership to the stakeholders of the emerging innovations, adaptations and solutions to those issues that are local and implementable by each community. Thirdly, all stakeholders can provide inputs to facilitate and support the application of the innovations and adaptations over a period long enough for change to occur.

The Sun-Satellite Model represents a dynamic and collaborative approach to knowledge exchange and capacity building within agricultural communities, resulting from involvement in FILM practices. In this Model, the ‘sun’ farmer embodies a wealth of experience, expertise and traditional knowledge in farming practices, often as a mentor or guide to the 'satellite' farmer. Notably, the Sun-Satellite Model emphasises a reciprocal exchange of knowledge with the intention that both 'sun' and 'satellite' farmers actively learn from each other (Salam et al., 2024). After seeking guidance and insights from the 'sun' farmer, the 'satellite' farmer may have fresh perspectives, innovative ideas and alternative approaches from which the 'sun' farmer can also learn. This bi-directional flow of information fosters a dynamic learning environment where sun and satellite farmers benefit from each other's experiences and perspectives. The model represents a powerful paradigm for farmer-to-farmer learning, offering flexibility for clusters of farmers to glean wisdom and experiences from progressive farmers.

The ASSIB project, meanwhile, drew on a similar metaphor of a ‘bright spot’ to describe the communities who would be engaged as co-inquirers as part of the project. Noble et al. (2006) inspired the use of this term to describe simple innovations adopted by farmers that improved their livelihoods while enhancing resource use sustainability. We considered ‘bright spot’ an apt term for communities that are “sustaining and perhaps enhancing their livelihoods through active community-driven adaptations” (Mitchell et al., 2020, p. 13). A key criterion used to identify such ‘bright spots’ relates to their interaction level with a nominating organisation. The importance of this connection was then extended to include the community’s potential capacity to engage with a range of other stakeholders. As detailed in Figure 1, these stakeholders not only included the farmers and the researchers from the nominating organisation that had the established connection but extended to agricultural service providers (ASPs), the private sector, and extension services. All these stakeholders play crucial roles in comprehensively understanding the issues the ‘bright spot’ community faces. To address these

challenges effectively, a technical support platform like the Sun-Satellite model is essential for the 'bright spot' communities, offering them socially acceptable solutions. This collaborative approach fosters knowledge exchange and innovation by linking 'bright spot' communities with ongoing research and experiences of other progressive farmers. This interconnected network enhances understanding and facilitates the implementation of sustainable practices, ensuring the success of agricultural communities (Figure 3).

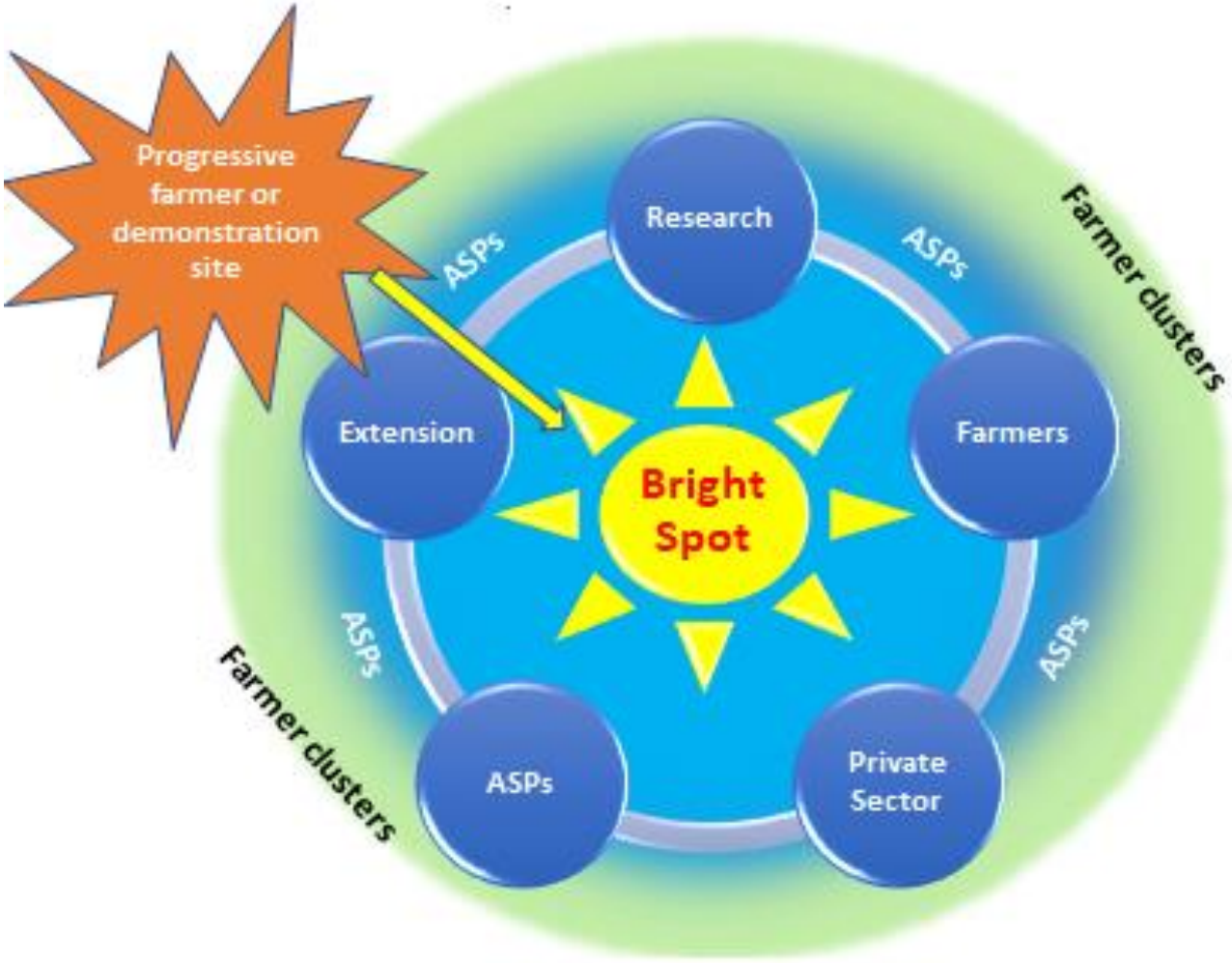

Figure 3. A Sun-Satellite Model approach for farmer-to-farmer learning

The ASSIB project used the SERL approach as the means to develop and investigate adaptation options and strategies for people managing and living in salinity-affected agricultural landscapes in the southern Indus Basin. The SSM allowed the CET and farmers to experience and offer feedback on an alternative approach to farmer-to-farmer learning. The application of both approaches will be explicated more fully below.

Stakeholder Engagement for Research and Learning in Practice

A technical report fully elaborates on the theory underpinning the SERL model and the process (Heaney-Mustafa et al., 2023). Figure 4 below shows the three iterative phases of the SERL approach. Phase One research was conducted during the pre-project phase to determine potential partners and communities for the project. Assets and capacities of potential partners and villages were determined through one-on-one interviews, focus groups and brief surveys. Issues surrounding adapting to salinity were gathered from each person or group, and a rich picture was developed to enable the selection of partners and villages.

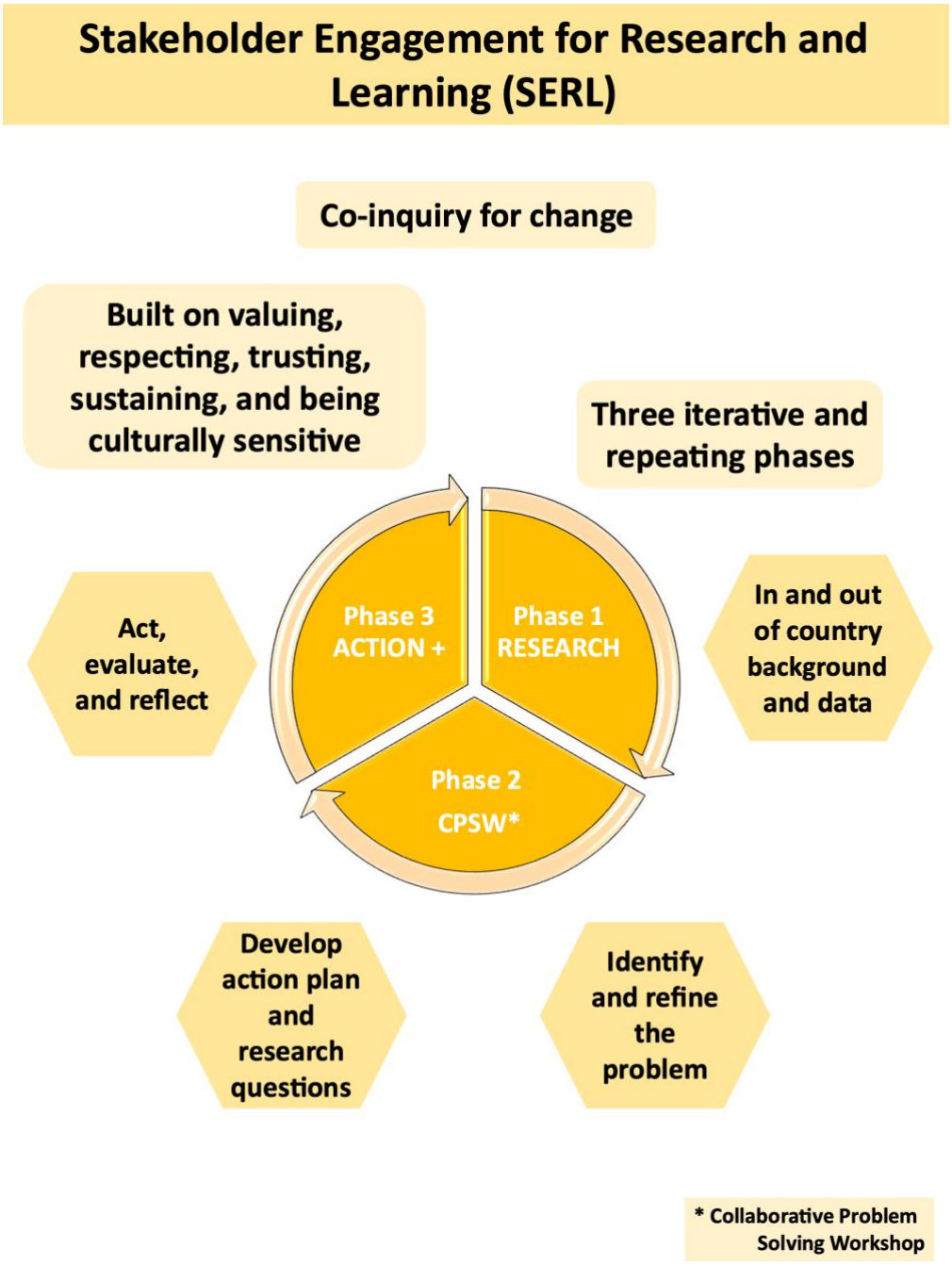

Figure 4. Phases of SERL

SERL was used to engage with farmers at 'bright spots' in the provinces of Punjab and Sindh (see Figure 5). In southern Punjab, 32 farms in three villages in two districts, Jalalpur Peerwala and Muzaffargarh, were included in the project. In Sindh, there were 27 farms in five villages in the districts of Thatta (Indus Delta) and Shaheed Benazirabad (along the Malwah distributary canal). Of the 59 farms involved, most were managed by individual farmers, while six involved family groups or groups of men (1) and women (5) with common goals. 38 women were included as individuals or as part of a family or group (see Appendix 1 for full details).

Selected cases will be reported here, and the relevant action plans and farmer cards are attached as Appendices.

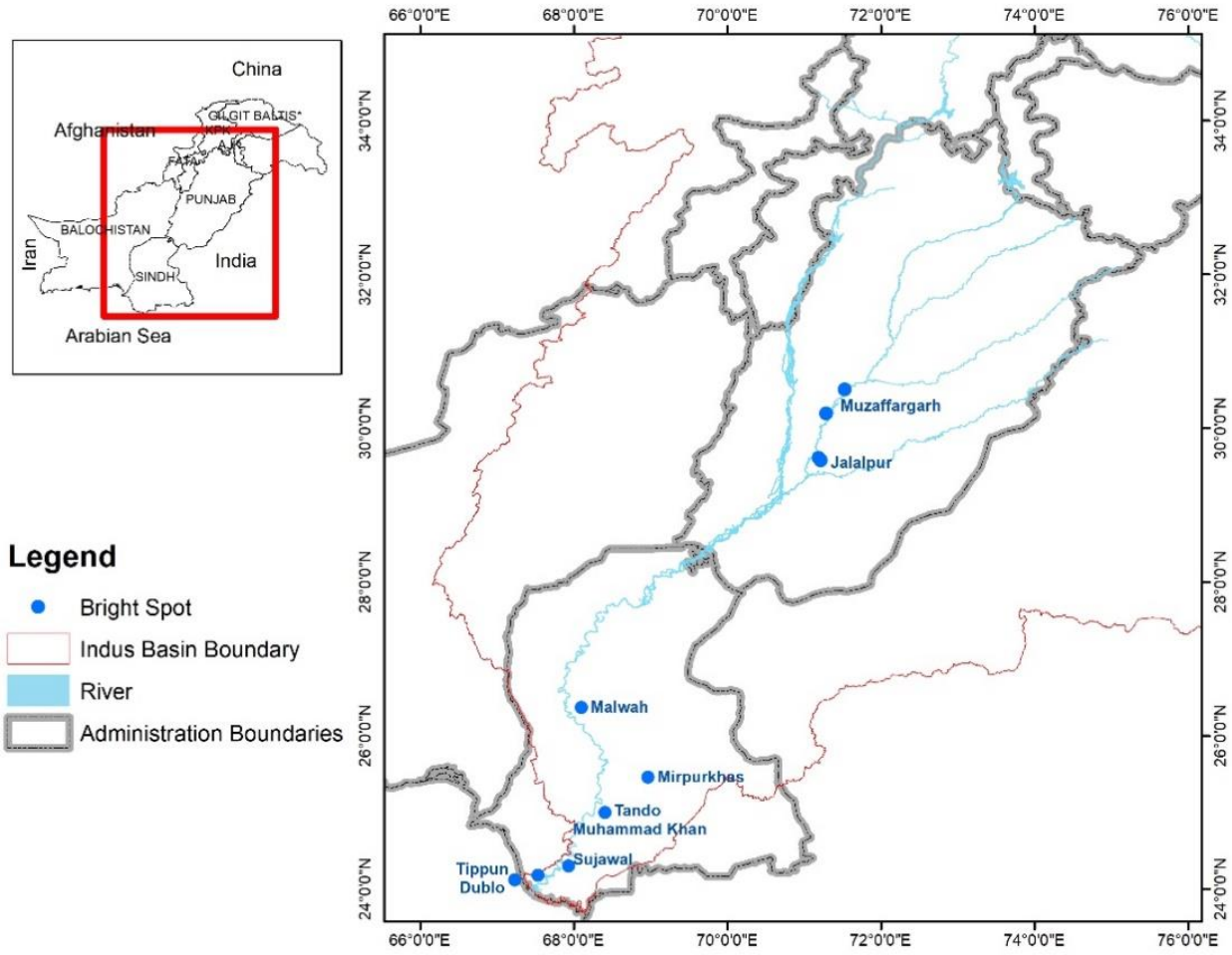

Figure 5. Map of ASSIB 'bright spot' locations

Case Study 1. Ridge Production Trials, Jalalpur

After taking part in Phase 2 of SERL, the divergent and convergent workshop, one farmer expressed his interest in researching the production comparison of ridge vs. flat wheat sowing. The action plan developed in the convergent phase of the workshop is given in Appendix 2. The results of the experiment are shown in Table 1.

Data analysis collected during wheat harvesting and threshing concluded ridge cultivation could be a better choice for sowing wheat crops in this saline affected area. There is no significant difference in wheat yield. However, there was a timing saving of 25 minutes for each irrigation. In the water-scarce environment, this could be a driving force behind the adoption of ridge planting. The farmer was satisfied with the ridge cultivation sowing method and will adopt this method for the coming cropping seasons. He also shared that he "*never applied any fertiliser in the experimental plot; it is totally organic*". A Feedback Card created to solicit feedback from stakeholders about this experiment is given in Appendix 3.

Table 1. Results for wheat sown on ridges vs. flat sowing

Details	Experimental Plot	Control Plot
Variety	Galaxy 2013	Galaxy 2013
Area	1 acre	1 acre
Sowing date	18 Nov 2021	18 Nov 2021
Total irrigations	5	5
Average time of each irrigation	65 minutes/acre	90 minutes/acre
Harvesting date	12 Apr 2022	12 Apr 2022
Date of threshing	15 Apr 2022	15 Apr 2022
Total yield (grains)	32 maunds (1,280 kg)	31 maunds (1,240 kg)
Total yield (straw)	30 maunds (1,200 kg)	33 maunds (1,320 kg)

Case Study 2. Family Vegetable Production, Malwah

In Malwah, Sindh, a woman farmer, Mukhtiar Naz, who attended the Phase 2 workshop in the SERL approach, said:

> *"… the SOFT and MUET teams taught us, step-by-step, how to present our problems and their solutions on charts. At the conclusion of the activity, we organised our action plans into co-inquiry research goals before beginning our research through various training sessions."* (Mukhitar, Story of Change Interview – for more information, see Allan et al., 2024; Mukhtiar gave her consent to disclose her identity and personal information from her interview.)

As a result, she conducted experiments on different vegetable cultivars under saline conditions. Further details are available in the feedback card in Appendix 4. The vegetable yields are given in Table 2.

When commenting on the vegetables grown, she commented that "*eating a good amount of vegetables each day is important*" and that they are not only nutritious but may also offer protection against different diseases.

Mukhtiar discussed her motive to get involved with the ASSIB project and participate in the SERL approach as "*exploring how to live with salinity.*" She said, "*Then we were inspired and involved in being a part of this family in the form of co-inquiry research from the beginning of the project*." She expressed her gratitude to the ASSIB team and commented in her interview that "*I plan to carry on with this practice and advise others to grow their own vegetables.*" This last statement indicates the ability for the co-inquiry approach to be scaled out.

Table 2. Vegetable yields achieved by Mukhtiar Naz

Vegetable	Yield (all produce was used at home or distributed to families)
Okra	360 kg
Ridge gourd	40 kg
Cluster bean	45 kg
Indian squash	30 kg

Case Study 3. Shrimp Farm, Indus Delta

Mohammed Ayub of Ayub Dablo village in Tippun Dublo, Sindh, who is a leading member of a fishing community relocated due to climate change, had experimented with shrimp rearing in ponds with his family. In Phase 2 of SERL, he and other fisher folk identified and prioritised training in modern fish farming as the main issue they faced. The community also considered the best solution for this was to contact institutions for knowledge and training on new methods. Supported by IUCN and SOFT, they contacted a consultant from the Sindh Fisheries Department. The SERL workshop report is in Appendix 5, and a detailed report of the shrimp farm experiment is available as Jarwar et al. (2024).

M. Ayub commented that he *"felt like a researcher after learning how to take care of the shrimp and doing it well during cycle 2."* He also pointed out how, prior to the ASSIB project, they relied on traditional knowledge for fish farming, but that did not always work. However, their involvement with ASSIB taught them that incorporating scientific information improves their chances of success in fish farming. He further described that involvement with the ASSIB project has helped him "*build contact with the experts"* and that he can use that as a guidance toolkit whenever needed. He also hopes *"to continue benefiting from the connections he has built in the future*". The SERL approach with multiple stakeholders involved in the workshops helps form networks that build and share knowledge.

Along with his family, M. Ayub was also involved in fish farming and spoke of how his family worked together. When the men go to sea to collect the seed, *"the women and children protect and feed the fish regularly".* Again, the strength of SERL in engaging women and youth in the approach is evident.

When asked if his opinions were considered by others in the SERL workshops and interactions, he commented that he is "*very satisfied with the ASSIB project because every decision is discussed with him and the family members and that their traditional knowledge and opinions are valued*." Smiling, he said, *"Because we are totally involved in the discussion, we know exactly how to properly manage and take care of our seed, and when we face a difficulty, we contact the team, and it helps us overcome that challenge."* Again, the following comment showed the ability of the SERL approach to build strong knowledge networks. The following comment also supports the notion that the co-inquiry approach builds and has the potential to scale out knowledge.

> *"Right now, we have started the stocking with good intentions, and we pray that we will succeed. Because of our knowledge and handling, a lot of people in our community are waiting for our success and have also been showing their interest by initiating discussions on how-to with us."* (M. Ayub, Story of Change Interview; Ayub gave his consent to disclose his identity and personal information from his interview.)

Case study 4. The Woman Farmer Who Became a Knowledge-Sharing Facilitator

Widowed and with young children to provide for, Rabia Bibi, from Meer Kot, near Jalalpur Peerwala, in southern Punjab, is an outstanding example of someone who embraced the co-inquiry SERL approach. Rabia has built her knowledge and works to scale it out to other farmers, both women and men, in her area and nearby villages. From her Story of Change interview, it can be seen that from being wary, she has moved to being an advocate of the process.

Rabia heard about ASSIB from others in her village but came to a SERL workshop and understood the project and how it would work. Nevertheless, she was sceptical and thought it would "*do high-cost experiments …and maybe I cannot afford to work with them*". However, she observed that the plans were simple, and the team guided them to do what was required within their resources. In the first season, her husband died, so she could not continue, but in Rabi (winter) of 2022-23, she again joined in the activities.

Rabia met with women and men farmers and followed their farming practices on saline land. She was assisted in laser levelling her land and started using green manure and mulch. Aided by the project, she planted 70 guava trees but stressed, "*I learned to use our own resources with accuracy according to the requirement for good yield of crops.*"

As a hired labourer on other farms, Rabia began teaching other women labourers about seed sowing. After this, she found that "*many contractor farmers started hiring me as lead female hired labourer due to my knowledge and learnings",* so now she charges an extra amount for teaching. Rabia feels she has helped bring change to her community due to the learning approach because "*… both men and women meet with me to learn about the activities I have learned.*" Smiling, she commented that others say Rabia never misses a session and always participates and shares her knowledge. Rabia is now trained as a F2FF.

Rabia's final words speak to the building and scaling knowledge in a simple but powerful way that SERL, with the co-inquiry methods, can enhance and sustain agriculture adaptations in saline environments and more broadly. Further, such an approach can empower women.

> *"I feel honoured that people are giving value to my knowledge and learnings. Before ASSIB no one was talking with me about agricultural practices, but now the community is valuing the worth of learning and sharing knowledge."* (Rabia, Story of Change Interview; Rabia gave her consent to disclose her identity and personal information from her interview.)

Case Study 5. Improving Fish Farm Production, Muzaffargarh

Dera Haibat is a village in Muzaffargarh that was severely affected by salinity, and many families had turned to fish farming as a source of income. During the SERL workshop with the men of Dera Haibat, they stressed the need to develop a better understanding of the protein requirements of the fish and how to prepare a better quality fish feed than they currently use. The CET, researchers, and industry trainers conducted a training session for eight fish farmers (aquaculturists) in February 2023.

It was reinforced for the fish farmers that they had the right ingredients for the fish food, but they needed to increase the protein content for the fish to gain weight. Table 3 indicates the current formula for fish food that industry experts recommend. The industry experts also advised them about alternate sources of meals that could be used to enhance the protein content.

Table 3. Formula for fish food

	As currently used by farmers		Recommended use by industry experts	
Ingredient	**% of each ingredient**	**Protein % of each ingredient**	**% of each ingredient**	**Protein % of each ingredient**
Corn	15	1.2	20	1.6
Rice Polish	40	4.4	20	2.2
Mustard meal	1	0.36	10	3.6
Canola meal	1	0.37	10	3.7
Soybean meal	2	0.88	10	4.4
Sugar syrup	5	0.05	10	1
Feed waste	36	5.4	10	1.5
Gluten 30	0	0	10	2.8
Total	**100**	**12.6**	**100**	**20.8**

A focus group discussion was held with the farmers participating in the training session. Some of their comments follow:

- The training session provided invaluable insights into fish feed preparation, specifically regarding protein content, which we previously lacked understanding of protein content in fish feed.
- We are grateful for the trainers' expertise and guidance in optimising our fish feed formula to meet the protein requirements of our fish, ultimately enhancing their growth and health.
- Learning about cost-effective alternatives for fish feed ingredients was particularly beneficial, as it allows us to improve our feed quality without straining our resources.

- The comparison of different feed types and associated costs was eye-opening, with almost a 40% difference compared to commercial feed. It will help us make informed decisions about our fish farming practices.
- Overall, we are highly satisfied with the training and feel more confident in our ability to produce high-quality fish feed tailored to our fish's and our farm's needs.

The farmers left the training feeling empowered and confident in improving their fish farming practices, contributing to their long-term success and sustainability.

In addition, three women in Dera Haibat engaged in research involving vegetable growing in their fields. One woman, Nafeesa, had not previously grown vegetables as she thought her land was "*too saline and sensitive for vegetables".* In November, Nafeesa prepared 1.5 marla (38 m^2) manually using hand tools and sowed see, provided by the ASSIB team. Using farmyard manure and tube well irrigations, she successfully harvested fenugreek, coriander, radish, and turnips. Buoyed by her success, she plans to "*grow vegetables (especially okra) for commercial purposes … and try growing fruit trees to earn an income"* (Nafeesa gave her consent to disclose her identity and personal information from her interview).

Reflections from the ASSIB Team

Story of Change interviews were conducted with CET members and partners (Allan et al., 2024). The following are some comments from those interviews. When asked what changes he had seen among the farmers, a CET member noted: "*At the beginning, the farmers were very shy to speak*", but he continued, "*Now they are answering for themselves.*" He considered they no longer needed the "*CET to speak for them.*" He considers "*they have grown in confidence*" and now "*have more knowledge about policies and subsidies*" and are starting to "*raise their voices.*" He also commented that "*The women, in particular, have grown in confidence*," pointing out that working with them was hard initially.

A MUET academic related how he has worked with farmers on other projects with ICARDA funded by USAID in which they were introducing drip and sprinkle irrigations in the project's phase 1. In phase 2, they had been able to get farmers to teach other farmers how to do it but emphasised that the farmers in that project…

> *"… only tell others what they have been told, however,* ***our farmers are more creative and have greater thinking power to identify problems and come up with other options."***

When asked if he had seen any changes in the people, the MUET academic enthusiastically commented:

> *"Oh yes, they have grown in confidence. We now have six men trained as farmer-to-farmer facilitators who are working in their own village, but they have now extended out to four new villages."*

Among his responsibilities was taking students to the field to work in groups of three (i.e., two students and one farmer) to collect soil samples for analysis. This is how he spoke of the changes he saw in his students:

> *"The students' knowledge increased, but also their respect for farmers increased as they saw that farmers have knowledge and now they know to work on the problems the farmers identify."*

When asked if he thought the students would continue to work this way after graduating, he said, "*Oh yes, they have changed their attitudes, and that will lead to change in practice. One of the students told me, "The farmers are my teachers, so I have to respect them.""*

Another CET member, when talking about the government departments, considered that they are now engaging as farmers had not seen them previously. However, he also pointed out that even though they are now being included in forums, there needs to be "*a formal process to encourage engagement and to be more sustainable.*" He considered it good that now the farmers know the agent and have their phone numbers so they can "*chase them,*" and there is a "*network developing."*

For the farmers, as a CET member noted, "*the problem is clear – salinity is the main issue and other issues less important" … "there is no one solution to salinity.*" She went on to say the farmers realise that there is no one solution they are "*more encouraged to engage with the team.*"

She also noted a fundamental change is that "*farmers are coming to learn from other farmers, so farmer-to-farmer learning is working well.*" She said that "*whole villages are talking about mulching and other practices now.*"

Sun-Satellite Model in Practice

The ‘sun’ site selection is crucial where promising land and water management, such as salinity management, is in practice and where satellite farmers from various locations can visit the site, see the management practices, freely discuss with sun farmers, and mutually learn from each other. In the Lower Indus, one such site is Nawazabad Farm, located in District Tando Allahyar, Sindh. It is a privately managed farm of approximately 810 ha of land, of which about 100 ha were severely affected by waterlogging and salinity.

However, attempts at removing the soil salinity at this farm required ample amounts of freshwater to leach the salts out of the root zone. Freshwater was scarce in the area; therefore, the management decided to live with the salinity by practising saline agriculture on the reclaimed land where best salinity management practices were carried out under the farm manager's and his team's supervision, who are thus identified as 'sun' farmers. Different salt tolerant crops and orchards were cultivated at the farm. The site has continuously served as a field research and demonstration site used by PCRWR, which has conducted a series of research experiments to understand the best salinity management strategies. The research studies have broadly covered physical, biological and chemical reclamation techniques (Salam et al., 2024).

PCRWR, in consultation with ASSIB project partners Mehran University of Engineering and Technology (MUET), Muhammad Nawaz Shareef University of Agriculture, Multan (MNSUAM), the Society of Facilitators and Trainers (SOFT), and the International Union for Conservation of Nature (IUCN), as well as representatives of the three ‘bright spot’ communities involved used this ‘sun’ site for farmer-farmer learning. Thirty farmers, ten from each of the three ASSIB project ‘bright spots’ (i) Malwah distributary, Shaheed Benazirabad, (ii) Tippun Dublo, Keti Bandar, Thatta, and (iii) Jalalpur Peerwala, Multan visited Nawazabad farm.

These ‘satellite’ farmers of the Malwah, Tippun Dublo, and Jalalpur were exposed to the ‘sun’ site, where they saw several crops and fruit plants grown on saline and waterlogged soils. The satellite farmers showed keen interest and asked several questions of the sun farmers about sowing practices, fertiliser applications, irrigation systems, harvesting and marketing procedures. The satellite farmers also saw the plantation of sapodilla and jujube on a new pattern where one row was dedicated to sapodilla and the other to jujube with a plant-to-plant distance of 6 m. They were told by the ‘sun’ farmer that, initially, the plantation of jujube and sapodilla was conducted on saline soil on a trial basis. However, the orchards fully matured and generated substantial net income. The satellite farmers also asked sun farmers several questions about various salinity management practices. This farmer-to-farmer interaction enhanced the knowledge of both the sun and satellite farmers. The satellite farmers were keen to implement some of the living with salinity options they had seen on the sun site at their farms.

However, the ASSIB farmers from Malwah pointed out their limitations to taking up some of these practices. While acknowledging that they had learned many things, many are restricted by not owning the land they farm, with several saying, “*I am a sharecropper and do as the landlord says.”* Those who did own their land commented that even though they learned that they could get more yield from their crops by “*proper technical methods,”* they lacked the resources to adapt to new practices.

One farmer impressed by the orchards had taken action since the visit and “*planted fruit trees on my land such as lemon, orange and jujube tree”.* Another had planted 400 eucalyptus trees on his land to address the water logging issue, but only 30 survived.

The facilitators who had gone with the farmers on their visit offered their reflections and felt that the farmers were impressed by the visit. However, as they are small landholders, and with many not owning any land, they lacked the resources to implement what they had seen. It was also noted that one visit was insufficient for the farmers to develop a good understanding and that farmers had expressed a desire for further visits.

Potential for Scaling Out

The conventional approaches of knowledge dissemination through development of demonstration farms at Research and Development centres, using a top-down approach, have not yielded the desired results mainly due to: (i) mistrust of the farmers as they believe that the government's farms have all kinds of resources and facilities to make technologies successful; (ii) different level and understanding of the resource persons and the farmers; and (iii) lack of communication between the resource persons and the farmers once the field visit is over. However, the sun-satellite model overcomes these issues as both groups of farmers have almost the same level of understanding, and they can talk to each other at any time, thus enabling farmer-to-farmer learning.

The SERL approach takes this further by being a farmer-led, farmer-facilitated, farmer-to-farmer scaling-out strategy, with the farmer-to-farmer facilitator being upskilled in the SERL approach and the adaptive practices. The F2FF, while having their own research plot, go to the other farmers to meet them in their context and identify the issues they face. A visit to the facilitator's plot may occur, but finding adaptations in the context of the farmers' location is central to SERL. Working with them to identify issues and find solutions within their resources and capacity to adapt is the foundation of the approach.

Both SSM and SERL have great potential to scale out more widely among farmers. Further use of such approaches must, however, be realistic and within the capacity of farmers to take up innovations and new technologies.

Many islands of success ('bright spots') exist in the country where farmers have adopted saline agriculture and saline aquaculture and have managed to live with the salinity. Besides managing the salinity, they also earn handsome money for their livelihood. However, there is a need to identify such 'bright spots' and convert them to 'sun' sites.

Here is the nexus between SSM and SERL: by training the women and men farmers in the SERL approach, they will be better able to communicate with fellow farmers and keep records of the adaptations and of all the inputs and outputs to provide evidence if required. Moreover, they can co-develop contextually relevant dissemination material with the satellite farmers.

An example is a 'sun' farmer under one of the ICARDA projects, Mr Yousaf Shah, who grew olives in the Kallar Kahar area. He was trained in soil and water conservation practices. Gradually, he became a resource person, and his farm is an excellent example of a 'sun' site where the satellite farmers, professionals and policymakers visit frequently. Now, besides providing services to fellow farmers, he organises a big olive fair annually where olive growers from around the country participate and showcase their products, interact with each other and share knowledge. This farm acted as a catalyst for promoting olive plantations in the country. Similar kinds of 'sun' sites can be identified and promoted.

Mr Abdul Haq Dharejo from the Malwah 'bright spot' in Sindh provides an example of a farmer trained in the SERL approach who now is a F2FF and visits other villages and in co-inquiry workshops with those farmers on their agricultural issues to help them identify their assets and capacities to address the issues. Together, they co-develop contextually relevant ways within their resources to adapt their practices to enhance production. The farmers are invited to visit Mr Dharejo's farm and see how he has adapted his practice and further develop their knowledge and practices. The SOFT facilitators trained Mr Dharejo in facilitation skills and, in a workshop with other soon-to-be F2FFs, co-designed and developed the materials for dissemination to other farmers. Such materials are contextually relevant and readily adaptable to other contexts as needed.

The strengths of uniting SSM and SERL are evident. By upskilling women and men farmers who have excellent or potential 'sun' sites with the capacity to not only show other farmers what they have done at their site but also to facilitate the SERL approach with other women and men farmers, policymakers, extension agents, staff from government departments and ASP to name a few will become a powerful way to upscale both approaches in tandem. This union will result in a farmer-led, farmer-facilitated, farmer-to-farmer scaling out strategy, which will help address the socio-economic imperative of Pakistan's agriculture.

Strategies for Scaling Out

Any strategies for scaling out these approaches will require action at all levels, from the small farmers' field to the policymaking level. Women and men small farmers have demonstrated during the ASSIB project that they can become F2FFs with training in the SERL approach. Thus, it is feasible that agriculture extension agents, field assistants, ASPs, and staff from NGOs and not-for-profits can be upskilled in SERL to enhance their current practices. Before expanding on strategies for scaling out SSM and SERL, it is worthwhile to consider what is already happening with ASSIB partner organisations due to their participation in the project.

New and Potential Projects using Farmer-led Strategies

The MNSUAM team has been able to extend the learnings of the ASSIB project approach through co-learning and farmer-led experiments established as part of a joint project with Eberswalde University for Sustainable Development (HNEE), Lahore University of Management Sciences (LUMS) titled “Innovations for Resilient Smallholder Production Systems in Punjab, Pakistan funded by BLE (Federal Office for Agriculture and Food). The three-year project will start in February 2025. The Jalalpur ‘bright spot’ community and area have been included in the project design because of the continuous interaction and collaboration of the community and experts. The research project has been designed as a participatory endeavour that systematically connects the stakeholders, from farmers to policymakers, including service providers and experts. The project will use the existing knowledge and capacity of the community (made up of small landholders) to involve them in more practice-oriented research activities. The project will involve practitioners and policyholders through a series of iterations to engage them with local communities to improve their livelihood through better adoption of technologies and practices.

The project team at MNSUAM and MUET has also used the capacity developed through the groundwater modelling research component of the ASSIB project. The associated university teams have successfully competed and won the grant for groundwater modelling in Punjab and Sindh under the FAO-GCF project. The competitive grant was for one year and included calibration, development and estimation of hydrological modelling, design and development of information products and training of the Punjab Irrigation Department and On Farm Water Management Wing officials.

An IUCN project funded by a private sector company primarily aims to enhance the livelihoods of local communities. Drawing on insights from the ASSIB project, IUCN's Thar initiative, tailored to the desert environment's challenges like water scarcity and high levels of water salinity, has prioritised community engagement through consultations and meetings from the outset and, with community support, identified the resources available and their capabilities. The adaptation options and livelihood enhancement plans were co-designed based on extensive community consultation with the respective objectives, activities, timescale and monitoring systems in place. Given the arid climate of the desert, adaptation strategies were customised to meet local needs. The ongoing initiative, starting with two pilot backyard ponds, has expanded to five, indicating positive progress. The success of this participatory approach is evident from neighbouring villages' interest in obtaining fish fry and expressing willingness to construct ponds independently if provided with seedlings.

The University of Canberra is liaising with ACIAR to seek funding for a Small Research activity (SRA) to adapt SERL further to meet climate change transformations for communities. Currently, the Australian National University (ANU) is in the final proposal stage of a multi-million-dollar project, “Climate adaptive livelihoods in Sindh: Locally-led pathways for inclusive transformation” to run in Sindh province in Pakistan. The Research Program Manager for climate change at ACIAR, Dr Veronic Doerr, considers there is merit in the SERL approach running alongside this ANU-led project over the coming months. It aims to build capacity using the SERL approach among those organisations and institutes working with communities in the ANU project. The SOFT facilitators will be employed to do the in-country training.

Sharing Knowledge

Professor Irfan Baig from MNSUAM was invited as a keynote speaker to the international conference on “Sustainable Food and Biomass Futures - Localised Approaches to Agricultural Change and Bioeconomy” from 22-24 June 2023. The title of his talk was “Transforming Livelihoods Together: Co-inquiry with Rural

Communities for Improved on-property Salinity Management in South Punjab". The talk generated much interest among the participants. It resulted in a proposal for a joint workshop (funded by Co2libri) at MNSUAM from 19-20 August 2024 in collaboration with Prof. Sarah Hultz, Humboldt University, Berlin, University of Peshawar and Quaid-e-Azam University Islamabad. During this workshop, Meerkot and Basti Kulab community facilitators will share their co-inquiry and on-field experimentation experience with the visiting academia and researchers.

In November 2023, Dr Heaney-Mustafa delivered a presentation on the SERL approach at the University of Canberra, International Faculties of Education conference entitled "Engaging Stakeholders from Research to Policy".

Dr Irfan Baig was also invited to deliver a lecture on the topic of "Participatory Co-Inquiry in Salinity Management in Pakistan" to the students of HNEE (Eberswalde University for Sustainable Development). The lecture took place online on May 30, 2024, as part of the "Extension Methods in International Cooperation" course for the postgraduate study program "International Forest Ecosystem Management."

These activities show that farmer-led, farmer-facilitated, farmer-to-farmer strategies have aroused interest in Pakistan and internationally. Tactics such as knowledge sharing and the generation of new projects using innovative ways of engaging a broad range of stakeholders are ways to scale out such approaches. However, other strategies are also needed to ensure the spread and sustainability of these approaches.

Champions for Change

From the field to the Ministry, these new approaches to teaching and learning must be championed by people who have a sense of ownership of the ideas and have influence and presence at the point of change. Such champions must be persuasive and determined and have an engaging leadership style. Women and men farmers who are now trained as facilitators can take up this role at the field level and are already championing the SERL approach with neighbours. The SSM 'sun' farmers do the same with the farmers who visit the sun sites.

Champions to bring about change in institutions and agencies working with farmers also need to be identified, experience the SSM and SERL approaches, and meet with women and men farmers who have used the methods to assist others in adapting to their practices. Then, within their organisations, they arrange for CET to facilitate workshops to upskill their staff. For example, a key person would become the champion within the Agriculture Extension Department. Extension agents and field assistants should be upskilled in using SERL in their interactions with farmers. Similarly, a champion for change is identified among ASPs, and those in NGOs who work with farmers need to be trained in using SERL. 'Sun' farmers are well suited to become champions and enlist other sun farmers to be upskilled in teaching and learning abilities.

A champion for change who has not only influence at the Ministerial level but also has knowledge and understanding of how farming communities operate and believes the SSM and SERL methodologies are essential for these innovative approaches to be widely adopted.

Sharing Knowledge Expansion

Publishing project findings is a good way to share knowledge about the new learning methodologies investigate through the project and will hopefully generate interest within Pakistan and globally. This includes use of conference presentations like those above to engender national and international interest.

Peer-to-peer networks should be established at all levels, including universities, research institutions, governments, and NGOs. More informally, such networks should be established with all those who provide services to farmers and extension services through the field assistants who work very closely with farmers.

Farmers already skilled in facilitation should be encouraged to form peer-to-peer networks within and between provinces to continue learning from each other and become influencers for new learning methods among farmers throughout Pakistan and more widely. Farmers trust other farmers more than others, so building farmer networks will help scale out these innovative practices.

Farmer field days usually facilitated by the agricultural universities are venues where farmers can promote the new method, and staff from SOFT, IUCN and the partner universities can also assist with scaling out the approaches.

The Pakistan Agricultural Research Council (PARC) should be encouraged to promote co-inquiry approaches to facilitate the spread of their valuable research. The Social Science Research Institute team at the National Agricultural Research Centre should be exposed to SERL, and some staff should be trained in its use as they are frequently conducting research with farmers, and co-inquiry methods can enhance their data collection. SOFT team members are ideally suited to facilitate staff in such institutes and other organisations in implementing the SERL approach, and funding to do so should be sought from the Pakistan government to enable this to occur.

Conclusion

Research is vital for improvement in agricultural practices, and equally important is the dissemination of that research. This report contends that farmers are also researchers in their fields and that the knowledge they hold, while different, is of equal value to that of the researcher, the extensionist and other stakeholders who engage with them.

Further, it advances and offers a critique of two approaches that are not dissimilar to knowledge sharing: the Sun Satellite Model (SSM) and the Stakeholder Engagement for Research and Learning (SERL) approach. The SSM relies on one farmer to demonstrate that farmer's new practices with others from the surrounding area – the farmer is the 'sun', and they are the 'satellites.' It is a good metaphor, but as above, small farmers feel that what was demonstrated at the site was beyond their means to employ. SERL engages stakeholders in a co-inquiry and co-learning process, allowing them to determine the adaptations they wish to make within their resources and capacities. Arguably, the SSM approach can be strengthened by the 'sun' farmers being upskilled in using SERL so that they not only demonstrate and tell satellite farmers but also engage in a co-learning experience with them for the benefit of all.

As with any innovation, change takes time, and perseverance and strategies for scaling out one or both new approaches are required. Key among them is finding champions for change who are passionate, knowledgeable, influential and able to convince crucial people in the right places to support and encourage the implementation of the SSM and SERL approach.

Sharing knowledge among research and extension bodies is vital and can be achieved through publication, conference presentations, and building knowledge networks among all stakeholders who work with and beside farmers. Formal and informal networks are required to scale out these new learning methodologies.

New projects using these methodologies should be encouraged, and the training of partners and collaborators in those projects using the SERL approach is pivotal. Funding should be sought to enable SOFT to facilitate members of other institutes and organisations using the SERL approach.

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Appendix 1. Matrix of All ASSIB ‘Bright Spot’ Co-inquiry Research Trials

See next page

Bright spot	Farmer	Field GPS	Kharif 2021	Rabi 2021-22	Kharif 2022	Rabi 2022-23	Kharif 2023	Rabi 2023-24	Kharif 2024
Dera Haibat	M.Saeed	30.5017329N, 71.5309608E	X	X	Sowing Seeds of Change: An Inspiring Kitchen Gardening Journey at a Fish Farm	X	X	X	X
Dera Haibat	3-women (Samina Batool, Nafeesa Bibi, Mumtaz Mai)	30.5040344 N, 71.5277248E 30.500782 N; 71.527536 E 30.500782 N; 71.527536 E	X	X	X	Cane grass	X	X	X
Dera Haibat	Mumtaz Mai (F)	30.5040344 N, 71.5277248E	X	X	X	Vegetables for the first time	X	X	X
Dera Haibat	Samina Batool (F)	30.500782 N; 71.527536 E	X	X	X	Vegetables for the first time	X	X	X
Dera Haibat	Nafeesa Bibi (F)	30.500782 N; 71.527536 E	X	X	X	Vegetables for the first time	X	X	X
Jalalpur - Basti Kulab	M.Abbas	29.5819679N, 71.2197062E	X	X	X	X	Salicornia Cultivation	X	X
Jalalpur - Basti Kulab	Zainab Bibi and Haji Arif	29.5816760N, 71.2194246E	X	Vegetables on ridges	X	X	X	X	X
Jalalpur - Basti Kulab	4 landless women (F)	29.587867N, 71.221237E	X	Vegetables in pots	X	X	X	X	X
Jalalpur - Basti Kulab	Haji Arif	29.5819679N, 71.2197062E	X	Wheat on ridges	X	Wheat Cultivation with comparison of 3 varieties	X	X	X
Jalalpur - Basti Kulab	Haji Arif	29.5819679N, 71.2197062E	X	Canola cultivation on ridges	X	Canola cultivation on ridges	X	X	X
Jalalpur - Basti Kulab	Nasreen Bibi (F)	29.5888689N, 71.2197800E	X	Acacia on barren land	X	X	X	X	X
Jalalpur - Basti Kulab	Haji Ashiq	29.595625 N; 71.216623 E	X	X	X	Canola cultivation on ridges	X	X	X
Jalalpur - Basti Kulab	Haji Ashiq	29.5912059N, 71.2176134E	X	X	X	Pomegranate orchard management	X	X	X
Jalalpur - Meerkot	6-women (Hajra bibi, Tasleem mai, Nasreen bibi, Tasleem Mai, Zaib Ilahi, Shazia bibi)	29.593391N, 71.224654NE 29.594266N, 71.229504E 29.594218N, 71.229367E 29.594060N, 71.228918E 29.5959411N, 71.2286018E 29.594694N, 71.229520E	X	X	X	Nourishing Nature, Nourishing Ourselves: ASSIB Project Case Study with Women from Meerkot Engaged in Kitchen Gardening for Saline Areas	X	X	X
Jalalpur - Meerkot	4-Farmers (M. Haneef, M. Hashim, M. iqbal and M. Bilal)	29.5943082N 71.229520E 29.593737N, 71.230525E 29.593800N, 71.229742E 29.593055N, 71.224171E	X	X	X	X	3-Cotton seed varieties comparison	X	
Jalalpur - Meerkot	Hanif family	29.5943082E 71.229520N	X	Vegetables on ridges (turnip & radish)	3 Cotton Seed varities comparison	Early Cultivation of Turnip	Growing Moringa with Value addition A case stury of JPP farmers	X	X
Jalalpur - Meerkot	Hanif family	29.5933523E 71.2286665N	X	Vegetables on ridges (garlic)	X	Wheat Cultivation with comparison of 3 varieties	X	X	X
Jalalpur - Meerkot	Hanif family	29.5943636E 71.2299865N	X	Vegetables on ridges (onion)	X	Sustainable Solutions: Onion Dense plantation with Mulch (Organic and Inorganic) application on saline areas	X	X	X
Jalalpur - Meerkot	Hanif family	29.5943082E 71.229520N	X	Okra mulch comparison	X	X	X	X	X
Jalalpur - Meerkot	Hanif family	29.5943082E 71.229520N	X	Chili mulch comnparison	X	X	X	X	X
Jalalpur - Meerkot	Hanif family	29.5933523E 71.2286665N	X	Cotton intercropping with garlic	X	X	X	X	X
Jalalpur - Meerkot	Hanif family	29°34'50.0"N 71°13'10.1"E	X	Vegetable on ridges with mulch seedling vs direct seeding	X	X	X	X	X
Jalalpur - Meerkot	Ghulam Fareed Family	29.593153, 71.224323	X	X	X	Sustainable Solutions: Onion Dense plantation with Mulch (Organic and Inorganic) application on saline areas	Vertical Summer Vegetables Cultivation	X	X
Jalalpur - Meerkot	Ghulam Fareed Family	29.592894 N; 71.223870 E	X	X	X	Canola Cultivation on Ridges	X	X	X
Jalalpur - Meerkot	Ghulam Fareed Family	29.592849N, 71.223842E	X	X	X	Wheat Cultivation with comparison of 3 varieties	X	X	X
Malwah	Usman	26.36455N, 68.10054E	X	Brassica on ridges	X	X	X	X	X
Malwah	Ayesha (F)	26.36467N, 68.10122E	X	Vegetables to sell	X	Multi-Vegetable on Mulch	X	X	X
Malwah	Allah Dad Zardari	26.377820N, 68.092710E	X	Brassica comparison 5 varieties	X	X	X	X	X
Malwah	Gul Sher	26.336213N, 68.08568E	X	Wheat comparison 2 varieties	X	Wheat Cultivation of TD1 variety	X	X	X
Malwah	Abdul Qadir	26.36542N, 68.09682E	X	Gypsum application with Brassica	X	X	X	X	X
Malwah	Mir Zadi (F)	26.36043N, 68.08786E	X	Vegetable for KG failure	X	Multi-Vegetable on Mulch	X	X	X
Malwah	Qaqir	26.36405N, 68.10358E	X	Wheat comparison 2 varieties	X	Cultivation of Wheat and Barley with application of Gypsum	X	Brasicca Varities Comparison	X
Malwah	Allah Dad Zardari	26.37846N, 68.09124E	X	Wheat comparison TD1 and local	X	Cultivation of wheat on ridges with application different doses of gypsum	X	Brasicca Varities Comparison	X
Malwah	Yaseen	26.36037N, 68.09834E	X	Wheat grown with organic manure	X	X	X	X	X
Malwah	Yaseen	26.36037N, 68.09834E	X	Brassica grown with organic manure	X	X	X	Brasicca Varities Comparison	X
Malwah	Qasim Ali	26.36522N, 68.10382E	X	Brassica comparison 2 varieties	X	Wheat trial planned	X	X	X
Malwah	Qasim Ali	26.36522N, 68.10382E	X	Wheat on ridges	X	X	X	X	X
Malwah	5 women (F)		X	X	X	KG fruit trees	X	X	X
Malwah	5 women (F)		X	X	X	Multi veg KG planned	Vegitables	Multi-vegetables Mulch	X
Malwah	Izzat Ali Dharejo Family (F)		X	X	X	X	X	Multi-vegetables	X
Malwah	Allah Dad Zardari Family (F)	26.377820N, 68.092710E	X	X	X	X	X	Multi-vegetables	X
Malwah	Abdul Haq Dharejo	26.360698; 68.101288	X	X	X	trial of gypsum application to salinity affected land with cultivation of wheat and barley	X	Brasicca Varities Comparison	X
Malwah	Abdul Rehman		X	X	X	Brassica trial planned	X	X	X
Tippun Dublo - Allah Bux Shah	Nasseban (F)	24°10'02"N 67°32'19"E	X	X	X	Multi veg KG	X	X	X
Tippun Dublo - Allah Bux Shah	Saleem Shah	24°10'02"N 67°32'19"E	X	X	Ridge Gourd and Bitter Gourd	X	X	X	X
Tippun Dublo - Allah Bux Shah	Saleem Shah	24°10'02"N 67°32'19"E	X	X	Chili trial 1	Wheat, Barley, Brassica, Barseem	Cotton Trial	Brasicca Varieties	Cotton
Tippun Dublo - Allah Bux Shah	Saleem Shah	24°10'02"N 67°32'19"E	X	X	Chili trial 2	X	X	X	X
Tippun Dublo - Ayub Dablo	Ayub Dublo family	24.12473° N, 67.44911° E	X	X	Shrimp pond	Shrimp Pond 2	Fish Pond	Fish Pond	Fish Pond
Tippun Dublo - Musa Katiyar	Katiaar family	24.16537° N, 67.52004° E	X	X	Fish cage	X	Fish cage 2	Fish cage continued	Fish Cage Continued
Tippun Dublo - Musa Katiyar	Katiaar family	24.16537° N, 67.52004° E	X	X	X	X	X	Shrimp Cage	Shrimp Cage
Tippun Dublo - Allah Bux Shah	Gul Hassan Shah	24°10'02"N 67°32'19"E	X	X	X	X	Salicornia	X	X
Tippun Dublo - Ahmed Samoo	Sikander Samoo	24°12'26"N 67°33'21"E	X	X	X	X	Salicornia	X	X

Appendix 2. Action Plan for Ridge Production Trials, Jalalpur

Adapting to Salinity in the Southern Indus Basin (ASSIB) Project
Village: Basti Kulab and Meer Kot, Jalalpur Pirwala, Multan

Experiment/Activity Title: Sowing of Wheat Crop on Ridges

Purpose of the experiment: Yield comparisons from ridge cultivation vs. flat sowing of wheat and traditional vs. salt tolerant wheat crop varieties

What is going to be studied in this experiment?

1. **Production comparison of ridge vs. flat sowing of wheat crop**
   - In this experiment the team is going to study the sowing methods of wheat
   - One plot of 1 kanal will be as control plot (with traditional sowing) and 3 kanals plot will be as experimental plot with ridges

2. **Salt tolerant varieties vs. traditional farmer's sowing wheat crop varieties**
   - Salt tolerant varieties will be introduced by external experts
   - Comparison of salt tolerant variety crop production with the varieties of wheat crop which farmer is already sowing on his farm and also grow in this season

Stakeholders involved:

Name(s) of farmer(s):
Basti Kulab (3): Haji Arif (0.5 acre), Haji Ashiq (0.5 acre) and M. Abbas (0.5 acre)
Meer Kot (3): M. Haneef (0.5 acre), M. Hashim (0.5 acre) and Abdul Shakoor (0.5 acre)

Name(s) of SOFT Facilitator(s): Muhammad Faisal Riaz, Syed M. Ali Zahid, Arzoo Rubab and Iqra Mohiuddin

Name(s) and Organisation(s) of other Stakeholder(s)/Experts: Dr. Tanveer ul Haq (Soil Science expert, MNSUAM)

#	What – is going to be done?	How – is it going to be done?				When – is it going to be done?	Where – is it going to be done?	Who – is responsible to do?	
	Activity	**Method**	**Work and input(s) by farmer**	**Input (s) from ASSIB project**	**Estimated costs of input (s) and operation from ASSIB**	**Date/Period**	**Place of activity**	**Person(s) responsible to do the activity**	**Person(s) responsible to monitor and feedback**
1	Background information of respective plots	The purpose of collecting this information is to note down for feedback cards and technical reports that what the farmers was doing with this plot before the sowing of this crop, and what are their views about this	Farmers will provide the information related to the plot	ASSIB SOFT Team will document and report the information	None	October	Basti Kulab and Meer Kot	SOFT Team Multan	ASSIB Team MNSUAM and SOFT Team Multan
2	Soil sample collection and note down coordinates	By random sampling techniques will collect soil samples from the experimental plot and note down the coordinates of the respective plot	Identification of plot	Soil samples analysis in the lab	None	October	Basti Kulab and Meer Kot	SOFT Team Multan will collect the soil samples and note down the coordinates, Dr. Tanveer ul Haq will conduct the soil analysis in MNSUAM lab and will provide soil analysis report	SOFT Team Multan, Dr. Tanveer ul Haq (MNSUAM)

3	Land preparation	By ploughing, cultivation, preparation for ridges making by ridge planter	Arrange the mechanical machinery for land preparation	If mechanical machinery for land preparation is not available, then local stakeholder may be asked to provide	None	October	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves at the time of preparation
4	Manure application	Highly decomposed livestock dung will be used, collected from their own animal farms	Manual application at the time of land preparation	A session on compost preparation with the help of local extension department may be conducted if needed	None	October	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves at the time of preparation
5	Fertiliser application	Manual application of fertiliser according to the requirements and sulphur application at the time of land preparation 3 kg/acre	Fertiliser will be applied by the farmers	Fertiliser application guidelines from the experts according to soil conditions and sulphur provided by the MNSUAM expert Team	None	As per requirement on suggestion of expert(s)	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording

6	Seed sowing	Certified good quality seed from ASSIB inputs	Broadcasting of Seeds in prepared land	Provision of Certified good quality and guidelines for cultivation		October	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording
7	Irrigation	Preference will be given to mix (tube-well plus canal) water if it is available	Timely irrigation when needed according to soil requirements and meteorological prediction	Guide farmers about the meteorological prediction and weather forecast when needed	None	Throughout the growing season as per crop demand	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording
8	Weedicide/ pesticide application	Control methods will teach by the expert to the farmer	Control methods will be applied according to the disease and pest attack by the guidance of expert	Guidance of the expert	None	As per requirement on suggestion of expert(s)	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording

9	Harvesting	Manual harvesting will be done by male and female farmers	Manual or mechanical harvesting	Harvesting will be done as per crop harvesting protocols.	None	In late April and May	Basti Kulab and Meer Kot	Technical Guidance of Expert/ Stakeholder (Dr. Tanveer ul Haq) Facilitation by SOFT Team Multan Field work by farmers themselves	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording
10	Reporting	Technical report and feedback cards preparation (collection/ recording of data throughout the season)	Farmers will share the data accordingly as it will be asked by the team and what the farmers have done throughout the season with crop	SOFT Team will record the data and will share with entire team	None	Throughout the cropping season	Basti Kulab and Meer Kot	SOFT Team Multan	Expert/Stakeholder Dr. Tanveer ul Haq and Team, MNSUAM SOFT Team Multan And farmers themselves for data recording

Note:

Monitoring and evaluation of each experiment/plot will be carried out separately because:

i. Each plot may have variable soil salinity level and irrigation sources
ii. The farmers may vary in input resources, interests, knowledge, skills etc.

Appendix 3. Farmer Card for Ridge Production Trials, Jalalpur

Adapting to Salinity in the Southern Indus Basin (ASSIB)

Wheat sowing on ridges

Report by: Muhammad Faisal Riaz, Iqra Mohiuddin, and Iftikhar Hussain (SOFT)

MNSUAM researcher: Dr. Tanveer ul Haq
SOFT team: Iqra Mohiuddin & Faisal Riaz

- Farmer: Haji Arif
- Village: Basti Kulab, Jalalpur Peerwala
- Total landholding: 25 Acres (10.1 ha)
- Location: GPS 29.5819679N, 71.2197062E
- Family size: 16 siblings
- Farming experience: 40 Years
- Cropping season: Rabi 2021-22
- Major crops: Wheat, fodder
- Horticultural crops: Date palm, pomegranate

Farmer training on crop cultivation by the staff of the local Agricultural Extension Department

On-farm practices

- Cropped area: 1 acre (c. 0.4 ha), salinity affected
- Land preparation on 17 Nov 2021
- Applied farmyard manure during land preparation
- Wheat variety: Galaxy 2013
- Seed sowing on 18 Nov 2021 by line sowing on ridge-top
- Seed rate: 25 kg/acre
- The farmer has developed a big pond for mixing water sourced from of canal and tube well water, which is then stored for later irrigation use
  - 1st irrigation on 18 Nov 2021
  - 2nd irrigation on 9 Dec 2021
- Germination of wheat is good
- No chemical fertiliser or weedicide has been applied so far

Canal and tube well water storage pond

Wheat field soil sampling

Wheat germination on ridges

Soil sampling investigation outcomes: an upper layer of clay soil with sandy soil at the bottom. Dr. Tanveer ul Haq suggested that several decades earlier the area was under a river bed.

Outcomes from wheat cultivation on ridges (2021-22)

MNSUAM Researcher: Dr. Tanweer-ul Haq
SOFT Team: Iqra Mohiuddin, Faisal Riaz, Syed M. Ali Zahid and Arzoo Rubab

Report by: Iqra Mohiuddin, Faisal Riaz, Syed M. Ali Zahid and Arzoo Rubab (SOFT)

Activities	Experimental Plot	Control Plot
Variety	Galaxy 2013	Galaxy 2013
Area	1 acre	1 acre
Sowing date	18 Nov 2021	18 Nov 2021
Total Irrigations	5	5
Average time of each irrigation	65 minutes/acre	90 minutes/acre
Harvesting date	12 Apr 2022	12 Apr 2022
Date of Threshing	15 Apr 2022	15 Apr 2022
Total Yield (grains)	32 mds	31 mds
Total Yield (Straws)	30 mds	33 mds

Average time saving of 25 minutes from experimental plots due to ridge cultivation

Wheat plant and soil sampling during its germination stages

Measurement of size of wheat plant and spikes by SOFT Team under guidance of Dr Tanveer ul-Haq

Samples from experimental plot	
Average plant height (cm)	Average length of spike (cm)
75.9	10.3
Samples from control plot	
37.67	13

AOFT Team collecting data of number of tillers and grains per plant at the time of harvesting

Samples from experimental plot	
Average no. of tillers/ plant	Average no. of grains/ spike
2.4	44.5
Samples from control plot	
3	42

Farmer's feedback on the experiment

The farmer is satisfied with the ridge cultivation sowing method and will adopt this method for coming cropping seasons. He also shared that he never applied any fertilizer in the experimental plot; it is totally organic.

Analysis of data collected at the time of harvesting and threshing concluded that ridge cultivation could be a better option for sowing of wheat crop in this saline affected area

Appendix 4. Farmer Card for Vegetable Production, Malwah

Adapting to Salinity in the Southern Indus Basin (ASSIB) Project

Different vegetable cultivars that can grow successfully under saline conditions

SOFT team: Benazir Kumbhar, Tahira Baloch, Babar Zaman, Mohsin Channa and Muhammad Yousif Channa

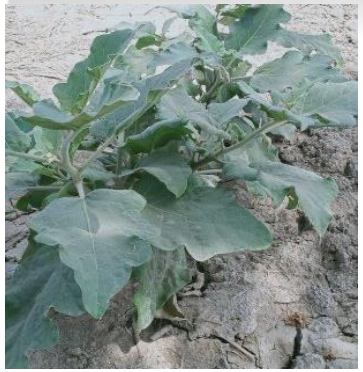
- **Farmer:** Mukhtiar Naz Dharejo
- **Family size**: 8
- **Farming experience**: 25 years
- **Village**: Mitha Khan Dharejo, Malwah distributary, Shaheed Benazirabad
- **Landholding:** 18 acres
- **Crop season:** Kharif, 2023
- **Vegetables grown**: Okra, ridge gourd, Indian squash, cluster bean

Farmer's comments

- Ms. Mukhtiar Naz is grateful to the entire ASSIB team for such creative and effective research into vegetables.
- She uses seasonal vegetables she has grown yourself and gives some to poor farmers.
- The training diverted us from old cropping patterns.
- Her family is healthy because of the variety of fruits and vegetables that are high in proteins and vitamins.

Current crop: 1 acre of vegetables (okra, ridge gourd, Indian squash, cluster bean)
Seed cost: 2,500 PKR
Land preparation: 2,000 PKR
Fertilizer: 3,000 PKR
Sowing date :25-04-2023
Fertilizer: Urea 8 kg, DAP 5 kg
Farmyard manure: 60 maunds

Irrigation Scheduling
1st Irrigation:25-04-2023
2nd : 15-05-2023
3rd : 06-06-2023
4th : 19-06-2023
5th : 30-06-2023
6th : 14-07-2023
7th : 28-07-2023



In this hectic situation it's better to grow our own vegetables

Vegetable	Yield
All produce was used at home or distributed to other farmers	
Okra	360 kg
Ridge gourd	40 kg
Cluster bean	45 kg
Indian squash	30 kg

- Ms. Mukhtiar Naz said in her point of view eating a good amount of vegetables each day is important.
- They are not only nutritious but may also offer protection against different types of diseases.

My husband Zulfiqar planted different types of fruit plants like papaya, grapefruit, mango, sapodila, falsa, grapes, lemon, jujuba with SOFT and MUET's support

Appendix 5. SERL Workshop Report, Tippun Dublo, August 2023

Stakeholder Engagement for Research and Learning (SERL)

'Bright Spot' Community, Tippun Dublo, Keti Bandar Sindh, Pakistan

Report prepared for the

Adapting to Salinity in the Southern Indus Basin (ASSIB) project

(LWR/2017/027)

on the outcomes of a workshop held at

Village Ghulam Hyder Samoo
using the Rural Research, Engagement and Learning Model (R^2EaLM)

Society of Facilitators and Trainers (SOFT)

(August 2023)

By: Babar Zaman, Mohsin Ali Channa, and Muhammad Yousif Channa

Introduction and overview of the workshop

The workshop was held on Friday, 11th August 2023. The workshop's objectives were to review and enhance the technical skills and knowledge of good agricultural practices that the Tippun Dublo 'bright spot' community had acquired for living with salinity. This involved analysing available and required resources in the community to reduce salinity and secure better agricultural yields. This workshop aims to bring forward active farmers who are old members of the project, have been involved in several trials, and have significantly benefited from the trials. Based on these experiences, these farmers can automatically share their experiences with other farmers, and other farmers can feel relaxed by seeing a farmer facilitator of their own. After further brainstorming with the selected farmers, they should be convinced to help their fellow farmers.

Agenda of Workshop

Briefing about the ASSIB project
Asset-Based Community Development (ABCD) a) Introduction of farmers and stakeholders
b) Detailing other assets and capacities within the people and the location
Identification of problems.
Prioritisation of problem (by voting) Sharing of ideas Brainstorming ideas for solutions to the selected problems – identify two ideas
SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the identified two ideas.
Prioritisation of the most promising idea (by voting) and developing a title for the research co-inquiry.
Development of SMART (Specific, Measurable, Achievable, Realistic, Time-based) Action Plan • What – is going to be done? • When – is it going to be done? • Where – is it going to be done? • Who – is responsible for seeing it gets done?
Feedback Plan (to be determined by farmers, stakeholders and facilitators) • How – will we know if it worked/did not work? • What – information will we need to know if it worked or not? • When – will we monitor the plan? • Who – will be responsible?

MEN'S WORKSHOP PARTICIPANTS

Facilitators (SOFT)

	Muhammad Yousif Channa Project Coordinator and SOFT Founder Member Master Facilitator Learning Approaches/ Model
	Mohsin Ali Channa SOFT Community Engagement Officer based at MUET Facilitator Learning Approaches/ Model
	Babar Zaman SOFT Community Engagement Officer based at MUET Facilitator Learning Approaches/ Model

Workshop Proceedings

The workshops for men and women were conducted simultaneously as separate sessions. The men's workshop was facilitated by Babar Zaman, Mohsin Ali Channa and Muhammad Yousuf Channa from SOFT, Mr. Naveed Soomro, Dr. Alsam Jarwar, and Mr. Akhtar Hussain Samoo from IUCN.

Farmer Groups

The workshop was separated into two groups since the participants came from two distinct groups: those working in agriculture and those fished. These two groups each had their own business. The two groups were then seated separately and followed the workshop

Introduction and brief profiles of participants

The workshop was organised at village Mitha Khan Dharejo and hosted by lead farmer and resource person Zulfiqar Dharejo. The host warmly welcomed all project team members, stakeholders and farmers.

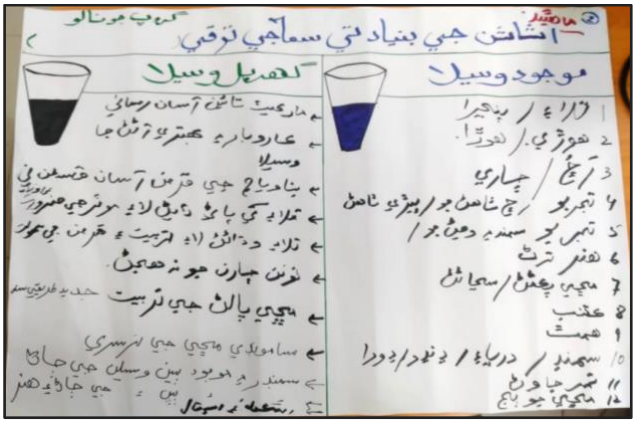
The workshop commenced with a recitation from the Holy Quran. Then Mr. Abdul Haq Dharejo and Mr. Qasim Lakho briefed the participants about ASSIB project and the objective to today's gathering. Mr. Abdul Haq Dharejo Allotted numbers 1 and 2 to the participants to form groups, all those with number 1 were grouped into one group, and those with number 2 were grouped into another group.

List and Introduction of Group Mahi Geer

	Age	Education	Occupation	Land/Ponds
1	25	nil	Farm labour/Fishing	1
2	27	nil	Farm labour/Fishing	
3	19	nil	Farm labour/Fishing	
4	36	nil	Farm labour/Fishing	2 acres
5	23	Primary	Farm labour/Fishing	1 acre
6	75	nil	Farm labour/Fishing	3 ponds
7	48	nil	Farm labour/Fishing	16 acre 3 ponds
8	55	nil	Farm labour/Fishing	3 fish cage, 16 acres
9	45	nil	Farm labour/Fishing	3 ponds, 2 fish cage
10	21	nil	Farm labour/Fishing	

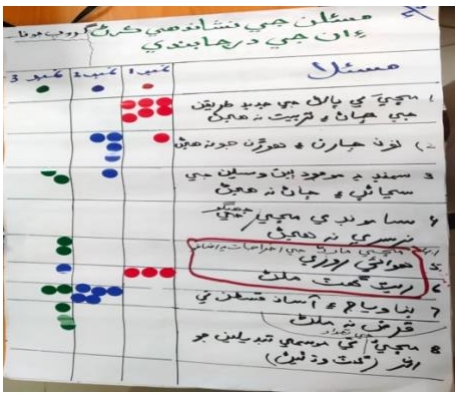
Asset Based Community Development (ABCD)

ABCD and its importance in the R^{2}EaLM approach was explained to the participants by master facilitators Babar Zaman and Mohsin Ali Channa, who described the ABCD approach using a visual representation of a half glass of water. When asked to describe the glass, most farmers replied, "half full glass of water". The farmers then discussed about the available resources with them and in their village (glass half full), and the resources that would be available and required to accomplish solution of their designated problem(s) (glass half empty). These were recorded on the flip chart.



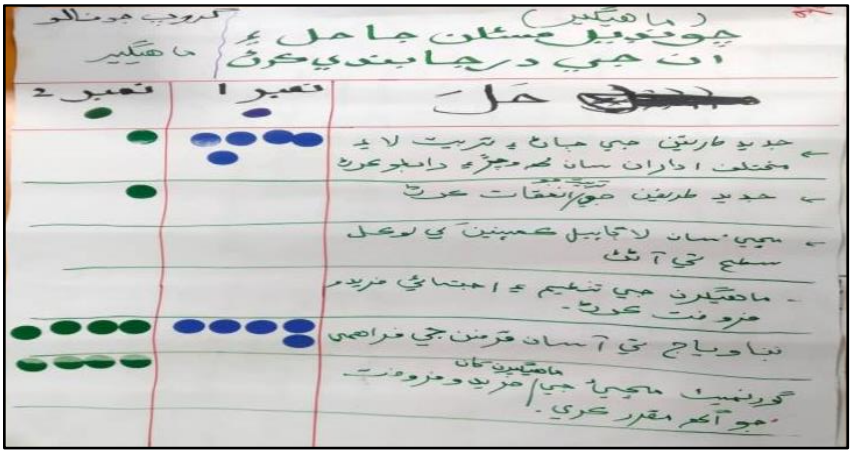
Mahi Geer Group ABCD (translated from flip chart above)	
Available Resources	**Required Resources**
Ponds, cages	Easily access to market
Small and big ships	Business Facilitation Resources
Net	Interest free and easy instalment loans
Experience of preparing nets for fish caching, and manufacturing ships	A water motor is required to water the pond
Experience of fish caching in deep sea	Training to increase the pond
Skills	Absence of new nets
Fish caching and identification of fish species	Training in modern fish farming
Relationship	Marine fish nursery
Enthusiasm	Knowledge of other resources in the sea
Sea, Ponds, lakes	School and hospitals
Mangroves trees	
Seed of fish	

Identification and prioritisation of problems



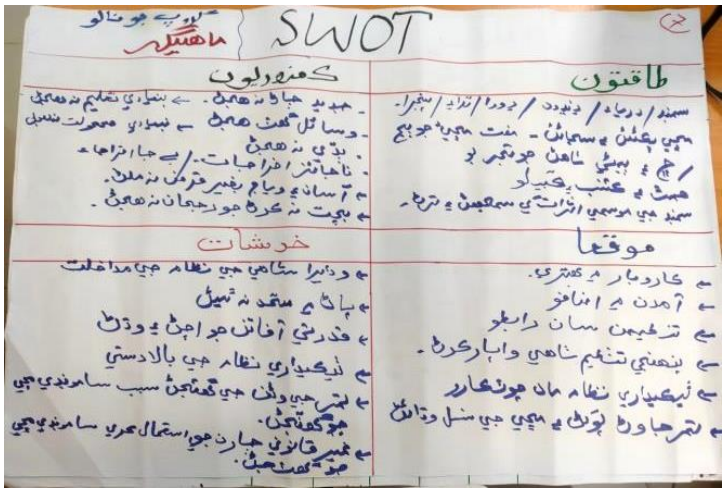
Translation of Flip Chart-3: Group: Mahi Geer "Identification and prioritisation of problems"			
List of problems	**Priority score**		
	1st	**2nd**	**3rd**
Training in modern fish farming	●●●●●●		
Non availability of new nets and new ships	●	●●●●	
No knowledge of other resources in the sea		●	●●
Non availability Marine fish nursery			
Increase in fishing cost			●●
Low rates of production	● ● ●		
No availability of Interest free and easy instalment loans		●●●●●	●●
Effects of weather on fish population			●●●

Sharing and prioritisation of ideas for solution of problem



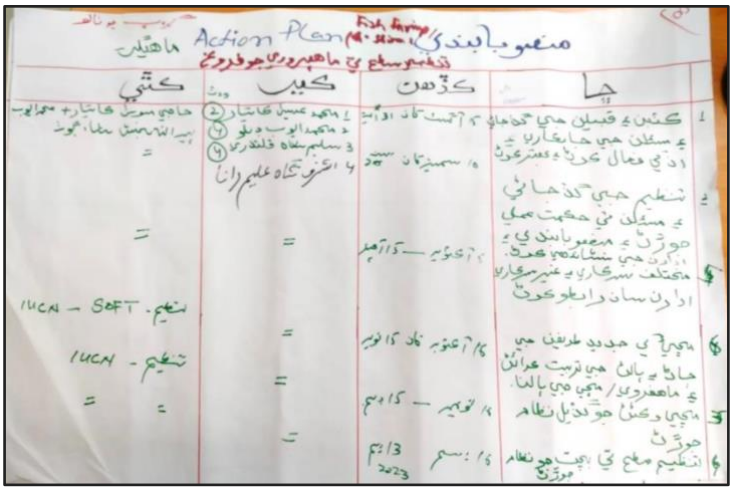
	Translation of Flip chart of group Mahi Geer	**First**	**Second**
1	Contacting various institutions for knowledge and training on modern methods	●●●●●	●
2	Identifying modern methods training		●
3	Introducing fishermen to the local level of fishing		
4	Interest free and easy instalment loans for fishermen	●●●●●	●●●●
5	Organisation of fishermen and collective bargaining, Fixing of fishing rate by Govt-		●●●

SWOT analysis of idea created to solve prioritised problems



Translation of Flip Chart SWOT Analysis (Mahi Geer Group)	
Strengths	**Weaknesses**
Sea, lakes, ponds, nets, ships Fish caching and identification Skill of manufacturing ships, Relations, community. Understanding and tolerating the effects of ocean weather	Lack of modern knowledge Lack of basic education, Lack of resources Lack of basic facilities ،Inflation and unnecessary expenditure No availability Interest free easy loan Lack of tendency to save
Opportunities	**Threats**
Business improvement, Increase in income Opportunity to make connections with organisations Opportunity to create your own organisation to buy and sell Break free from the contractual system Cultivation of mangroves and increasing fish population	Interference in the system by powerful and political people – not to unite Occurrence of natural calamities The supremacy of the contracting system Reduction in the mangroves can affect the number of sea fish population Depletion of fish population due to use of illegal nets

Development of Action Plans



Translation of Flip Chart: Action Plan Mahi Geer group **Promotion of fisheries at organizational level**			
What	**WHEN**	**WHO**	**WHERE**
Identifying issues tribally and trying to solve them collectively	15 August - 31 September	Muhammad Eisa Katiyar Ayub Dablo,Saleem Shah Qalandari, Ashraf Shah, Aleem Rana	Village Haji Moosa kkatiyar, Ayub Dablo. Pir Allah Bux Shah
Identifying issues by organization level and trying to solve them collectively with developing action plan	10 September - 30 September	do	do
Liaison with various government and non-government organisations	5 October - 15 October	do	do
Develop mechanism for collective bargaining	16 November - 15 December	do	do
Fishing training with modern technology and collective bargaining	16 October - 15 November	Organisation, IUCN, SOFT	
Creating a savings plan at the organisation level	15 December - 15 January	Organisation, IUCN	

Group 2

List and Introduction of Group A

	Age	Education	Occupation	Total land area
1	35	MA	Farmer	150
2	41	BA	Farmer	50
3	44	Matric	Farmer	50
4	45	Primary	Farmer	200
5	35	Primary	Farmer	0
6	34	8th class	Farmer	100
7	50	Intermediate	Farmer	2
8	32	BA	Farmer	0
9	28	Matric	Farmer	4
10	32	Intermediate	Farmer	4
11	47	Matric	Farmer	2
12	31	Intermediate	Farmer	2
13	30	Matric	Farmer	5
14	30	NA	Farmer	0
15	22	NA	Farmer	5
16	60	NA	Farmer	5

Asset Based Community Development (ABCD)

Group ABCD (translated from flip chart above)	
Available Resources	**Required Resources**
Land	Certified good quality sees which grow well in saline soil
Human resource	Technical Modern Agriculture Trainings
Water-agri equipment	Water courses should be cemented
Goverment departments	Drainage system
Farmyard manure	Small tube well on solar system
Trees	Trees plantation of Coconut and sapodilla
Domestic Animal	Strong contacts with agricultural institute
Basic agricultural information	Soil and water testing
Sudden river	

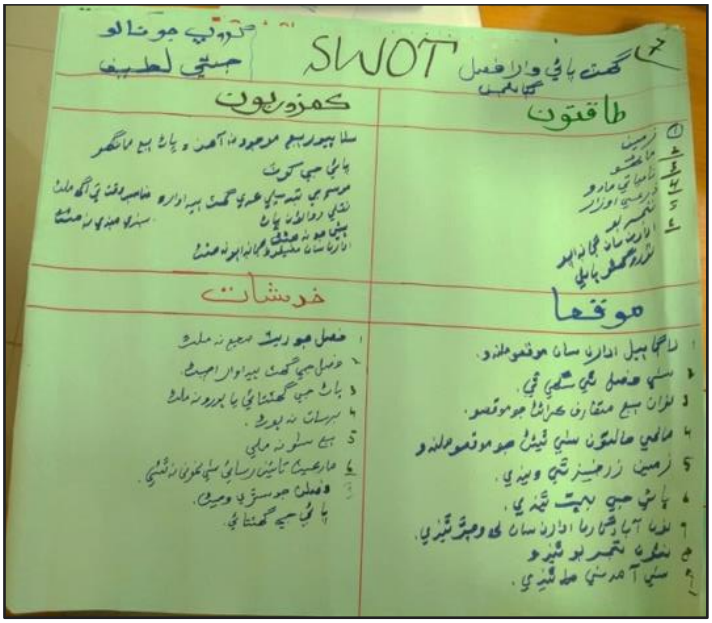
Identification and prioritisation of problems

Translation of Flip Chart-3: "Identification and prioritisation of problems"			
List of problems	**Priority score**		
Soil become saline	**1st**	**2nd**	**3rd**
Transportation shortage	3	1	
Water shortage	9	4	
Non availability of pure and certified seed	1	6	1
No awareness about latest and modern technologies and equipment's			1
No awareness about latest and modern production technology	1		3
Saline water of sea is coming forward	2		
No drainage system		1	2
Lack of information about seasonal crops			
No market for vegetables		1	3
Unseasonal rain		1	1
Heat build-up			3

Sharing and prioritisation of ideas for solution of problem

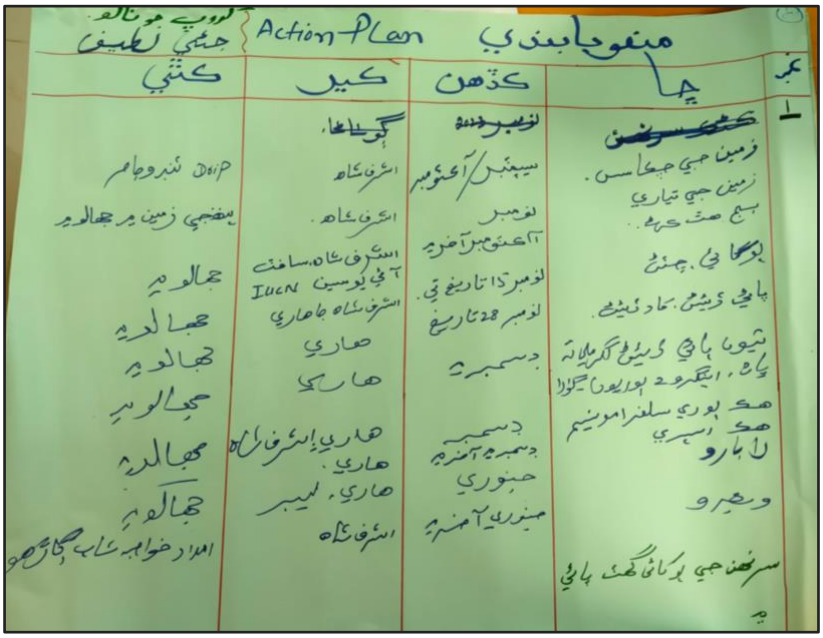
	Translation of Flip chart of group A	First priority	Second priority
1	It can be taken advantage of by damming the sudden river	●●●●	
2	Water should be stocked	●●	●●
3	Water efficient crops should be cultivated, barley, millet, brassica, Guwar, Sesbania, and fruit trees	●●●●●●●	●
4	Installation of tube well (for rich people)	●	●
5	**Salt water desalination system**		●●●●●●●
6	Mulching		
7	Only irrigate the crop when needed (no random or calendar irrigation		●
8	Cleaning of water courses,	●	●●●
9	Use Drip irrigation system	●	
10	cultivation in ring pit system		
11	Wara Bandi system		
12	Application of farmyard manure		
13	Application of laser leveller	●	

SWOT analysis of idea created to solve prioritised problems



Translation of Flip Chart SWOT Analysis (A Group)	
Strengths	**Weaknesses**
• Land is available, • Human resource • Farmyard manure is available • Experience • contact with institute • Water (limited)	• Good seeds are not available • water shortage • low yield because of climate effects • No rate in market at suitable time of crop sale • bad quality pesticides and chemical fertilisers • No vegetable market
Opportunities	**Threats**
• Opportunity to contact with related ag institutes • Crop could be good • opportunity to introduce new verities • There will be an opportunity to improve the financial condition • soil will be fertiliser • Water saving • will meet new progressive farmers • Will learn new experience	• Will not earn good rate of crops • Low yield of crops • water shortage • No rain at the time of need • Not getting the good seed • Crop failure

Development of Action Plans



Translation of Flip Chart : Action Plan group Cultivation of brassica in water shortage circumstances			
What	**WHEN**	**WHO**	**WHERE**
Soil testing	September/ October	Ashraf Shah	DRIP Tando Jam
Land preparation	November		At Jhalo , on the land of Ashraf Shah,
Searching and purchasing seed	In the end of October	Ashraf Shah, IUCN, SOFT	At Jhalo , on the land of Ashraf Shah,
Cultivation	15th November	Ashraf Shah	At Jhalo , on the land of Ashraf Shah,
Irrigation fertilisers application	from 28th November to harvesting (on need base and availability)	Ashraf Shah	At Jhalo , on the land of Ashraf Shah,
Fertilisers (Urea 1, NAP 1, Sulphur ammonium 1)	On 2nd day in the month of December (when water is available)	Ashraf Shah	At Jhalo , on the land of Ashraf Shah,
Harvesting	15th January	Ashraf Shah	At Jhalo , on the land of Ashraf Shah,
Sell to market	In January	Ashraf Shah	Imdad Khuwaja Stop Garho

Farmer Facilitators

One of the objectives of this gathering was to selection of those farmers who are responsible for leading all farmers in the future. Farmers who have been involved in the project since the beginning and have also conducted experiments with the researcher and benefited from these experiments. Have the ability to communicate these successful experiences to other farmers and other surrounding communities easily in their own language. In this regard, feedback was taken from the community and they were requested to select a facilitator. All the members gave their opinion cheerfully and selected four facilitators.

Selection of Farmers

The decision to choose a farmer facilitator was made by a vote in which all 16 members who were active farmers cast their votes. All 16 members' names were listed on a list, and each member was then asked to select a facilitator of their choosing. Each participant deliberately and formally selected the farmer facilitator.

Selection fishing community

This community group also used a vote to identify and select a facilitator.

Farmer Facilitator Selected

Sr.	Name	Education	Farming Experience (Years)	Group	ASSIB Project experience	Attended all workshops, Trainings, meetings, exposure visits.
1	Saleem Shah Qalandari	Matric	25	Agriculture	Since the beginning	Selected farmers having very good relations with the communities. All are agreed to provide their services voluntarily.
2	Ashraf Shah	B.A.	15	Agriculture	Since the beginning	
3	Gulsher Shah	Matric	10	Agriculture	Since the beginning	
4	Eisa Katiyar	Nil	Fishing experience 30 years	Fisheries	Since the beginning	
5	Ayub Dablo	Nil	30 years	Fisheries	Since the beginning	
6	Salman Dablo	Nil	8 Years	Fisheries	Since the beginning	


ADAPTING TO SALINITY IN THE SOUTHERN INDUS BASIN
Workshop on
RURAL RESEARCH AND ENGAGEMENT LEARNING MODEL (R²EaLM)
Friday 11th August 2023
Venue: Village Ghulam Hyder Samoo - Keti Bandar
Society of Facilitators and Trainers (SOFT)
International Union for conservation of Nature- IUCN

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