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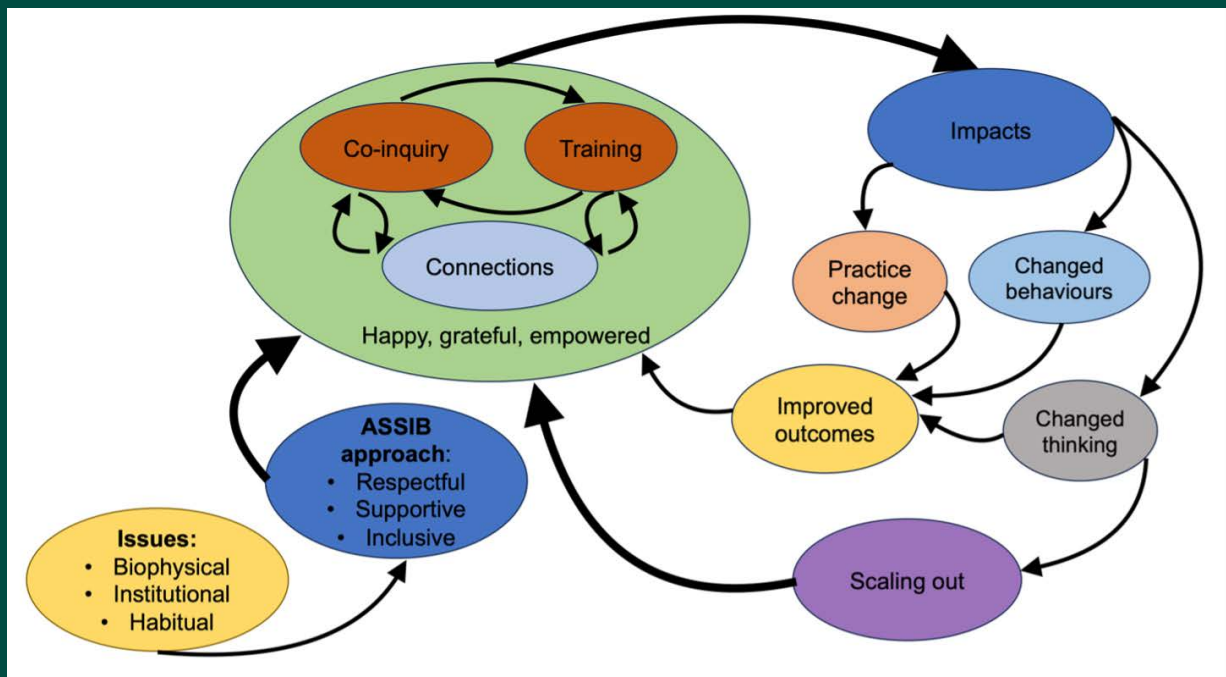
Gulbali Institute

Agriculture Water Environment



Adapting to Salinity in the Southern Indus Basin: Stories of Change

Catherine Allan, Tahira Baloch, Mohammad Yousif Channa, Mohsin Ali Channa, Sandra Heaney-Mustafa, Nadia Jabeen, Benazir Kumbhar, Ifrah Naseem Malik, Michael Mitchell, Iqra Mohiuddin, Muhammad Faisal Riaz, Arzoo Rubab, Akhtar Hussain Samoo, Sayed Muhammad Ali Zahid, Babar Zaman



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Executive Summary

The Adapting to Salinity in the Southern Indus Basin (ASSIB) project has three inter-related research areas. This report contributes to the overall assessment of the second and third research areas that relate to implementing co-inquiry into salinity adaptation options and planning strategies with affected communities, and demonstrating best practice methods for such collaborative research in ways that build community adaptive capacity.

This evaluation uses a situationally tailored version of the Most Significant Change (MSC) method. The approach to data co-creation for this report was undertaken with the review and approval of the Charles Sturt University and University of Canberra Human Research Ethics Committees. Fifty-seven interviews focused on change were undertaken between September 2022 and March 2024. Interviews were co-created purposefully with ASSIB project participants, the majority of whom were farmers and fish raisers. Interviews were led, recorded and transcribed by members of the project's community engagement team (CET).

Analysis of interview transcripts involved building substantive information from the individual transcripts to produce thematically organised insights. These themes were:

- The context of the ASSIB project (issues faced by communities).
- Perception of ASSIB's approach to learning and change.
- Forms of learning.
- Connections.
- Emotional response to co-inquiry.
- ASSIB learning and outcomes: evidence of impact; changed practices, improved outcomes, changed behaviours and changed thinking.

Many of the stories of change provide examples of new practices and their outcomes, providing evidence of changed human conditions brought about by involvement with the ASSIB project.

The information provided in the co-created narratives can also be considered in relation to overarching discourses. Part of the project design was a very deliberate and ongoing discourse related to recognising the assets of a community. Another deliberate choice of discourse was that of learning: no one knows everything, so learning together and over time can be powerful.

Many of the narratives dwelt on change, as expected when using the MSC evaluation method. Less anticipated was the degree of nuance in the narratives of change. The narratives included indications of changed behaviour and changed thinking in addition to changed practices, which is exciting as all these changes relate to increased adaptive capacity. The changed thinking extends to individuals within communities choosing to support the learning of their friends and families beyond the funded project time. Overall, the stories suggest increased adaptive capacity as a key outcome of the project.

The data presented in this report suggest that carefully considered and supported co-inquiry should be considered as a means for transformational change in poorly resourced areas facing salinity, climate change and systemic institutional neglect. Such co-inquiry does not need to be vastly expensive, but should have sufficient resources to enable facilitation, risk mitigation, and longevity.

The results suggest that focusing on adaptive capacity can be worthwhile in complex social-ecological situations. The results also suggest that a focus on adaptive capacity can be achieved through a process of co-inquiry based around principles of inclusivity.

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1. Introduction

This report presents an evaluation of, and reflection on, the impacts of the ACIAR funded project Adapting to Salinity in the Southern Indus Basin (ASSIB) in relation to building community capacity to adapt to salinity and change. A brief background to the project's approach is followed by a description of the process, results and implications of a qualitative, narrative-based inquiry. The report concludes with a discussion and recommendations for use of the insights developed from the ASSIB project.

1.1 Foundations

ASSIB builds on the outputs, practical lessons and professional networks from previous ACIAR funded projects in Pakistan (Heaney-Mustafa et al., 2021; Mitchell et al., 2020; Mitchell et al., 2018; Punthakey et al., 2021; Spriggs et al., 2016).

1.2 ASSIB

The ASSIB project has three inter-related research areas. The first is focused on improving multi-scale knowledge and systemic understanding of salinity in southern Indus Basin landscapes. The second involves implementing co-inquiry into salinity adaptation options and planning strategies with affected communities. The third seeks to explore and demonstrate best practice methods for such collaborative research in ways that build community adaptive capacity.

This report contributes to the overall assessment of the second and third research areas, which together have three expected outcomes:

1. The project's case study community members and their institutional support networks have improved understanding of the opportunities for, and constraints to, current options for adapting to salinity.
2. Individuals and groups (including women and youth) from the project's case study communities are building capacity to plan their own futures for adapting well to salinity.
3. Relevant government departments, policy makers, donors and other institutions have engaged with and are supporting locally and collaboratively determined adaptation planning and action, including through co-development of future participatory research projects.

The project is engaging with selected communities in southern Punjab and Sindh to help to answer the project's research questions while benefitting them directly. Selection of the farming/ rural communities included them being impacted by salinity, that there was some indication of change already occurring or desired, and having a partner or collaborating organisation willing to be involved in collaborative research activities with the community. The full list of selection criteria is provided in Appendix 1.

The ASSIB project's focus is on enhancing best practice co-design and co-inquiry research methods. Intended outcomes include improved information and knowledge sharing through to increased skills, confidence, and practice change among those managing and living in salinity affected landscapes. The project was also guided by an articulated strategy to include women and younger people from the farming community; ASSIB's Gender Strategy.

Facilitation of the co-inquiry in Pakistan was undertaken by members of the Community Engagement Team (CET). The CET includes staff from the International Union for Conservation of Nature (IUCN) and the Society of Facilitators and Trainers (SOFT), an Islamabad-based NGO. The CET took lead responsibility for all community engagement activities and documentation of community-related research activities. They also contributed to the design of future scaling-out strategies. The SOFT members were based with project partner Muhammad Nawaz Sharif University of Agriculture, Multan (MNSUAM) in southern Punjab or with Mehran University of Engineering and Technology (MUET) in Sindh, while the IUCN team focussed on Tippi Dublo in the coastal regions of Sindh, with support from the Sindh-based SOFT team. The CET were guided and supported by the ASSIB project's coordinating team, in particular Drs Mitchell, Heaney-Mustafa and Allan, using intensive in-person sessions in Pakistan, and regular on-line meetings.

1.3 Evaluation

Evaluation is a type of applied research undertaken to understand a specific activity such as a project, or a program. Unlike auditing, which checks that tasks were done, milestones were achieved and money was spent appropriately, evaluation research seeks evidence of impact. Such evidence can be used to support changes to future practice, and to explore the success or otherwise of a project, program or other activity. Although it can draw on and add to theory, evaluation remains focused on the on-ground, specific, practical situation: it is a very applied type of research (Patton, 2002). Evaluation can use quantitative, qualitative or mixed research methods.

The evaluation behind this report uses a qualitative method, based on guided conversations among project participants which yielded narratives. Narratives are an important source for evaluation because they are chronological, meaningful stories created for a specific audience and purpose (Elliot, 2005).

An important question for this evaluation is whose narratives should be included? Given the objectives and approach of the project, this research sought narratives from among all the 'actors' involved. This included:

- The farmers and their families and communities involved in the project.
- The CET members that facilitate the project.
- University researchers and agency staff that provide advice and information to project activities.
- The ASSIB project coordinating team.

2. Methods

2.1 Stories of change

This evaluation uses a situationally tailored version of the Most Significant Change (MSC) method. MSC is becoming a regular evaluation approach used in a range of 'development' projects globally, and involves the regular collection and participatory evaluation of stories from project participants (Dart & Davies, 2003). Potential use of this general method was proposed to members of the CET, who responded positively. The steps in the process for this evaluation were:

1. Participatory coaching of CET members.
2. Developing the research question and approach.
3. Co-creation of narratives.
4. Regular review of emerging outputs.
5. Analyses of combined narratives.

2.2 Participatory coaching

The overall research activity was led by experienced social researchers from Australia; Drs Heaney-Mustafa, Allan and Mitchell. Most of the data co-creation, and some analysis and report writing, was undertaken by members of the CET. Their regular access to the various project participants and shared linguistic and cultural ties with many of them was instrumental in achieving access to a wide range of farming and fisher participants. Undertaking interviews over time was also an important opportunity to build the capacity of CET members in undertaking evaluation and other social research.

The CET members were supported in their development firstly by training in ethically and methodologically sound interview and notetaking techniques during an in-person workshop in Multan in September 2022. The coaching included observing Drs Heaney-Mustafa and Allan undertake initial interviews with researchers and project team members, including being interviewed themselves. Reflection on the process and transcripts of these initial interviews was started at the Multan workshop and continued during the regular on-line meetings of the CET and the Australian social researchers. As CET members undertook subsequent interviews, their transcripts were shared among the team, and suggested improvements to interview and transcription process were discussed.

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2.3 Developing the interview questions and approach

The initial questions suggested for the semi-structured, conversational approach to co-creating narratives were:

Could you tell me briefly about what you do in the ASSIB project? How has working with ASSIB project impacted on you? And then ask: What has been the most significant change for you since you've been involved in the ASSIB project?

This approach was revised following discussion with the group early in the data co-creation to:

Please tell me a story to describe what you think has been the most significant change for you as a result of your involvement with the ASSIB project.

A summary of the interviewing guidelines developed after the Multan coaching session is provided as Appendix 2.

2.4 Co-creation of narratives

Fifty-seven interviews focused on change were undertaken between September 2022 and March 2024. Interviews were co-created purposefully but opportunistically, that is, they were undertaken with project participants, but as part of other planned activities rather than during specially arranged conversation times. As described above, the individual interviewers were members of the CET, including Drs Allan and Heaney-Mustafa:

Catherine Allan	Iqra Mohiuddin
Tahira Baloch	Arzoo Rubab
Mohsin Ali Channa	Faisal Riaz
Yousif Channa	Akhtar Hussain Samoo
Sandra Heaney-Mustafa	Sayed Muhammad Ali Zahid
Benazir Kumbhar	Babar Zaman
Ifrah Naseem Malik	

Interviews lasted between 10 and 60 minutes, mostly at the site of the ASSIB activity of the day. The CET members generally undertook the interviews in pairs, with written notes being taken by one while the other managed the conversation. For the farmer-related interviews, women were interviewed by women from the CET, and men by men from the CET. The interviews were conducted in local language; for example, interviews in Sindh were mostly undertaken in Sindhi, and in the Multan area in the local Saraki language. Notes were taken in the language of the interview, and/or directly into English. Where necessary, the notes were translated into English by the relevant CET members. All notes were ultimately shared as electronic, typed documents in English.

In most cases, the translated interview transcripts were written up as though they were the translated voice of the interviewee. However, in some cases, these translated transcripts were produced using third person pronouns by the note-taker referring to what the interviewee had said. The extracts provided in this report have been revised so that are almost all written in the first person as though spoken by the interviewee themselves. The exceptions were retained as they contained additional insights provided by the note-taker.

Some interviews with researchers and project team members were undertaken by Drs Allan and Heaney-Mustafa in September 2022 and March 2024, the latter as part of the International ACIAR Salinity Futures Symposium in Vietnam. Some later interviews were also conducted by them on-line. These interviews were in English, and hand-written notes were transcribed by the interviewers.

2.5 Regular review of emerging outputs

As each interview transcript was completed it was shared among the CET and Drs Mitchell, Heaney-Mustafa and Allan, who sometimes offered further edits to improve and verify English language translation, and then added to a central repository. Sharing the transcripts enabled both group and individual feedback on the process and content of the interviews over time. Some CET members also accessed this data set for their own analyses as part of drafting journal papers focusing on one or more aspects of ASSIB project research activities in their area.

The transcripts in the shared repository are a collection of narratives, or stories, which can be considered a corpus for analysis. Participatory review of stories and themes emerging in the corpus was undertaken during regular on-line project CET meetings.

2.6 Analyses

Analysis of the corpus started with the transcription and translation as CET members developed deeper understanding of the stories they had co-created. Later evaluation of the whole collection of transcripts was led by Dr Allan, and group discussions with CET members. All team members had opportunities to comment on the emerging analysis and report during development. This was both to ensure accuracy and relevance, and to contribute to the on-going capacity building of the team.

Quantification of items is not appropriate for this analysis given the purposive sampling and conversational data creation method (Silverman & Lincoln, 2003). Rather, the analyses involved exploration of meaning related to each of the stories, and of the corpus. Each story of change within the corpus can be considered as both a text, and a 'discourse event' – described by Cameron (2007, pp. 113-114) as "a contextualised stretch of talking-and-thinking, such as a specific conversation between individuals, with a beginning and an end that indicate a degree of completion and wholeness." The analysis of interview transcripts thus occurred at two levels. Firstly, there is substantive information from the individual transcripts that provides thematic insight. Many of the stories of change provide examples of new practices and their outcomes, providing evidence of changed human conditions brought about by involvement with the ASSIB project. Secondly, the information provided in the co-created narratives can be considered in relation to the discourse event, the context in which the narrative was co-created, and the overarching storylines in the corpus.

2.6.1 Thematic analysis

Thematic analyses identify and articulate implicit and explicit ideas in the data, with coding typically used to represent these (Guest et al., 2012). For this evaluation the initial thematic categorisation and coding was undertaken by Dr Allan, with the assistance of NVivo® software. Both inductive and deductive coding (Neuman, 2014) were used to build a list of thematic categories, referred to here as a codebook. An example of the deductive coding was the development of a thematic category labelled 'change' at the beginning of the analysis; this reflects the interview focus on change. Most of the coding categories were, however, developed and modified inductively; that is, they emerged from close reading of the narratives. Even the initial code 'change' was modified to reflect the emerging nuances in the narratives. As the reading and coding progressed three subcategories of change emerged; changed practices, changed behaviours, and changed thinking. There were also stories of improved outputs related to changed practices. These four codes were eventually grouped together under the theme Evidence of Impact.

The analysis was undertaken on the primary data unit of the interview transcript, as at least one interview involved multiple participants, and some interviews were with the same participant but at different times. Each transcript was assigned attributes of role, site and gender to enable deeper exploration of the data.

2.6.2 Discourse

Discourse can be considered as an interrelated set of texts and talk that brings our social reality into being (Phillips & Hardy, 2002). Focusing on discourse as a window to the world is acknowledgement that our realities are at least partially constructed through social processes. Analysis of discourse looks at and through those social process including talk, text and images. Much discourse analyses rely on specific language elements, such as metaphors, to go below the surface of the substantive text. A focus on actual words is less suitable in this research as many of the voices are heard through lenses of translation, transcription and hierarchies.

Instead, other elements in the transcripts are considered, including themes and the immediate and longer-term contexts of the co-creation of the stories of change. A collaborative discussion about the thematic output from these interviews is guided by the question: How is change being enacted in the corpus?

2.7 Ethical considerations

Research on or with humans must be undertaken respectfully, and in ways that at least do no harm to, and at best empower, research participants (Israel & Hay, 2006). The approach to data co-creation for this report was undertaken with the review and approval of the Charles Sturt University and University of Canberra Human Research Ethics Committees.

The principle of informed consent was foundational to the co-creation of data. Consent to take part in an interview was sought after the purpose of the interview and the research was explained verbally, and potential participants had the opportunity to ask questions. Participants were specifically asked if their names could be used for publication and all but one agreed. In this report we have chosen to provide an identifier for each interview to further protect the privacy of individuals. Each interview transcript has an identifier numbered by broad category and rough chronological order.

2.8 Presentation

The results of the analyses are presented in a range of formats in this report. Visual summaries of aspects of the coded information are provided, followed by a narrative summary of the themes of the interviews that relate to evaluating the impact of ASSIB. Extracts from selected transcripts are presented in italics with the transcript designator provided at the end of the extract. While these sections of text are taken directly from the transcripts, readers should be aware that they may not always represent verbatim what a participant said. The verbal exchanges of the interviews have been rendered into text through orthographic transcription, which imposes a structure not necessarily present in the conversation. Additionally, most of the interviews are translated from the language of the conversation, sometimes during note-taking, at other times as a separate step. As noted above, some of the transcriptions used third person renditions of the stories, but these have for the most part been converted to first person renditions for consistency in the following section.

3. Results

3.1 The data set

Fifty-seven interviews were undertaken. Because the aim of this project is about building farmer community capacity to adapt to salinity, the data co-creation was heavily weighted toward the farmers and their communities, including farmers, fish raisers and farmer facilitators. Farmer facilitators refer to farmers and fish raisers who were elected by their communities to act as facilitators to scale out the co-inquiry approach for adapting to salinity to other farming and fishing communities. Others involved in the ASSIB project were also invited to discuss it in interview, including researchers who helped with action plan development and implementation, and other members of the larger project team with management and/or community engagement responsibilities. Table 1 provides a summary of the interviews undertaken, indicating the spread of roles, gender and sites.

Table 1 Summary of Story of Change interviews undertaken between September 2022 and March 2024.

Role	Gender	Site
28 farmers	26 female	7 Tippun Dublo
4 farmer facilitators	31 male	12 Malwah
3 fish raisers		7 Meerkot
9 researchers		7 Dera Haibat
12 other project team members		2 Basti Kulab
1 anonymous		22 non site specific/ anonymous

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The attributes related to the individual interview transcripts are provided in Table 2, again providing information on gender, sites and roles. The individual transcript identifier that is applied to the extracts in the following sections is also provided. Fishers, farmers and farmer facilitators are all covered by 'FARM'. The site for researchers and other project team members is not provided in Table 2 as the small numbers involved would make identification of individuals possible.

Table 2 Identifier and details of each co-created interview with ASSIB actors between September 2022 and March 2024

Interview identifier	Gender	Site	Role
FARM 1	Male	Meerkot	Farmer
FARM 2	Male	Meerkot	Farmer
FARM 3	Male	Dera Haibat	Farmer
FARM 4	Male	Tippun Dublo	Fish raiser
FARM 5	Female	Tippun Dublo	Farmer
FARM 6	Female	Malwah	Farmer facilitator
FARM 7	Female	Malwah	Farmer
FARM 8	Female	Malwah	Farmer
FARM 9	Male	Meerkot	Farmer
FARM 10	Female	Meerkot	Farmer
FARM 11	Female	Meerkot	Farmer
FARM 12	Female	Malwah	Farmer
FARM 13	Female	Dera Haibat	Farmer
FARM 14	Female	Malwah	Farmer
FARM 15	Female	Dera Haibat	Farmer
FARM 16	Female	Tippun Dublo	Farmer
FARM 17	Female	Basti Kulab	Farmer
FARM 18	Male	Malwah	Farmer
FARM 19	Male	Dera Haibat	Fish raiser
FARM 20	Female	Basti Kulab	Farmer
FARM 21	Female	Meerkot	Farmer
FARM 22	Group of Females	Meerkot	Farmers
FARM 23	Male	Dera Haibat	Fish raiser
FARM 24	Male	Tippun Dublo	Farmer
FARM 25	Male	Malwah	Farmer
FARM 26	Male	Malwah	Farmer
FARM 27	Male	Tippun Dublo	Farmer
FARM 28	Male	Tippun Dublo	Farmer
FARM 29	Female	Dera Haibat	Farmer
FARM 30	Female	Dera Haibat	Farmer
FARM 31	Male	Malwah	Farmer facilitator

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Interview identifier	Gender	Site	Role
FARM 32	Female	Malwah	Farmer
FARM 33	Female	Tippun Dublo	Farmer facilitator
FARM 34	Male	Malwah	Farmer
FARM 35	Male	Malwah	Farmer facilitator
RES 1	Female		Researcher
RES 2	Unassigned		Researcher
RES 3	Female		Researcher
RES 4	Male		Researcher
RES 5	Female		Researcher
RES 6	Male		Researcher
RES 7	Male		Researcher
RES 8	Male		Researcher
RES 9	Male		Researcher
PRT 1	Female		Other project team member
PRT 2	Male		Other project team member
PRT 3	Male		Other project team member
PRT 4	Male		Other project team member
PRT 5	Female		Other project team member
PRT 6	Male		Other project team member
PRT 7	Female		Other project team member
PRT 8	Male		Other project team member
PRT 9	Male		Other project team member
PRT 10	Male		Other project team member
PRT 11	Male		Other project team member
PRT 12	Female		Other project team member
Anonymous	Male		Not applicable

The results of the thematic coding, as they relate to the evaluation questions and to the Gender Strategy, are presented below. The complete codebook, based predominantly on inductive (emergent) theme development, is provided as Appendix 3.

3.2 Thematic understanding of impact

3.2.1 The context of the ASSIB project

The focus of the interviews was change arising from ASSIB, but it is instructive to first consider the range of issues raised during the interviews by the people (Figure 1). These issues were often spoken of as a bundle of related problems, for example limited resources, and the need for middlemen, and poor-quality seed, each compounding the other.

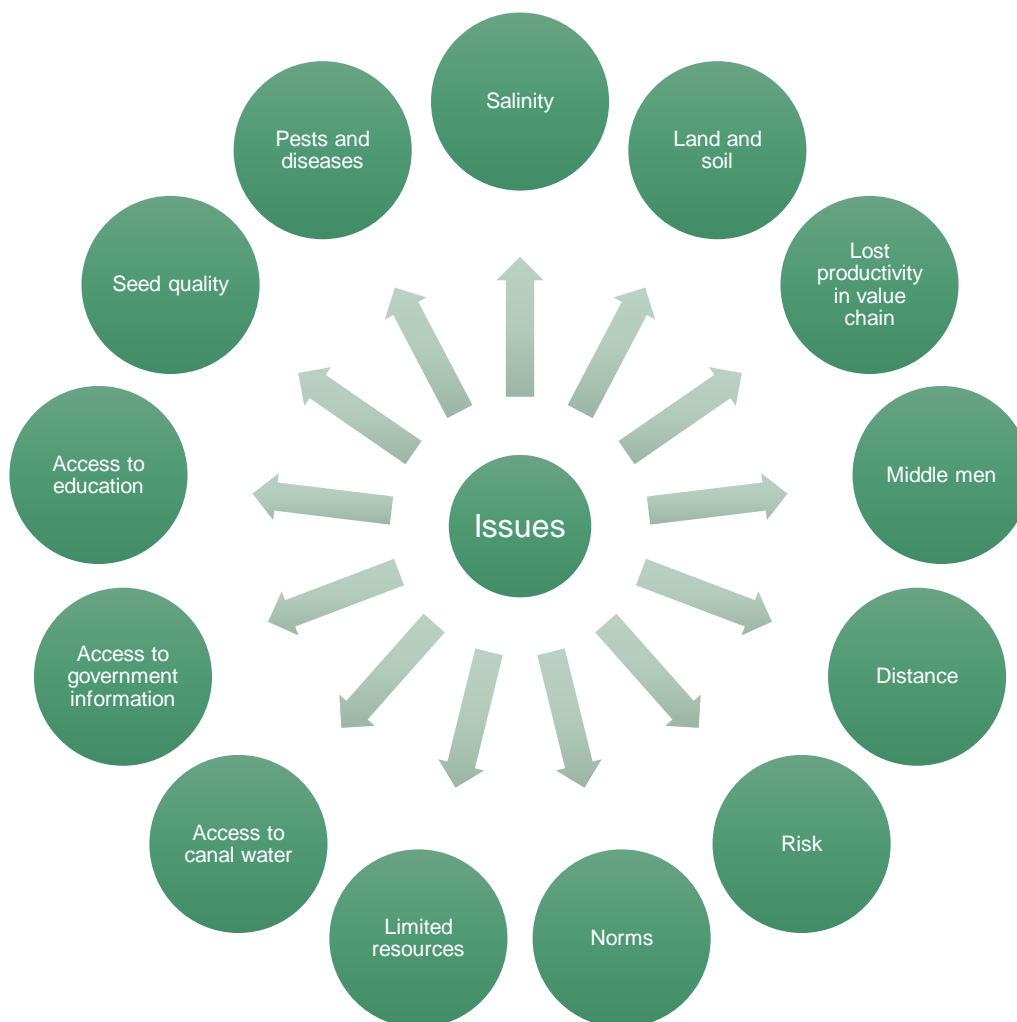


Figure 1 The types of issues raised while discussing ASSIB and change.

Unsurprisingly, but confirming the project position and need, salinity and poor soil quality were raised by many of the farmers and some researchers. For example:

...the land where the yield is low, the germination is not good, the plant is not healthy, we call it weak land. (FARM 34)

I was searching for this type of project because soil salinity and water shortage is the main issue for us. (FARM 1)

That land was arable but the salinity in it was very high...In the first two years, we planted rice on it, but, in both years, the yield was very low – 20 to 22 maunds – due to salinity. (FARM 35)

The bright spots were finalized through an inclusive process. This was on land that had been abandoned for the past 30 years because of salinity and waterlogging. (RES 9)

Poor access to canal water was also raised, as was the lack of control of it even when available:

The decreasing yields are basically due to the increasing scarcity of the canal water. The alternative to canal water are tube wells which not only cause salinity but also their rent is high. (FARM 23)

...one acre has not been cultivated since long because of a shortage of irrigation water and a shortage of money. (FARM 24)

...we cannot control water management so farmers water when they can. (PRT 3)

Water was just one of the constraints raised in the interviews. Limited resources were discussed in relation to money, but also to time and access to education.

When I was in middle class my mother passed away. She worked in the field as a farmer picking cotton, harvesting wheat, fodder cutting. I was unable to continue my education because of poverty. My father is a poor farmer who only makes enough money to support our daily needs. (FARM 7)

Because their lands are salinity affected, most women in the village earn an income as hired labourers on the farms of other landowners. (FARM 22)

Another constraint raised was the poor engagement with government and other agricultural advisors, a problem that was even greater for women in the farming community:

There was no government or non-government organization working in our villages. No extension department official has visited our village for any activity.... if our animals are diseased or unfit, and the men are not available or unable to interact with livestock health officers, then the women would discuss with older women in the village about the animal's condition and treat them based on the older women's instructions. That's why we are highly in favour of having women livestock officers to work in our village because our women are strictly unable to talk to outsider men. (FARM 22)

A range of structural issues were also raised: post-harvest losses, the necessity of 'middlemen' to provide loans to enable purchase of agricultural inputs, and district norms and habits. Some current and historical agricultural practices for addressing salinity were discussed, for example:

... since the time of their ancestors they had been growing a grass known as Shor mar grass [Digitaria horizontalis] for saline affected lands to reclaim it and as animal fodder. (FARM 29)

However, the reliance on growing single crops that farmers were familiar with, coupled with strong local norms and risk aversion, suggests a generally inflexible approach to agriculture, even as climate change and salinity create a declining situation:

[We use] traditional methods included routine crop selection (i.e., cotton, wheat), no crop rotation, no selection of particular seed varieties that are suitable, routine application of fertilizer without soil testing, and irrigation without observing moisture. (FARM 18)

I have been cultivating wheat, cotton, and mustard from the beginning. Apart from that I do not cultivate any other crops. I love these crops and they are the only ones that give me profit. Why not think of planting other crops? I had submitted that I consider this crop to be easy, and I have sufficient experience with it...Because in our area farmers do the same as what their neighbours did without investigating and responding to their problems. (FARM 34)

The issues discussed above are from the perspective of farmers and fishers. The issues mentioned by researchers during the interviews were more broadscale, rather than focused on individual situations. Researchers spoke of salinity, and also of the resource issues faced by farmers, for example:

...he pointed out the financial constraints small farmers experience so that at the beginning the project has to purchase some seeds and gypsum. He also commented that farmers with small land plots feel restricted to do experiments – it is too risky. (RES 8)

Although healthy food was discussed by bright spot participants during the latter half of the project, malnutrition as an issue was only raised during the interviews by a researcher:

...because malnutrition is one of the main issues, as they are inactive and not eating enough food for growth. The communities face different diseases related to their stomachs (RES 1).

3.2.2 Perception of ASSIB's approach to learning and change

The co-inquiry approach of ASSIB, structured around SERL and ongoing collaborative learning, is not commonly used in Pakistan. As we analysed how farming and fisher participants spoke of their situations, themes emerged of how they understood and experienced the project approach as key elements of the most significant changes they had experienced (Figure 2). These can be summarised as themes of respect and inclusion.



Figure 2 Themes related to how farmers and fishers understood and experiences the ASSIB approach to learning for change.

3.2.2.1 RESPECT IS APPRECIATED

Figure 2 Shows the sub-themes related to the project being perceived as supportive, respectful, culturally aware and friendly. Just a few examples of these reflections are provided below:

I am very satisfied with the ASSIB project because every decision is discussed with me and my family members and our traditional knowledge and opinions are valued. (FARM 27)

But I also want to share a very important thing, that if SOFT team was not talking with us in our local language and helping us at each and every step in our own language, the outcome would have been different. Because of this, we never felt left out of a discussion because the SOFT team was always speaking in local languages which gave us the confidence to be a part of the co-inquiry process. (FARM 11)

All the women are motivated to learn to improve their agricultural and livestock practices through the ASSIB team training sessions, but they are not allowed and not willing to learn from male trainers. This is against their cultural norms and they don't like to learn from outsider men. (FARM 22)

It's a great platform for me for friendly learning about the SERL model. (FARM 6)

The farming community participants valued support provided with genuine respect. Being part of the research, rather than just recipients, was a key aspect enabling this supportive approach.

3.2.2.2 INCLUSION BUILDS CONFIDENCE

Many of the farmers in the project felt included – feeling they were co-researchers, or at least part of the project decision making. A few examples indicate the profound impact this had:

I felt that I was part of research from the start because I was a part of decision with IUCN about our options of the juvenile fish seed that needed to be stocked, and I discussed about what fish will yield more income. (FARM 4)

Yes, the most beneficial thing in co-inquiry was that we were the part of experiment planning, and no one was imposing knowledge on us – we only planned work that was accessible and adaptable with our own resources. In the initial stage, we were thinking that it will be like student research that someone will dictate to us and then we will do the things. But after the SERL workshop, we realised this was a co-inquiry process and we were part of the planning for the work plan. (FARM 11)

The things/issues involving a participatory approach have good results, and the speciality of this programme is that everyone can feel like they are a researcher.... farmers, labour, researchers, academics, students, facilitators. (FARM 18)

From the beginning, my advice has been considered at every stage of the co-inquiry. All vegetables and field crops were grown with my advice, with some very minor changes. I told the team about the best time for which type of crop could be grown and which was not suitable at this time, and thanks to the team, they followed. (FARM 24)

...when all the women sit in the workshop with ASSIB team and shared their ideas about the problem solving then I observed that my community women could also generate ideas for the betterment of their livelihoods with the better ideas for agricultural farming ... because the fruiting trees plantation idea was generated by the community women. (FARM 30)

Researchers and other project team members also discussed how this inclusive project differs from some previous experiences:

My first ACIAR project was in 1986-1992, a lot of information didn't make it onto farmland, it stopped at the boundaries of the university farms. (PRT 2)

We [one of the SOFT Team members] sit and talk about how knowledgeable the farmers are. So going to the field and telling farmers they are wrong does not work. (PRT 5)

Among those who took the students to the field to do water sampling, I can see a change. They used young men and women in the teams with the farmers and then sat and had long discussions about the results and they learned a lot from the farmers. So they respect the farmers more now. (RES 8)

In many projects the government would generally follow the service delivery approach and would give the farmers things, like gypsum, and tell them to do it; one end giving, the other end receiving. Other projects collect information, maybe provide some information, but really in return do not give much. This project [ASSIB] is good because it takes time and is inclusive. (RES 9)

One of the key and unique part of this project was that, you know, like it's not more like working with farmers from one side, that going and telling them rather, I mean engaging them into the research so that they can become a researcher, and then they can continue these kinds of activities. This is a very neat and unique way of doing this this work. (PRT 11)

A feature of the project was that some researchers felt they had learned from the farmers, for example:

I have gained a lot of knowledge from the farmers, and this has changed my attitude to farmers. I am careful now as they know more than me. (RES 8)

Here we learnt many things. (RES 6)

3.2.3 Forms of learning

Learning is a key component of the ASSIB project's Theory of Change as represented by the Impact Pathways Analysis (refer to annotated version in Appendix 4). There were many ways in which project participants spoke of learning. Although all of these are related, these are presented in two separate figures for clarity. One cluster of comments relates to learning through co-inquiry (Figure 3); the other cluster relates to traditional training (Figure 4).

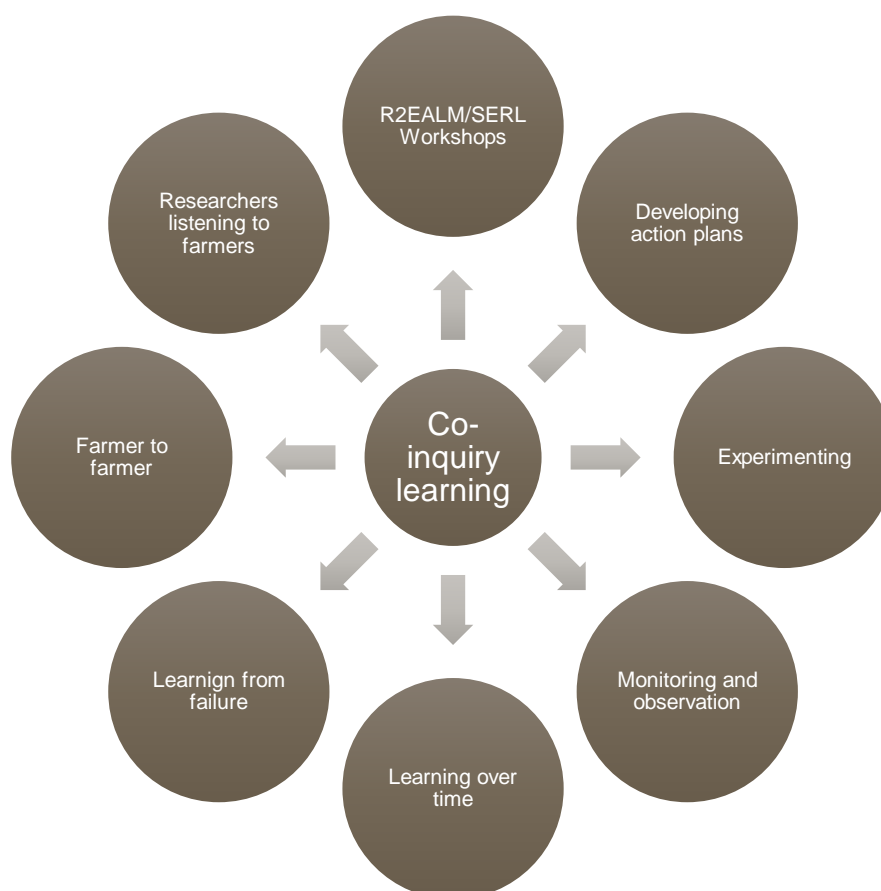


Figure 3 Aspects of learning through co-inquiry as described in the stories of change

Adapting to Salinity in the Southern Indus Basin: Stories of change

Catherine Allan, Tahira Baloch, Mohammad Yousif Channa, Mohsin Ali Channa, Sandra Heaney-Mustafa, Nadia Jabeen, Benazir Kumbhar, Ifrah Naseem Malik, Michael Mitchell, Iqra Mohiuddin, Muhammad Faisal Riaz, Arzoo Rubab, Akhtar Hussain Samoo, Sayed Muhammad Ali Zahid, Babar Zaman

3.2.3.1 CO-INQUIRY/ EXPERIMENTAL FORMS OF LEARNING

A foundational component of the ASSIB project was learning for adaptation through collaborative planning and action. This was facilitated through a workshop process initially referred to as Rural Research Engagement and Learning Model (R2EaLM), itself built on the previous farmer learning model (FILM). After reflection on the R2EaLM activities and outcomes the name of the process was revised to Stakeholder Engagement for Research and Learning (SERL). This new title, with its reference to stakeholders, acknowledges that all those who have a stake in further improving rural livelihoods and agricultural practices and policies are to be actively engaged in both learning and teaching each other about how these improvements can be achieved (Heaney-Mustafa et al., 2023). Reflections on the workshop process were made within several interviews with farmers. The following selection exemplifies how the workshops were understood by the bright spot community participants:

It was like a school in which farmers were making charts, writing down problems and their solutions, discussing and having great fun with each other. That was the program for the day, and then the next day they made some more charts. ... It was very good. I have never participated in any program like this. It seemed that all these officers, farmers and facilitators had gathered for me and were discussing my problems and then finding solutions to all the problems. There are also solutions that are within my reach, that I can do. (FARM 34)

SERL is a learning platform where all the female farmers are participating, sharing their problems and best solutions, and ending with smart action plans for future implementation and results. (FARM 6)

We gathered in each meeting and learned about the experiences of other farmers (FARM 1)

R2EALM process had given them an opportunity to have input into what happens on their farms. They could tell "their side of the story". He said how farmers had spoken of using gypsum to manage salinity and also how they had tried and wanted to try more different varieties of seeds that could tolerate salty soil. (RES 2)

When people first started asking me about the project, I explained to them that it wasn't the kind of project where they would donate money or other items; instead, we would be building our agricultural capacity and offering advice based on our experiences and research on how to deal with salinity. Most individuals expressed dissatisfaction and left, and we can tell that only those who are interested in learning and seeking answers to salinity and other agricultural issues are still present. (FARM 31)

... the most beneficial thing in co-inquiry was that we were the part of experiment planning, and no one was imposing knowledge on us – we only planned work that was accessible and adaptable with our own resources. (FARM 11)

...the SERL workshop was ...the first time for us to sit together with an educated team and the team was giving value to the experiences and knowledge of all the participating women. Because of this process, all the women were also talking about the farm practices and experiences even after the workshop in the village. This was a change for me because of ASSIB that women are sharing with each other about the agricultural practices, as well as with their husbands, sons and fathers. Before the ASSIB involvement I have never seen this scenario that women could share their thoughts about agricultural practices with men. (FARM 11)

After involvement in ASSIB project activities, when SOFT and IUCN came and shared the main objective of this project through the two days R2EALM workshop, we shared our problems and their solutions. After that IUCN has given the vegetable seeds. (FARM 16)

...it is a lengthy process to write up charts step wise.... In this village no women are educated, only the SOFT team [should] ask and write the charts. It is too difficult to write one by one on the charts. (FARM 5)

The observation above suggests that the process may require (and could accommodate) modification, an observation clearly articulated from within the wider project team:

Regarding implementation of the R2EALM model, it needs to fit in with cultural barriers... So, we adapted R2EALM; the questions were in front of us, but we were not time bound. We took a step-by-

step approach guided by the R2EALM model. We had a plan to do the action plans with the community. You do something, you learn, you do again. The first draft of the plan is totally different to the last. They had a document, but at each stage they were able to change each time. I have the liberty to change everything and that is good. (PRT 6)

As indicated in the extracts above, central to the workshop process was the development of local action plans that involved experimenting with potential adaptations:

After her village was selected for ASSIB activities, [a local woman] and her family had planned to grow okra with guidance from experts in the ASSIB team. The Multan-based ASSIB team prepared the action plan with them according to their consent. They implemented the plan of okra sowing (2022) with mulched and non-mulched rows. (FARM 22)

At the conclusion of the activity, we organized our action plans into co-inquiry research goals before beginning our research through various training sessions. (FARM 32)

Many stories of change discussed the experimental side of these action plans. For example:

This is my first experience of cultivating mung bean, and the purpose behind the multiple varieties is to determine which are suited to this environment and my land (FARM 18)

We also want to experiment with the fish and try to use the pond for farming the fish whenever the shrimp are not available in the wild so we can earn good money year-round.... I hope to continue with the experiment and develop skills and that we will be able to raise our living standards for years to come (FARM 27)

I have planted different varieties of wheat... let me tell you that the varieties I got through this project were great. I planted my own varieties along with them for comparison. The project varieties gave me more yield than my own. The project variety was completely new to me, and I didn't even know about it.... And now I have planted three different varieties of wheat in this season of 2023... (FARM 34)

Many farmers specifically mentioned how the experiments had led to new understanding, as well as positive outputs:

Cultivation of wheat on raised bed, and multi vegetables cropping. Both trials have yielded very good results and a lot has been learned. Cultivation of vegetables was amazing. (FARM 26)

... I learned from the experiment that multiple crops give us more vegetables as compared to single cropping, which earns money, but we can also use the vegetables for food. (FARM 12)

Because I was unable to arrange rice straw mulch, I used dry fodder mulch. But I experienced that the farmers who applied rice straw mulch got very good vegetable yields compared to my vegetable plot and I realised that the difference in mulch could be the reason. (FARM 21)

Monitoring was also highlighted as part of the learning from experimenting:

At first, I had no idea that the water flow of the river we were culturing in will cause the ropes to start dragging the cage. It caused some damage to the net and loss of some 20 fish. We then started to monitor the cage closely and gave our young children this duty. Doing this helped us a lot in protecting our fish.... I plan to manufacture a floating makeshift boat out of plastic water tank and use it as a kind of floater boat to go further into the water for feeding and monitoring. (FARM 4)

We are going to include the lessons we have obtained from the previous cycle and monitor very closely and know that our hard work will pay. (FARM 28)

We learned a lot in this experiment. We started with the shrimp and saw growth in the early days. Then total mortality occurred but the restocking afterwards with close monitoring showed us that we can do it well on our own as we saw good results. (FARM 27)

A final feature raised about the co-inquiry by the farming communities was the encouragement of sharing information and moral support among farmers. The farmer-to-farmer learning appeared to consolidate the confidence developing through respect, and involvement.

When the community engagement team and researchers taught us any activity, we learned it with interest and when we implement this activity, we have the capacity to teach to other farmers also. For example, the ASSIB team guided us about efficient use of water ... and then I taught this to another woman of my village who had applied too much irrigation ... when I saw this I guided her to apply irrigation as I had learned from the ASSIB team because that woman was a widow and she was performing all the agriculture activities by herself. (FARM 9)

No one to date has grown [mung bean] ... some people from my neighbourhood visited and asked me. They are just watching and waiting for the result. ...I will facilitate them accordingly in this regard. ...People are coming to me in the field and at my home for advice on problems, and I am trying to give appropriate advice based on my knowledge. (FARM 18)

I am always present, whoever comes to ask me for help, I will definitely tell them what I have learned. (FARM 34)

People are now asking about the wheat and brassica seed which has been used in the trials. (FARM 31)

We did learn from farmer [X] who was trained from this project. We want to increase our yield but do not have fresh water and soil becomes more saline day by day.... We gathered in each meeting and learned about the experiences of other farmers. [He] learnt and started implementing turnip as a crop, which gives good yields, and he earns good profits. I want to learn from him about turnip growing, how he gets his seeds, how he sows the seed, which types of land preparation he uses, what kind of fertilizer he uses, and how he markets them. (FARM 1)

In support of this project, I have decided to take on the role of volunteer facilitator. Although I am not educated, I can share my experience with other villagers so they can adopt new methods in their field crops and get good results for their crops on their land. (FARM 33)

As mentioned by some of the farmers above, some key researchers contributed their time and expertise to the workshops and action planning.

Some work was done in the laboratory, and after that, as part of this activity with the community, we developed an action plan. (RES 6)

Initially I put a lot of time in the field, attending the workshops, planning the experiments, and monitoring the experiments. (RES 7)

I used to go to the field as I wanted to connect with all the farmers, modellers, SOFT, and others while the field activities were going on. This included participating in the workshops. We initially discussed [questioned] the workshops with farmers and researchers, but that settled down once we saw the purpose. (PRT 8)

I participated in planning workshops. These were good, as people had always thought the land was unusable. The workshops had not only the community and the researchers and NGO facilitators, but also the agriculture department and the irrigation department. At the bright spots all the organisations were included, it was inclusive. (RES 9)

Researchers and other project team members also had comments about the co-inquiry approach, for example:

We visited the area with the SOFT team and found farmers already addressing salinity. We attended the workshop; it was two sorts of capacity building, the farmers and us. (RES 4)

The farmers were so progressive and willing to work with us. We thought we would be telling them, but, in the field, they are experts. (RES 3)

Indigenous knowledge is also important. We are very open to explore the knowledge of the people. For example, the fish species was identified by a comment from an old person who knew everything about fish – even the expert didn't know... (PRT 6)

I feel the on-farm experiments should be based on the assets of the farmers. We try to make realistic action plans without fancy experiments, just simple experiments. It should not be rocket science. (PRT 3)

Well you know our farmers are poor and so it was hard for them to buy gypsum, the transport costs were high due to the long distance it had to be carried. So some of the farmers experimented with using smaller quantities of gypsum and they still got a good yield. So we learned from them that smaller quantities could be used. (RES 8)

I did the planning of the experiments mostly by myself. A good thing about this project was it gave us flexibility to design experiments as per demand, whereas in many projects you have to strictly follow an agreed plan, but this project allowed customization to the sites, and changes over time... Sometimes there was problem that experiments were not executed in the field as these were planned. Sometimes, for example, the farmer could not manage time and resources and planted trials few days later than planned. I might have had particular times for planting, but the farmer said "no, I can't do that", even though it was in the plan, so that was a problem. (RES 7)

Some agricultural and other agency staff (which project participants usually referred in shorthand as stakeholders) did attend some of the workshops, but none of these other stakeholders were interviewed for this report.

Stakeholders came to the workshop and responded to questions, but they treated it as a one-time event. (PRT 8)

3.2.3.1 AGRICULTURAL EXTENSION AND ITS ROLE IN LEARNING

Over the course of the project, as action plans were developed, traditional expert-to-farmer training (sometimes referred to as research extension) occurred to support the implementation of the experiment. Aspects of the extension approach raised in the interviews are summarised in Figure 4 and discussed in some detail below.

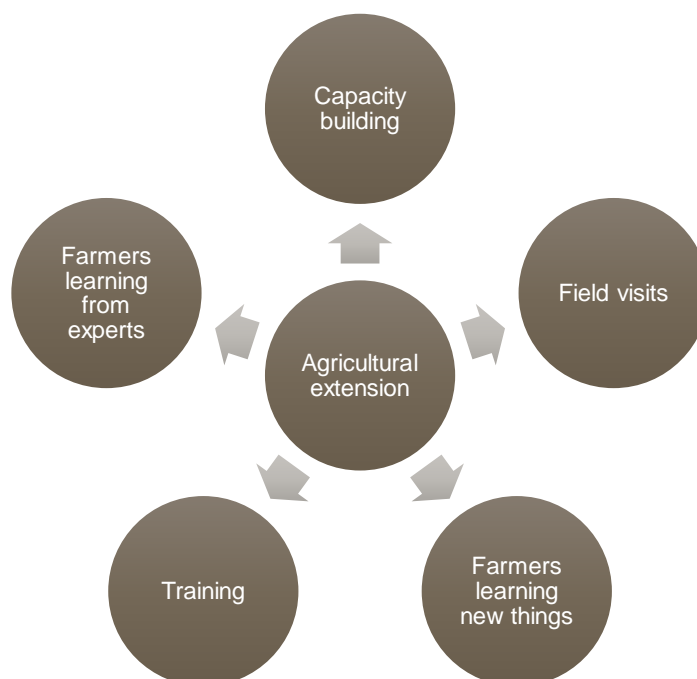


Figure 4 Aspects of learning related to more traditional extension/ teaching

The training undertaken in parallel with the co-inquiry appeared to be well accepted by the farming communities:

Several workshops, training sessions, and expert visits were held at our site. My field team of agricultural labourers and I have attended all of these. There is a lot of knowledge that we have gained, and linkages have also been developed in this project. (FARM 18)

...the SOFT and MUET teams conducted a one-day training session on multiple vegetable gardening. (FARM 7)

I have attended almost all trainings and programs (R2EaLM workshop) ... Training on soil sampling, training on fertilizer management, training on vegetable cultivation.... I think it was very useful. From the training I received about fertilizers, I learned that there are different types of fertilizer, giving too much and unnecessary fertilizer will either increase your input cost or have negative effects on the plant. First you analyse your soil and then apply fertilizer according to the soil requirement so you will get good results and good yield as well. (FARM 34)

After that the SOFT and MUET team provided us with various training like kitchen gardening, multi vegetable cropping, seed storage and preservation throughout the project. Training on multi-layering vegetables was led by specialist Mr. Mustafa Nangraj. (FARM 8)

...all women welcomed such training for the cultivation of vegetables by women. (FARM 14)

We were told about mulch and then the SOFT team worked with us to mulch one bed and we did the rest ourselves. (FARM 26)

After attending training about multi-vegetable cropping, I was inspired to begin growing multiple vegetables with mulch application with the help of SOFT and MUET. (FARM 32)

I would say that the most significant change for me was the training on fish feed preparation. Before, we were unaware of the protein ratio of our self-prepared fish feed. We didn't even know the protein percentage of the ingredients we were adding in the fish feed. Now, we have a lot more knowledge about it. We know the protein percentage of every single ingredient to be added in the feed and hence we can easily calculate the final protein ratio of our self-prepared feed. Training from experts is very helpful and necessary in the capacity building of farmers. (FARM 19)

Training included some opportunity for visiting farms and research stations outside of the project areas, as part of the Sun-Satellite farmer-to-farmer field exchange arrangements that were championed by PCRWR (Salam et al., 2024).

It was a very good visit and it was the first time I went on such a visit with such senior people. There I saw the tile drainage, how the surface water is drained to reclaim the soil from water logging. Saw many crops there like rice, dates, sugarcane crop, cotton crop. In this visit I saw the water and soil testing laboratory, saw the wind direction and wind speed instruments. (FARM 26)

It was great to see the good work of others. It was the first time I got a chance to visit a government research institute. Otherwise, who would let us go to such places? ... what can a person learn in a single visit? There were a lot of people, so we didn't get a chance to ask something, if we had visited three or four times, we would have asked something. Otherwise, there would be nothing from a single visit. (FARM 34)

Hmmm, those are matters beyond our reach; we need a lot of money for them, and we poor people don't even own the land; we are just sharecroppers. (FARM 31)

3.2.4 Connections

Co-inquiry and extension activities were not just about articulating issues and sharing knowledge. An important aspect of learning together is the creation of enduring connections. People within farming communities discussed connecting with each other, and with wider connections (Figure 5).

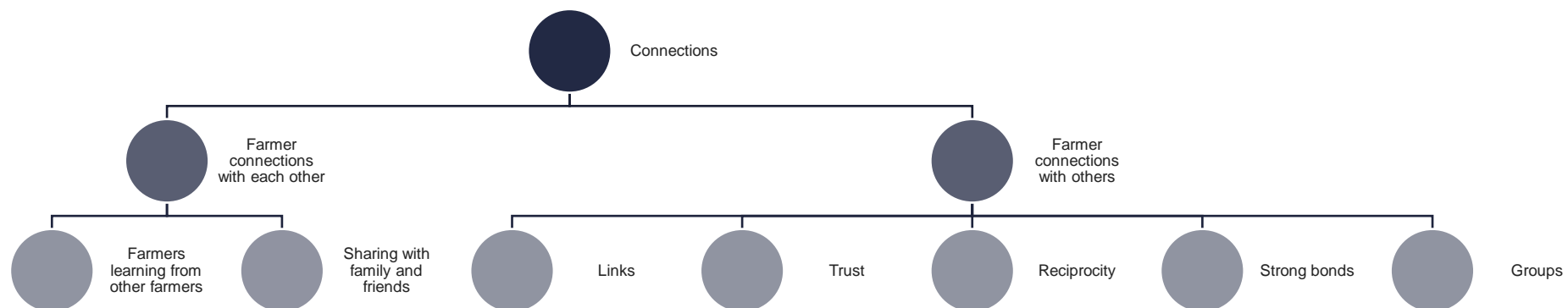


Figure 5 Connections

Adapting to Salinity in the Southern Indus Basin: Stories of change

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Discussions among farmers were encouraged by the ASSIB approach:

[X] is my relative and we met each other at events but never discussed about agricultural practices and what they were doing for their saline lands. But after involvement with ASSIB, when the ASSIB team invited me to the workshop at [X's house] we got the opportunity in the workshop to share about agricultural practices with one another. (FARM 17)

No one else is doing the extensive shrimp farming and when other people hear about the good results of this hard work they also want to do it. (FARM 28)

We are practising the information from fish feed training ourselves and sharing our knowledge and experience with other community fish farmers as well. This is the development we can say we will keep practising in the future (FARM 19)

...in a village nearby, where my relatives have lived for many years, they are facing salinity problems. So, I am now visiting them frequently because of the close distance between the two villages to share my learnings from the ASSIB experience and to guide them to grow vegetables. They have got benefits after following my suggestions from my ASSIB experience. (FARM 20)

When we get success growing multiple field crops and multiple vegetables on my land, I have offered to let communities near and far visit my land, and I have described the whole mechanism and offered that I will facilitate in this regard if anybody wants to follow. My brother and other community members are very interested in following our work. (FARM 24)

Our friends and relatives are also poor like us, now we have helped them, which has increased our brotherhood, now people come to us to get vegetables, the relationship has deepened, and we hope that they will also help us in bad times (FARM 26)

Of course, everything I learnt I pass on to my family members and farming friends who did not attend the meeting or are not part of this project. (FARM 1)

The existence of connections among a wide range of project participants also emerged during the interviews.

Linkages were developed with the fertilizer companies, soil experts at MUET, and other government institutes; they came to us for training sessions and other activities. First, our linkages developed with experts who are involve in this project, then became a series with other experts, but the source was this project. When I attended the workshop held in Islamabad, there was a lot of opportunity to be linked with the experts of Sindh and Punjab. I fully availed myself of this opportunity. (FARM 18)

I got information about the institutions, which institution is located where, and what is their work, which officers can help us in which matters. (FARM 25)

Yes, there are some people that we have developed relationships with because of this project, so far we have not needed any help from them, maybe we will in the future. (FARM 26)

3.2.5 Emotional response to co-inquiry

Research projects can be presented, and even thought of, as objective, rational management activities, but research is human activity, so emotions are inevitable, and desirable. The ASSIB approach of collaborative inquiry encourages reflection and recognises the importance of emotions among all the actors in the project. Figure 6 summarises the range of emotions that emerged in the stories of change narratives.

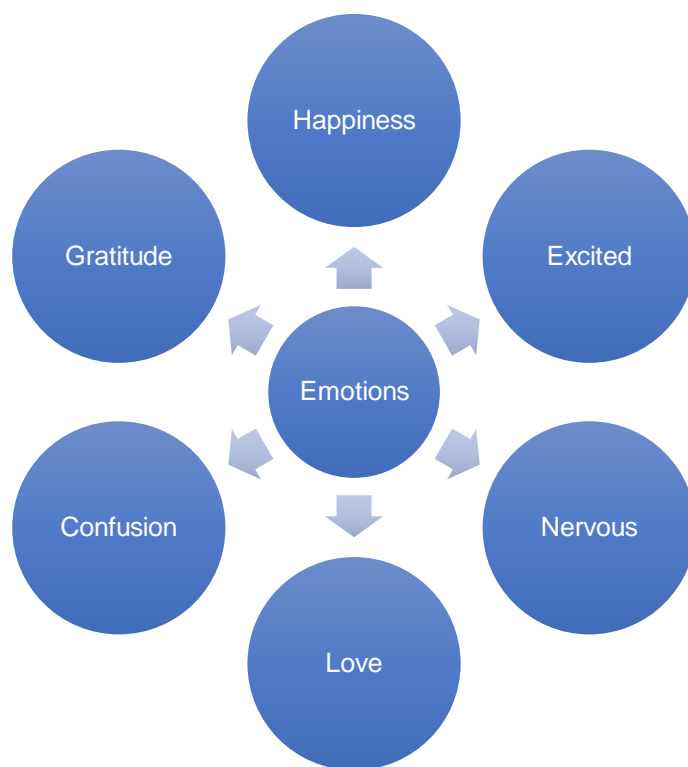


Figure 6 Emotional responses to aspects of ASSIB identified within the stories of change

There was one mention each of confusion (a project team member reflecting on starting out), one of nervousness, and the following mention of excitement, as recounted by the interviewer referring to the farmer being interviewed:

He said that ever since getting involved with ASSIB he has learned to use all his skills together and contributed his share of expertise in the co-inquiry. When asked how, he excitedly jumped up and pointed to the semi-constructed boat he had standing outside his home and told that he is currently working on completing it so that he can use it to go and collect even more seeds from the wild and farm them in his pond. (FARM 28)

Being nervous of the processes was also raised:

I had not attended any workshop or meeting, so I was nervous. I remember I did not participate in the discussion of the group. (FARM 25)

And there were also a few references to love:

Each person has their own thinking and perception; we live with love and peace and support each other. (FARM 1)

Notwithstanding the examples above, the majority of emotions identified in the conversations related to feelings of happiness and gratitude. For example, interviewers' notes included the following:

...[The interviewee] expressed her gratitude to the complete project team, SOFT and MUET, as well as the researchers, for helping to increase the knowledge of female farmers about growing a variety of vegetables. (FARM 14)

all women were happy for such kinds of training provided to women on agriculture, it is a great step towards capacity development in agriculture, particularly for women. She feels very happy to be part of this project. (FARM 8)

...is happy being a part of ASSIB and says thanks to whole team for this success. (FARM 12)

The conversations with researchers and project team members did not reveal much about their emotional engagement. We speculate that this may be indicative of the analytic training and scientific norms of objectivity that often determine how research should be discussed.

Together, the results presented in section 3.2.5 provide context and depth for the focus of the MSC interviews, which sought to understand how the project had impacted on participants. These impacts are discussed in the following section.

3.2.6 ASSIB learning and outcomes: evidence of impact

Themes related to significant change from involvement in the project included changes in practices, behaviour and thinking, as well as improved outputs and outcomes (Figure 7). Each is discussed below, mostly from the perspective of the farming communities, but also from others in the project.

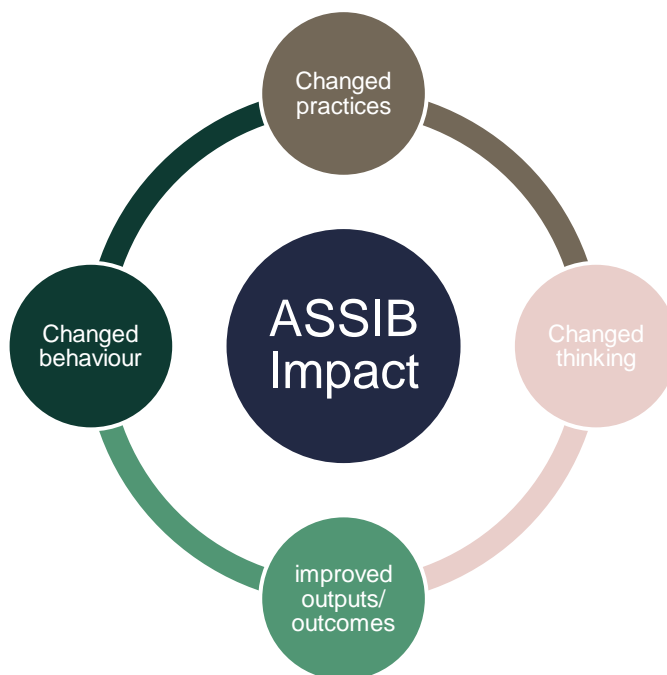


Figure 7 Four aspects of impact of the ASSIB project as created through stories of change

3.2.6.1 CHANGED PRACTICES

Most interviews with the farming community included some discussion of changes they or others have made to their farm management practices, as exemplified by the following:

I am managing my land differently after my involvement with ASSIB ...I am applying organic and in-organic mulch, I have a dense plantation of onion for the first time, I make more efficient use of water, irrigation, fertilizer and chemical applications according to the requirements and needs for better yield of crops. (FARM 9)

I will adapt this mulch practice for the rest of my whole life. Even I am also guiding my relatives and friends from other villages about the practice of mulch application for saline areas. (FARM 11)

This initiative included research on multiple vegetables in saline soil. Huge quantities of vegetables were eaten and distributed in both Rabi and Kharif season. After this benefit, we preserved seeds like coriander, spinach, fenugreek for the next Rabi season, and okra and ridge gourd for the Kharif season. (FARM 12)

Before ASSIB project involvement, lands were prepared using traditional practices with no ideas about new techniques to increase production and set the saline land. After ASSIB involvement, the land was totally changed through the modern ways vegetables grow on beds and the mulch technology adopted to maintain soil moisture and leach out the salts. (FARM16)

3.2.6.2 IMPROVED OUTPUTS/ OUTCOMES

The changed practices have, in many cases, led to improvements in the situation of individual farmers and/ or their communities. Some is directly related to improved production:

The introduction of cane grass and fruiting trees including guava and pomegranate will help us use our saline agricultural lands more efficiently. When these three newly introduced crops/trees become successful in the area, we will multiply them on a large scale, which will positively help the economic status of the community. (FARM 19)

[The woman farmer interviewed] told us [the interview team] that her brother forced her to come, as well as him, as he wanted her to listen to other farmers and be taught about crop changes. She had a barren area but few resources, and didn't want to take any risks. We suggested she take the risk of planting acacia trees on that land, and we provided the acacia seedlings. By our combined passion the barren land now has trees. She bought water from her neighbour. She is happy with 30-40 trees, and now wants to undertake other work. (PRT 5)

So, we got a very good income by selling moringa leaf powder and now we have extended the number of moringa plants. (FARM 11)

We can see that production in mulched rows is better, water requirement is lower, and number of weeds is fewer. We have earned PKR 101,500 net income from okra sales with total expenses of PKR 35,000. (FARM 22)

I have been engaged with the ASSIB project during the past two years. I participated in about four or five events. We discussed better seeds, fertilizers and crop management. Owing to my involvement with them, this year, I noticed improvements in my crops, yields, financial wellbeing and knowledge. (FARM 2)

Other benefits were about improved situations more generally. For example:

Mulching activity also became a source of leisure for the women of the household because, due to mulching, they don't need to perform weeding activity many times, that's why it saves the time of women for other activities. (FARM 10)

We also took part in ASSIB activities for the whole period of project, even in our family, females are not allowed to go outside but due to this agriculture activity, I looked after and picked the vegetables. Also, my grandsons came with me to enjoy picking the vegetables. (FARM 12)

Now I can pick vegetables from my own field and my children can eat fresh food on a daily basis. That's why I said now my children's health is improving because of vegetable cultivation. (FARM 21)

The entire family has also reaped the benefits of eating fresh vegetables and nutritious food free of pests and illnesses throughout the Rabi season, thanks to SOFT's provision of seeds for the Kharif season. (FARM 14)

I am also working as a hired labourer, I am also working in nearby villages with groups of women with the purpose of earning an income on a daily wage basis. When I was guiding the women at other villages on seed sowing as I had learned from ASSIB, many contractor farmers started hiring me as lead female hired labourer due to my knowledge and learnings. So that's why now I am charging an extra amount of wage because of my teaching to other women also. (FARM 21)

3.2.6.4 CHANGED BEHAVIOUR

Behavioural change goes beyond changed agricultural practices, encompassing how, and by whom, information is shared, and decisions are made. Examples from within the farming community include:

Female farmer behaviours have changed to grow their own vegetables, which is better than purchasing vegetables from the market. We save money and save our health from poisons in market-bought vegetables. (FARM 7)

My husband uses new agricultural methods to prepare the land after participating in the ASSIB salinity project and plants various vegetables and crops there. As our habits change, we become more interested in different vegetable cropping trends. (FARM 14)

...the ASSIB project led us and other community members to identify our problems and challenges and to find our solutions within the available resources. Now, we as a community of farmers feel more relaxed to share our problems with each other and find possible solutions. (FARM 19)

Before ASSIB no one was talking with me about agricultural practices but now the community is valuing the worth of learning and sharing of knowledge. (FARM 21)

this was the first time I have seen a gathering of women to discuss agricultural and livestock problems. We had the opportunity to learn from women agricultural experts and can easily attend training related to our concerns. (FARM 29)

The good thing is that the farmers that were not willing to work with us in the past are willing. Before they asked the farmers in the project why are they visiting you, what are they selling to you? Now they invite farmers and friends from other communities. (PRT 4)

Identification of new varieties, planting of gypsum, planting of vegetables and mulching, planting of fruit trees, these are the things that I was not aware of before but now I do a little research before planting. This was not the case before. (FARM 35)

Behavioural change was also noted among the research community:

Mostly we have pre-designed projects; we go to the field and mobilise. In this project we engage first, this is a good thing. When someone is involved in the design, they own it (PRT 6)

Before this, the research agency finds collaborators, writes and submit papers. From this we understand that, no, you have to go to the field and listen to them and see what they perceive the solutions are... For the first six months of the project I thought I had to go with SOFT and answer questions. Then I learned that we have to co-design and co-research. Now, beyond this project, we are using this co-design approach on another project. This co-design, co-research is wonderful. Questions should come from the farmers. (RES 4)

Before this project I would go to villages and just tell them information, let them know. Now I interact between them and the markets, in ongoing communication with the SOFT team. During the R2EALM workshops I listened ... I don't think I would be behaving this way without the ASSIB project. This project has enabled me to do research differently. I was not necessarily involved before, and I am very happy that I am now. (RES 1)

3.2.6.5 CHANGED THINKING

While much of the farmer reflection was on changed practices, outcomes and behaviour, some did note the changed thinking behind some of that change. One lady (FARM 29) observed that this was the first time she saw a gathering of women to discuss agricultural and livestock problems, and that they could continue. Another (FARM 30) reflected that, because of ASSIB, her community women and herself could generate ideas by themselves, even after the project ending, whereas before they never even discussed about agricultural farming related ideas. There is, in short, a sense that how farming and salinity can be considered changed for some of the project participants:

My perspective on fish farming and agriculture has changed. I now see myself not only as a farmer but also as a knowledge seeker. (FARM 19)

Before ASSIB no one was talking with me about agricultural practices, but now the community is valuing the worth of learning and sharing of knowledge. (FARM 21)

My husband uses new agricultural methods to prepare the land after participating in the ASSIB salinity project and plants various vegetables and crops there. As our habits change, we become more interested in different vegetable cropping trends. (FARM 14)

Before this project intervention, I had no interest in farming. However, after attending SOFT and MUET meetings, I wondered why I wasn't growing vegetables at home the conventional way. (FARM 14)

It was a new thing for me to explore how we can adapt to salinity and resolve our problems using new techniques on salinity-affected land. No one was thinking we could improve our land.... Now we are planning to plant fruit trees in our village. (FARM 33)

Sir, believe me, what a big change has come. We used to think that only 20-22 maunds of wheat are our destiny, but in the first trial, I saw a very clear difference. (FARM 35)

I learned that we can gain outputs from highly saline lands. Crops and vegetables are not the only option – we can work on some other alternatives also.... I realised at that day the solutions were present in our own communities, but we never think like that to solve the salinity problem with our own resources and ideas. (FARM 17)

Researchers reflected on their deeper involvement with farmers and their land management issues. One researcher (RES 2) was profoundly affected, repeating again and again how they had never had such an experience of working with farmers in this way and how strong the bonds had become with each other. This was not an isolated impact, for example:

One of my colleagues said getting a paper is an impact... here is not, this gave us an opportunity to impact the people. This project gave us the opportunity for influencing the human aspect. (RES 3)

For the first time in my career using the R2EALM process I found that farmers have knowledge.... when we went with the SOFT team first, and Channa sb spoke to them before the meeting with farmers and told them they had to be quiet and listen to farmers first before we gave them advice, I "felt very uncomfortable" and "thought he (Channa sb) was crazy." But then after that I realised that farmers have knowledge, and they are experts in their fields. (RES 2)

We were using the wrong model. This is the first time we have a model that might enable change. (PRT 2)

Before this project I would go to villages and just tell them information, let them know. Now I interact between them and the markets, in ongoing communication with the SOFT team. During the R2EALM workshops, I listened, and it became clear in my mind that it is about building better pathways to market. (RES 1)

This has been a wonderful experience. Salinity is a challenge. The priorities set have left people as almost forgotten. This project acts as a reminder of people, and as a catalyst for discussions and planning. (PRT 9)

It has been rewarding to see the change among the academic team members to be more open to adapt the way of working with farmers and valuing the knowledge farmers have. The notion of

learning from farmers has shifted to being more open and to considering the research partnerships they can continue to develop with farmers. Listening to conversations at the Vietnam symposium where they were championing SERL from being highly sceptical at the start of the project was a significant change. (PRT 12)

3.2.7 Relationship to ASSIB's Gender Strategy

Gender inclusion and the empowerment of women was the responsibility of all team members involved in the ASSIB project, an approach which corresponds with the gender mainstreaming described in Aik Saath's gender inclusiveness strategy (ACIAR, 2018). Strategies to achieve gender inclusion were considered and developed as part of the project's scoping activities, and in particular through a dedicated workshop held in July 2019 as part of the second SRA in preparation for ASSIB (Mitchell et al., 2020). Five themes and related strategies emerged from the 2019 workshop, as summarised in columns one and two in Table 3. Related themes emerged from the stories of change interviews, as shown in the third column, and discussed in detail below.

Table 3 ASSIB's Gender Strategy

Theme	Project strategy	Emergent themes from stories of change
Recognition that engaging women from communities in project interventions challenges cultural norms, so it is preferable that the engagement of women has support from their male counterparts.	When invitations are made to women to be involved in field trials, or co-inquiry, or co-design, where possible, the invitation should be to the farming family, and the roles and responsibilities negotiated by the project team. SOFT have expertise in this area of negotiating female involvement.	Challenging cultural norms
Because of cultural norms that can prevent women meeting with men, female researchers and/or students will need to be engaged in project activities that involve women in communities.	Universities will be requested to ensure female researchers and/or students are engaged in the project, and that they are supported to be able to travel in and work with women in the communities.	Encouraging engagement by female researchers and students
Women can be/ are effective co-learners who can support the project's investigations and can contribute to the delivery of intended project outcomes.	Each proposed activity in the project should be considered for potential female involvement. For example, if salt tolerant plants are the focus, women who have kitchen gardens or responsibility for livestock should be invited (as per strategy above) to investigate salt-tolerant kitchen garden crops and fodder, as well as to trial improved land management techniques such as mulching.	Women as important partners
Women who co-investigate adaptation options and strategies are well-positioned to influence other family and community members drawing on their experiences and are thus empowered as local knowledge brokers.	Activities between the project team and women co-researchers will include time for discussion and reflection on how best to share new knowledge.	Positioning women for scaling out

Adapting to Salinity in the Southern Indus Basin: Stories of change

Catherine Allan, Tahira Baloch, Mohammad Yousif Channa, Mohsin Ali Channa, Sandra Heaney-Mustafa, Nadia Jabeen, Benazir Kumbhar, Ifrah Naseem Malik, Michael Mitchell, Iqra Mohiuddin, Muhammad Faisal Riaz, Arzoo Rubab, Akhtar Hussain Samoo, Sayed Muhammad Ali Zahid, Babar Zaman

There is great entrepreneurial experience and potential among women in farming communities.	Entrepreneurial potential will be strengthened through their engagement in community development awareness training programs related to health and nutrition. Pursuing this potential may be particularly relevant for communities in dire circumstances, whose citizens may need to transform how they make a living.	Opportunities for women
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The impact of the project on the emergent themes that relate to the gender strategy are evidenced in the general narrative of this report, but some additional comments and quotes are provided below to emphasise that impact.

3.2.7.1 CHALLENGING CULTURAL NORMS

The narratives discussed above suggest that women involved in ASSIB activities did so with the support of their families, including fathers, husbands and children. In addition to evidence already present are comments such as:

She shared that they never met with any outsider men for discussing agricultural activities but due to the positive image and respectful behaviour of the community engagement team in their community their whole family (men and women) jointly met with all of the community engagement team (male and female) and discussed about ASSIB Project activities. That's why share shared that they also met with researchers also and didn't feel hesitant to talk with male researchers also for experimental activities. (FARM 10)

...it was multiple activities. Some were related to kitchen gardening and mostly focused on female empowerment. (FARM 33)

Training related to agriculture was also conducted such as on kitchen gardening, multiple vegetable cropping, seed storage. Before this project I had no idea how to grow vegetables. My husband and sons told me the main things about how to grow crops and vegetables, but, after the training, I know how to cultivate a variety of vegetables and their benefits. (FARM 12)

3.2.7.2 ENCOURAGING ENGAGEMENT BY FEMALE RESEARCHERS AND STUDENTS

The female research staff and students who were supported and encouraged to engage in the field reported positively on the experience, for example:

I went to the village to show them how to prepare pickles. They were interested in those. Then later they had dates declining in quality pre-harvest, as they didn't know how to save the fruit on the trees. I told them how they can prepare jam, and paste, using their own existing resources. There was a 13-14 year old there watching; he was so interested I am sure he will do something with this. When I visited that date orchard an idea came into my mind. Why don't we work on the pre-harvest protection, with SMART protection? There are now 10 registered projects after that visit. Harvesting premium dates and managing them well post-harvest brings better returns to the smallholders. (RES 1)

My role is as a mentor of a student who is directly involved in the project; they have her engaged in the field activities. The student did a wonderful job, collected soil, did testing in the PCRWR lab. I looked at the results with her. ... This project gave us the opportunity for influencing the human aspect. ... People from different fields, the SOFT team sitting with the farmers, learning from SOFT is an opportunity for students. (RES 3)

As predicted in the strategy, the presence of female researchers, along with female CET staff, encouraged involvement of women in the action planning and experimentation.

Yes, the SERL workshop was a very good procedure of ASSIB because it was the first time for us to sit together with an educated team and the team was giving value to the experiences and knowledge of all the participating women. Because of this process, all the women were also talking about the farm practices and experiences even after the workshop in the village. This was a change for me because of ASSIB that women are sharing with each other about the agricultural practices, as well as with their husbands, sons and fathers. Before the ASSIB involvement I have never seen this scenario that women could share their thoughts about agricultural practices with men. (FARM 11)

This is the first time I have seen the gathering of women to discuss agricultural and livestock problems and we have an opportunity to learn from lady agriculture experts, so we can easily attend training related to our concerns (FARM 30)

This is a good project because for the first time SOFT and MUET have focused specifically on enhancing the skills of female farmers in relation to agriculture (FARM 7)

3.2.7.3 WOMEN AS IMPORTANT PARTNERS

Again, as predicted in the strategy, involving women enabled them to contribute to building adaptive capacity of their communities. For example:

So, me and some friends from the community now planned to grow vegetables in unused plots at household level for this Rabi 2023-24 cropping season. I hope that this experience will be successful – and if it will be successful, then I will adopt this practice in the future as well. (FARM 17)

The ASSIB project team is the first to engage both men and women in our village. It is the first time in our life experience that someone has come to discuss agricultural and livestock activities with women and acknowledge our activities. (FARM 22)

So those are really important, bringing those gender perspectives at all levels. It is extremely important. ... I mean having a more diverse team not only in Australia, but also encouraging our partners to have more female voices because it brings a lot of diversity of ideas, different ways of thinking it. It's very useful. And then I would say, it's a very healthy work environment as well. (PRT 9)

3.2.7.4 POSITIONING WOMEN FOR SCALING OUT

Key women within the communities embraced the project, and the opportunity to share their new knowledge and skills with others:

I am feeling very honoured and now realise that my knowledge is equally valuable as that of my husband because, in the SERL workshops, I shared my knowledge with the ASSIB team and with my community women. (FARM 11)

I even also shared my learnings with my relatives and friends from other villages. When I shared my knowledge with others, and they appreciated my learnings, and gave me compliments that I look like an agricultural officer while sharing the experiments. Then I feel very honoured for this respect. (FARM 16)

When the community engagement team sat with us and talked about the details of the experiment and guided us again and again after the one-time guidelines of researcher, then I felt the activities could be planned properly for its better implementation. I felt that I myself was a researcher when I learned about mulching activities and then taught other relative women of the community and from outside of community who were not involved in ASSIB activities (FARM 10)

New techniques inspire and motivate the female farmers because, up until now, no one had ever been able to easily share their experiences with others. (FARM 7)

3.2.7.5 OPPORTUNITIES FOR WOMEN

That real empowerment was happening in some cases was clear:

Due to ASSIB involvement we learned that we can also cultivate vegetables for commercial purpose to increase our household income, because before ASSIB involvement we never thought we could also sell vegetables. (FARM 10)

From my experience with the ASSIB team, I and my community women could generate ideas on our own even after the project ended because before ASSIB involvement we never even discussed about agricultural farming related ideas. (FARM 29)

3.2.8 Summary of thematic analyses

The project shows how small, respectful projects centred on empowering communities to act can lead to wider scale practice and behaviour change, with potentially genuine and ongoing outcomes for farming communities (Figure 8).

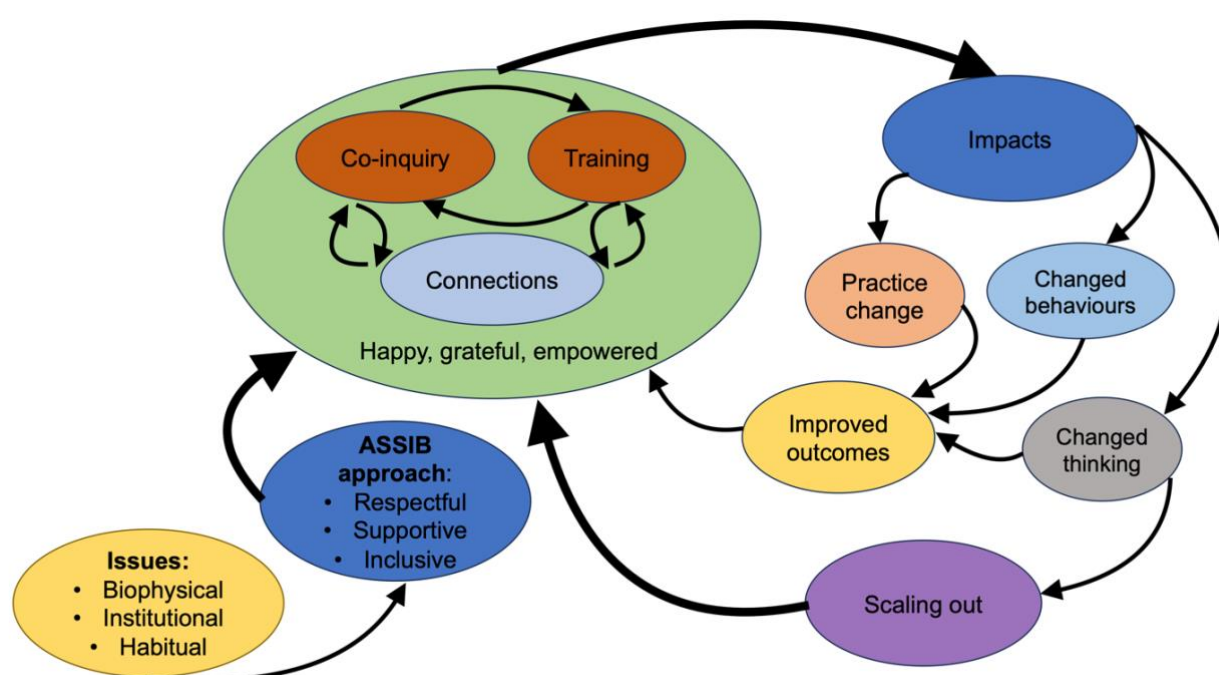


Figure 8 Visual summary of the insights from the stories of change as related to ASSIB farming communities

The farmers and fish raisers involved in the ASSIB project, and their geographical communities, are vulnerable to biophysical conditions and changes, a vulnerability exacerbated by historical and current policy decisions. People in these rural communities have ideas and ability but are generally ignored by institutional processes, including by people within knowledge and management organisations. The ASSIB approach of being respectful, supportive and inclusive demonstrated how little it takes to enable latent capacities to emerge within such communities. The structured but flexible SERL approach, combined with tailored support from local, enthusiastic facilitators, enabled some rural community members to believe in themselves and their capacities. The green circle in Figure 8 captures the dynamic learning conditions created in the project, with a range of connections being made and maintained, and information moving among the participants. Encouragement to learn, and to feel part of creating potential solutions was a new concept for many people involved in the project, but the support provided by the ASSIB project team members enabled a learning community to grow together.

Many of the narratives dwelt on change, as expected when using the MSC evaluation method. Less anticipated was the degree of nuance in the narratives of change. On-ground impacts such as improved yields or new crops were mentioned, mostly positive and discussed with pride, along with the changed practices that led to them. However, the indications of changed behaviour and changed thinking are, perhaps, most exciting, as they relate to increased adaptive capacity. The changed thinking extends to individuals within communities choosing to support the learning of their friends and families beyond the funded project time. All of this is captured in Figure 8, the circularity of the key action area emphasizing increased adaptive capacity as a key outcome of the project.

3.3 The overarching discourses

The Earth's climate will keep changing, and salinity will be a continual problem in the Southern Indus Basin. The ASSIB project title signals the importance of adapting to salinity, but it is easy to be caught up in the (important) details of specific adaptation practices and lose sight of the longer goal of helping communities help themselves to keep adapting to the on-going change. The discourse analysis sought to understand how change is being enacted in the corpus. That increasing adaptive capacity emerged as an overarching theme within the narratives of change speaks to the appropriateness of the project design. Other notable discourses of the corpus are discussed below.

Part of the project design was a very deliberate and ongoing discourse related to recognising the assets of a community. This is in contrast with the underlying discourse of community deficit found in many agricultural development projects in Pakistan and globally. The asset discourse, built into the project design, was introduced and maintained by the SERL process, which enabled all project participants to work through their issues and ideas and to consider what they could do. They drew on these reflections on their assets in developing action plans for small experiments. The discourse of recognising assets was also maintained by the respectful facilitation of field activities by CET members and others in the project team, exemplified by instructions to 'experts' to take time to listen and learn from farmers at activities, before providing them with information. Supporting farmers to become local facilitators of change emphasised recognition of human assets, including women and young people. The asset discourse, introduced early in the project, continued in many of the stories of change.

Another deliberate act was choosing a discourse of learning, specifically acknowledging that no one knows everything, but that learning together and over time can be powerful. The choice of this discourse is an example of deliberately avoiding the popular discourse of providing solutions to problems. The emphasis on learning rather than providing answers encourages questioning of existing hierarchies of knowledge and power. Again, this discourse continued to be apparent in some of the shared stories.

One discourse that was only associated with researchers was that of complexity; in particular, that salinity is a complex 'problem' that needs many technical and expert solutions, and hence a lot of resources. The 'building adaptive capacity' discourse that emerged through the stories of change provides an opportunity to shift the focus away from seeking complexity and large, expensive, expert 'solutions', to learning and acting in feasible, albeit small, ways right now.

4. Discussion

4.1 Features that support building capacity to adapt

The results suggest that focusing on adaptive capacity can be worthwhile in difficult social-ecological situations. The results also suggest how a focus on adaptive capacity may be achieved, and this is discussed briefly below.

Respect for people's inherent worth, their experiences and knowledge, and their cultural practices is an essential foundation for any form of co-inquiry. Genuine respect in turn enables brokerage of paradigms and knowledge. The 'worlds' of farming communities, researchers and agency staff are very different, and collaborations and dialogue are facilitated by dedicated, trained and supported staff who can bridge those worlds. Brokerage is aided by structure; the SERL workshop sessions exemplify how a structured approach can support emergence of ideas and plans and empower people to act while doing so. The art is to provide structure while also being flexible, when needed, to accommodate local needs.

The action that SERL encourages and supports is built on inquiry and learning. De-mystifying research and experimenting are part of empowering people to understand and address their current and future situations. Empowerment should not, however, equate with abandonment. As individuals and communities seek new approaches to living with change, support is needed to spread risks and learn from failed experiments, or mistakes. Support is also needed to facilitate monitoring and shared analyses.

Being as inclusive as possible also appears to be an essential feature of building adaptive capacity. This includes seeking to involve and support women and youth, as well as tenant farmers and non-farmers where appropriate. It is important to value and use existing community networks, but also to provide support to build on these.

4.2 Constraints on projects such as this

Co-inquiry is relatively novel and challenging for all project participants. Habits and the comfort of acting in established ways mean constant reiteration of purpose and difference are needed during the project's time span. For some potential participants, such as government farm advisory staff, there was insufficient incentive to become engaged. Even when active participants (especially farmers and researchers) embraced co-inquiry they were often at odds with the practice norms around them. Disciplinary divides also need constant bridging through shared planning and joint activities. To find appropriate incentives, and build trust, and to bring whole communities (farmers, researchers, advisers, and more) together to learn and reflect and transform takes time; this was not available in the current project. The stories of change presented above show the potential, and the start of changed practices, behaviours and thinking.

4.3 Recommendation

The data presented in this report suggest that carefully considered and supported co-inquiry should be considered as a means for transformational change in poorly resourced areas facing salinity, climate change and systemic institutional neglect. Such co-inquiry need not be vastly expensive, but should have sufficient resources to enable facilitation, risk mitigation, and longevity.

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Appendix 1. Selection criteria for ASSIB communities

A portfolio of “bright spot” communities was started as part of the proposal development of the ASSIB project, with eight communities identified (Mitchell et al., 2020).

We adopted the term “bright spots” (cf. Noble et al., 2006) to describe communities living in salinity affected landscapes that are sustaining and perhaps enhancing their livelihoods through active community-driven adaptations.

Those organisations engaged in the project’s development, who then became the project’s partners, were invited to nominate “bright spot” communities. Five communities were initially selected, and others were subsequently nominated as the project developed.

The following selection criteria were included in the nomination form as the basis for selecting our “bright spot” community case studies:

1. A partner or collaborating organisation willing to champion collaborative research activities with the community (usually the organisation providing the nomination).
2. Convenient distance and logistics for those involved to undertake regular research activities.
3. Well-established interaction by active members of the nominating organisation with key contact persons involved in the adaptation actions being driven by the nominated community.
4. A broad range of different contexts in which communities are adapting to salinity (location, types of salinity impacts being faced, range of severity of impacts, and predominant means of making a livelihood, including at least one community involved in horticulture, one involved in aquaculture, and one involved in livestock).
5. A broad range of different ways in which communities are adapting to living in salinity affected landscapes.
6. A high level of success achieved by the community, or high potential for success if issues identified by the community could be further investigated and addressed.
7. High level of evidence that the adaptation actions are being driven by community members.
8. High potential to engage women and youth in co-inquiry investigations, with at least one community where women are taking a leadership role in community-led adaptation strategies.

Selection criteria 4 and 5 relate to the desire to achieve a broad range of different contexts across our “bright spot” community case studies. Most bright spot communities selected included families with livestock, and we had at least one “bright spot” community whose primary focus was either horticulture or aquaculture.

References

- Mitchell, M., Allan, C., Punthakey, J. F., Barrett-Lennard, E. G., Heaney-Mustafa, S., Lashari, B. K., Baig, I. A., & Hussan, I. (2020). *Living with Salinity in the Indus Basin: SRA 2*. ACIAR.
- Noble, A. D., Bossio, D. A., Penning de Vries, F. W. T., Pretty, J., & Thiyagarajan, T. M. (2006). *Intensifying agricultural sustainability: An analysis of impacts and drivers in the development of ‘bright spots’*. (Comprehensive Assessment of Water Management in Agriculture Research Report No. 13). Colombo: Comprehensive Assessment Secretariat.

Appendix 2. Interview guidelines for co-creating ASSIB stories of change

Guidelines for interviews with participants from farming communities

1. Begin with a broad starter prompt to allow you and the interviewee to become comfortable with each other and to see where the discussion takes you both.

Example starter: Please tell me a story to describe what you think has been the most significant change for you as a result of your involvement with the ASSIB project.

Or you can start with the question: “what has been the most significant change for you since you’ve been involved in the ASSIB project?” and then keep prompting the interviewee to tell you more, and ask questions to get more details: what happened, when, why, how did you feel, etc.

If you need to, you can take a step back and ask the kinds of questions we originally asked that lead into this question – i.e.: Could you tell me briefly about what you do in the ASSIB project? How has working with ASSIB project impacted on you? And then ask: What has been the most significant change for you since you’ve been involved in the ASSIB project?

2. As you listen to their story, listen out for aspects of the story they describe which offer examples for how the change they experienced was positively influenced by certain factors, take a note of the factor, and then refer back to it when there is a moment to dig deeper into that aspect.

Similarly, if the interviewee mentions an aspect that was a constraint for them in their story of change, make sure you ask for more details explaining to them that it is important for us to understand how we can manage such constraints in the future.

3. As you listen to the story, you should also check to see if you can hear anything that you think relates to our project’s intended outcomes that are relevant to farming community participants, such as:
 - a. **Participation:** Community members (including women and youth) have been actively involved in participatory research processes, including in the planning, delivery, co-learning and dissemination of outcomes
 - b. **Access to information:** Communities have improved access to information related to salinity, water use and management, and climate change / Agricultural extension services are providing opportunities
 - c. **Better options:** Communities have been introduced to better options for managing their salinity affected landscapes / They have an improved understanding of a range of salinity adaptation options
 - d. **Adapting:** Individuals and groups (including women and youth) are learning and using that to adapt how they manage their salinity affected landscapes
 - e. **Planning:** Individuals and groups (including women and youth) are engaged in processes to plan their own futures for living with salinity
 - f. **Capacity to influence their situations for the better:** Communities have ideas for how they can improve their institutional arrangements so that they can do any of the above more effectively
 - g. **An ethos of caring for land and water has increased**

When you hear parts of the story that relate to any of these topics, take a note of what was said so that you can come back to it. When they have finished telling their story, you can refer back to what you had heard – e.g., you mentioned that “.....”. I’m interested to understand more about this, can you tell me more.

4. If the interviewee does not mention any of the above topics, you could ask them directly, e.g.:
 - a. **Participation:** A project aim was that you would feel as though you were part of the research team, helping to design and deliver the research together with academics from the university and other experts. Did you feel part of the research team? If they answer yes, ask them to give you an example of when they felt they were active researchers. If they answer no, you could explore with them why they felt excluded from the research process – what parts and why.
 - b. **Adapting and planning:** Do you think you are managing your land differently from how you managed the land before your involvement in the project? If they answer yes, ask them to explain how their land management has changed. And then ask them to think about what they are planning to do in the future. Do they feel they have the strategies and information to help them make decisions about what they will grow and how they will manage their land into the future.

Appendix 3. Thematic Codebook

<i>Name</i>	<i>Files</i>	<i>References</i>
ASSIB issues	0	0
Complexity	2	3
Expectations	1	1
Limited resources	2	3
Limited time	2	2
Low 'stakeholder' contribution	3	4
ASSIB learning and change approach	0	0
Affordable	1	1
Builds on changes already occurring	1	1
Builds on existing experience	10	14
Culturally aware	2	2
Enjoyable	4	4
Equitable	7	8
Flexible	3	3
Friendly	1	1
Inclusive (Feeling part of the research)	11	12
Interesting	7	8
Provides information	9	10
Respectful	7	7
Supportive	9	18
ASSIB Learning and change outcomes	0	0
Capable	8	9
Confident	9	17

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<i>Name</i>	<i>Files</i>	<i>References</i>
Courageous	2	2
Empowered	4	6
Inspired	2	3
Knowledgeable	10	12
More potential	1	1
Motivated	6	6
Responsible	5	6
Connections	0	0
CET	0	0
<i>Bridge</i>	4	6
<i>Engagement among CET</i>	2	3
<i>Engagement with CET</i>	15	20
Farmer connections with others	0	0
<i>Groups</i>	1	1
<i>Links</i>	6	11
<i>Reciprocity</i>	5	5
<i>Strong Bonds</i>	4	5
<i>Trust</i>	4	4
Farmers connections with each other	1	1
<i>Farmers learning from other farmers</i>	12	16
<i>Sharing with family and friends</i>	17	22
Policy makers	1	1
Project team	3	5
Researchers	2	2
value chain	1	1
Emotions	0	0
Confusion	1	1

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<i>Name</i>	<i>Files</i>	<i>References</i>
Excited	1	1
Gratitude	6	6
Happiness	8	11
Love	6	6
Nervous	1	1
scary	1	1
Evidence of impact	0	0
Changed behaviour	0	0
<i>Farmers</i>	13	16
<i>Researchers and Project Team</i>	4	4
Changed practice	0	0
<i>Farmers</i>	27	52
<i>Researchers and Project Team</i>	6	7
Changed thinking	0	0
<i>Farmers</i>	21	32
<i>Researchers and Project Team</i>	6	7
Improved outputs	17	20
Forms of learning	0	0
Capacity building	7	9
<i>Students</i>	4	6
Developing action plans	9	12
<i>Using existing resources better</i>	4	4
Experimenting	23	32
Expertise	6	7
Farmer to farmer	12	21
Farmers learning from experts	21	32
Farmers learning new things	10	15

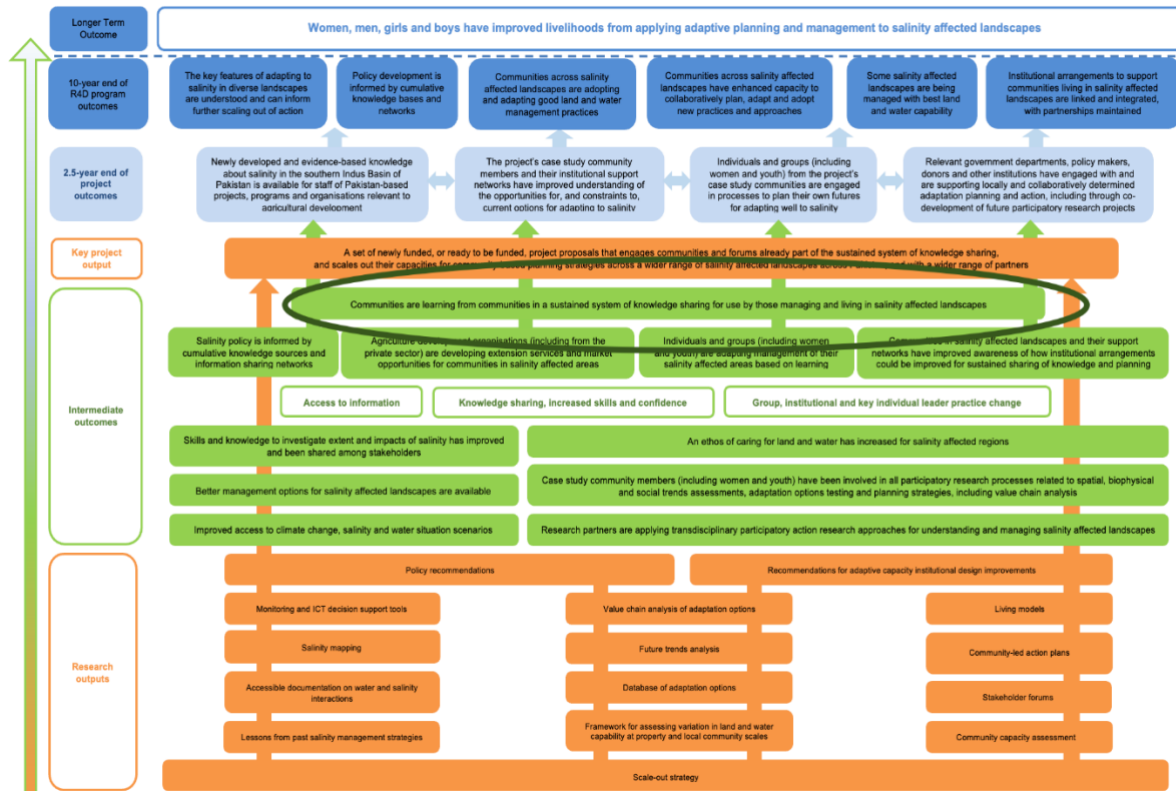
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<i>Name</i>	<i>Files</i>	<i>References</i>
Field visits	10	11
Learning from failure	2	2
Learning over time	13	14
Monitoring and observation	4	5
REALM SERL Workshops	30	39
Researchers learning	7	10
Researchers listening to farmers	8	13
Training	16	19
Site Issues	0	0
Absent managers	1	1
Access to canal water	2	2
<i>No control of water timing</i>	1	1
<i>Scarcity of the canal water</i>	5	5
Access to education	2	2
Access to government information people	2	3
Access to straw	1	1
Distance	1	1
Historical practices	6	7
Land and soil	1	1
Limited resources	1	1
<i>Financial constraints</i>	6	6
<i>Time</i>	1	1
Lost productivity in value chain	1	3
Low yields	1	1
Malnutrition	1	1
Middle men	1	1

<i>Name</i>	<i>Files</i>	<i>References</i>
Pests and diseases	2	2
Risk	2	2
Salinity	8	8
Seed quality	3	3

Appendix 4. Impact Pathways Analysis




The ASSIB Impact Pathways Analysis represents a theory of change, and includes a central, all-encompassing, top-level intermediate outcome focuses on learning: “Communities are learning from communities in a sustained system of knowledge sharing for use by those managing and living in salinity affected landscapes”. This in turn builds on other intended outcome related to learning, including this “Individuals and groups (including women and youth) are adapting management of their salinity affected areas based on learning”.

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