

**Report on a workshop, 14-15 November, 2017**  
**Serena Hotel, Faisalabad**

**Improving Salinity and Agricultural Water Management**  
**in the Indus Basin of Pakistan**

**A Short Research and Development Activity (SRA) undertaken by**  
**Charles Sturt University and partners with support from the**  
**Australian Centre for International Agriculture Research (ACIAR)**

**LWR-2017-028**



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## Workshop objectives:

1. Contribute to a holistic understanding of the underlying causes of salinity in the Indus Basin of Pakistan, and the difficulties that result for farming and coastal communities affected.
2. Contribute to an understanding of how the concept of ecosystem services can be incorporated into and improve holistic approaches to salinity management.
3. Identify examples of holistic approaches to salinity management already being undertaken in Pakistan, including any that consider the use of the ecosystem services concept, and a strategy to engage with and learn from those involved in these case study examples.
4. Identify the most significant research questions that might arise from this emerging holistic understanding of salinity management for further investigation as part of a four-year research project.
5. Establish a network of researchers and intended research beneficiaries with whom the case for a more holistic approach to salinity management can be investigated.

## Presentations:

Five brief presentations were delivered to provide context for workshop discussions, including a panel session for questions to presenters.

- |  |   |
|--|---|
| 1. Salinity issues and management options in Pakistan  | Dr Ashfaq Sheikh,<br>PCRWR                  |
| 2. Brief overview of state of salinity research internationally and Pakistan, and rationale for currently proposed project     | Dr Ed Barrett-Lennard,<br>Monash University |
| 3. Brief overview of holistic approaches to salinity research and management in Punjab   | Dr Javiad Akhtar,<br>UAF                    |
| 4. Brief overview of holistic approaches to salinity research and management in Sindh  | Dr Altaf Ali Siyal,<br>MUET                 |
| 5. Improving salinity and agricultural water management in the Indus Basin of Pakistan: using holistic or ecosystem approaches | Prof Max Finlayson,<br>CSU                  |

These presentations are attached separately.

## Outputs from workshop activities:

Workshop participants were asked to come prepared to offer examples and evidence from their working experience:

1. Case examples where salinity management has improved through the use of a holistic or integrated approach.
2. Case examples where remedial focus on the broader environmental context has led to improved livelihoods of communities affected by salinity.
3. Case examples where livelihoods of those living or working in environments affected by salinity have improved through the use of innovative agricultural or coastal practices, especially any that have been driven by community collective action.
4. Case studies of innovative and successful salinity management interventions that have been adopted and implemented by farmers.

A “World Café” approach was used, with participants initially assigned to one of four tables to share and document their experiences on the topic. Participants then rotated to the next table to add to the list developed there, and so on until each participant had visited and contributed to the document being developed on each table. The topics for discussion were:

**Table 1: Understanding Salinity as a Systemic Issue:** Case examples where a holistic or integrated approach to salinity management has been trialled or put into practice

**Table 2: Save our Environments:** Case examples where a focus on broader environmental causes of salinity has resulted in improved landscapes or livelihoods

**Table 3: Bottom Up is Best:** Case examples of innovative salinity management practices developed by communities through their own efforts

**Table 4: Successful Adoptions:** Case examples of innovative salinity management practices introduced to a community that they have adopted and implemented

Small groups were also arranged to document participants’ experience relating to:

### 1) Suggested sites for the salinity project core team to visit

Suggested site to visit	Reason	Times recommended
Delta areas: Baime District; Thatta; Sujawal; Badin, Sindh		7
Satiana, Punjab	Visit of farmers site using reclamation techniques. Contact soils salinity. SSRI	3
Shorkot District, Punjab	Saline sodic soils	3
Umer Kot, Sindh		2
Bahawalpur, Punjab		2
Jhang District, Punjab		2
Pindi Bhattian, near Hafizabad, Punjab	Tile drainage, history is known, pilot studies are already conducted on these sites, saline sodic soils	2
Southern projects, esp. Bahawalnagar		2
SMO-WAPDA research institution, Pindi Bhattian	AusAid Bio drainage program with AWASRI	
Nankana Sahib, Punjab		
Near Sangla Hills, Punjab		

Mir Pur Khas	farmer's intervention area
Mona, Punjab	
IUCN project sites	Mangroves
Taluka Warah, District Larkana Sindh	
Khurruanwala, Faisalabad	Sodic soils
Pind Dadan Khan, Punjab	
Cholistan, Punjab	AZRI, PARC,
Balwal, Sargodha, Punjab	
WWF sites	

## 2) Additional people for proposed salinity project network

Name	Role	Contact
Dr Jamal Khattak,	Professor of Soil Science, Univ. of Agriculture, Peshawar. Extension/ adoptive research, SAU, Jamshoro	jamal@aup.edu.pk
Mian Muhammad Alim	Ex Director General Soil Survey	
Dr Nazim Hussain	BZU, Multan Agronomist	nazimlabar@yahoo.com
Ali Hassan Shah	ex-IWASRI senior research officer, now working for NESPAK	
Dr M. Aslam	ex-IWMI water expert	
Dr S.M. Mehdi	Director soil fertility research institute, Lahore	mehdi853@hotmail.com
Dr Tahir Qureshi	IUCN	Tahir.qureshi@iucn.org
Zahoor Aslam	Landcare International	<a href="http://www.silc.com.au/pakistan">http://www.silc.com.au/pakistan</a>
Farmers/ FOs/ WUAs from salinity affected area		
Extension Department members, particularly working on salinity control or fertiliser management		
Breeders, to tell about work for salt tolerant crops		
NIAB, Faisalabad		
SMO WAPDA		
PID-SID (project monitoring units)		
WWF		
NGOs Sindh (MDF)		
Salinity experts (other than in Sindh/ Punjab) e.g. Islamabad or KPK or Balochistan		

## 3) Research on ecosystem services approach to salinity management

Document	Contact
SLMP-UNDP-GEF Ministry of Climate change	Waqar
Global soil partnership, FAO	
Annual and abridged reports of Director SSRI Pindi Bhattian	
UNDP site f2 BioSaline ii project	

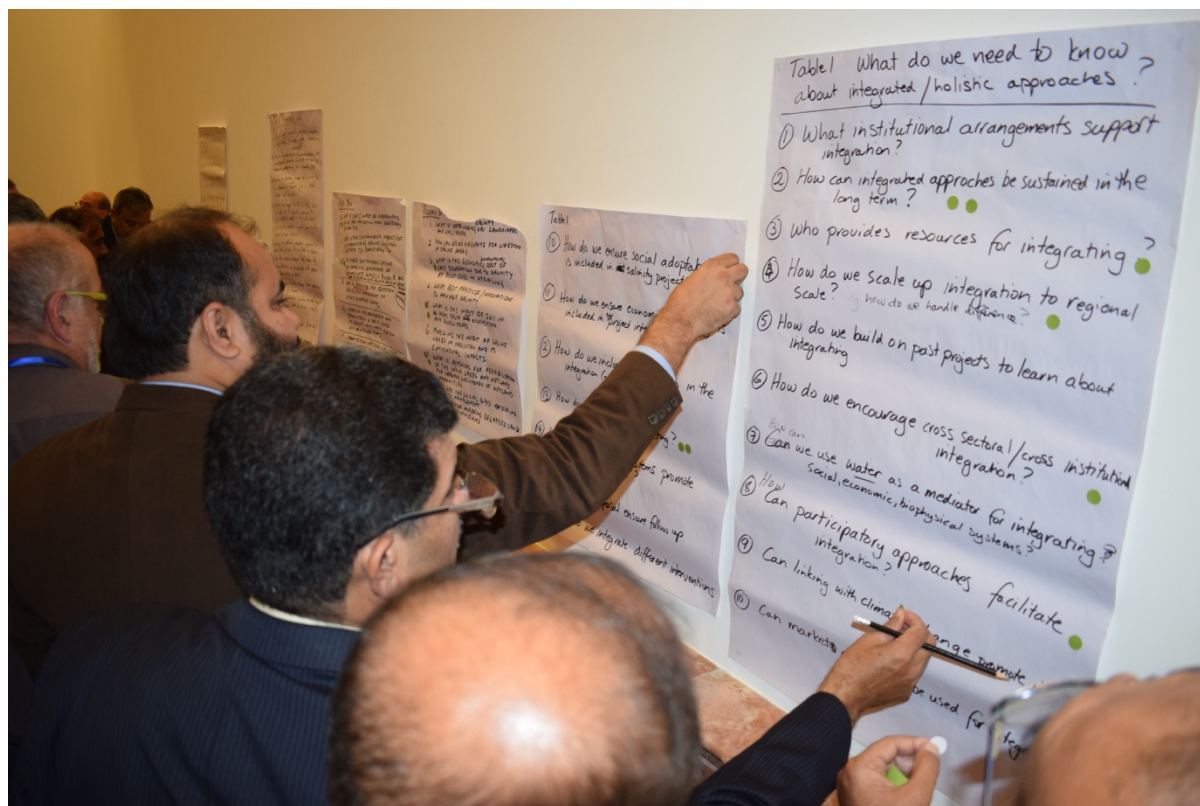
ALD. IWASRI, NDP, UAF soil and environmental sciences - Through email, SSRI reports, long term experiments	
One PhD thesis about soil quality improvement at UAF	
One PhD student is writing on carbon sequestration potential of saline land	
IUCN	
WWF	
Dr Lashari's reports	
IWASRI report	
National Institute of Oceanography, Karachi	
DRIP, Tando Jam (PCRWR)	
IWMI reports (also key literature)	
Nico Marcar's ACIAR project 2	
Ed's ACIAR projects	
Plenty of ecosystem in delta to reduce degradation of coastal ecosystems	
Allocation of releases downstream of Kotri Barrage	

#### 4) Key Literature

Document	Contact
IWASRI reports; IWASRI surface salinity maps 2003-2004	
One report of 4R nutrient stewardship for salt affected soils	Waqar
Recommendations from a National Policy dialogue	
Atlases, FAO	Waqar
Gypsum mining, production processing and marketing, 2006	
Previous ACIAR reports	
National Coordination Projects	
NIAB annual reports (Biosaline I and II)	More details from Dr Javaid
WAPDA work of 1960s and later	
Salinity work in Rechna Doab and Sindh	
Theses in the library of UAF	Dr Javaid
HEC website <a href="http://www.hec.gov.pk">www.hec.gov.pk</a>	
PhD theses	
Masters theses	
Proceedings of conferences at UAF	
Botany Department Karachi University	Rafiq Ahmed, Shoaib Ismail, Ajmal Khan
AusAid/ IWASRI, main project	check with Nico Marco
Terminal report of BIOSaline 2 project (available on net). It covers Pindi Bhattian Tesil Sahiwal of Sargodha district	
Punjab development statistics 2003	
Ijaz & Davidson. Report on socioeconomic effects of salinity in Setiane area	Ed has a copy

## 5) Research questions arising out of World Cafe exercise

Through the World Café exercise, participants developed some key research questions, and later prioritised them by voting using dots.



The highest ranked questions are listed immediately below. These are followed by a set of tables showing the full set of questions developed, and the vote each question received from the workshop participants.

Highest ranked research questions:

- What are the best practice / innovative approaches to managing salinity?
- Can linking with climate change promote integration?
- How do we ensure economic feasibility is included in project interventions?
- How do we ensure social adoptability is included in salinity projects?
- What kind of spatial mapping data can we provide to support targeted education and awareness programs for different types of places (so that adaptation responses can be modelled and grouped)?
- How can we provide awareness raising activities for communities to initiate responses that are locally relevant and site specific?

### *Understanding salinity as a systemic issue*

Research questions related to integrated/ holistic approaches to salinity management:

Questions	Votes
Can linking with climate change promote integration?	14
How do we ensure economic feasibility is included in project interventions?	13
How can integrated approaches be sustained in the long term?	12
How do we ensure social adoptability is included in salinity projects?	11

How can we use water as a mediator for integrating social, economic and biophysical systems?	7
How can participatory approaches facilitate integration?	7
What institutional arrangements support integration?	6
How do we build on past projects to learn about integrating?	4
How do we encourage cross-sectoral/ cross-institutional integration?	3
How do we scale up integration to regional scales? And how do we handle differences?	2
Can market approaches be used for integrating?	2
How do we learn for integrating?	2
How can this proposal ensure follow up?	2
How do we integrate different interventions?	1
Who provides resources for integrating	1
What decision support systems promote integration?	0

### *Save the environment*

Research questions to link the broader environmental context with improved livelihoods of communities affected by salinity:

<b>Questions</b>	<b>Votes</b>
What are the best practice / innovative approaches to managing salinity?	17
What is the impact of salt water intrusion in the Indus Delta on ecosystems and livelihoods?	8
What is the economic environmental cost of land degradation due to salinity at pilot level – upscaling?	8
Are there sustainable options for improving governance of groundwater usage in the Indus Basin and its relation with salinity build up and stakeholder interaction?	8
How can we use rain water harvesting to reduce salinity in rain fed areas?	7
What is the cost and impact of overpumping of groundwater for irrigation from electric/ diesel/ solar tubewells?	7
What is the potential for ecosystem services for management of saline/ degraded lands (e.g. aquaculture)?	7
What is the potential for mapping degraded land using new techniques?	6
What are the social gaps hindering salinity management?	5
What is the potential for rehabilitating the Indus lakes and wetlands for improving livelihoods of wetland communities?	5
What is the potential for improving management and rehabilitation of arid lands (e.g. Cholistan) using native vegetation (medicinal plants)?	5
How can Cholistan/ Thar environments be improved from diversion of flood waters?	4
What are the impacts of waterlogging and salinity on landscapes and livelihoods?	3
Can we model the impacts of saline lakes in Cholistan and its environmental impacts?	3
What is the environmental impact and cost of transferring saline groundwater and surface water from upstream to downstream?	3
What is the appropriate and judicious use of eucalyptus in water logged soils? (What can we learn from mixed experiences of eucalypts to reduce waterlogging in different soil types?)	2
How can we use halophyte for livestock in saline areas?	2

### *Bottom up is best*

Research questions related to supporting community-initiated innovative practices

Questions	Votes
What kind of spatial mapping data can we provide to support targeted education and awareness programs for different types of places (so that adaptation responses can be modelled and grouped)?	10
How can we provide awareness raising activities for communities to initiate responses that are locally relevant and site specific?	9
What are some best practice examples that we can document and disseminate?	5
What kind of institutional structures can we suggest to help disseminate bottom up initiatives – even at a policy level?	4
What are the bottle necks preventing communities from finding and pursuing their own bottom-up solutions?	3
What kind of (integrated data and modelling can we provide (e.g. on land capability, cropping patterns, market value chains) to assist communities find their own adaptation pathways, and to imaging alternative futures (scenarios)?	3
How can we build on all the expertise of farming and coastal communities – especially by including women’s perspectives – to better enable and support community-led initiatives?	3
How can we facilitate exchanges between progressive farmers and other farmers?	2
How can we support FOs and CBOs working with communities undertaking their own initiatives to adapt to living with salinity?	1
How can we assess/ model impacts and unexpected consequences arising from community-based initiatives so that we can help decide if these initiatives should be supported/ disseminated?	0
What are the constraints to upscaling community-based initiatives?	0
Are there common strategies being taken up communities that can be adopted in other places that have similar conditions?	0
How can we provide education and awareness programs that can empower communities to initiate their own adaptation pathways on a sustainable basis?	0
How can we best support community initiatives responding to difficult challenges (e.g. no access to irrigation, irrigation with brackish water, sodic soils)?	0

### *Successful adoptions*

Research questions related to innovative and successful salinity management interventions that have been adopted and implemented by farmers

Questions	Votes
What salt tolerant varieties should be explored, adopted and its adoption accelerated across Pakistan?	12
What cropping pattern changes and precision levelling tools can be expedited for adoption across different parts of Pakistan?	8
How can we maintain quality of gypsum used for soil reclamation?	8
How can salt tolerant crops also have positive impacts for human health?	4
Is aquaculture a sustainable option?	1
Under what water deficit scenario can shifting to rice be sustainable?	1

### Field trip:

A half-day field trip to two locations near Faisalabad was organised for the morning of 15 November by Drs Javaid Akhtar and Zulfiqar Saqib from UAF. Both locations involved support from local farmers. Surface salt was visible at both sites, despite overnight rain. No doubt the presence of surface salt would be much more visible at the end of the rabi season.

At the first site, we saw an interesting example of barren waste salt land immediately adjacent to a recently harvested rice crop. The rice field had been reclaimed by the use of tile drainage, and the application of gypsum and organic matter. It provided a dramatic example of the difference that technology, management and farmer confidence can make.



At the second site, we inspected a field for wheat cultivation that had been reclaimed from saline wasteland.





We observed that salinity within cultivated areas results in 50-60% decrease in crop yields. At this site discussion with a local farmer indicated that the farmer was producing 35-40 maunds (1 maund = 40 kg), whereas the average yield for wheat in Punjab is 65-70 maunds. The farmer was using groundwater as a supplementary irrigation source, adding further salt to the soil and increasing input costs.

On our way back we passed through a herd of goats – a strong indicator of the continuing importance of livestock in this area.

### **Evaluation summary:**

A rapid evaluation was undertaken after the workshop, and 21 out of 40 participants completed the one-page questionnaire. All workshop activities were rated very good or excellent by over 75% of participants, with the input presentations, world cafe exercise and facilitation rated very good or excellent by 90% of participants. All participants agreed the workshop adopted methods that used their time effectively, and all thought meeting logistics and preparations were very good or excellent.

In terms of workshop outcomes, strong endorsement from participants helped establish the initial members of a network to advance the proposed salinity project, and through which new ideas and innovations for living with salinity and improving management of salinity can be shared. This network will not be limited to workshop participants and efforts will be undertaken to expand the network to include those who were unable to attend the workshop. We envisage that in time this semi-formal network will help us reach policy and decision makers in order to improve salinity management in the irrigated landscapes of the Indus basin.

During the workshop it became clear that there is a level of uncertainty about the value and role of ecosystem approaches for managing salinity and agricultural water at the farm, distributary and basin level. Although the value of environmental

improvement is recognised, there seemed to be a lack of clarity about how an ecosystem approach could be adopted. The core team therefore determined that, as we develop our project proposal, we instead refer to “an increasingly integrated approach to salinity and water resource management”, and that ecosystem approaches for specific areas be incorporated into this approach.

### Next steps:

1. Feedback to workshop participants  
*Due Fri 24 Nov 2017*
2. Engage consultants (if funds available) to assist with desk-top reviews on:
  - a. Technical, economic and social aspects related to salinity management in the Indus Basin Irrigation System, drawing on relevant grey literature reports, project reports, policy documents and critical assessments of past projects, with a view to advancing holistic approaches to salinity management.
  - b. Examples of the application of ecosystem service approaches to agricultural landscapes in other equivalent parts of Asia, particularly in relation to salinity management.

*Due Fri 24 Nov 2017. A contract is being arranged to engage Dr Akhtar Ali to assist with (a); (b) will be undertaken in-house by the CSU team.*
3. Draft of desk-top reviews  
*Due Fri 15 Dec 2017*
4. Desk-top reviews finalised  
*Due Fri 22 Dec 2017*
5. Report to ACIAR on SRA  
*Due Fri 29 Dec 2017*
6. Draft ACIAR Phase I project proposal for discussion with network and with potential partners and collaborators  
*Due Mon 25 Jan 2018*
7. Additional field visits sites and workshop with IUCN, WWF etc. on application of ecosystem approaches to salinity management  
*Mon 1 – Sun 7 Feb*
8. Feedback from network on draft Phase I project proposal  
*Due 16 Feb 2018*
9. Submission of revised Phase I project proposal to ACIAR  
*Due Fri 9 Mar 2018*
10. In house review of our proposal by ACIAR, *22 March 2018*

## Improving Salinity and Agricultural Water Management in the Indus Basin of Pakistan

### Workshop, 14-15 November, 2017 – List of Participants

Organisation	Name	Position	Email Address
<b>Core Team, Australia</b>			
ACIAR	Dr Robyn Johnston	Research Program Manager, Land and Water Resources	Robyn.Johnston@aciar.gov.au
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<b>Universities – Sindh</b>			
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<b>Apologies – Governments – Provincial</b>			
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Planning Department	Ms Shabnam Baloch	Snr Provincial Advisor, German International Cooperation	Shabnam.baloch@giz.de
SAU, Tandojam	Prof Allah Wadhayo Gandahi	Associate Professor, Dept. of Soil Sciences	