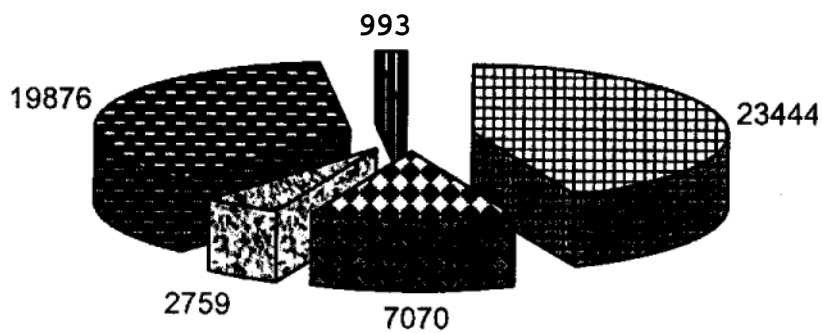


Mirwal Dam



Shahpur Dam

Crops
 Livestock
 Working on other farms
 Other Sources
 Remittances

Figure 5.10. Average Income From Various Source (in Rs.) of the Respondents (Farmers having land of 1600 kanals and above not included.)

of good quality seed was ranked no. 1 by 3.6 percent the farmers, no. 2 by about 21 percent, while 22.2 percent of them ranked it as no. 3. For chemical fertilizers, 17.5 percent of the farmers ranked it no. 1, about 31 percent as no. 2 and about 30 percent of the farmers ranked chemical fertilizers as no. 3.

Machinery used for land development at subsidized rates, was ranked as no. 1 by about 23 percent of the farmers, no. 2 by about 24 percent, and 18.6 ranked it as no. 3. Some respondents (15.5%) did mention more dam water as no.1, about 3 percent of them ranked it as no. 2 and about 4 percent of the respondents ranked 'more dam water as no. 3 as an important factor associated with more crop production. There were some respondents, who ranked better extension services, credit facilities, improved water management and quality of pesticides/insecticides at no. 1 or no. 2 or at no. 3, but the percentage of the farmers who ranked these factors was negligible.

Table 5.17. Ranking of Factors Associated with Increase in Crop Production.

Factors	Mirwal			Shahpur			Overall		
More dam water	8.5	5.1	8.5	18.5	1.5	1.5	15.5	2.6	3.6
Ensured dam water	8.5	8.5	6.8	37.8	11.1	8.9	28.9	10.3	8.2
Improved water management	3.4	-	1.7	1.5	3.0	1.5	2.1	2.1	1.5
Better extension service	1.7	6.8	1.7	-	0.7	2.2	0.5	2.6	2.1
Good quality seed	6.8	30.5	27.1	2.2	17.0	20.0	3.6	21.1	22.2
Chemical fertilizer	23.7	32.2	23.7	14.8	31.1	32.6	17.5	31.4	29.9
Credit facilities	6.8	5.1	11.9	2.2	4.4	4.4	3.6	4.6	6.7
Machinery at reduced rates	35.6	10.2	16.9	17.8	30.4	19.3	23.2	24.2	18.6
Quality pesticide	3.4	-	3.4	0.7	1.5	5.2	1.5	1.0	4.6
Quality weedicide	-	1.7	-	-	-	2.2	-	0.5	1.5

CHAPTER 6

ISSUES

The following are the main issues, as stated by the respondents, of the irrigation system network and the command area at Mirwal and Shahpur Small Dams.

6.1 Ensured Dam Water Supply

The issue of ensured water supply is arising due to lack of a proper warabandi system in the area. Though there exists an agreed warabandi in both of the pilot small dams, yet farmers are not strictly following it. Whenever crops need water, the farmers just unplug the nakka and start irrigating their fields. During this process, farmers at the tail reach of the canal are deprived of dam water. This is true under both the Mirwal and Shahpur Small Dams. Therefore, the introduction of an effective warabandi system in the area is very much required in order to have equitable water distribution. This issue basically stems from a lack of clear water rights for the users.

6.2 Water Rights

With the construction of a small dam and the associated water channels/canals, a mogha was constructed for whosoever applied, without considering the size of the outlet and the area to be irrigated by that outlet. Presently, farmers of the area consider watercourses as their property and are not allowing other farmers, who have developed their land in the recent past, to irrigate their fields through their watercourses. This point was raised by the sufferers in the process of awareness and consultation meetings with farmers in connection with the formation of Farmers Organizations at Mirwal and Shahpur Small Dams. Management of the irrigation system is not properly established and the influentials use more water than their authorized share of dam water. With water being such a crucial input, the issue of water rights (that every farmer in the command area should get water according to his share) will continuously be a source of problems unless it is resolved by the concerned agency, such as the Small Dam Organization, Department of Irrigation and Power, Government of the Punjab.

Further, to minimize land and water disputes, the Small Dam Organization (SDO) officials should demarcate passages for the official watercourse to fulfil the farmers' demand for dam water.

6.3 Water Conveyance Network

The water channel/canal, particularly of Shahpur Small Dam, is in miserable condition. The canal was constructed before it was actually linked to the dam. During the last rabi season, farmers remained without dam water for three months; from January to March,

1997. At one place, one of the pillars under the aqueduct collapsed and it took three months for its repair. The canal has not been very well maintained by the Small Dam Organization due to non-availability of funds and manpower. One can easily observe the ruined bed and the cracks appearing in the canal where bushes have grown and covered the canal at some places. This has resulted in waterlogging in Shahpur Small Dam command area due to continuous seepage and leakage of the water from the canal and the watercourses, that has made the surrounding land uncultivable.

6.4 Land Levelling

With the construction of small dams in the area, farmers have started investing in land levelling to optimally use irrigation water available through the aqueduct. Presently, only 25 to 30 percent of the Mirwal and Shahpur Dams command area has been developed by the farmers with the help of government agencies, like Agency for Barani Area Development, Soil Conservation, On Farm Water Management, etc. and by hiring private tractors. Still, a lot more of the command area needs land levelling. To attain maximum benefit from the small dams and the dam water, there is a need to bring more and more area under irrigated agriculture by levelling barani uneven/undulating fields by bulldozers or tractors. The machinery in this regard may be provided by the government agencies at the subsidized rates.

6.5 Farm Productivity

Where there is a question of inequitable distribution of water, farmers have concerns about lack of timely availability of other inputs, like fertilizer, pesticide, good quality seed for various crops, etc. Lack of timely availability of inputs, coupled with uneven land and inequitable distribution of water, have really hampered farm production to a large extent.

To lift water for irrigation through pumps, where land is at higher elevations and cannot be irrigated through gravity flow, schemes for providing lift pumps should be introduced in the project area. When the proper quantity of dam water is available, along with other inputs associated with crop production, better cropping patterns can be established and crop production can be increased in the area. One can grow vegetables, chillis, orchards, etc., instead of growing conventional crops like wheat, maize and groundnuts.

REFERENCES

1. Cheema, M., Iqbal, Z., Hussan, M.. and Bandaragoda, J., 1997." Socio-Economic Baseline Survey for a Pilot Project on Water Users Organizations in the Hakra 4-R Distributary Command Area, Punjab" Report No. R-37. International Irrigation Management Institute. Lahore.
2. Cheema. M.. Sharif. M., Longmire, J. and Farooq, U., 1992." Initial Sources of **Information** and the Pioneers in the Adoption of Recent Technologies for Rice B-385" Pakistan Agriculture Research Council Unit, Ayub Agriculture Research Institute, Faisalabad.
3. Government of Punjab, 1980. "PC-1 Feasibility Report and Project Estimates of Shahpur Dam" Small Dam Organization, Irrigation and Power Department, Agency for Barani Area Development, **Rawalpindi/Islamabad**.
4. Government of Pakistan, 1996. "Economic Survey 1995-96." Finance Division, Economic Advisor's Wing, Islamabad.
5. Iqbal, W. M., 1991." Screening Survey of Potential Small Dam Sites in Punjab (Phase iv)" Publication No. 273, Punjab Economic Research Institute. Lahore.
6. Iqbal, S. M and Khan, S.A, 1991. "Benchmark Survey of Jabbi and Nikka Small Dams" Publication No. 275, Punjab Economic Research Institute, Lahore.
7. Iqbal, S.M. 1989. "Baseline Survey of Shahpur Small Dam". Publication No. 257, Punjab Economic Research Institute, Lahore.
8. **IIMI-Pakistan** 1996. "Social Organization for Improved System Management and Sustainable Agriculture in Small Dams" Inception Report No. P-5. International Irrigation Management Institute, Lahore.
9. Lionberger, H.F. 1961. "Adoption of New Ideas and Practices", The Iowa State University Press, Ames, Iowa.
10. Shahid, A. S.. M. Sharif, K. Ata and S. A. Namdar, 1995. "Evaluation of Small Dams Project in **Punjab**" Publication No. 315, Punjab Economic Research Institute, Lahore.
11. Shahid, A. and Ashraf, M., 1989. " Benchmark Survey of Mirwal Small Dam" Publication No. 262, Punjab Economic Research Institute, Lahore.

12. Sharif, M., Khan, M. and Sarwar, M., 1986. "Constraint Facing Small Farmers in Punjab" Publication No. 224. Punjab Economic Research Institute, Lahore.
13. Zaidi, A. H., 1995. "Institutional and Management Issues in the Development of Irrigation with Small Dams in Pothwar Area of Punjab" Paper presented at the International Conference on Irrigation Management Transfer, held in Wuhan, China during Sept 20-24, 1995.

BASELINE SURVEY FOR FARMERS ORGANIZATIONS OF SHAHPUR AND MIRWAL SMALL DAMS

Name of the interviewer: _____

Farmer's I.D. _____

Date of interview: _____

Time started: _____

Finished: _____

Village _____

Dam Name _____

SDCA (Acres) _____

Farm location on the Water Channel. i) Head, ii) Middle, iii) Tail

Characteristics of the Respondent

1. Name of the respondent: _____

2. Father's name: _____

3. Age (years): _____ []

4. Resident local or a settler?
[Local=1, Settler=2] _____ []

5. Caste/Sub-caste _____
[Pathan=1, Malik=2, Khatar=3, Maliar=4,
Rajput= 5 Awan= 6, Any other=7] _____ []

6. Marital status _____
[Married=1, Single=2, Widower=3] _____ []

7. Father's occupation []
 [Same as respondent=1, Other=2]

8. Educational level []

- i illiterate
- ii Primary
- iii Middle
- iv Matriculation
- v F.A/F.Sc
- vi B.A/B.Sc
- vii M.A/M.Sc
- viii Any other (Sp)

9. Household size and composition

Particulars	< 5 Years			5 < > 15			15 < > 65			65 and above			
	M	F	T	M	F	T	M	F	T	M	F	T	
Number of members													
How many are at school?													
How many are working at farm?													
a. Full time													
b. Part time													
How many are working?													
a abroad											-	-	-
b. in armed forces											-	-	-

Persons up to primary education in the family.

Males _____ Females _____ Total _____

Irrigation Practices

10. Years of experience with irrigated agriculture — years. []
 Years of experience with agriculture _____ years. []

11. Source of irrigation.
- i. Dam
 - ii. Private lift pump
 - iii. Dam + private lift pump

- iv. Well
- v. Dam + well
- vi. Any other (Sp) .._____ []

12. To what extent this source fulfills your **crop** water requirement?
- i. Not at all
 - ii. To some extent
 - iii. To large extent []

If answer is i or ii, then ask how do you overcome crop water deficiency?

13. Irrigation method.
- i. Basin
 - ii. Furrow
 - iii. Basin + Furrow
 - iv. Wild flooding
 - v. Any other (Sp) _____ []

Water Management

14. For how many hours a day small dam water runs into the water channel?
_____ hours.

15. At what time you usually open and close your nakka during:

a. Rabi
Open _____
Close _____

b. Khrif
Open _____
Close _____

16. How much time it takes to irrigate one **kanal** of land at your water channel? _____ **minutes/kanal**

Irrigation System Performance

A. Equity in Water Distribution

17. Do you think that water is equitably distributed at your water channel? Yes/No
[Yes=1, No=2] []

If no, state reason (s) responsible for unequitable distribution of water?

- 1. Location of farm (H - M - T) []
- 2. Farm size []
- 3. Tenancy status []
- 4. Influential person []
- 5. Poor maintenance []
- 6. Any other (sp) []
- 7. Not applicable []

B. Adequacy, Reliability and Variation in the Supply of Dam Water

18. Was Dam water sufficient for the crops you cultivated in last Kharif season? Yes/No
[Yes=1, No=2] []

If no, month of the most acute shortage of water.
_____ []

19. Was Dam water sufficient for the crop you cultivated in last Rabi season? Yes/No
[Yes=1, No=2] []

If no, month of the acute shortage of water.
_____ []

20. To what extent are you satisfied with the present distribution of water ?
- i. Not at all
 - ii. To some extent
 - iii. To large extent []

If not at **all**, who can improve water distribution?

- i Government agency
- ii Farmers organizations
- iii Both
- iv Any other (sp)
- v Not applicable []

Institutional development

21. Is WUA formed **at** your water channel 7
Yes/No
[Yes=1, No=2] []
If no, **ask** Q.29
22. If yes, are you a member of this WUA ? Yes/No
[Yes=1, No=2] []
23. How many are the members of this WUA? _____ []
24. How many are the members of the Executive Committee?
_____ []
25. How the members of the Executive Committee are selected ?

26. Number of persons Who did not contributed for improvement of WC ?

Why ? _____
27. Has the WUA been useful to you ? Yes/No
[Yes=1, No=2] []
If yes, how ? _____

If no, what in your view **is** lacking in WUA ? _____

28. What activities has the WUA undertaken?

i. _____

ii. _____

29. **Existing Status of Organizational Behavior**

Areas of Collective Action	Yes/No [Yes=1, No=2]	If yes, how do you perform this action?
a. Maintenance/construction of village mosque		
b. Maintenance/construction of village school		
c. Land and water disputes		
d. Purchase of inputs		
e. Marketing of crop produce		
f. Maintenance of Dam		
g. Maintenance/construction of water channel		
h. Maintenance/construction of mouza streets/roads		
i. Any other (sp)		

30. Has the Dam which delivers water to your water channel:

- 1) remained in about the same functional condition as it was 5 years ago.
- 2) deteriorated to worse condition than 5 years ago.
- 3) improved to a better condition than 5 years ago.
- 9) do not know.

31. Has the main channel which delivers water to your farm:

- 1) remained in about the same functional condition as it was 5 years ago.
- 2) deteriorated to worse condition than 5 years ago.
- 3) improved to a better condition than 5 years ago.
- 9) do not know.

32. Has the watercourse which delivers water to your farm:

- 1) remained in about the same functional condition as it was 5 years ago.
- 2) deteriorated to worse condition than 5 years ago.
- 3) improved to a better condition than 5 years ago.
- 9) do not know.

Farmer's Perception

33. Did following agents or representatives of the agencies visit your farm during the last two seasons?

Agent	Yes/No [Yes=1, No=2]	If yes, what Benefit did you get?
1. Agriculture Extension agent		
2. Fertilizer company agent		
3. Pesticides company agent		
4. OFWM representative		
5. Mobile credit officer		
6. SDO representative		
7. ABAD reoresentative		
8. Other (sp)		

34. **Tenancy status**

[]

- i. Owner (absentee)
- ii. Owner-cum-operator
- iii. Tenant
- iv. Contractor/Lessee

	A B Total		
	A	B	Total
1. Area owned			
2. Area rented in			
a. On cash			
b. Share produce			
c. Total			
3. Area rented out			
a. On cash			
b. Share produce			
c. Total			
4. Area operated (1+2c-3c)			

* A = Irrigated B = Barani

35 a Acreage of levelled land _____ kanals
 Potential land needed levelling _____ kanals

36. **Machinery**

Statement	Yes/No
1. Do you own tractor?	
2. Do you own following modern equipments?	
a. Thresher	
b. Seed drill	
c. Reaper	
d. Ridger	
e. sprayer	
f. Any other (sp)	

Soil and Water Status

37, Is ground water available ? Yes/No []
 [Yes=1, No=2]

38. **Quality of ground water.**

- i. Fit for irrigation []
- ii. Marginal fit for irrigation
- iii. Unfit for irrigation

39. **A. Waterlogging.**

Number of acres affected by water-logging. _____ []

B. Salinity.

Number of acres affected by salinity. _____ []

40. **Method(s) used for reclamation of your land?**

Action	Waterlogging Yes/No/N.A. [Yes=1, No=0]	Salinity Yes/No/N.A. [Yes=1, No=0]
a. No action		
b. Use gypsum		
c. Grow grass		
d. Plant trees		
e. Rice cultivation		
f. Leaching		
g. Field levelling		
h. Any other (sp)		

CROP, AGRICULTURAL PRACTICES AND INPUTS

41. Cropping pattern, production and marketing: (Irrigated)

Season/ crop	Area under crop (kl)	Seed used/ kl	Fertilizer used/Kl	Total produce (Maund)/ kl or value/kl	Price Rs/40Kg	Total exp/Kl
KHARIF						
Peanut						
Oil Seed						
Rice						
Maize						
Fodder						
Tobacco						
Orchard						
Vegetable						
RABI						
Wheat						
Pulses						
Gram						
Fodder						
Oilseed						
Orchard						
Vegetable						

42. Cropping pattern, production and marketing: (Barahi)

Season/ crop	Area under crop (kl)	Seed used/ kl	Fertilizer usedkl	Total produce (Maund)/kl or value/kl	Price Rs/40Kg	Total exp/kl
KHARIF						
Peanut						
Oil Seed						
Rice						
Maize						
Fodder						
Tobacco						
Orchard						
Vegetable						
RABI						
Wheat						
Pulses						
Gram						
Fodder						
Oilseed						
Orchard						
Vegetable						

43. Name three main factors (priority wise), from the followings, which help in increasing yield per acre?

Factors	Priority
1. More dam water supply	
2. Ensured dam water supply	
3. Improved water management practices	
4. Better extension services	
5. Availability of good quality seed	
6. Timely availability of chemical fertilizer	
7. Easy availability of credit facility	
8. Availability of machinery on subsidized rates	
9. Availability of quality pesticides/insecticides	
10. Availability of quality weedicides	

44. Livestock inventory

Livestock	Number
1. Bullocks	
2. cows	
3. Camels	
4. Buffaloes	
5. Sheep	
6 Goats	
7. Donkeys	
8. Horses	
9. Poultry	

45. Estimated Family Income (per year)

Income from crop _____
 Income from livestock _____
 Income from labor _____
 (from outside farm)
 Remittances _____
 Any other _____
 Total family income _____

Land Manaagement

46. Do you level your land to optimize the utilization of water efficiently ?
Yes/No [Yes=1, No=2] []

If no, state reasons. _____

47. Have you heard about precision land levelling ? Yes/No
[Yes=1, No=2] []

If yes, how do you know ? _____

Attitude Towards Water Users Organization

48. Do you know that organized people work effectively for the development work ?
Yes/No
[Yes=1, No=2] []

If yes, how do you perceive the farmers organization?

49. Are you willing to work with people for any kind of development ?
Yes/No [Yes=1, No=2] []

If yes, how do you perceive your willingness in the organization ?

50. Have you ever initiated such kind of association in your area? Yes/No
[Yes=1, No=2] []

If yes, please explain about the formation of organization.

50.a Have you ever participated in any kind of association in you area? Yes/No
[]

51. Are you willing to contribute your labor or in case affordable money towards the work to be carried out by the organization for the development of your area?

Yes/No [Yes=1, No=2] []

If no, state reason _____

52. What kind of advantage you perceive by organizing farmers at small dam level?

53. Are you willing to give your services and or contribute if needed while maintaining and operating the irrigation system at the small dam level ?

Yes/No
 [Yes=1, No=2] []

How? _____

Health Component

54. State common illness/diseases you had in your family during 1996, treated where and by whom ?

Illness/diseases	Treated where?	By whom?

56. Community Characteristics

S.No.	Facilities	Yes/No [Yes=1, No=2]	If no, state distance
	Hospital/dispensary		
2	Veterinary hospital		
3	School (Male) P/M/H		
4	School (Female) P/M/H		
5	Industrial home (Female)		
6	Farm to market road		
7	Electricity		
8	Telephone		
9	Safe drinking water/tape water		
10	Post office		
11	Marketing facilities		
12	Bus station		
13	Bank		
14	Cooperative society a. Formal b. Informal		
16	Sewerage system		
17	Any other (sp)		

57. Total number of households in the village.

58. Total population in the village.

59. Whether panchayat system exists in the village to solve dispute among the villagers ? Yes/No

[Yes=1, No=2]

[]

60. If yes, to what extent it is effective in solving disputes among villagers?

1. To large extent
2. To some extent
3. Not at all
9. Not applicable

[]

Item of Information	Name of Small Dam			
	Mirwal	Shahpur	Bughtal	
Name of Stream	Dubran Kas	Nadna Kas	Sirli Nallah	
Storage Capacity	Live	3.36 MCM(2726 AF)	5.1 MCM (4095 AF)	0.8 MCM (675 AF)
	Dead	1.28 MCM (1039 AF)	6 MCM (10241 AF)	0.6 MCM (465 AF)
Design Discharge	0.31 M3/sec (11 cusecs)	1 M3/sec (43 cusec)*	0.25 m3/sec (9 cusec)	
Design Command Area	7.11 ha (1,050 acres)	1,364 Fa** (4,308 acres)	406 ha (600 acres)	
Year of Completion	1990	1986	1990	
O&M Cost	93/94	P.Rs. 1,72,400	P.Rs. 6,55,800	P.Rs. 50,000
	94/95	P.Rs. 1,63,780	P.Rs. 6,23,010	P.Rs. 50,000
Abiana Collected	92/93	P.Rs. 6,070	P.Rs. 7,027	P.Rs. 22,713
	93/94	P.Rs. 15,647	P.Rs. 20,132	P.Rs. 23,572
	94/95	P.Rs. 19,786	P. Rs. 17,901	P.Rs. 24,080
Number of Water Users	95	157	200	

*Actual discharge is 15 cusecs as reported by the Small Dams Organization.

**Actual command area is 1250 acre as reported by the Small Dams Organization.

¹ Information in this table was collected with the help of Dr. Shahid Ahmed and Mr. Mohammad Aslam of WRR

IIMI-PAKISTAN PUBLICATIONS

RESEARCH REPORTS

Report No.	Title	Author	Year
R-1	Crop-Based Irrigation Operations Study in the North West Frontier Province of Pakistan Volume I: Synthesis of Findings and Recommendations	Carlos Garces-R D.J. Bandaragoda Pierre Strosser	June 1994
	Volume II: Research Approach and Interpretation	Carlos Garces-R Ms. Zaigham Habib Pierre Strosser Tissa Bandaragoda Rana M. Afaq Saeed ur Rehman Abdul Hakim Khan	June 1994
	Volume III: Data Collection Procedures and Data Sets	Rana M. Afaq Pierre Strosser Saeed ur Rehman Abdul Hakim Khan Carlos Garces-R	June 1994
R-2	Salinity and Sodicity Research in Pakistan - Proceedings of a one-day Workshop	J.W. Kijne Marcel Kuper Muhammad Aslam	Mar 1995
R-3	Farmers' Perceptions on Salinity and Sodicity: A case study into farmers' knowledge of salinity and sodicity, and their strategies and practices to deal with salinity and sodicity in their farming systems	Neeltje Kielen	May 1996
R-4	Modelling the Effects of Irrigation Management on Soil Salinity and Crop Transpiration at the Field Level (M.Sc Thesis - published as Research Report)	S.M.P. Smets	June 1996
R-5	Water Distribution at the Secondary Level in the Chishtian Sub-division	M. Amin K. Tareen Khalid Mahmood Anwar Iqbal Mushtaq Khan Marcel Kuper	July 1996
R-6	Farmers Ability to Cope with Salinity and Sodicity: Farmers' perceptions, strategies and practices for dealing with salinity and sodicity in their farming systems	Neeltje Kielen	Aug 1996
R-7	Salinity and Sodicity Effects on Soils and Crops in the Chishtian Sub-Division: Documentation of a Restitution Process	Neeltje Kielen Muhammad Aslam Rafique Khan Marcel Kuper	Sept 1996
R-8	Tertiary Sub-System Management: (Workshop proceedings)	Khalid Riaz Robina Wahaj	Sept 1996
R-9	Mobilizing Social Organization Volunteers: An Initial Methodological Step Towards Establishing Effective Water Users Organization	Mehmoodul Hassan Zafar Iqbal Mirza D.J. Bandaragoda	Oct 1996
R-10	Canal Water Distribution at the Secondary Level in the Punjab, Pakistan (M.Sc Thesis published as Research Report)	Steven Visser	Oct 1996
R-11	Development of Sediment Transport Technology in Pakistan: An Annotated Bibliography	M. Hasnain Khan	Oct 1996

Report No	Title	Author	Year
R-12	Modelling of Sediment Transport in Irrigation Canals of Pakistan: Examples of Application (M.Sc Thesis published as Research Report)	Gilles Belaud	Oct 1996
R-13	Methodologies for Design, Operation and Maintenance of Irrigation Canals subject to Sediment Problems: Application to Pakistan (M.Sc Thesis published as Research Report)	Alexandre Vabre	Oct 1996
R-14	Government interventions in Social Organization for Water Resource Management Experience of a Command Water Management Project in the Punjab, Pakistan	Waheed uz Zaman D.J.Bandaragoda	Oct 1996
R-15	Applying Rapid Appraisal of Agricultural Knowledge Systems (RAAKS) for Building Inter-Agency Collaboration	Derk Kulper Mushtaq A. Khan Jos van Oostrum M. Rafique Khan Nathalie Roovers Mehmood ul Hassan	Nov 1996
R-16	Hydraulic Characteristics of Chishtian Sub-division, Fordwah Canal Division	Anwar Iqbal	Nov 1996
R-17	Hydraulic Characteristics of Irrigation Channels in the Malik Sub-Division, Sadiqia Division, Fordwah Eastern Sadiqia Irrigation and Drainage Project	Khalid Mahmood	Nov 1996
R-18	Proceedings of National Conference on Managing Irrigation for Environmentally Sustainable Agriculture In Pakistan	M. Badruddin Gaylord V. Skogerboe M.S. Shafique (Editors for all volumes)	Nov 1996
R-18.1	Volume-I: Inauguration and Deliberations		
R-18.2	Volume-II: Papers on the Theme: Managing Canal Operations		
R-18.3	Volume-III: Papers on the Theme Water Management Below the Mogha		
R-18.4	Volume-IV: Papers on the Theme: Environmental Management of Irrigated Lands		
R-18.5	Volume-V: Papers on the Theme: institutional Development		
R-19	Detailed Soil Survey of Eight Sample Watercourse Command Areas in Chishtian and Hasilpur Tehsils	Soil Survey of Pakistan IIMI-Pakistan	Nov 1996
R-20	Unsteady Flow Simulation of the Designed Pehur High-Level Canal and Proposed Remodeling of Machai and Miara Branch Canals, North West Frontier Province, Pakistan	Zaigham Habib Kobkiat Pongput Gaylord V. Skogerboe	Dec 1996
R-21	Salinity Management Alternatives for the Rechna Doab, Punjab, Pakistan	Gauhar Rehman Waqar A. Jehangir Abdul Rehman Muhammad Aslam Gaylord V. Skogerboe	May 1997
R-21.1	Volume One: Principal Findings and Implications for Sustainable irrigated Agriculture		
R-21.2	Volume Two: History of Irrigated Agriculture: A Select Appraisal	Gauhar Rehman Hassan Zia Munawwar Asghar Hussain	Jan 1997

Report No.	Title	Author	
R-21.3	Volume Three: Development of Procedural and Analytical	Nazim Ali Hassan Zia Munawwar	
R-21.4	Volume Four: Field Data Collection and Processing	Gauhar Rehman Muhammad Aslam Waqar A. Jehangir Mobin Ud Din Ahmed Hassan Zia Munawwar Asghar Hussain Nazim Ali Faizan Ali Samia Ali	1997
R-21.5	Volume Five: Predicting Future Tubewell Salinity Discharges	Muhammad Aslam	Jan 1997
R-21.6	Volume Six: Resource Use and Productivity Potential in the Irrigated Agriculture	Waqar A. Jehangir Nazim Ali	Feb 1997
R-21.7	Volume Seven: Initiative for Upscaling: Irrigation Subdivision as the Building Block	Gauhar Rehman Asghar Hussain Hassan Zia Munawwar	Apr 1997
R-21.8	Volume Eight: Options for Sustainability: Sector-Level Allocations and Investments	Abdul Rehman Gauhar Rehman Hassan Zia Munawwar	Apr 1997
R-22	Salinisation, Alkalinisation and Sodficalion on Irrigated Areas In Pakistan: Characterisation of the geochemical and physical processes and the Impact of Irrigation water on these processes by the use of a hydro-geochemical model (M.Sc Thesis published as Research Report)	Nicolas Condom	March 1997
R-23	Alternative Scenarios for Improved Operations at the Main Canal Level: A Study of Fordwah Branch, Chishtian Sub-Division Using A Mathematical Flow simulation Model(M.Sc Thesis published as Research Report)	Xavier Litrico	March 1997
R-24	Surface Irrigation Methods and Practices: Field Evaluation of the Irrigation Processes for Selected Basin Irrigation Systems during Rabi 1995-96 Season	Ineke Margot Kalwij	March 1997
R-25	Organizing Water Users for Distributary Management: Preliminary Results from a Pilot Sludy in the Hakra 4-R Distributary of the Eastern Sadiqla Canal System of Pakistan's Punjab Province	D.J. Bandaragoda Mehmood Ul Hassan Zafar Iqbal Mirza M. Asghar Cheema Waheed uz Zaman	April 1997
R-26	Moving Towards Participatory Irrigation Management	D.J. Bandaragoda Yameen Memon	May 1997
R-27	Fluctuations in Canal Water Supplies: A Case Study	Shahid Sarwar H.M. Nafees M.S. Shafique	June 1997
R-28	Hvdraulic Characteristics of Pilot Distributaries in the Mirpurkhas, Sanghar and Nawabshah Dislricts. Sindh. Pakistan	Bakhshal Lashari Gaylord V. Skogerboe Rubina Siddiqui	June 1997

Report	Title	Author	Year
R-29	Integration of Agricultural Commodity Markets in the South Punjab, Pakistan	Zubair Tahir	July 1997
R-30	Impact of Irrigation, Salinity and Cultural Practices on Wheat Yields in Southeastern Punjab, Pakistan	Florence Pintus	Aug 1997
R-31	Relating Farmers' Practices to Cotton Yields in Southeastern Punjab, Pakistan	P.D.B.J. Meerbach	1997
R-32	An Evaluation of Outlet Calibration Methods: A contribution to the study on Collective Action for Water Management below the Outlet, Hakra 6-R Distributary	Arien Durning	Aug 1997
R-33	Farmers' use of Basin, Furrow and Bed-and-Furrow Irrigation Systems and the possibilities for traditional farmers to adopt the Bed-and-Furrow Irrigation Method.	Nanda M. Berkhout Farhal Yasmeen Rakhshanda Maqsood Ineke M. Kalwij	Sep 1997
R-34	Financial Feasibility Analysis of Operation and Maintenance Costs for Water Users Federations on three distributaries in Province of Sindh, Pakistan.	Amin Sohani	Sep 1997
R-35	Assessing the Field Irrigation Performance and Alternative Management Options for Basin Surface Irrigation Systems through Hydrodynamic Modelling.	Ineke Margot Kalwij	1997
R-36	Socio-Economic Baseline Survey for Three Pilot Distributaries in Sindh Province, Pakistan.	Yameen Memon Mehmood U Hassan Don Jayatissa Bandaragoda	N w 1997
R-37	Socio-Economic Baseline Survey for a Pilot Project on Water Users Organizations in the Hakra 4-R Distributary Command Area, Punjab.	Muhammad Asghar Cheema Zafar Iqbal Mirza Mehmood U Hassan Don Jayatissa Bandaragoda	Dec 1997
R-38	Baseline Survey for Farmers Organizations of Mirwal and Shahpur Small Dams, Punjab, Pakistan.	Muhammad Asghar Cheema Don Jayatissa Bandaragoda	Dec 1997