GOVERNMENT OF THE PUNJAB
Agriculture Department

TECHNICAL BRIEF
1

WATERCOURSE IMPROVEMENT

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DISTRICT WISE INVENTORY OF IMPROVED WATERCOURSE IN PUNJAB

S.No.	District	Total watercourses (No.)	Improved watercourses 1971 to 2003-04 (No.)	Improved under NPIW 2004-12 (No.)	Improved under PIPIP 2011-12 (No.)	Total Improved watercourses (No.)	Balance un-improved (No.)
1	Bahawalpur	3,625	1,986	1,247	3	3,236	389
2	R.Y.KHAN	5,230	1,959	1,529	10	3,497	1,733
3	Bahawalnagar	4,080	2,193	1,360	4	3,553	527
4	D.G.Khan	2,826	743	823	12	1,578	1,248
5	Muzaffargarh	4,808	2,436	1,092	15	3,543	1,265
6	Layyah	1,121	1,035	59	5	1,099	22
7	Rajanpur	2,357	865	477	11	1,353	1,004
8	Faisalabad	2,729	1,970	626	1	2,597	132
9	Jhang	1,763	607	700		1,307	456
10	Chiniot	676	301	248	2	551	125
11	T.T.Singh	1,366	979	373	4	1,356	10
12	Sargodha	2,641	1,169	693	7	1,869	772
13	Khushab	840	366	268		634	206
14	Bhakkar	1,209	322	556	5	883	326
15	Mianwali	906	210	363	3	576	330
16	Multan	2,503	603	751	6	1,360	1,143
17	Khanewal	2,188	770	749	11	1,530	658
18	Vehari	2,145	999	608	4	1,611	534
19	Lodhran	1,576	502	581	1	1,084	492
20	Sahiwal	1,639	760	576	5	1,341	298
21	Pakpattan	1,192	308	658	4	970	222
22	Okara	1,903	506	865	9	1,380	523
23	Lahore	479	134	249	8	391	88
24	Shaikhupura	1,528	777	497	3	1,277	251
25	Nankana Sahib	866	386	410		796	70
26	Kasur	1,628	418	519	1	938	690
27	Gujrawala	1,868	711	587		1,298	570
28	Hafizabad	905	430	273		703	202
29	Narowal	200	83	51		134	66
30	Sialkot	474	119	154		273	201
31	M.B.Din	1,240	455	489	4	948	292
32	Gujrat	259	155	45		200	59
	Total	58,770	25,257	18,476	139	43,866	14,904

PUNJAB WATERCOURSE IMPROVEMENT PROGRAM

FACT SHEET

S.#	Particulars	Unit	Canal Commanded Areas	Non Canal Commanded Areas	Total
1	Total watercourses/Irrigation Schemes	No.	58,770	187,656 (Potential)	246,426
2	Watercourses Improved/ Irrigation Scheme Installed	No.	43,866	15,722	59,588
3	Works Executed				
	❑ Earthen Reconstruction	Km	128,702	-	128,702
	❑ Length Lined	Km	30,103	5,334	35,437
	❑ Nakkas Installed	No.	1,953,008	102,834	2,055,842
	❑ Culverts Constructed	No.	96,792	66	96,858
4	Government Assistance	Rs.	18,008.00	1,606.17	19,614.17
5	Farmer's Contribution				
	❑ Labour	Rs.	4,502.10	401.54	4,903.64
	❑ Earthen Improvement	Rs.	5,627.60	-	5,627.60
	❑ Construction Material	Rs.	960.00	-	960.00

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WATERCOURSE IMPROVEMENT

BACKGROUND

Tertiary canal commanded irrigation system in the Punjab comprises of about 58,000 watercourses irrigating 37.46 million acres (15.16 Mha) of land. It has been established that colossal loss (upto 40%) of water takes place in these century old community channels because of their poor maintenance and aging. This is resulting in severe shortage of irrigation supplies at the farm level that is being further aggravated due to escalating pressure on agriculture because of rapidly increasing population. In addition, there is another 10.11 million acres (4.09 Mha) of land outside the canal commands, which is irrigated by about 200,000 tubewells as well as water lifting systems, farm dugwells, streams, nullahs etc.

On Farm Water Management (OFWM) Program in Pakistan was initiated during 1976-77 on pilot basis including seven selected tehsils of the Punjab for farm level participatory conservation of irrigation resources through improving conveyance and application systems. This pilot phase, funded by USAID was completed during 1979-80, which was followed by various OFWM projects by upscaling its different activities in the entire province with the financial assistance of international donor agencies viz-a-viz World Bank, International Development Association (IDA), International Fund for Agricultural Development (IFAD), Overseas Economic Corporation Fund (OECF) now Japan Bank for International Cooperation (JBIC), Asian Development Bank (ADB), Food and Agriculture Organization (FAO) etc. Implementation of various OFWM schemes has proved to be very effective and beneficial.

Since inception of OFWM program, about 40,000 watercourses have been remodeled and reconstructed according to engineering design in the canal commanded areas of the Punjab. In addition, about 13,000 irrigation schemes have been installed/developed in non-canal commanded areas. The intervention has generated significant economic, financial, social, and environmental benefits. On Farm Water Management strategy has, therefore, been widely accepted by the farmers, planners, and policy makers at national as well as international level.

MAIN CAUSES OF WATER LOSSES IN WATERCOURSES

The main sources of water losses from watercourses are seepage, spillage, and side leakage resulting from following factors.

- **Irregular profile and zigzag alignment of banks, with many points of weakness**

- **Silt deposition, causing restrictions in flows and overtopping**

- **Shrubs, vegetation, and trees growing in watercourse right of way**

- **Varying cross sections of the conveyance channel**

- **Frequent bank cuttings and plugging for water diversion**

- **Damage caused by rodents and animals**

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WATERCOURSE IMPROVEMENT PROCEDURE

The watercourse improvement / renovation consists of complete demolishing of community channel and its rebuilding/re-aligning according to the engineering design to increase conveyance efficiency by reducing seepage, evaporation, and operational losses. The physical execution of water conveyance system is carried out as follows.

1) The OFWM staff mobilizes shareholders of the watercourse to organize Water Users Associations (WUA), which is registered under OFWM and WUAs Ordinance [Act] 1981.

2. Water Users Association executes an output-based agreement with District Officer (OFWM) wherein, roles and obligations of both the parties are defined. The agreement is based on lump-sum contracts with payments linked to achievement of pre-determined physical milestones.

3. The OFWM staff conducts engineering surveys of the command area and prepares designs and cost estimates in consultation with WUA. The same are checked/verified by supervisory consultants.

4) Water Users Association carries out earthen improvement of entire section of the watercourse by leaving reaches to be lined. This involves removal of shrubs and other vegetation from the right of way, demolishing the existing channel, constructing a well-compacted pad, and digging out new section in accordance with the design.

WATERCOURSE IMPROVEMENT

5) After completion of earthen improvements, naccas are installed and culverts are constructed at specified places. This is followed by lining of planned reaches/sections.

6) The OFWM staff provides technical assistance to water users for all works by making frequent visits at sites to ensure that prescribed standards/specifications are being followed.

Different impacts evaluation studies of watercourse improvement program have been carried out by various organizations/institutions. The findings of these assessments have revealed that the intervention is highly cost effective option for improving farm gate water availability. The salient impacts of watercourse improvement are summarized hereunder.

Sr. #	Impact	Extent (%)
1	Annual water saving (Acre-ft)	122
2	Improvement in crop yields	2-15
3	Increase in cropping intensity	4
4	Saving in irrigation time	28
5	Expansion in irrigated area	21
6	Reduction in labor for irrigation	50
7	Enhancement in farm incomes	15
8	Decrease in conveyance losses	39
9	Curtailment in saline area	87

LINING CRITERIA

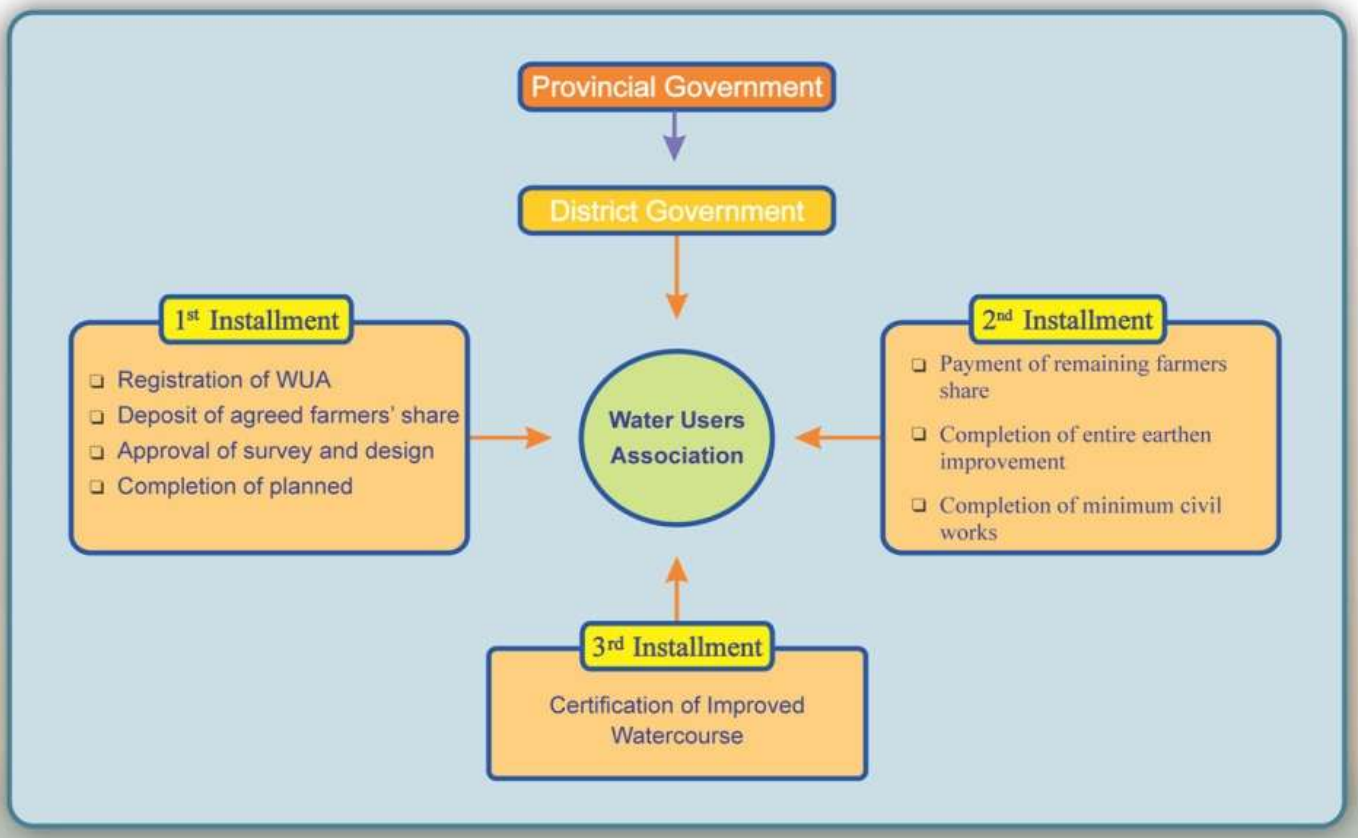
Sections of watercourse to be lined are selected as per following criteria.

- Head reaches having maximum usage and flows.
- Elevated sections susceptible to leakage, over topping, and spillage.
- Portion of watercourse crossing / passing through / along villages / populated areas / roads.
- Sections having sandy/porous soils.

COST SHARING

The government is providing entire cost of construction materials besides providing technical guidance while the farmers are required to contribute entire labour costs for improvement of the watercourses as per following provisions.

Farmers	Government
Contribute entire labour costs for: i. Demolishing and reconstruction of katcha watercourse ii. Excavation for the portion to be lined iii. Back earth filling of structures and lined section iv. Masons and unskilled labour of all civil works	Provides entire material costs for: i. Lining and structures ii. Technical assistance and supervisory support



WATERCOURSE IMPROVEMENT

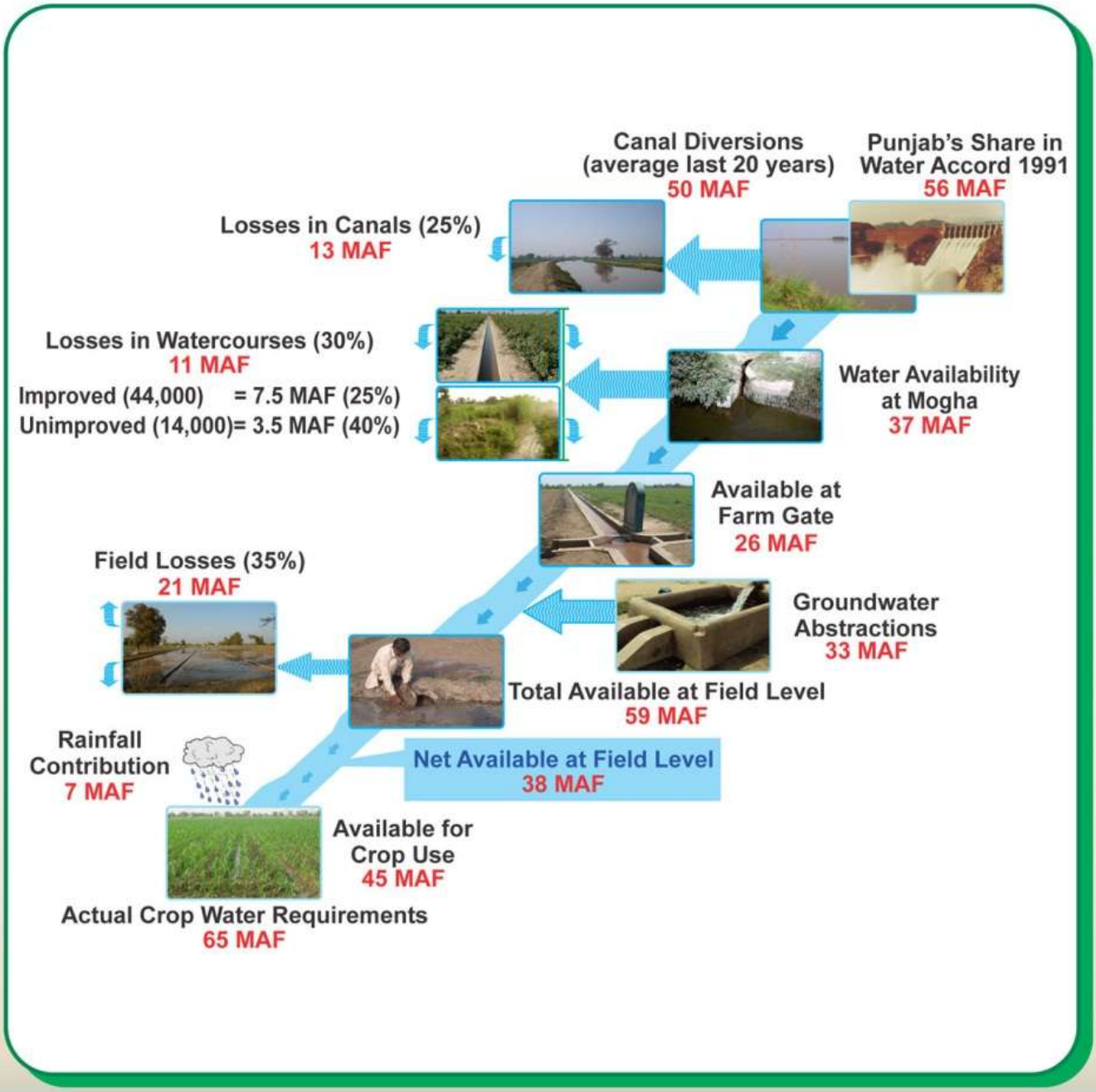
CERTIFICATION OF IMPROVED WATERCOURSES

The certification of improved watercourses is carried out through project consultants who designates their engineers to certify technical as well as financial standards and specifications.

SOCIAL AND ENVIRONMENTAL BENEFITS OF WATERCOURSE IMPROVEMENT

- Enabling farmers to execute small scale community irrigation development works through their institutions
- Building farmers' capacity for better managing water at farm level
- Alleviating poverty as a result of improving agricultural output as well as increased employment opportunities in the rural sector
- Control of tampering of watercourse turn-outs (nuccas), particularly in lined sections
- Reduction in conflicts/thefts/disputes among water users regarding water distribution
- Lessening the drudgery of irrigation operation

PUNJAB WATER BUDGET



WATER MANAGEMENT ACTIVITIES

LASER Land Leveling

Watercourse Improvement

Sprinkler Irrigation

Drip Irrigation

Bed & Furrow Technology

Solar Water Pump

Hydro Flume Irrigation

Flexible Pipe Irrigation

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