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## Emerging Issues in the Implementation of Irrigation and Drainage Sector Reforms in Sindh, Pakistan

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### 1. INTRODUCTION

Ever increasing demand for food, electricity and domestic water use due to rapid growth in population has remained a key challenge for Pakistan since the 1950s. The country has invested heavily in water engineering projects to establish the world's largest gravity-driven irrigation network on the Indus [Bandaragoda (2006); Bengali (2009)]. Besides fulfilling a significant proportion of the country's energy demand from hydro-power installations, the system irrigates about 14 million hectares of farmlands and supports agriculture sector to contribute about 21 percent of the GDP, 60 percent of the exports and 45 percent of the labour force [Bhutta (2006); Pakistan (2012)]. Amidst its development, the elaborated irrigation facility has left a deep footprint on productivity and environment of the basin itself in the form of the rising levels of water-logging and salinity and the degradation of deltaic ecology [Briscoe and Qamar (2009); Memon and Thapa (2011)]. By the 1960s, every year about 40,000 hectares of fertile farmlands were turning into wastelands because of water-logging and salinity in the basin [Bhutta (2006); Mulk (2009); Qureshi, *et al.* (2008)]. Therefore, the country had no option but to develop a remedial drainage network of thousands of kilometres of drains and numerous tube wells parallel to the existing irrigation infrastructure.

Investment in the irrigation infrastructure had been rationalised based on the assumption that it will pave the way for social change in the country [Haines (2011)]. However, once the major phase of irrigation development completed, the policy-makers and the World Bank (with its crucial role in the Indus Water Treaty of 1960, and subsequent development of the basin) sensed the political economy of the agrarian society; within which the irrigation infrastructure was unable to recover even a small fraction of its operation and maintenance (O&M) costs. The politically dominant feudal lords who possessed the major share of farmlands, were not only interfering in the everyday affairs of irrigation management [Mustafa (2002a)], but could also influence the legislature and enjoy water subsidies in the name of small landholders [Faisal (2009);

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Nabi, *et al.* (1986)]. Add-ins were the ethos and colonial legacies of the hydraulic bureaucrats who kept themselves isolated from the general public and had no option but to connive with the feudal lords and operate the system at their will [Mustafa (2002a)]. Numerous policy and operational problems, such as unjustified irrigation subsidies, low crop assessment and cost recovery, inequitable irrigation distribution and widespread corruption in all tiers of water management, emerged and caused the gradual deterioration of system infrastructure and efficiency [Bengali (2009); Faisal (2009); Memon (2006); Prathapar, *et al.* (2001)].

Concerning the situation, the World Bank stopped financing the engineering solutions and explored the possibility of institutional reforms. The idea was to reduce the discretionary power of water bureaucrats and subsequent corruption and mismanagement through the introduction of farmer-managed and participatory irrigation and drainage (I&D) system. Obviously, this transformation was easier said than done. The years of action research and policy dialogue finally yielded the Provincial Irrigation and Drainage Authorities Act in 1997 [Bandaragoda (2006); Dinar, *et al.* (2004)]. The act facilitated the formation of autonomous institutions at the different levels of irrigation management. Under the umbrella of the provincial authorities, Area Water Boards (AWBs) were to be established to manage the secondary level channels or canals. Below this, farmers were to be organised into Water User Associations (WUA) and Drainage Beneficiary Groups (DBGs) to form Farmer Organisations (FOs) and manage the distributary/minor or tertiary level I&D affairs [Memon (2006); Prathapar, *et al.* (2001)].

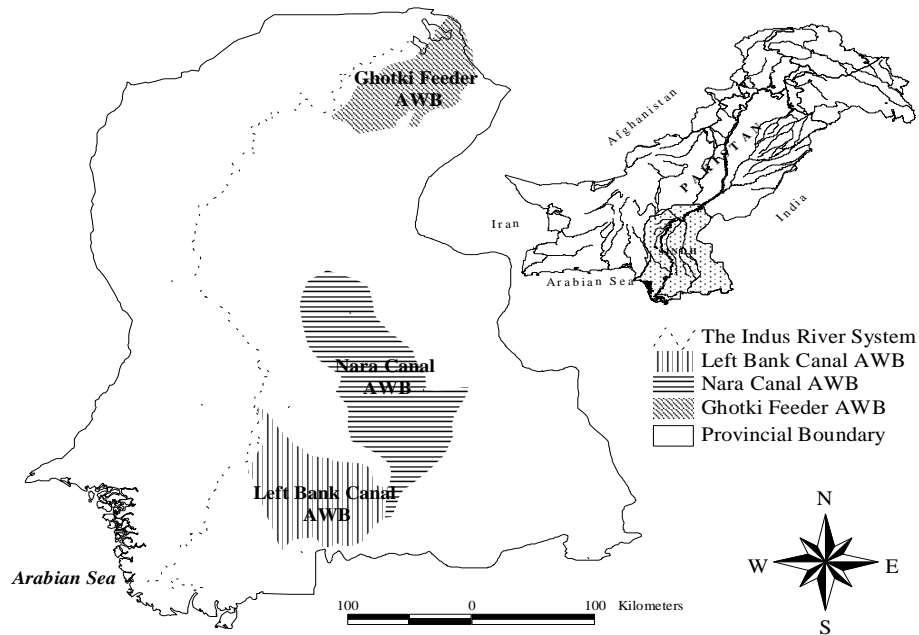
Sindh Province has been the second largest beneficiary of the irrigation development on the Indus River. The provincial irrigation facility itself stands as one of the largest contiguous irrigation networks in the world (Figure 1). The provincial system irrigates about five million hectare of farmlands through 14 canals, 1,446 distributaries/ minors and 45,000 watercourses [Memon (2006)]. Besides, the system also features about 3,690 kilometres of drains. Since the last 15 years, the province has been implementing irrigation and drainage sector reforms. The provincial cabinet approved the Sindh Irrigation and Drainage Act in 1997 and replaced it with the Sindh Water Management Ordinance 2002 to accelerate the implementation of the reforms [Sindh Governor House (2002)]. This study evaluates the extent to which these reforms could be implemented and highlights some of the emerging issues in this process. The next section describes the data sources and methods and is followed by the result section highlighting the major achievements towards the reforms. The final section discusses key findings in the broader theoretical and policy context to draw the conclusions and make policy recommendations.

## 2. METHODOLOGY

### 2.1. Study Approach

At first, the broad indicators of progress in the implementation of reforms were qualitatively analysed. Subsequently, we focused on the three AWBs, namely, NC-AWB, GC-AWB and LBC-AWB, due to the fact that so far the implementation of reforms in Sindh Province has been limited to those areas. The emerging trends in the implementation were highlighted through the descriptive statistical analysis of FO profiles. The reasons for those trends were inquired through in-depth interviews conducted with the purposively selected respondents.

**Fig. 1. Irrigation Network of Sindh Province of Pakistan**



## 2.2. Data Sources

SIDA is primarily responsible for the implementation of proposed institutional reforms in the I&D sector of Sindh Province. In 2009, the agency published a one-page profile of 354 FOs in Sindh Province. Since then, the profile has never been updated as there has been hardly any progress in the FO formation. Data on key variables was extracted from those profiles and was processed for descriptive analysis. Face to face and telephonic interviews were conducted with the SIDA, AWB and Water Sector Improvement Project (WISP) officials in order to explore the reasons behind the emerging trends. Besides, formal and informal discussions with some of the Management Committee members of FOs were also insightful in understanding the underlying factors responsible for the overall state of reform implementation.

## 3. RESULTS

### 3.1. Overall Implementation of Institutional Reforms

Despite years of action research by the International Water Management Institute (IWMI) and subsequent implementation by SIDA, the I&D reforms in Sindh Province are still immature (Table 1). As a precondition for the take-over of reforms, the SIDA has been established and made operational since 1998. It was pursuing its mission to decentralise the irrigation and drainage management at the canal and distributary/minor levels. The SIDA was also functioning as the ‘Regulatory Authority,’ as the establishment of such institution has been pending since the promulgation of Sindh Water

Management Ordinance 2002 [SWMO (2002)]. So far only three AWBs, namely, the Nara Canal, the Ghotki Feeder Canal and the Left Bank Canal (Figure 1), could be established against the plan of establishing 14 AWBs on all canals throughout the Province by 2008. On account of FO formation, progress was conditional to the establishment of AWBs. At the provincial level, only one fourth of the total targets of FOs formations could be achieved while the progress in terms of actual Irrigation and Management Transfer to FOs was less than one fifth of the targets (Table 1). Most of the progress towards FO formation and IDMT was observed in the above-mentioned three AWBs (Table 1 and Table 2). The NC-AWB was the only subsystem where the targets of management transfer were almost complete. It worth mentioning that the Nara Canal had been the pilot AWB in Sindh province where the action research carried out by IWMI found that participatory irrigation and drainage management was viable in Sindh Province.

Table 1

*Overview of the Implementation of Institutional Reforms in the Sindh Province*

Progress indicator	Target and achievements	Remarks
- Formation of Provincial Irrigation and Drainage Authority	Sindh Irrigation and Drainage Authority have been formed to oversee the irrigation and drainage affairs at the provincial level.	Complete.
- Formulation of Regulatory Authority (RA)	Appropriate formation is still awaited. Currently, SIDA is functioning as RA.	Incomplete. RA is operational through an ad hoc arrangement.
- Formulation of AWBs	Out of 13 AWBs, only three (Fig. 1.) could be formed as of 2009. No progress has been made thereafter.	23 % complete.
- Formulation of FOs in AWBs	Out of about 1,400 FOs, about 338 have been formed in three AWBs namely: NC-AWB, GC-AWB and LBC-AWB. Beside some 16 FOs has also been formed in the canal commands where irrigation reforms are yet to be implemented and AWBs are to be established.	25 % complete.
- Irrigation and Drainage Management Transfer (IDMT) to FOs	Out of 359, about 259 FOs have been transferred irrigation and drainage management responsibility. About 94% FOs of NC-AWB, 38% FOs of GC-AWB and 60% FOs of LBC-AWB had been transferred the irrigation management responsibility of their minors and distributaries.	For three AWBs, the target is 73 % complete. At the provincial level, only 18 % complete.

*Note:* Calculations are based on FO Profile 2009. No substantial progress in FO formation thereafter.

Most of the FOs of NC-AWB were formed during 2000-2003 and were handed over the management responsibility during 2001-2004 and in 2008 (Table 2). In GC-AWB and LBC-AWB, most of the FOs were formed during 2005-2008. However, the FOs in GC-AWB and LBC-AWB were bestowed with the responsibility of managing their channels during 2007-2008 and 2006-2008, respectively (Table 2). Besides these three AWBs, some FOs were also formed haphazardly in the command areas of other canals (secondary level channels) which were still not handed over to the SIDA for the establishment of AWBs and FOs. In total, about 16 such FOs were formed outside the jurisdictions of the three AWBs of which only one could be transferred the management responsibility till the time this study completed (Table 2).

Table 2

*AWB Wise Details of FO Formation and Irrigation and Drainage Management Transfer*

Year	NC-AWB		GC-AWB		LBC-AWB		other AWBs	
	Formed	IDMT	Formed	IDMT	Formed	IDMT	Formed	IDMT
1998	2	-	-	-	-	-	-	-
1999	5	-	-	-	-	-	-	-
2000	17	-	-	-	-	-	3	-
2001	12	24	-	-	1	-	4	-
2002	94	54	5	-	5	-	2	-
2003	25	48	6	-	7	11	-	-
2004	5	16	-	11	-	2	-	-
2005	-	-	3	-	7	-	-	-
2006	-	-	18	-	27	14	1	-
2007	1	-	46	5	38	19	5	-
2008	-	18	6	12	4	15	1	1
2009	-	-	-	-	3	-	-	-
Total	161+1 <sup>a</sup>	160	84	28	92	61	16	1

Notes: <sup>a</sup>Value for one case is missing.

- Figures in the table are the numbers of FOs.

The achievements in FO formation were mostly the outcome of various projects implemented by SIDA and voluntary contributions of various government and non-government organisations (Table 3). The credit for FO formation till 2000 goes to the IWMI under the World Bank financed Left Bank Outfall Drain Project (LBOD) and the Directorate of OFWM (Agriculture Department, Government of Sindh) for their voluntary contributions. However, most of the FO formation is attributed to the SIDA and OFWM under the National Drainage Programme (NDP) during 2002-2007, also sponsored by the World Bank. Meanwhile, the World Bank also sponsored the Sindh On-farm Water Management Project. This project also had a component dealing with the FO formation—that too was implemented by the OFWM. Besides those formal and sponsored attempts, some local and international NGOs, such as OXFAM and SWAFCO, have also formed FOs in the NC-AWB and outside the command areas of the three AWBs (Table 3).

Table 3

*Different Agencies Involved in FO Formation During the Years 1998–2009*

FO Forming Agency	NC-AWB	GC-AWB	LBC-WB	Other AWBs	Total
SIDA	47	48	44	8	147
On-farm Water Management (OFWM)	79	36	48	5	168
SIDA and OFWM Jointly	23	-	-	-	23
International Water Management Institute	11	-	-	1	12
Other NGOs such as OXFAM, SWAFCO	1	-	-	2	3
Total	161	84	92	16	353+1 <sup>a</sup>

Notes:

<sup>a</sup> Missing values.

– Figures in the table are the number of FOs.

### 3.2. Composition of Farmer Organisations

Since irrigation right in Pakistan is a proxy to farmland ownership, all those who have possessed or leased any farmland in the command area of a channel were by default the members of its FO. Thus, the membership size of a FO or its constituting WUAs was the function of the command area that its respective irrigation channel was designed to serve. On average, a FO of NC-AWB had 280 farmers/members out of which about 24 were women farmers. In GC-AWB and LBC-AWB, although the average number of farmers/members was substantially higher than that of the NC-AWB, but the number of woman farmers/members was considerably less or even negligible. The average landholding per farmer in a FO of three AWB ranged between nine and 13 hectares but the distribution of land was quite skewed towards the privileged small number of farmers. The average landholding of the smallest farmer in any of the FO was not more than five hectares while the average landholding of the largest landholder could be as high as 100 hectares in NC-AWB, 85 hectares in GC-AWB and about 175 hectares in LBC-AWB.

Table 4

*Characteristics of FO Membership in Three AWBs of Sindh Province*

Salient Features of FOs' Membership	NC-AWB			GC-AWB			LBC-AWB		
	$\bar{x}$	SD	n*	$\bar{x}$	SD	n*	$\bar{x}$	SD	n*
Farmers/Members (Person)	280	231	161	347	400	72	347	383	78
Women Farmers/Members (Person)	24	36	100	5	5	20	9	11	26
Land Holding per Farmer (ha)	13.0	10.7	159	9.4	7.5	70	11.9	7.4	77
Land of the Smallest Landholder (ha)	2.8	2.5	160	2.5	2.7	84	4.7	22	91
Land of the Largest Landholder (ha)	97.8	84.5	160	84.3	106	84	176	230	91

Notes:

\* The number of cases valid in the calculation of  $\bar{x}(s)$ ; ' $\bar{x}$ ' is the arithmetic mean and 'SD' is standard deviation while 'n' is the number of cases valid for the calculation of  $\bar{x}$ .

– Calculations are based on FO Profile 2009. There is no substantial progress in FO formation after 2009.

### 3.3. Institutional Attributes of Farmer Organisations

A complete transformation from the state-to a farmer-managed irrigation system could only be observed in the case of NC-AWB (Table 5). The majority of the FOs in NC-AWB was near to complete the second tenure of their MCs while a few of the FOs

had already started the third tenure. In GC-AWB and LBC-AWB, the majority of the FOs was still going through the first tenure of their MCs (Table 5) mostly because FOs in these AWBs were formed relatively recently (Table 2). However, while comparing the FOs of GC-AWB and LBC-AWB which were formed during the same time (Table 2), the percentage of FOs in their second tenure was much higher for the GC-AWB than the LBC-AWB. This defect appears to be a function of unknown status of MC tenures of 14 percent FOs of the LBC-AWB (Table 5). When specifically inquired about the exact reason behind the unknown status of the MC tenure of some FOs, it was revealed that their re-election was pending due to a severe conflict among farmer groups. Unfortunately, neither the SIDA nor the respective AWBs could play any successful role in the resolution of the conflicts over re-election.

Table 5

*Organisational Feature of FOs in three AWBs in Sindh Province*

Organisational Details	NC-AWB (n=162)	GC-AWB (n=84)	LBC-AWB (n=92)
FOs signed IDMT Agreement	98.8	45.2	65.2
Tenure of FO Management Committees			
- 1st tenure	–	79.8	75.0
- 2nd tenure	92.6	19.0	10.9
- 3rd tenure	0.6	–	–
- Status unknown	6.8	1.2	14.1
The Largest Landholder of a FO in MC	39.8	35.7	32.6
The Smallest Landholder of a FO in MC	17.4	20.2	20.7
Women Farmers in MC	1.8	1.2	–

*Notes:*

- Figures in the table are percentages.
- Calculations are based on FO Profile 2009. There is no substantial progress in FO formation after 2009.

From the information given in the FO Profiles 2009, the participation of three farmer groups, namely, woman farmers, the smallest farmers and the largest farmers, in the FO management committees can be analysed. It could be observed that two-fifth of the largest landlords of the FOs in NC-AWB, one third of the largest landlords in the FOs of GC-AWB and LBC-AWB were MC members of their respective FOs (Table 5). Most of the largest farmers in FOs across all AWBs, who were members of MCs, were either Chairmen or other important office-bearers and only a few of them were just the members (Table 6). Compared to the largest landholders, the participation of the smallest landholder in the MCs of FOs was in much lesser numbers. In all three AWBs, only about 20 FO management committees had the participation of the smallest landholders (Table 5). Most of the smallest landholders, who were in the MC of their FOs, were just members while a few of them could be found holding the offices of a chairman, vice chairman, secretary and treasurers (Table 6). It can be further observed that the composition of FO management committees was quite masculine. Compared to the percentage of women landholders in FO general bodies across all AWBs (Table 4), their participation in the MCs was negligible or completely missing. Only four women could be found bearing an office, three of whom were in the NC-AWB while only one in the

GC-AWB. None of the office-bearers was found to be a chairwoman (Table 6). In NC-AWB, three women were designated each as a Vice Chairwoman, General Secretary and Treasurer; while the only woman in GC-AWB was just a member (Table 6).

Table 6

*Participation of Different Farmer Groups in FO Management Committees*

Farmer Groups	Not Participating	Positions in FO management committees				
		Chair	V. Chair	G. Sec	Treasurer	Members
NC-AWB (n=161)						
- Women farmer	98.2	–	0.6	0.6	0.6	–
- Smallest farmer	79.5	0.6	3.7	3.1	3.1	9.9
- Largest farmer	57.8	23.0	8.1	4.3	3.1	3.7
GC-AWB (n=84)						
- Women	98.8	–	–	–	–	1.2
- Smallest farmer	78.6	3.6	2.4	3.6	1.2	10.7
- Largest farmer	64.3	22.6	6.0	1.2	1.2	4.8
LBC-AWB (n=92)						
- Women farmers	–	–	–	–	–	–
- Smallest farmer	79.3%	1.1	4.3	3.3	2.2	9.8
- Largest farmer	65.2	14.1	1.1	5.4	4.3	9.8

*Notes:*

- Figures in the table are percentages.
- Calculations are based on FO Profile 2009. There is no substantial progress in FO formation thereafter.

#### 4. DISCUSSION AND POLICY IMPLICATIONS

Although the need for water sector reforms has been uniform across various countries, the underlying causes, the cost of implementation and a certain degree of success in achieving the stated objectives varied across different socio-political and geographical contexts [Dinar, *et al.* (2004)]. In the case of Pakistan, improper O&M of irrigation infrastructure, low crop assessment and revenue collection, inequitable water distribution and corruption in water bureaucracy were compelling reasons behind the I&D sector reforms [Memon (2006)]. Nevertheless, like other South Asian countries, the design of reforms and push for their persuasion mainly came from the World Bank having a major role in the post-independence irrigation development in the country [Bandaragoda (2006)]. Given the fact that the demand for reforms was not internally generated by users and managers of irrigation facilities [Bandaragoda (2006)], the findings of this study revealed that the prescriptions were implemented half-heartedly. The establishment of SIDA was a cosmetic step that partially transformed the Provincial Irrigation Department and created a parallel institution that was made responsible for the implementation of a farmer-managed irrigation system. After the initial hike, not much progress has been made. So for, the farmer-managed irrigation system is confined to NC-AWB, GC-AWB and LBC AWBs and could not encompass the remaining 11 canals in the province. By the year 2000, the Government of Sindh had already notified five canals to be brought under a farmer-managed irrigation system. Nevertheless, the Irrigation Department continues to operate the Begari Sindh and the Western Sindh canals and never transferred these two to the SIDA for the establishment of AWBs and the introduction of a farmer-managed irrigation model.



Even in the AWBs, where the SIDA was able to implement reforms, the process had been quite slow and grinding to halt as no major achievement has been made since 2009. Over the last 15 years, the SIDA could not establish any mechanism to ensure the democratic election of the members of AWB for any of the three canals where the system has been implemented so far. The operations of these AWBs were in the hands of politically installed feudal lords without having any representation of the farmers at large. Besides, the FO formation and management transfer was still incomplete in GC-AWB and LBC-AWB and will certainly require decades to complete for the remaining canals at the current pace of implementation. Surprisingly, despite knowing that reforms were supply-driven [Bandaragoda (2006)] and a lengthy process, SIDA had not established any programme-level staff for social mobilisation, FO formation or post transfer management support to newly created FOs.

So far, most of the FO formation had been project-based, done either through the project staffs of SIDA or by outsourcing other governmental and non-governmental agencies. Evidences suggest the large landholders, who were one of the reasons for the failure of the state-managed irrigation system in the province, had already captured the management committees of FOs by implanting either themselves or their proxies on the key positions of MCs. Although such a tendency on the part of the large landholders could have its roots in the skewed power distribution in rural Sindh, another reason, as narrated by some of the Social Mobilisers, could be the project-based approach of FO formation persuaded by the SIDA and AWBs. According to them, their supervisors compelled them to meet the targets of FO formation by implicitly compromising over the quality of social mobilisation for farmer participation and capacity building. Upon the condition of anonymity, many of the social organisers confessed that they sought out help from influential landlords and politicians in the formation of FOs in exchange for the selection of MC members at their will.

Another major concern that had been missing from the debate on institutional reforms was the total ignorance of drainage affairs throughout the implementation of the reforms. Such an observation was particularly valid for the low-lying topography of NC-AWB and LBC-AWB, where the farmers highly acknowledge the importance of the drainage network in maintaining the fertility of their farmlands. It was gathered that almost half of the FOs in both of NC-AWB and GC-AWBs had some form of drainage structures such as surface and tube well and tile drains. However, virtually none of those FOs had formed any DBG for managing their drainage structures. Farmer organisations were reluctant to take over the responsibility of drainage management in purview of the payment of drainage levy [Official Correspondent *Daily Dawn* (2004)]. Since the government was not generating any revenue from the drainage facility, it ignored O&M of these structures until absolutely inevitable. As a result, the state of drainage structures was indeed miserable characterised by the choked drains and non-functional tube-wells. It was virtually in a state what the major theorist of Commons Pool Resources have explained as an open access resource [Berkes and Farvar (1989); Schlager and Ostrom (1992)] or an unmanaged common [Hardin (1968, 1994, 1998)]—where everybody was a beneficiary but nobody was bearing the management responsibility.

To a neutral observer, the existing state of the implementation of institutional reforms in Sindh Province was not much surprising. Surprising, however, was the fact that policy makers ignored or perhaps concealed some of the major findings of the action research carried out by IWMI under the LBOD Project. For example, Murray-Rust et al (2001) found that FO formation was possible, but the sustainability of such institutions was unclear since none of the FOs was handed over the responsibility of O&M of their irrigation channels till the project ended. Besides warnings that the well-established hydraulic bureaucracy could impede the success PIM, Murray-Rust, *et al.* (2001) and Bandaragoda, *et al.* (1997) found it unrealistic to assume that the large farmers, for whom control over irrigation was the key to remain advantageous in the local power structure, could relinquish it in favour of the marginalised farmers. Similarly, other initial studies conducted by the IWMI research team [Bandaragoda and Memon (1997); Bandaragoda, *et al.* (1997)] and others [Mustafa (2002a); Mustafa (2002b)] also identified various caveats in the implementation of reforms such as rivalries of the hydraulic bureaucrats against institutional reforms, the possibility of feudal lords and politicians capture and chances of corruption among FO leaders. Nevertheless, perhaps the donor push was strong enough to compel the policy-makers to ignore these caveats and pick up only those conclusions which suggested the viability of the PIM within the socio-political context of Sindh Province.

One of the SIDA officials who had been an instrumental advocate of reforms expressed his frustration as, “the inception of reforms shook the roots of a century-old water bureaucracy in Sindh; however, it is the fact of today that over the time the water bureaucracy has sustained those shocks and has re-emerged as a major threat to the reforms.” It is perhaps the peak time for the policy makers to revisit the design of reforms before continuing the failed path of their implementation persuaded so far. Despite the unsatisfactory progress so far, the lessons learned could serve as the guiding principles for setting the future directions of water management policies. Undoubtedly, it requires more research, particularly in evaluating the performance of FOs against the stated objectives of equitable irrigation distribution, maintenance of channels and cost recovery. Besides, it is also necessary to re-evaluate the prospect of PIM in the context of local power structure, factors determining the willingness of water bureaucracy to support the institutional reforms and the capacity and willingness of farmers to manage the system. Understanding of such dimensions will provide new insights and policy input for the re-design of reforms and address some of the key obstacles in their implementation.

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