

# **Rural Water Supply Scheme Sustainability in Pakistan: A Comparative Institutional Analysis**

*by*

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## Acronyms

CO	Community Organization
DC	District Council
GI	Galvanized Iron
HDP	High Density Polyvinyl Chloride Pipe
LG&RDD	Local Government & Rural Development Department
MOU	Memorandum of Understanding
NGO	Non-Government Organization
NRSP	National Rural Support Programme
PHED	Public Health Engineering Department
PIT	Project Implementation Team
RWSS	Rural Water Supply Schemes
TOP	Terms of Partnership
UC	Union Council
WCOM	Water Community
WB	World Bank

# I

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## Overview

This report is primarily about exploring the determinants of rural water supply scheme (RWSS) sustainability. The two complementary hypotheses being explored are that demand responsive project rules and social mobilization are positively correlated with scheme sustainability. These hypotheses are viewed as complementary because the implementation of project rules critically depends on the success a project has in mobilizing communities.

A "project" represents a funding agency with a particular set of rules for funding community RWSS. The key aspects of demand responsive rules are that they conform to demand theory with regards to allowing communities to choose a level of service and requiring communities to at least partially pay for the service. The logic is that demand responsive project rules would result in self-selection on the part of communities and those communities would opt for the service that could pay for it and, given this, would own the scheme and participate in its maintenance.

This study is part of a larger World Bank multi-country study. In each of the six countries, two projects have been selected and data collected for 15 schemes of each project. In Pakistan, given our interest in social mobilization, we argued for the inclusion of the National Rural Support Programme (NRSP) in the study. NRSP is an autonomously run government funded organization that has adopted the community mobilization approach of development NGOs. The second project in our sample is IDA (International

Development Association) funded Local Government and Rural Development Department (LGRDD) schemes. We also included five IDA funded Public Health Engineering Department (PHED) schemes in the sample. The government line departments are naturally of interest due to their much wider coverage for social sector delivery. While the focus of our report is on RWSS, there are general lessons obtainable from this sector for other social sector delivery.

This report is based on field reports written by two trained teams, after a discussion based on two day field investigation, and on analyses based on data collected from village focus group meetings, household interviews, interviews with the project field staff and technical evaluations.

Based on the field reports, our main finding is that rural water supply schemes (RWSS) were more likely to be sustainable when the community is mobilized to make them work. This is not a new finding. It accords with both common sense and a gut feeling of those who endorse community participation. This study does however add to scarce systematic evidence, based on empirical research, on the functioning of government line departments compared to that of development NGOs.

In principle, due to donor urging, the project rules and implementation procedures of the government departments now also endorse participation and are very similar to those of NRSP. The real question, therefore, is why they were less successful in realizing this than NRSP. We found that one critical difference is in the way NRSP and the government projects approach social mobilization. The NRSP social mobilizer orientation is more often a genuine concern for mobilizing the community which is very painstaking work. The government project concern was with form and not substance. Thus the LGRDD and PHED officials were generally satisfied with the formation of a community organization (CO) or a water committee (WCOM). It did not seem to matter that this was done by working with the local notables in the community

and that the general body of the community had little or no say in the decision making.

One should not downplay the complex political realities in a rural setting. It is much easier to approach a community via the local notables. However, we found that doing so is likely to mean that the local notables will appropriate the major benefits of scheme and that the community as a whole will not own or support the scheme. We found this to be the case even when the NRSP social mobilizers approach to the community was mediated by the local notables. All five out of the fifteen NRSP schemes that the field observers found to be non-sustainable had local notables dominating decision making, appropriating the major benefits from the scheme and hence alienating the general body of the community. The only one of the five PHED schemes that was clearly found to be sustainable had a mobilized community with exposure to several of the most prominent capacity building NGOs in the country. In three of the four LGRDD schemes found to be sustainable, an individual activist essentially played the role of an effective social mobilizer.

Of course, one could argue that some communities have more proclivity towards becoming mobilized. This may well be true. The more interesting policy issue is that NRSP staff managed to mobilize communities in three different provinces under very different social and economic conditions. This achievement was particularly noteworthy in Sindh where the communities were highly ethnically and class differentiated. For us, this represents a strong endorsement of the concept of social mobilization. What is it that makes the NRSP more effective? An important part of the answer is skills in social mobilization that comes from training and the motivation to apply those skills.

There is an important lesson to be learnt from the LGRDD experience in AJK. It appears that the field officers were able to impart what they had internalized. The concept of community self-help that they internalized was that the community should make a cash contribution, carry pipes, lay the pipes, build the tanks and

also make a cash contribution. While the community clearly had an incentive to do all this considering their need for water and considering that they solicited the schemes in the first place, it is still not a small achievement to get this kind of contribution from communities generally believed to be entirely dependent on the state. However, the important point is that if LGRDD field staff took the communities this far, they could take them further. This also applies to PHED which was effective in establishing water committees and having them implement a tariff system.

To sum up, scheme sustainability is dependent on factors identified as important in our conceptual framework. First, latent demand played an important role. Latent demand was revealed by community solicitation of the scheme as well as by a willingness to accept and implement project rules that called for substantial community contributions and participation. Second, social mobilization is critical for a meaningful implementation of project rules. We also found that the government projects field staff indicated their capacity for social mobilization. The problem was that they had limited expectations from the community and therefore got limited results.

The results of technical, community and household data analyses for the most part confirmed the evaluations of the field teams contained in the field reports. There were two major differences. First, the field reports are much more sanguine about the overall financial sustainability of the schemes than is evident from the technical evaluations. For example, only five out of the thirty-five schemes had instituted a regular system of tariff collection and, strictly speaking, only one of the schemes could be viewed as financially sustainable. This however sounds more serious than the ground reality. Since NRSP institutes regular saving schemes, they have resources to fall back on. Also, the NRSP schemes in Sindh had no recurring costs and hence no need of a tariff. Twenty of the remaining schemes were gravity based and as such are low and irregular maintenance schemes. Second, and this is more difficult to explain, the field report assessment of PHED schemes were in

general much more negative than suggested by the structured data analyses. We place much more confidence in the field team evaluations since structured question responses can be coached.

Exploring the data to understand why NRSP schemes were viewed as better managed, we discovered that the quality of construction, masonry, catchment and better placing and condition of the pipes stood out. With regards to social mobilization, NRSP communities were better informed, better aware of project rules and demonstrated more participation and self-reliance. Also, one could view NRSP as being a more demand responsive project in that communities actually built the schemes, made a greater cash contribution and indicated a greater willingness-to-pay for improvements.

While NRSP's performance was far superior to that of the government line departments, we don't believe that development NGOs are a panacea. This is because they confront inherent limitations of coverage. Many of their special advantages may be derived from size. Ultimately, one can probably only conceive of NGOs like NRSP as development partners. Their more important role is that of being path breakers. We show that development NGOs, while limited in scope, may have important lessons to teach in delivering social services. Since their method of doing business is much more effective than that of the government line departments, one needs to find a way of making the government line departments function like the development NGOs. Thus government personnel need to be further trained and be given the right incentive structure to use this training. Training in social mobilization is now not a scarce service in Pakistan. The right incentive structure can emerge from bonuses tied to results based assessment done internally by the department and by outside evaluators. Interviews with government field staff revealed the lack of satisfaction with low salaries. Compared to LGRDD and PHED, NRSP field staff were paid a competitive salary, were better trained and were expected to work hard.



## II

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# Introduction

This report is a follow-up of an earlier study conducted for the Government of Punjab, in which we investigated the sustainability of rural water supply schemes (RWSS) that had been managed by a government agency, PHED (Public Health Engineering Department), and returned to rural communities to manage.<sup>1</sup> Our investigation showed that the transfer process was hasty and not accompanied by adequate social mobilization and training. Nonetheless, several communities were successfully managing their RWSS and we investigated the factors responsible. Need, due to the lack of viable alternatives, played an important role in galvanizing communities to work together for water supply. Water committees (WCOM), with representation duly given to each *beraderi* (clan), contributed significantly to scheme sustainability. Other factors included support for the WCOM by village notables and the positive role of a dedicated activist.

None of the fifty communities whose RWSS were in our sample had undergone any social mobilization or systematic training. We conjectured, but were not able to establish, that this may play an important role in scheme sustainability and highlighted this as an important area for further study. Fortunately, another World Bank research exercise was awarded to the Sustainable Development Policy Institute. This research is part of a multi-country study being undertaken by World Bank researchers.<sup>2</sup> The Bank's researchers' main interest was in investigating the hypothesis that demand responsive project rules are positively correlated

with scheme sustainability.<sup>3</sup> A "project" represents a funding agency with a particular set of rules for funding community RWSS. The key aspects of demand responsive rules are that they conform to demand theory with regards to allowing communities to choose a level of service and requiring communities to at least partially pay for the service. The logic is that demand responsive project rules would result in self-selection on the part of communities and those communities would opt for the service that could pay for it and, given this, would own the scheme and participate in its maintenance.<sup>4</sup>

There are several macro implications of this public policy perspective. First, given limited resources, it provides a policy rule for selecting communities for service delivery. Second, it lightens the fiscal burden on cash strapped states by making rural communities wholly or partially responsible for providing their own social services. Third, it implicitly makes a bold statement that communities which are not able to express demand for a social service, out of either apathy or impoverishment, need not be catered to. Fourth, it accentuates the urban bias since urban communities continue to get highly subsidized social services. Many of these are broad issues and our focus in this report will be more narrow. Whether or not demand responsiveness of project rules is important is an empirical issue. A priori, based on earlier research, we view social mobilization of rural communities as an equally important issue to be explored.

In each country, which is part of the World Bank multi-country study, two projects have been selected and data collected for 15 schemes of each project. In Pakistan, given our interest in social mobilization, we argued for the inclusion of the National Rural Support Programme (NRSP) in the study.<sup>5</sup> NRSP is an autonomously run government funded organization that has adopted the community mobilization approach of development NGOs. The second project in our sample is IDA (International Development Association)

funded Local Government and Rural Development Department (LGRDD) schemes. We also included five IDA funded PHED schemes in the sample.<sup>6</sup> The government departments are naturally of interest due to their much wider coverage for social sector delivery. While our focus in this paper is on RWSS, there are general lessons obtainable from this sector for other social sector delivery.

In section two, we present the conceptual framework for the research. In section three, we outline the sampling procedure and study design. In section four, we describe the project implementation procedures and project rules. In section five, we present findings based on an analysis of field reports. These reports were written by the field team after completing a two day survey of each scheme. In section six, we add to these findings by analyzing the data collected via structured questionnaires. In section seven, we describe the involvement of and benefit to women in the provision of rural water supply. We end with a summary of findings and concluding remarks.



### III

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## Conceptual Framework<sup>7</sup>

"Participation" has been and still is a catchword in the development community.<sup>8</sup> It is associated with concepts of decentralization and collective action. Briefly, the idea is that if communities, on their own or via social mobilization and training (outside interventions), take full or partial responsibility for providing for their needs via collective action, the results will be sustainable.<sup>9</sup> The reasoning is that such participation gives communities a sense of ownership and involvement and that therefore the construction, operation and maintenance are sound.<sup>10</sup> More recently, the notion of tapping into the demand responsiveness of communities, by outside interventions, to attain sustainability of community efforts has been introduced. This was referred to in the introduction.

The entry point of demand responsiveness into this literature on participation and collective action could be viewed as coming via individual and collective **motivation**. Why after all should individuals engage in collective action?<sup>11</sup> Several possible motivations for collective action could be identified. There could be a social motivation that includes altruism and a sense of well being that comes from the social affirmation of performing a community role.<sup>12</sup> There could be an individual motivation, to be part of a collective effort, driven by personal and household needs. When this need is backed by the ability and willingness to pay for a certain level of service – quantity and quality – on the part of individuals and communities, one can assert that individual or

community demand exists. One could further assert as a testable proposition that participation, collective action and scheme sustainability is more likely if latent demand exists in a community.<sup>13</sup> In the literature on collective action, among the major contributions are those of Olson (1971), who could be viewed as a collective action pessimist, and Wade (1994), who could be viewed as guardedly optimistic about collective action.<sup>14</sup> In Olson's derivation, collective action would occur if the benefit to any one individual exceeds the total project cost. In this case the individual would essentially provide the public good and the probability of this happening is inversely associated with the size of the community. Wade pointed out that community collective action could result from economic compulsions and externalities that require communities to work together.

A catalyst for collective action could be the social mobilization and community organization formation of development NGOs.<sup>15</sup> Thus, social mobilization should be viewed as a catalyzing factor which can bring other motivations into play. Thus social mobilization can complement latent demand and the other sources of motivation mentioned above. If the various motivational sources are present in a community, one could argue that, per se, these are not adequate for successful collective action if communities are not spontaneously or externally mobilized or lack the necessary skills. Thus the various sources of motivation for collective action need to be accompanied by social mobilization and training to ensure scheme sustainability.<sup>16</sup> In this report, our focus is on social mobilization and demand and their impact via collective action on scheme sustainability.

Sustainability is inferred to exist by the physical condition of the system, the quality of service provided and the consumer satisfaction with it, the willingness and ability to operate and maintain the system and the organizational (which includes enforcement mechanisms) and financial skills of the WCOM. If observations based on the above indicators suggest that there is a high probability of the maintenance of an acceptable level of water

supply service throughout the design life of the scheme, it is viewed as being sustainable.<sup>17</sup>

If the association of community demand and scheme sustainability can be established, it has important implications for public policy. Many developing countries confront a severe fiscal crisis and this is certainly true in Pakistan's case. Ideally, current policies should be altered so that there is less expenditure on the military, more agricultural income taxation and/or a less urban bias so that, for example, subsidized water is not provided to some urban sectors while peri-urban and rural sectors confront drinking water scarcity. However, researchers also need to be concerned with options that are politically possible.

Given that the fiscal crisis is likely to persist, not all communities can immediately be provided with a rural water supply scheme (RWSS).<sup>18</sup> If that is the case, the important policy question is: which communities should the schemes be delivered to? If there is an association of scheme sustainability and the presence of latent demand in communities, there may be a case for delivering schemes to communities that reveal such demand first. Since such communities will presumably be willing to cover the marginal costs, it would also result in limited resources allocated to rural water supply going further.

The hypotheses testing pertaining to scheme sustainability can take the following form:

$$SS = SS (SM, LD, N, WCOM, EDU, T); (1)$$

Where

SS	=	Scheme sustainability
SM	=	Social mobilization
LD	=	Latent demand
N	=	Need
WCOM	=	Water committee managing scheme
T	=	Training
EDU	=	Community education index

It is however difficult to infer the presence and extent of latent demand at the time that the construction of the RWSS was being contemplated by the project. One way of doing this could be to ascertain how demand responsive the project rules were (DR). Project rules are demand responsive if they respond to latent demand in the village. Project rules represent formal prescriptions that guide the operation of the project. In a demand based approach, they also represent a filter mechanism that will weed out communities that do not have latent demand for a service. Examples of rules that act as a filtering mechanism include requirements for the formation of water committees, undergoing training for properly running the scheme and contributions to construction and O&M costs. Without latent demand, communities would not be expected to accept such rules.

Whether or not the project rules are demand responsive is captured in this study by both a study of the project rules (intent) and by investigating the absorption of these rules in the community (practice). By using focus group and survey methods, the survey team captured the demand responsiveness of the implemented project rules by inquiring about and observing the following: whether the community clearly expressed their desire for the new RWSS; whether they actually choose to participate in the scheme as opposed to being awarded the scheme or having it imposed on them. Schemes can be awarded politically as a reward for past electoral support or a bribe for future electoral support. They could also be awarded by the influence of legislators who are genuinely interested in the well being of their constituencies. Alternatively, the award could result from slow and relatively blind bureaucratic momentum. We explore this issue further in the empirical section.

In conformity with demand theory, choice is the critical word here and it must be exercised with a full awareness of the relevant information. Thus, for project rules to be demand responsive, the community must have full awareness of them. Expressing a desire

at the time of the first dialogue could merely be a reflection of need if the project rules did not clearly specify, and the community was not fully aware, that it had responsibilities for scheme operation and maintenance and that they were expected to contribute to the scheme. Also, the project rules must allow the community a choice with regards to the preferred level of service (e.g., hand pump or stand post) and the cost of these options.

So far, the aggregation problems of moving from individual or household demand to community demand have been ignored. For example, some individuals in the village may not have demand for water either because they have alternative options (own tubewell, access to spring or river) or because they are too poor. Again, an aggregation problem can occur due to heterogeneity in income, caste, sect or for some other difference in the community. In fact, a community in the real sense of people sharing and acting upon a common interest may not exist. A village dominated by the rich will witness decisions that serve the interests of the rich.

Another manifestation of the aggregation problem is different individuals having varying willingness to pay and varying demands for service. One market approach, if specific conditions are satisfied, would be a differentiated tariff set by a price discriminating monopolist who would cater to a varying demand for the service. In fact, a market solution may not be possible. The neo-classical logic for establishing non-possibility is that, were it possible, it would exist. One reason why a collective market solution does not exist is that the more prosperous often cater for their demand by sinking their own tubewells.<sup>19</sup>

Those whose needs are not met may therefore be fairly homogeneous economically. They are also generally poor, and, their capacity to pay may barely be enough to cover the operating cost.<sup>20</sup> In fact, in many cases, need would not get translated into latent demand because of the limited capacity to pay. Thus, water supply continues to be in the domain of public sector

provision as a subsidized or as a public good. The economic homogeneity at a low economic level may also explain why project rules normally expect or explicitly specify a uniform tariff.

In the context of social sector delivery, demand may be conceptually an even more difficult idea to grapple with than heterogeneity. We infer the presence of latent demand at scheme inception from the extent to which project rules are demand responsive i.e. responsive to latent demand in the community. The reasoning is that if project rules are demand responsive, only communities which have latent demand will accept such rules.<sup>21</sup> Even if one accepts this reasoning and views project rules as a reasonable filter mechanism for identifying latent demand, several analytical problems remain.

First, each scheme includes a large subsidy component. Communities may quite happily accept project rules to qualify for the subsidy. This is particularly the case when local notables dominate decision making and there are collusion and rent appropriation opportunities for the local notables and project staff.

Second, the project may not be able to rule out providing a scheme in villages where the first dialogue with the community indicated a reluctance to accept project rules. In the Pakistani context, one anticipates that at least for government schemes, communities are pre-selected based on political or administrative criteria and project rules are then presented as a *fait accompli* rather than as a filtering mechanism. In this case, the project is supply driven rather than demand based. For a supply driven project, the project rules could be demand responsive but do not really serve the function of a filter for identifying latent demand. It is possible and very likely for a scheme to be awarded to communities with little latent demand at project inception even if the rules themselves are demand responsive on paper. Indeed, the project rules summarized in Appendix Table I show that the three sets of project rules are remarkably similar. Thus the researcher has to be alert to this distinction between project intent and the reality on the ground.

One needs to investigate the awareness of project rules on the part of project field staff and the awareness and implementation of these rules at the household level.

Third, there may be latent demand but, it may not be expressed due to a failure in social mobilization. This could happen for example because the overhead costs of effective social mobilization are too high or because the staff utilized is ill-trained or simply not talented enough. Thus, latent demand could flourish or die depending on the quality of social mobilization.

Actual demand, expressed at the community and household level by variables such as the willingness to pay, may be a much more important in explaining scheme sustainability. Such demand is likely to be more instrumental on an ongoing basis in motivating collective action necessary to ensure scheme sustainability. If so, this would suggest testing the association of latent demand, as identified by the project rules and their implementation, and actual demand. A strong positive association would suggest that project rules are an adequate filter for identifying latent demand, which gets translated into realized demand and contributes to scheme sustainability. It would therefore also provide support for the public policy prescription of demand based scheme selection and information on how better to frame project rules.

To sum up, the public policy objective of this research is to identify factors that are critical to ensuring scheme sustainability. One of these factors could be household demand which could motivate the necessary collective action. Project rules in the case of demand based projects could act as a filter for identifying villages where latent demand exists. An additional factor complementing household demand is social mobilization that induces the necessary collective action. Training is likely to be a necessary condition for scheme success, since the will for collective action needs to be accompanied by the requisite technical and organizational skills.



## IV

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# Sampling and Study Design

Given the nature of the investigation, two stage PPS (probability proportionate to size) sampling was identified as appropriate.<sup>22</sup> In the first stage, the village/scheme was to be selected based on the size and in the next stage 15 households were to be randomly selected.<sup>23</sup> This procedure enabled us to maintain an equal probability of selection of each household (EPSEM) in the targeted populations. While EPSEM was maintained at the second stage, in almost all cases, we had to deviate from PPS at the first stage such that schemes were included with a probability of one. This was because of the scheme, as one of the specified inclusion parameters that we needed to conform to, impinged on the original design.

In order to investigate sustainability, it was preferable to include older schemes in the sample.<sup>24</sup> In the AJK, the phase I LGRDD schemes were completed in 1994 or 1995. Out of the 30 relevant schemes (conforming to the conditions specified in Appendix 1), we included all twelve of the relevant 1994 schemes with a probability of one. Three 1995 schemes were then selected on a PPS criteria out of the 18 relevant 1995 schemes. Out of the 32 NRSP/AJK schemes in the universe, we did not consider the 14 1996 schemes. Of the remaining 18, we selected four of the five 1994 schemes with a probability of one and excluded one because of the small size of the community. One out of the ten relevant 1995 schemes was selected on a PPS basis. We selected all four of the 1995 schemes out of the 15 relevant NRSP schemes in

Rawalpindi and the oldest 1996 scheme. In Sindh, we selected all four of the 1995 NRSP schemes and the oldest of the three relevant 1996 schemes. Similarly, we selected all four of the 1995 schemes and the oldest of the 6 relevant 1996 schemes. The table in Appendix IV shows that there is no significant systematic difference between the selected and remaining schemes. It turned out that the average number of beneficiaries in sample schemes was lower and the per beneficiary cost therefore higher. If anything, this should make collective action more difficult.

The study was structured to enable a multi-layered project comparison as indicated by the schema below.

LGRDD	
}	AJK
NRSP	
NRSP	Punjab
NRSP	
}	Sindh
PHED	

Thus the study design enabled us to compare NRSP's performance with the two government projects, NRSP's performance across the three provinces and the two government projects with each other.

Information for this report was drawn from several sources. The main source of information was field reports of two highly educated three member trained field teams including an engineer, and a male and female social scientist.<sup>25</sup> The field report was written based on a group discussion after two days of fieldwork. The fieldwork included observation, a focus group discussion with the community, 15 household surveys, one technical survey, a one page survey to review the scheme implementation process and a one page survey to solicit information from the field workers.

Thus apart from observations of the field team, we had three data sets generated from structured community, household and technical questionnaires. Multiple sources of information are an advantage when the information is all consistent but contradictory information can also result from multiple sources. In making a final assessment, we have given the most weight to the field reports and technical evaluations. Following this, we believe that data based on one on one household interviews are more reliable than those based on the focus group community questionnaire. While focus group discussions can bring hidden information to light and contradictions in the group can bring the researcher closer to social reality, we felt that responses designed to please project personnel or those following the views of the local notables were equally likely. At the end of the data analysis section, we have conducted a robustness test to indicate how consistent field reports are with the technical evaluations and household and community responses.



## V

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# Project Description, Rules and Implementation Procedures

As mentioned in the introduction, NRSP, LGRDD and PHED were the three projects we investigated in this study. NRSP drew its inspiration from the Agha Khan Rural Support Programme (AKRSP) which is an internationally and nationally well known development NGO in Northern Pakistan. NRSP was formed to replicate the AKRSP development approach across the country. The first management team realized that rapid expansion would dissipate quality. Also, they realized that anticipated targets were, in any case, literally not achievable in the time envisaged. They therefore converted the first government grant into an endowment that now partially finances its operations.<sup>26</sup>

The AKRSP approach relies on intensive social mobilization by a trained professional social organizer. The goal is to form a village or community organization which could then serve as a platform for multi-sectoral initiatives. The first initiative is referred to as a PPI (productive physical infrastructure), which is partially funded by the project, and this also serves as an incentive for communities to organize. The PPI is expected to be identified and implemented via a series of interactive dialogues between the community with the project management group. If a RWSS emerges from this process as a high priority of the community, one can infer community demand for it exists, since the community has to make a

substantial contribution.<sup>27</sup> A mechanism for holding the village organization together, after the completion of the PPI, is regular meetings at which mandatory savings are deposited. Community savings can then be used as collateral for loans mediated by the project for other community initiatives. In addition, the project provides training for various income generating and income defending activities. NRSP has quite successfully adapted and adopted this approach.

NRSPs interactive engagement of communities is referred to as a diagnostic survey which comprises of three dialogues. In the first dialogue, the NRSP introduces itself, explains its approach and interactively develops a detailed village profile and engages in needs analysis. The result of the first dialogue is the identification of a small productive scheme required by the community. The second series of dialogues with the community, in which the project senior engineer and the social organization unit are involved, results in blueprints and cost estimates prepared by the field unit which are sent to the management group for approval. In the third series of dialogues between the community and the management group the terms of partnership between the two parties are explored and the community organization (CO) consisting of all scheme beneficiaries is formed.

The execution, maintenance and monitoring of the scheme is entirely the responsibility of the CO. During scheme construction, the general body of the CO meets weekly to manage all aspects of the scheme and collectively assign responsibilities. The project social organization unit provides technical and financial assistance, supervises progress of scheme construction and CO functioning and makes recommendations about payments of project installments and provision of support services. Management responsibility becomes vested in the CO after the scheme is completed.

In the LGRDD schemes, the needs are again identified by the villagers who lobby their elected representatives. While in practice, political considerations may be paramount, in theory prioritization

is also based on need as defined by the distance and quality of the present water source, the field assessment of the per capita cost, the technical feasibility of the scheme and evidence of previous community work. Once the scheme is approved, the District Office of the LGRDD conducts a feasibility study. The District Council (DC) or Union Council (UC), which are the tiers of local government, then decide if funding is available. In this case, it was made available by the IDA.

For implementation, a scheme committee is set up consisting of three to five members. Usually a UC member or supporter invariably becomes the scheme leader and the others play supportive roles such as keeping accounts and supervising purchase. Unlike the NRSP, where the terms of partnership is between the community and the project, here the contract is between the scheme leader and the LGRDD. Thus the scheme leader is responsible for the utilization of the funds and materials provided by the project.

The LGRDD's responsibilities include the scheme survey and design in consultation with the community, planning and arranging the work, arranging the government contribution, paying for the materials including pipes, fittings and other stand post materials to be transported to the nearest metalled road from the village, assisting the community in procurements including design specifications, quality control and bill and contract preparation, imparting training to plumbers and technicians chosen by the community and overseeing the implementation of the civil work construction.

The responsibilities of the community include the following: forming a committee; co-operating with LGRDD for surveying; planning and designing the scheme; providing the local materials like sand, stone, clay and gravel; opening a bank account and depositing the government contribution; collecting local donations and the water rate fee; acquiring the land and water rights; placing the order for the GI pipes and certifying the quality and quantity;

arranging transportation of the project supplied material from the nearest metalled road to the site; installing the pipes according to the design; arranging the funding and construction of community civil works such as spring intakes; constructing spring protection works, pump houses, reservoirs of less than 5,000 gallons (approved reservoirs of greater than 5,000 gallons are paid for by the project); returning unused material to the project and providing skilled and unskilled labor free as required.

Once the scheme is complete, the scheme committee is expected to be dissolved and a WCOM is established which is entirely responsible for operating and maintaining the scheme. The WCOM is required to collect the water tariff established by the community and emergency dues when needed, facilitate the training of suitable persons from the community for scheme operation and maintenance, settle local disputes by reconciliation, prevent or disconnect unauthorized (not authorized by the project) connections, maintain accounts as advised by the project and educate water users in hygiene and sanitation. The project is expected to continue to monitor and supervise the scheme after its completion and provide assistance (up to 25% of rehabilitation cost) to the WCOM to rehabilitate the scheme if damaged by natural calamities. The PHED project also responds to community requests for schemes. The request is forwarded to the project implementation team (PIT) which conducts a needs assessment based on the cohesiveness and willingness of the community to make land available for the scheme and assume O&M responsibilities. PIT and PHED community mobilizers visit selected villages for social and technical feasibility and to discuss and decide upon affordable technology. The technical design is prepared jointly by PIT, PHED and the CO and submitted for approval. The community organization (CO) is formed at this stage (with a PHED sub-engineer as its technical member), a bank account is opened and the CO members trained for O&M and other sustainability issues. The next stage is the formal signing of Memorandum of Understanding (MOU) between the CO and a high ranking official of the PHED (the executive engineer). PIT

signs as a witness and a senior district administrative official (the deputy commissioner) verifies the MOU.

After the signing of the MOU, PHED calls for bids, selects the contractor and awards the bid. The CO signs as a witness and identifies community members for training in O&M and account keeping. PHED supervises the construction while the CO provides labor for assisting in the laying of distribution pipes and collects the water tariff for the first month. The contractor test runs the scheme for two weeks prior to handing it over to the community. This handing over process is formally documented.<sup>28</sup>

The PHED commits to paying energy charges (for four hours of daily operation) for four years, to clearing the schemes financial liabilities and to operating the scheme for the first three months. It also undertakes to provide the community assistance for major repairs and rehabilitation, including extension, at no financial cost to the community. The community undertakes to pay for the trained operator and pays the power connection fee.

The "ideal" implementation procedures and project rules for these three projects have been outlined above. As we describe in the next section, reality deviated considerably from the ideal for the two government projects.



## VI

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# Field Report Analysis

Some of the main village characteristics drawn from the technical data set are reported in the summary table below. These provide a context for the field report evaluation that follows. In these and subsequent comparisons, the reader needs to keep in mind that there were only 5 PHED schemes but 15 LGRDD and NRSP schemes in the sample.

*Table 1:* Comparative village background characteristics (percentages)

	<b>LGRDD</b>	<b>NRSP</b>	<b>PHED</b>
At or below poverty line	40	60	60
Village electrified	93	80	100
Mean travel time from the nearest city (mins.)	154 (95)	100 (45)	104 (22)

*Source:* Technical evaluation data set.

*Note:* Parentheses contain standard deviations.

LGRDD villages were in general more remote and also more of them gave the impression of being at or below the poverty line. The extent of village electrification, as a proxy for village infrastructure, was quite high across the board.

### A. LGRDD/AJK

The AJK terrain in which the RWSS are constructed is very hilly with scattered population in clusters of households.<sup>29</sup> While spring water is available, this is often seasonal and a good distance away over hilly terrain. The average total cost of the LGRDD gravity

schemes was Rs. 463 thousand.<sup>30</sup> The total cost of the schemes was high because IDA requires schemes to cover the whole population of the village. The use of GI pipe is another cause of the high cost. Water is generally collected in a big storage tank with a storage capacity ranging from 2000 to 5000 gallons. There are also small storage tanks connected with the distribution network for the scattered population clusters. The level of service in all the LGRDD schemes is public stand posts, although local notables managed illegal house connections.

Given the seasonal nature of spring water availability, the gravity schemes generally resulted from an expressed need. In most cases, a local notable managed to deliver the scheme to the village and such local notables were also the entry point of the project into the community. The decision making was therefore usually confined to the local notables who had the major say in critical decisions such as the location of the stand posts.<sup>31</sup>

All but two of the 15 LGRDD schemes we investigated were completed either in March or April 1994. The remaining two were completed in August and October 1995. Two-thirds of these 15 schemes were judged to be non-sustainable by the field team judged by the criteria defined in section 2. Many of them were in poor physical condition despite the recent completion dates. Of the remaining five, one was a borderline case and four were judged to be clearly sustainable. In three of these four schemes, success was attributed to an important individual contribution. In one case, a plumber, as a permanent employee of the scheme (which was exceptional) and, in the other two cases, an interested activist and a selfless activist made the difference. The activist was described as selfless since he derived no personal benefit from the scheme. He managed to galvanize the community which met to deal collectively with crisis situations. The community also paid a regular monthly tariff of Rs. 10 and later agreed to raise this to Rs. 50.

In all cases, the males of the community generally participated

quite wholeheartedly in the scheme construction which included transporting the project delivered pipes over long distances, laying them underground in difficult terrain and constructing the tanks.<sup>32</sup> However, in most cases, this was the extent of the participation. This is as could be expected, since there was no sustained social mobilization. In most cases, the community felt little sense of ownership and the scheme was perceived as belonging to either the project, the World Bank or the chairman of the WCOM and there was little collective action, beyond the initial effort, to maintain the scheme.

The public policy lesson for LGRDD is straight forward. As long as they continue to use village local notables as the entry point for communication with communities, they risk alienating the communities. Local notables personally benefit the most from the schemes mediated through them. A more effective strategy, and of course a much more difficult one, would be to ascertain who is generally trusted by the community and work with such individuals as activists and leaders.

#### B. NRSP/ AJK

The gravity based NRSP schemes operate essentially on the same principle as the LGRDD schemes. The average per beneficiary cost of NRSP schemes in AJK was about 60 percent of the comparable LGRDD cost.<sup>33</sup> In fact, the scheme was delivered by the project for even a lesser amount, since about a third of total cost was contributed by the community. The use of HDP pipes by NRSP, which are very cheap in comparison with GI pipes, was an important factor in reducing per beneficiary cost. The level of service depends on demand and took the form of either public stand posts or house connections.<sup>34</sup>

While the LGRDD and NRSP schemes are physically comparable, there was a qualitative difference between the community management of the schemes. The NRSP communities in general were well mobilized, chose their level of service, were familiar

with project rules and had a sense of ownership. One problem is that NRSP focuses on the interests of the community organization whose members, rather than the community at large, represent the project beneficiaries. Since the NRSP mandate is to focus on the "poorest of the poor", this is not necessarily a problem if they realize their objective.

Four of the five schemes were judged to be sustainable by the field team. In the sustainable schemes, the communities worked well together. The physical condition of the schemes was good, the pipes were laid underground as required and leaks were not evident, the community was willing to repair the scheme in case of damage via collections and had regular meetings and a saving scheme. In all cases, consumer satisfaction was high and the community demonstrated a sense of ownership of the schemes.

The project mobilized the communities effectively, relied on them to identify their own needs, involved them in all phases of the project and imparted training to a plumber. Given this standard format, it is instructive to find out what went wrong in the one NRSP scheme not found to be sustainable. Interestingly, participation appears to have been impeded by the project's reliance on a local notable. This local notable/activist was the sole decision maker and it seems that consequently there were no regular meetings, tariff collections or a sense of ownership of the scheme by the community. The local notable was also the only person with a direct connection to the mainline.

### C. NRSP/ Punjab

The analysis of the five NRSP schemes in the Punjab reinforces the main conclusion drawn from the AJK schemes. The mean cost of the scheme was Rs. 125 thousand and on average just over two-fifths of the total cost was contributed by the community. The per beneficiary cost was somewhat higher than the cost of the AJK/NRSP schemes because of the pumping and the more elaborate distribution network. Four of the five schemes were completed in 1995 and one was completed in 1996.

The source of almost all the Punjab NRSP schemes was ground water pumped with the help of an electric motor and stored in an elevated tank. A distribution network then delivered the water stored in the tank to the community.<sup>35</sup> The level of service was public stand posts shared, in principle, by not more than seven families, although, in practice, more than seven families sometimes utilized a public stand post.

Two of the five schemes were found to be clearly non-sustainable, two clearly sustainable and one fit into the "may be" category. The two non-sustainable schemes and the one with an non-determined status all had the problem of the scheme being captured by a local notable and consequently of a non-participating community. In one case, the secretary was entirely influential in decision making and he and his family were the sole beneficiaries. Even the president of the CO was excluded from the scheme benefits. In the second non-sustainable case, the community relied entirely on the activist who enjoyed the bulk of the benefits from the scheme. In the third scheme, with the undetermined status, the president and CO manager were once again the most influential in decision making and the remaining community members showed little awareness of the project rules.

The unsustainable schemes were in poor physical condition and provided limited service. The communities were not satisfied with the service, did not own the schemes, did not pay a tariff and had little awareness of operation and maintenance responsibilities. The project failed by working via local notables and by not mobilizing the communities and by not providing maintenance or hygiene training.

NRSP clearly has the capacity to do much better. This was evident from the performance of the well functioning schemes in AJK, from the performance of the two Punjab schemes that were found to be sustainable and the four sustainable schemes in Sindh (described in the next sub-section). In the case of the sustainable Punjab schemes, the NRSP field officers performed well in

implementing the project software and hardware.<sup>36</sup> They provided all the necessary information and training and ensured broad based participation of the community in all phases of the project. As a result, the schemes were in good physical condition, the record keeping was good, tariffs were paid regularly and the community was willing and able to maintain the scheme. For non-routine maintenance, there were emergency meetings for collective decision making and implementation. There were no mal-practices and the community revealed a sense of ownership of the schemes.

#### D. NRSP/Sindh

Four of the five surface water NRSP schemes, built in the Sindh planes, were completed in 1995 and the fifth in 1996. The average per beneficiary cost was 15 times less than that of the more elaborate PHED schemes in Sindh discussed in the next subsection. On average, 37 percent of the total cost of the scheme was contributed by the community.

The NRSP schemes were very basic and used canal water as a source since ground water is very saline and is generally not potable. This water was stored in well built but open storage reservoirs. These were low cost schemes with no full time employees required. The level of service was a shared delivery chamber or house connections.

Four of the five schemes were found to be sustainable. The one problematic scheme in Sindh has similar problems of an exclusive reliance by the community on the activist and hence a lack of broad based participation. Moreover, the poor and the minorities (Hindu and Qadiani) were excluded. The project social activist was clearly inadequate, since he himself was unaware of the project rules.<sup>37</sup> By helping cement the floor of a community built reservoir, contaminated by the upward push of saline water, the scheme had improved the quality of water and hence created a sense of satisfaction among community members, particularly women. However, the water quality continued to be poor and the lack of

community mobilization or collective action was evident from individual households engaging in their own water purification by crude techniques.

The other four schemes were found by the field team to be sustainable. The project was very successful in delivering on its part of the contract. The community was involved in all stages of the project and all the relevant information was provided. Training was provided in leadership and management skills, water purification, hygiene and scheme maintenance. As a result, in general the physical condition of the tank was good and the sense of ownership, the willingness to maintain the scheme and consumer satisfaction were high.

Thus, across the three regions, 10 of the fifteen NRSP schemes were found to be sustainable. In the three non-sustainable schemes and the two not completely satisfactory schemes, the big failing was the project reliance on a local notable and hence the lack of broad based community participation and ownership of the scheme. In this regard, the non-satisfactory NRSP schemes resemble the bulk of the LGRDD schemes which were non-sustainable and, interestingly, the few successful LGRDD schemes managed to replicate the broad based participation of the NRSP schemes. This same lesson once again comes through from the review of the PHED schemes.<sup>38</sup>

#### E. PHED/Sindh

The dates of completion of the five PHED schemes varied from August 1995 to January 1996. The average cost of the PHED schemes was Rs. 5.9 million but they were more elaborate than the NRSP schemes. As indicated earlier, the average cost per beneficiary was 15 times more than the average for NRSP Sindh schemes.

Once again, canal water was generally the source.<sup>39</sup> The scheme design included two reservoirs surrounded by a boundary wall.

Water was required to be stored in these reservoirs and sufficient time provided for sedimentation. After this, it was to be filtered through a chlorine tank and pumped directly into the distribution network. Since electricity load shedding is a serious problem in rural Pakistan, a diesel engine was to be provided. An operator-cum-plumber is to be provided to look after the scheme, although the salary of the employee was expected to be paid by the community. The level of service was house connections.

Of the five schemes, two were found to be unsustainable, one sustainable and two were of indeterminate status. In all cases, the community expressed a strong need for the schemes. In most cases, even when the scheme was sustainable, the project software and hardware was not well executed. There were technical errors in the design or construction, not enough information or training was provided for operation and maintenance, community members were not clear on the project rules and hygiene education was either not provided or only informally provided.

The physical condition of the two unsustainable schemes was poor. Equipment such as the chlorinator and sluice gate valves were not in working order, spider webs were found in the manhole, direct pumping endangered pipes due to high static pressure and resulted in leaky pipes, valves, electric pumps and chlorinator. Further, the sedimentation tanks were dirty and not being utilized and there were acute drainage problems. However, the communities chose the level of service and in one case made a cash contribution and in another case contributed the land. Even so, in the former case, they refused to contribute for an overhead tank to avoid direct pumping for a slow sand filter.

Social mobilization was weak as evident from the lack of implementation of a tariff regime, no formal training, lack of a sense of community ownership or community awareness of its responsibility. There was little community participation in decision making and the CO and project officials or local notables were viewed as responsible for the scheme. Not surprisingly, there was

inequality in the distribution of benefits. In some cases, households had more than one connection and in other cases they had none. There was little likelihood that the communities would be able to pay the electric bill once the PHED subsidy phased out.

The two schemes of indeterminate status had a more mixed record. Drainage and static pressure due to direct pumping was still a problem. However, the physical structure was good in both cases and consumer satisfaction was high. The scheme was perceived to be a World Bank scheme in one case and so there was no sense of community ownership. In both cases, there was no formal training, and, in one case, no record of tariff collection. In the other case, the tariff collection was regular and, since the names of defaulters were announced in the Friday sermon, collection was not a problem. However, the tariff rate was too low to pay the electricity bill ones the PHED subsidy phased out.

The communities chose the level of service but were not involved in planning or decision making. Once again, this was viewed to be the prerogative of the local notables represented in the CO. There were no regular CO meetings. In one case, the poor were excluded entirely from the scheme because they could not afford the pipes for the house connections. While default was low in one case, even in that community, people did not bother to report leaks and were not aware of the project rules.

Once again, the one sustainable scheme had much to do with the community being mobilized prior to contact with PHED. A CBO (community based organization) was present in the village since 1971. They established links with some of the most prominent national capacity building organizations such as TVO (Trust for Voluntary Organizations) and SPO (Strengthening Participatory Organizations). Thus they had a long established history of collective action on a self help basis which included building school rooms for the high school and community drains. They solicited the PHED project to upgrade from stand posts to yard connections.

The scheme worked like a blue print of successful community action. The physical condition of the project was excellent, it was well maintained, no leaks were evident, a proper tariff structure was in place, payments were prompt and there was virtually no default. The level of community satisfaction with the scheme and ownership of it was high. Thus the community indicated a capability and willingness to operate and maintain the scheme in every way.

In Appendix V, we present two case studies that highlight two of our main points from this section. Case study I is probably the worst LGRDD scheme with regards to the rudimentary implementation of project rules and the lack of social mobilization. We chose it to highlight the danger of using local notables as an entry into village communities. The likely consequence is a capture of scheme benefits by local notables and the alienation of the rest of the village community. Such an approach is unlikely to lead to successful social sector service delivery, even if the community has the capacity to pay for the service.

Case study II does not represent the best example of NRSP=s social mobilization, which, combined with its demand based approach, can produce sustainable social sector service delivery. However, we selected it because it is geographically a very similar community to Patthi and also subject to the same kinds of social tensions. As the case study will indicate, the social mobilization and community organization has provided enough of a glue to enable the villagers to work together to collectively address problems pertaining to RWS.

## VII

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# Data Analysis<sup>40</sup>

### A. Technical evaluation data set

The results in the last section are more optimistic than those evident from the technical evaluation. The most striking finding resulting from the technical evaluation is that, in a fundamental sense, only one and perhaps none of the 35 schemes in the sample are financially sustainable. Only 2 LGRDD schemes and 3 NRSP schemes had instituted regular tariff collection. While tariff collection was in place in all PHED schemes, in only one case was it high enough to cover O & M, repair and expansion. Four schemes (three PHED and one NRSP scheme) had adequate reserves available at the time of the survey for O&M. These results need to be qualified for NRSP since the COs have a regular saving scheme which can be drawn on by the community by consensus for any one of their schemes across different sectors. Also, the NRSP schemes in Sindh had no recurring costs and hence no need of a tariff. Twenty of the remaining schemes were gravity based and as such are low and irregular maintenance schemes.

The table below provides a technical overview of how well the schemes were performing in a comparative context.

*Table 2:* Comparative technical evaluation of WSS

	(percentages)		
	<b>LGRDD</b>	<b>NRSP</b>	<b>PHED</b>
Possibility of source contamination	47	67	60
Efforts taken for protecting source	57	27	20
Good quality construction	27	67	60
Defects in water catchments	27	7	0
Defects in masonry	20	0	0
Pipes exposed and leaking	60	6	60
Many stand posts leaking	27	20	na
Highly capable operators	27	13	20
Most of the scheme working	73	73	20

*Source:* Technical evaluation data.

The table above does not show NRSP to be as overwhelmingly superior in all respects as one might expect from the field report analysis. However, in critical categories such as the quality of construction, lack of defects in masonry work, lack of defects in water catchments and exposed and leaking pipes they clearly dominate. The technical evaluation was a key input into the field reports and these are then the physical categories of the water schemes that the field team attached a high weight to. The category that NRSP does poorly in is the possibility of source contamination. This results mainly from low cost exposed open tanks of the five NRSP schemes in Sindh. PHED also rates well in construction but rates poorly in terms of leaking pipes and the fact that only one of the five schemes is rated as mostly functional.

Just as we are able to explore physical sustainability conclusions arrived at in the field report analysis in greater depth using the technical evaluation data set, we can explore other issues such as need and demand assessment, social mobilization, participation and community satisfaction in greater depth using the household and community data sets.

## B. Community and household data sets

Since many of the same questions were asked of communities and

households, it is possible to juxtapose the responses to indicate the consistency in the responses from the two different sources. As earlier mentioned, we attach more weight to household responses than community responses because there is a possibility of project coached responses or local notables influencing opinion even when focus group meetings are skillfully conducted.

We have focused on the key variables and sorted them into the following three categories: social mobilization; need/demand, perceptions of performance and sustainability. These categories capture the themes of the paper as identified in the conceptual framework i.e. the relative importance of social mobilization and demand in determining WSS sustainability. Since we attach the most weight to field reports followed by technical evaluation, our main interest in drawing on the community and household data sets is to investigate the additional insights that may be forthcoming which explain the relative institutional strength of NRSP. We indicate when there is a lack of concordance between the findings of the field report on the one hand and the community and household responses on the other hand.

*Table 3:* Comparative community need and demand for WSS

Project Data set	(percentage)					
	LGRDD		NRSP		PHED	
	COMM	HH	COMM	HH	COMM	HH
HHs spending more than 15 mins. to collect water before WSS	na	88	na	62	na	70
Water identified as main need	67	96	53	82	80	95
Project provided information on cost of alternative options	0	9	40	50	20	27
Aware of scheme cost	20	02	80	41	100	32
Community made the final decision about type of RWSS	7	31	93	63	100	64
Mean cash contribution	1,225 (14)	1,341 (150)	1,269 (14)	1,643 (116)	700 (1)	683 (9)
Paying tariff	27	19	27	20	100	89
Willing to pay for improvements	na	36	na	46	na	23

*Source:* Community and household data sets.

*Note:* Parentheses contain the number of communities and households respectively who reported a cash contribution.

As indicated in the analytical overview, need can play an important role in galvanizing communities to work together. Need can be identified both by subjective responses and by ascertaining the time the community spent in procuring water prior to the scheme. As expected, Table 3 shows need, as proxied by time spent to collect water prior to the scheme, was the highest in the AJK hilly terrain communities which had LGRDD schemes. However, expressed need was equally high in the LGRDD and PHED communities and higher than the NRSP communities visited. This is likely since NRSP has multi-sectoral interventions and there is a purpose to expressing alternative needs.

The remaining responses in Table 3 attempt to grapple with the issue of demand and demand responsiveness of projects. Projects could be viewed as demand responsive if at a minimum they make the necessary information for a reasoned choice available to communities and then let communities make the choice. In this regard, both community and household responses suggest that overall NRSP is more demand responsive. According to community and household responses, NRSP has made a greater effort in providing information about the costs of alternative options than the other two projects. This is also reflected, as a cross check, in a greater awareness at the household level of the scheme cost. However, the awareness of scheme cost reflected at the community level was greater for the five PHED schemes. Finally, for both NRSP and PHED schemes, the communities were in more cases allowed to make the final decision about the type of RWSS they were going to get.

Since there was a much larger subsidy component in the PHED schemes than in the NRSP and LGRDD schemes (see Appendix IV), exercising choice in the latter two cases was more meaningful. Also, if one were to infer community demand in terms of the actual cash contribution made and the extent of willingness to pay for improvements, community demand in the NRSP and LGRDD schemes was greater than the PHED schemes. However, community and household responses suggest that PHED has been

much more effective in instituting a system of tariffs.

It was pointed out in the conceptual framework that social mobilization and community demand could reinforce each other as inducing participation and collective action to ensure scheme sustainability. There is also not always a hard and fast conceptual distinction between the two. For example, community awareness of project rules and their O & M responsibilities could be viewed as elements of project demand responsiveness and also as elements in project success in mobilizing and informing communities. In Table 4 we review responses that are indicative of project efforts and success in social mobilization and training.

*Table 4:* Comparative social mobilization: awareness, decision making and training

Project Data set	(percentage)					
	LGRDD		NRSP		PHED	
	COMM	HH	COMM	HH	COMM	HH
Awareness of project rules	7	17	40	39	40	16
Aware of O & M responsibilities	53	67	87	84	80	88
Built WSS / Felt participation in WSS adequate	87	74	100	83	0	78
Felt community owned scheme	67	30	80	71	100	77
Trained (Nos.)	6	13	10	22	25	18
Considered training sufficient / Considered training useful	13	69	53	59	20	61

*Source:* Community and household data sets.

*Note:* Front slashes separate questions asked of communities and household when there is a difference in questions asked.

Awareness of project rules at the household level was much higher for NRSP than the other projects, although at 39 percent this awareness was low in absolute terms. At the community level, the awareness was matched by PHED. Participation was also greatest in NRSP schemes. Awareness of O&M responsibilities was recorded as greatest for PHED at the household level (88 percent) and greatest for NRSP schemes (87 percent) at the community level.

NRSP schemes were more participatory in that all of them were built by the communities. This was also true for most of the LGRDD schemes but for none of the PHED schemes. However, at the individual level, 74 percent and 78 percent respectively of the LGRDD and PHED household respondents felt their participation in the WSS was adequate. This perception of participation was again higher at 83 percent for NRSP schemes.

One way to infer if meaningful participation and collective action is actually underway is to gauge the sense of ownership of the scheme present at the community and household level. At both the household and community level, this was highest for PHED (77 percent and 100 percent respectively) followed by NRSP (71 percent and 80 percent respectively) with LGRDD a distant third at the household level (30 percent) and a closer third (67 percent) at the community level.

The investment in training was greatest by PHED since, in relative terms, they had the largest numbers of individuals trained on various aspects pertaining to water supply and sanitation.<sup>41</sup> However, the training delivered by LGRDD was considered useful by a larger percentage of households (69 percent) than was the case for PHED (61 percent) and NRSP (59 percent). At the community level a much higher proportion of schemes considered the training provided by NRSP as sufficient.

While the field report section and technical evaluation subsection address issues of sustainability in an "objective" sense, it is nonetheless interesting to address this issue from the perspective of household and community responses as summarized below in Table 5.

*Table 5:* Comparative perceptions of performance and sustainability

(percentage)

Project	LGRDD		NRSP		PHED	
	COMM	HH	COMM	HH	COMM	HH
Satisfied with WSS management	Na	69	na	95	na	97
Rating the RWSS as good	80	84	80	83	80	88
Viewing the RWSS as unreliable	Na	9	na	11	na	1
Cited existence of mal-practices	7	16	13	9	0	0
Viewing community as a source of funds for major repair	40	76	67	84	60	61
Felt community had financial capacity to keep scheme operational for 10 years	100	86	100	93	100	96
Felt community would have the funds to replace scheme when necessary	7	10	27	28	0	20

*Source:* Community and household data sets.

A great deal of confidence was placed in the schemes by communities and households. Thus 97 percent and 95 percent of households for PHED and NRSP schemes respectively were satisfied with the scheme management (69 percent for LGRDD). Over four-fifths of all households and communities across the board rated the performance of the scheme as good. We were able to cross check this since information had also been solicited about the unreliability of the system. Only 1 percent of the households viewed the PHED schemes as unreliable and 9 percent and 11 percent respectively viewed the LGRDD and NRSP schemes as unreliable. A very similar response was also evident on the existence of mal-practices in the community.

Overall, the spirit of self-reliance evident from community and household responses was once again the highest for NRSP. Eighty-four percent of the NRSP households, 76 percent of the LGRDD households and 61 percent of the PHED households viewed the community as a source of funds for major repair. The corresponding community data set percentages were 67, 40 and 60 percent respectively. All the communities across the board felt that the community had the financial capacity to keep schemes operational for 10 years although at the household level the expressed level of confidence was lower at 86, 93 and 96 percent for LGRDD, NRSP

and PHED respectively. However, only 7, 27 and 0 percent responses at the community level and 10, 28 and 20 percent responses at the household level for LGRDD, NRSP and PHED respectively suggested confidence in being able to replace the schemes when the current one became obsolete.

Overall, the household and community responses are broadly consistent. Also, the household and community data re-enforce the findings of the field reports and technical evaluations that NRSP was in general performing best in terms of social mobilization and demand responsiveness of the schemes. This result is broadly consistent with the assessment of the field reports. However, PHED's performance is much better than evident from the field reports or technical evaluation.

The field team also interviewed the field staff. One of the main findings that emerged from the field staff survey was that on average the eight NRSP field staff interviewed (staff often were responsible for more than one project) were able to recall over 90 percent of the documented project rules ( if we exclude one social organizer who virtually knew none or refused to cooperate) while the nine LGRDD staff and the two PHED field staff recalled 52 percent and 35 percent respectively. Thus better trained field staff was another reason for better performance of the NRSP schemes.

### C. Exploring data robustness and hypotheses testing

As a test of robustness of the findings from the different sources, we created a non-sustainability variable based on the findings of the field report. Schemes were classified as either non-sustainable or as sustainable based on the assessment of the field reports. While there is a loss of information in merging the intermediate category with the sustainable schemes, this enables a sharper test to be conducted. Using the non-sustainability variable, we re-computed Tables 2-5 which are reported in Appendix VI. The hypothesis is that non-sustainable schemes would consistently do worse than the other schemes on all criteria.<sup>42</sup> A response in the affirmative means consistency between field reports and the data sets based on the

structured questionnaires. Such consistency is quite clearly evident in the technical, community and household responses for NRSP and PHED. However, the results are mixed for LGRDD.

Notwithstanding this discrepancy, we went ahead and attempted to more rigorously identify the relative importance of social mobilization and demand responsiveness as determinants of sustainability. For this purpose, we computed indices of sustainability, social mobilization demand responsiveness, and a few other relevant variables, based on the methodology for this developed for the multi-country study (reported in Appendix VII). The econometric estimation mirrors what we investigated and reported on above using cross-tabulations and has been described in the conceptual framework (section 2).

Table 6 below presents the results of the estimation.

*Table 6:* OLS Regression Results  
Dependent Variable: Index of Sustainability (SS)

	(1)	(2)	(3)	(4)	(5)
Constant	4.77* (3.67)	1.32 (0.73)	0.50 (0.25)	0.73 (0.32)	0.11 (0.05)
SM	0.61** (2.17)	0.75* (2.84)	0.82* (3.00)	0.83* (2.96)	0.95* (3.26)
DR	-0.13 (-0.91)	-0.17 (-1.31)	-0.17 (-1.27)	-0.17 (-1.27)	-0.19 (-1.40)
NEED	-	3.45** (2.59)	3.17** (2.33)	3.16** (2.28)	3.53** (2.53)
WCOM	-	-	0.67 (0.98)	0.73 (0.99)	0.42 (0.54)
EDU	-	-	-	-0.03 (-0.22)	-0.01 (-0.06)
TRAINING	-	-	-	-	-2.90 (-1.31)
n	35	35	35	35	35
Adj. R <sup>2</sup>	0.12	0.25	0.32	0.30	0.34
F-Stat.	3.24**	4.77*	4.95*	3.85*	3.89*

*Source:* Community data set

*Note:* Figures in parenthesis are t-statistics

SM: Index of social mobilization. Description of all indices is contained in Appendix VIII.

DR: Index of demand responsiveness (see Appendix VIII)  
NEED: 1 If water supply scheme is the pressing need, 0 otherwise  
WCOM: 1 If Water Committee exists in the village, 0 otherwise  
EDU: Mean level of education in the community across household (see Appendix VIII)  
TRAINING: Mean household perception on the value of training (see Appendix VIII)  
\* : Significant at the 1 % level  
\*\* : Significant at the 5 % level  
\*\*\* : Significant at the 10 % level

We tried interaction terms(NEEDSM, TRAINSM and WCOMSM) but none of them were statistically significant.

Social mobilization and need are the only two variables that are significant and they are consistently so under alternative specifications. Overall, the results reported in Table 5 are consistent with our earlier findings based on cross-tabulations. However we view these findings as only suggestive for several reasons. First, we do not have enough observations to estimate separate estimation by project. Separate estimation would be useful in and of themselves but also represent a robustness test of the statistical model. Second, an earlier robustness test revealed discrepancy in the observations of the field team and findings based on structured questionnaires for the LGRDD project.

## VIII

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# Women and Rural Water Supply

Women were included in the decision making in only two out of 35 schemes. One was an NRSP scheme, where the president of the CO and the more educated community members were nonetheless more influential. The other was a PHED scheme in a community with a long history of collective initiatives. Despite the lack of direct involvement in decision making, women, nonetheless, expressed full or partial satisfaction with the schemes in 30 out of 35 cases. This is not surprising since in all but one case, women had the responsibility of collecting the water, often from great distances and, in hilly areas, across difficult terrain.

In most cases, women managed to give new uses to the water. These include washing utensils and clothes at, or close to, home (Sindh is an exception since in the plain there is a drainage problem), providing water to animals close to home and horticulture. They also mentioned better hygiene as a major advantage of clean scheme water, particularly in Sindh. In many cases women also continued to use the old sources. In AJK, this was because spring water was cooler in Summer and in Sindh this was because of the drainage problem resulting from the use of the scheme water at or near home.

In 5 cases, women wanted improvements and stated a partial or complete willingness to pay for these improvements. It is difficult to interpret this willingness to pay since women were generally not the cash earning family members.



## IX

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# Conclusion

The performance of two line agencies in delivering 15 and 5 rural water supply schemes (RWSS) respectively and one development NGO which delivered 15 such schemes is reviewed in this report. The delivering agencies are referred to as projects in the study and the two government projects are the Public Health Engineering Department (PHED) and the Local Government and Rural Development Department (LGRDD). The development NGO is the National Rural Support Programme which follows a tried and tested approach to rural social sector delivery. The results reported are based on field reports written by trained teams, after a discussion based on two day field investigation, and on analyses of data generated from focus group meetings, household interviews, interviews with the project field staff and technical evaluations.

The purpose of the research was to investigate how critical demand or latent demand and social mobilization and training were to the success and sustainability of these schemes in particular and social sector delivery in general. It was important to include government projects in the study because of their scale of operations and the NGO project was included because of its focus on social mobilization.

The importance of demand in determining sustainability is not easy to establish in social sector delivery. Ideally, market surveys identify the presence or absence of demand. If this could be done, demand could in principle be used as a targeting criterion on the assumption that a willingness to pay will be associated with

scheme sustainability. Clearly, the community's ability to pay for at least the scheme recurring cost and perhaps depreciation charges could be an important factor in scheme sustainability. However, we argue in the text that demand is a questionable selection criterion for poor communities.

In the absence of market surveys, project rules could be used as a filter mechanism for identifying the presence of latent demand in communities. The idea here is that communities without a demand for the water would not accept stringent demand based rules. Thus the fact that they accepted these rules indicates the presence of community demand. In practice, the three sets of project rules were virtually identical and all were reasonably demand based. Also, almost all the communities lobbied projects either directly or indirectly, via representatives, for the schemes. Thus one could argue that all communities had expressed at least a need and that their acceptance of the project rules indicated the presence of latent demand. Given this universal acceptance of project rules, latent demand could be considered, with qualifications mentioned in the text, a constant and, by common sense, as a necessary condition for scheme sustainability. However, latent demand so identified is not a sufficient condition since many of the schemes studied indicated very poor outcomes.

Our findings based on the field reports show that the NRSP schemes stuck much more closely to the project rules and implementation procedures specified in the project documents. They had a much higher success rate in sustainable delivery and that their schemes were also more cost effective. NRSP staff managed to mobilize communities in three different provinces under very different social, economic and technological conditions. The accomplishment was particularly noteworthy in Sindh where the communities were highly differentiated by ethnicity and income. This represents a strong endorsement of their approach to social mobilization.

NRSP social mobilizers were much less inclined to use village

local notables as their entry point into the village and as the individuals through whom subsequent scheme related work was mediated. In fact, the NRSP schemes where this did happen were judged to be among those performing poorly on the criteria for sustainability. The reason for this failure was the lack of broad participation in decision making and hence the lack of ownership of the scheme by the community or any collective effort to make the scheme a success. Typically, in such schemes, the local notables who made the key decisions also disproportionately captured the scheme benefits. Thus such NRSP schemes operated like the typical government scheme. Interestingly, government schemes where decision making was much more broad based showed a success similar to the successful NRSP schemes.

In fact, the performance of LGRDD field workers showed that they managed to get a good participatory response from the communities in the scheme construction process but that they didn't attempt to carry the community participation process any further. This clearly indicates their more limited expectations. If they were trained, expected and remunerated to take the process further, their performance suggests they could. Similarly, if PHED could have success in forming water committees and having them implement regular tariff collection, they could take the process further.

The results of technical, community and household data analysis for the most part confirmed the evaluations of the field teams contained in the field reports. There are two major differences. First, the field reports are much more sanguine about the overall financial sustainability of the schemes than is evident from the technical evaluations. For example, only five out of the thirty-five schemes had instituted a regular system of tariff collection and strictly speaking only one of the schemes could be viewed as financially sustainable. This result sounds more alarming than it is. NRSP COs have savings they can draw upon if the community so decides. Also, the NRSP schemes in Sindh had no recurring costs and hence no need of a tariff. Twenty of the remaining schemes were gravity based and as such are low and irregular maintenance

schemes. Second, and this is more difficult to explain, the field reports and the technical evaluations rate the PHED scheme performance to be much worse than indicated by the community and household responses. We placed more confidence in the field reports since structured questionnaire responses can be coached.

Exploring the data to understand why NRSP schemes were viewed as better managed, we discovered that the quality of construction, masonry, catchment and better placing and condition of the pipes stood out. With regards to social mobilization, NRSP communities were better informed, better aware of project rules and demonstrated more participation and self-reliance. Also, one could view NRSP as being a more demand responsive project in that communities actually built the scheme, made a greater cash contribution and indicated a greater willingness-to-pay for improvements. The results of our econometric estimation support the hypotheses that social mobilization and need are critical determinants of scheme sustainability. Other indices such as demand responsiveness, training, education level of the community were not significant.

The main public policy message of this report is to get government projects to function like the development NGO projects. This requires social mobilization training for government personnel and an altered incentive structure and service rules so that they have the will and flexibility to deliver.

### **Endnotes**

1. See Khan et. al. (1996). That study was funded by the Multi-Sectoral Support Unit which has been playing a key role in Pakistan's Social Action Programme. The latter is directed at providing access to basic education, health, family welfare services and water supply and sanitation to rural communities. Pakistan's four main provinces listed by population size are Punjab, Sindh, Sarhad and Balochistan. In addition, there are federally or provincially administered areas and Azad Jammu and Kashmir (AJK) is an autonomously run province. A new rural water supply scheme will be referred to as RWSS or

simply as a scheme. Note that what is referred to here as a scheme would normally be called a project. However, here the direct or indirect funding agencies are referred to as the project.

2. This multi-country study, which is part of the UNDP-World Bank Water and Sanitation program, includes Bolivia, Honduras, Indonesia, Pakistan, Benin and Uganda and is titled "A Comparative Analysis of the Impact of Institutional Rules on RWS Sustainability." Jennifer Sara is the task manager for the study and Travis Katz the global coordinator. This multi-country study follows an earlier World Bank multi-country study (1987-1990) that also explored demand side issues. See World Bank (1993).
3. Sustainability and demand responsiveness are discussed in detail in the next section.
4. This logic is discussed in section 2.
5. The Bank team's agreement was premised on the demand oriented nature of NRSP as a project. Our interest was in the combination of this demand orientation with social mobilization.
6. Strictly speaking the funding source is referred to as a "project". Alternatively, as indicated in note 1, the scheme implementing agency could specify the project rules on behalf of the funding source in which case the implementing agency could be referred to as a project. In this study the NRSP, LGRDD and PHED as implementing agencies with identifiable project rules are referred to as the projects.
7. This conceptual framework for the Pakistan report emerged from discussions with Jennifer Sara. Thanks are also due to Mozaffar Qizalbash, Haris Gazdar, Asif Mahmood and Tariq Banuri for useful comments. It also draws from the terms of reference for the World Bank multi-country study. Changes have been made particularly with reference to the distinction between demand and latent demand and in viewing these, as well as community social mobilization, as motivators for collective action.
8. See Narayan (1995) and Khan et. al. (1996) for the use and empirical test of this concept in the context of rural water supply and for other references to the literature.
9. We are not addressing the link of participation with autonomy and hence more "authentic" development.
10. The issues of heterogeneity of communities and related aggregation problems are addressed later.
11. Collective action in the context of rural water supply schemes refers

to the community selecting or electing a water committee and entrusting its operation and maintenance to the committee, participating in community meetings for collective decisions, collectively agreeing upon and paying the tariff in a timely manner and feeling a sense of ownership for the water scheme. This sense of ownership would result in their using peer group pressure when others default, report leaks and mal-practices, such as deliberate breakage, illegal connections and the use of suction pumps, to the water committee. Thus collective action is the broader framework that includes individual responsibility and effort harnessed to the provision of an individual and collective need. Ostrom, (1993) reviews examples and draws generalizations from cases across countries where collective action is successful in different situations. Also see references to the collective action literature in Ostrom (1996, pp. 1073-1087), endnote 6.

12. This would be the case for example if an individual activist makes a social contribution to a scheme that exceeds the individual benefit from such an effort. The quality of leadership invariably makes a difference whether it is at the level of an institution, community or the country. Unfortunately, assessing the quality of leadership in brief field visits can be difficult and can involve circular reasoning. In other words, there is a danger of inferring that the quality of leadership is good because field observation indicates that the scheme is sustainable. The focus of this study is much more on policy responsive community factors that contribute to sustainability.
13. Actual demand is only registered on the market when the service is actually delivered for a fee. Thus latent demand is the more relevant social concept here.
14. Wade's focus on rural developing country collective action is much closer to our viewing rural water supply as a collective action issue than the rest of the literature in this area. Ostrom (1990) is conceptually relevant to the issues we address.
15. This is different from Wade's [1994] notion of collective action emerging in communities in response to economic compulsions involving externalities. In the case of rural water supply, such spontaneous action may or may not occur in response to community need. The contention here is that even if collective action does not spontaneously emerge, social mobilization can act as a catalyst in engendering it. In this regard, one could conceive of social mobilization as reducing the transaction costs of collection action.

16. Social mobilization needs to be viewed in a dynamic perspective. There may be community resistance to social mobilization based on an innate suspicion of outsiders and on scams that they may have been subjected to in the past like the cooperative scandal in Pakistan. However, once an organization is formed and the benefits of collective action demonstrated, the skeptical may join in.
17. Sustainability in this narrow sense can be viewed as a pre-condition for sustainability in the broader sense of concern with the well being of future generations.
18. Currently, according to the UNDP (1995, p. 167), about 50 percent of the rural sector in Pakistan has access to clean drinking water. The average total cost of schemes in our sample was Rs. 5.87 million in Sindh and Rs. .46 million in the AJK (see Appendix IV). If we assume that roughly 23,000 villages still need schemes (half the total villages in the country), the approximate total cost of providing drinking water supply to all villages (not counting the urgent need for much rehabilitation work) using an average of the two cost estimates, would be Rs. 72.9 billion. The total allocation under phase II of the Social Action Programme for RWSS between 1996 and 2000 is Rs. 37.5 billion.
19. See Khan et. al. (1996).
20. Our earlier research shows that in poor rural communities the tariff rate would need to be sensitive to the capacity to pay. In Khan et. al. (1996, p. 41), we found the willingness-to-pay, even for improved service, gravitated to what communities were actually paying and it ranged from Rs 16 to Rs. 30 per month. It would be preferable to identify willingness-to-pay (WTP) based on a survey of communities without a rural water supply scheme. In any case, to get some perspective on the WTP, it is interesting that Rs. 20 represents the cost of an ice-cream cone which many urban middle class parents routinely buy for their children.
21. Ideally, the best way of identifying latent demand would be with a market survey done before the first project dialogue with communities. This would be a way of pre-selecting communities relevant for a demand based project. However, this would be very expensive compared to using project rules as the filter mechanism.
22. Details of this method and our sampling approach are reported in Appendix I.
23. Village household lists as sampling frames were made available by NRSP and PHED. For LGRDD, the household sampling frame was constructed at site by the field team.

24. The fieldwork started on March 25, 1997 and ended on May 15, 1997.
25. To save on time in the field, two teams were trained. The training included in house sessions, a pre-test survey, follow-up in house sessions, another pre-test survey and further follow-up in-house sessions. The engineers had a bachelors degree while the rest of the field team had masters' degrees from various social science disciplines.
26. The Sarhad Rural Support Corporation (SRSC) and the Balochistan Rural Support Programme (BRSP), funded by provincial government, extended this development approach into the Sarhad (North) and Balochistan provinces. This approach is now well established and several donor agencies and other indigenous development NGOs run adapted versions of such programmes and the Punjab Rural Support has been launched in August 1997.
27. Between a third and two fifths of the total cost for the 15 NRSP schemes we investigated was contributed by the community.
28. This is in sharp contrast to the NRSP approach in which there is no handing over of the scheme, since the project believes the scheme belongs to the community to begin with.
29. The reader is referred to the account of Murree schemes in Khan et. al. (1996) for the various problems confronted by hilly area schemes.
30. Appendix IV presents the comparative data across the projects. One dollar exchanged for Rs. 41.38 in September 1997.
31. The project decision not to give a choice with regard to the level of service to the community seems to have been driven by project convenience rather than a scarcity of water since the source often had an abundant yield.
32. Donations of cash, in kind contributions and provision of land appeared by consensus to substitute for each other. Thus those offering a portion of their land for the scheme or offering more cash, contributed less labor. In some cases, those whose land the pipe passed through did not pay a tariff. Thus there is a developed sense of equitable contribution which reveals an ability for devising norms that enable collective action.
33. Implicit in these numbers is a statement about NRSP being more cost effective i.e. at a lower cost it delivers a more satisfying service. Critics often claim that this ignores the large NGO overheads that are needed for the social mobilization. This is an important issue for investigation. However, two points are noteworthy in this context.

First, the community organizations that result from the social mobilization become a platform for multi-sectoral interventions. Second, the recurrent expenditure of each provincial ministry and district and lower tier offices represent part of the government overheads. Thus, for a parallel treatment, these government administrative costs should also be taken into account in cost-effectiveness analysis.

34. Obviously, the HDP pipe is not as durable as the GI pipe. This is particularly important in hilly areas such as AJK where landslides can easily damage pipes, including GI pipes. However, the NRSP pipes were well laid underground.
35. One of the five schemes located in hilly Murree was gravity based as in the AJK.
36. It is also notable that in the two sustainable Punjab schemes, the communities were homogeneous in that they belonged to the same caste. This finding is consistent with the evidence reported in Khan et. al. (1996).
37. Also, a Sindhi social activist trying to mobilize a Punjabi community settled in Sindh probably did not help much either.
38. We shared the first draft of this report with the projects and received a response from NRSP with supporting documentation. This indicated that the quality of the water in one of the schemes found to be non-sustainable in Sindh was poor because the water channel from the canal to the reservoir was unlined. One of the non-sustainable schemes in the Punjab was partly functional due to a delay in securing a three phase electric connection. These explanations are useful but we need to reiterate that criteria used by the field team in assessing sustainability were multi-faceted as earlier indicated in the conceptual section.
39. There was one exception for which the source was ground water.
40. In evaluating the comparative institutional analysis in this section, the reader needs to keep in mind that there were only five PHED schemes in the sample.
41. Training subjects included operations and maintenance, administration and finance, sanitation and hygiene education, organization and leadership and design and construction.
42. Of course one could expect little difference when the percentage scores were already very high such as is the case with over ninety percent of household respondents satisfied with PHED and NRSP schemes.
43. See Kish (1965, pp. 217-218) for other such justifications and also

for arguments concerning the statistical efficiency derived from such a sample design.

44. Indeterminate schemes are included in the sustainable scheme category to make a sharper distinction between non-sustainable schemes and the rest.

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## Appendix I

### Sampling

The sample design involved a random two-stage cluster sampling. In the first stage, 15 villages, in which the RWSSs were situated, were selected for the NRSP and IDA/LGRDD projects and 5 for the PHED/IDA project. To ensure global comparison, scheme/village selection was done on the basis of the following eligibility criteria:

1. Include communities with >15 HHs but < 2500 HHs;
2. Include only rural communities in the sample;
3. Include, if possible, new (not rehabilitated) schemes that were initiated in 1995 or earlier;

To ensure regional representation, NRSP scheme/villages were selected from Sindh (5/7), Punjab (5/15) and AJK (5/17). The numerator in the parentheses represents the number of villages selected and the denominator represents villages that met the above eligibility criteria. Five out of ten PHED/IDA schemes were selected in Sindh. All the LGRDD/IDA villages (15/30) were situated in AJK. The sampling frames for the selection were procured from the projects with the assistance of the Water and Sanitation Programme housed in the Resident World Bank Mission in Pakistan.

In principle, the clusters/villages in the first stage of the two-stage sampling process were to be selected with probability proportionate to size (PPS). This would allow a fixed sample of 15 households (HHs) in the second stage and still maintain the efficient equal probability of selection method (EPSEM) for all the hhs in the populations (project villages that met the eligibility criteria) we were sampling from, as will be duly explained.

There are various rationales for this sample design. The total sample of households in a village ( $x_i$ ) can be subject to large variations following purely random selection if the villages ( $X_i$ ) vary a great deal in size as they do in Pakistan. One reason to want to control the sub-sample size of households in the villages was that it became easier to make work-plans and administer the survey knowing roughly how much time the field teams needed for each village. This was necessary because project personnel needed to be informed in advance about the arrival of the field teams. Another reason for wanting a fixed sample of village hhs was to attain uniformity in the sample size of hhs across country for the cross country comparisons.<sup>42</sup>

The above reasoning can be presented more formally. In the first stage, the probability of selecting a village with  $N_i$  hhs (where  $N_i$  represents a selected village household population) is  $N_i/F_b$  (where  $F_b$  represents the zone size [explained below] for the relevant project household population,  $P$ ). At the second stage, we select a fixed sample,  $b$ , of hhs from the  $N_i$  hhs in the village i.e.  $b/N_i$ . Thus, this two stage sampling design ensures EPSEM as earlier stated:

$$N_i / F_b * b / N_i = 1/F = f$$

Systematic selection with a random start was utilized for the first stage selection of villages. Given the desired number of schemes for a project,  $a$ , in a region, the zone size  $F_b$  is computed as  $P / a$ . For example, for the NRSP project in AJK 20 villages met the eligibility criteria and 5 villages ( $a = 5$ ) were to be selected. Thus the zone size was  $759/5 = 152$ , where 759 represents the total population,  $P$ , of the eligible villages for a project. The villages household populations were stacked in a cumulative frequency distribution extending from 1 to 759. A random number ( $R_n$ ) was selected between 1 and 152 to identify the first scheme with the probability of  $N_i / F_b$  ( note the larger villages had a higher probability of selection). The other four schemes were selected

with the same probability as  $R_n + Fb$ ,  $R_n + 2Fb$ ,  $R_n + 3Fb$  and  $R_n + 4Fb$ .

Household populations were again provided for the selected villages by the projects. We again used systematic selection to choose 15 villages with probability  $b/N^n$ . Note that in this second stage the probability of selection of the hh from the larger villages was lower, exactly offsetting the higher probability of selection of the larger villages.

## Appendix II

### Project rules pertaining to communities

Project Rules	PHED	NRSP	LGRDD
Forming of water committee	U	U	U
Participation of community at all levels of Implementations	U	U	U
Handing over of the scheme to the community	U	U	U
O & M – responsibility of the community	U (Partially)	U	U
Labor be provided by the community	U	U	U
Cash contribution by the community		U	
Land provided by the community	U	U	U
No more project financial responsibility after the completion of the scheme		U	
Committee will open a bank account	U	U	
Maintenance of accounts by the committee	U	U	U
Promotion of drainage & sanitation facilities by the community	U		
Civil works done by the community		U	
Periodic meetings of the community			U

Source: Projects

## Appendix III

### Project responsibilities

Project Rules	NRSP	PHED	LGRDD
Project will form a CO/VDA/WSC	U	U	U
– will socially mobilize the community	U	U	U
– will sign TOP/MOU with the community	U	U	U
– will seek labor contribution from the community	U		U
– will seek in kind contribution from the community	U	U	U
– will conduct a feasibility study	U	U	U
– will design the scheme	U	U	U
– will provide technical and organizational assistance on fiscal and other planning and management issues	U	U	U
– will construct the scheme		U	
– will supervise construction	U	U	U
– will impart hygiene education	U	U	U
– will impart LMST* training to activists	U		
– will impart training in plumbing to the nominated community member(s)	U	U	U
– will rehabilitate the scheme by sharing up to 25% of the cost afterwards		U	
– will transfer the scheme in proper working condition and free of all liabilities		U	U
– will provide assistance for repairs including extension free of cost		U	
– will monitor the scheme after completion	U	U	U
– will run the operation and clear all financial and other responsibilities of the scheme		U	
– will pay energy charges up to 4 hour of daily pumping for 3 months after scheme hand over		U	

Source: Projects

\* = Leadership and management skills training.

## Appendix IV

### Comparative beneficiary and cost data for government and NGO schemes.

Project	Avg. No. of Beneficiaries		Scheme Avg. Total Cost		Per Beneficiary Cost		Avg. Project Cost as % to Total Cost	
	S	NS	S	NS	S	NS	S	NS
LGRDD	578	388	462,604.5	336164.7	800.0	866.4	*100	*100
NRSP								
Sind	239	438	83,821.6	129,909.0	360.7	296.9	69.4	68.1
Punjab	134	554	110,326.8	69,128.4	543.5	145.1	55.7	79.2
AJK	259	277	125,045.6	101,581.8	458.0	366.8	62.7	66.5
PHED	1,113	909	5,886,600.0	4,106,000.0	5,288.8	4517.1	*100	*100

Source: Projects

Notes:

S Data regarding the schemes included in the sample.

NS Data regarding the non-sample schemes.

\* There was some community contribution but these two projects did not quantify it and only the project contribution was taken into consideration.

## Appendix V.

### Case Study I.

**Scheme: Patthi Wala, Muzaffarabad, AJK**

**Project: LGRDD**

#### *Village Profile*

Patthi Wala is a small village with 61 widely dispersed households. However, only 8 households were not connected to the scheme. It is located at a distance of 40 Km (ninety minutes by bus) from the district headquarters which is also the nearest city. The majority of the households are engaged in labor and could be categorized as poor. The village contained a primary school for boys and girls and had electricity.

#### *Demand responsiveness*

This scheme was not delivered to the community based on an expressed need or demand. One version was that the delivery was based on bureaucratic bungling. Another version was that the chairman of town committee had good relations with the then Prime Minister, AJK and that the scheme was delivered as political patronage. A few notables did however make a cash contribution.

The village already had an LGRDD scheme which was functioning and few people even had house connections. Also, there were several private springs in the village. The community did not have prior knowledge about the scheme and were not given a choice about the level of service.

#### *Social mobilization*

One respondent mentioned that the community didn't know that a scheme had been sanctioned for the village. The day the pipes

reached the village, the chairman WSC informed the community that a scheme had been sanctioned for the village and if they helped in carrying pipes, the village would get water supply.

Since the community was not taken into confidence, nobody knew much about the scheme before its implementation. The chairman of the WSC and other village notables were influential in the decision making. Thus all the village notables had house connections while the rest of the population got water from the public stand posts.

The community neither had the ability nor the willingness to operate and maintain the system. The community had no managerial, financial or technical knowledge and, in fact, the majority of the respondents were unaware of the presence of a WSC in their village.

### *Sustainability*

The physical condition of the scheme was very bad. There were a number of storage tanks which were built by LGRD in the earlier scheme. For this scheme, the community constructed two storage tanks which every community is supposed to construct as a scheme requirement. However, the condition of these two tanks was very poor. One tank was destroyed by landslides and the other tank had big cracks. The main tank, damaged by landslide some months prior to the field team visit, had not been repaired. The community had resorted to direct supply from the source. There were a large number of leaks in the distribution network.

The quality of service was not satisfactory, and only the small segment of the community with house connections were satisfied.

## **Case Study II**

**Scheme: Androate, Rawalakot, AJK**

**Project: NRSP**

### *Village Profile*

Androate is a hilly area in district Rawalakot. It is located at a distance of 30 km from Rawalakot towards Mang along the metalled road leading to Rawalpindi, and a 3.5 km un-metalled road leads to the village. The village population is scattered over the hills. Small hamlets of about two to five houses cluster together. The residents generally work abroad and so remittances are an important source of income for the poor village population. Other than that, small terraced agricultural land is a source of livelihood. The village has access to electricity.

### *Demand responsiveness*

Due to the dispersed nature of the settlements, the scheme did not respond to the requirements of the whole community. The community actively contributed to the project in terms of cash and labour. Its cash contribution of Rs. 24,870 amounted to 37 percent of total project cost.

Consumers were given a choice regarding the level of service and they opted for house connections.

### *Social Mobilization*

The community was provided the relevant information concerning the scheme by the project. A community organization was formed and made responsible for decision making. The community was involved in the identification, planning and implementation of the scheme. The community revealed a sense of ownership and was well aware of its responsibilities for O & M.

### *Sustainability*

The main CO formed a water committee comprising of three persons and made them responsible for the operation and maintenance of the system. They have been appointed at each of three lines to monitor the system. The physical condition of the system is good.

The field team found that not all consumers were fully satisfied. Women especially complained about abrupt stoppage of water due to the opening of the taps at the houses located at the upper level. There is no valve system to control the supply.

There was a feeling that the source selection was influenced by the interests of some influential CO members. Community members felt that another source should be tapped by the existing scheme in order to extend supply to current non-users who are members of the CO. The community is willing to contribute for such an extension.

There is no tariff structure but the community takes collective action when any kind of repair is required.

## Appendix VI

### Comparative technical, community and household responses by scheme non-sustainability.<sup>43</sup>

Table VI.1: Comparative technical evaluation of WSS (technical)

	(percentages)					
	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Possibility of source contamination	0	47	53	13	20	40
Efforts taken for protecting source	40	13	27	0	20	0
Good quality construction	7	13	60	7	40	20
Defects in water catchments	7	20	7	0	40	20
Defects in masonry	13	7	13	0	20	20
Pipes exposed and leaking	27	33	0	7	20	40
Many stand posts leaking	13	13	13	7	0	20
Highly capable operators	13	13	13	0	20	0
Most of the scheme working	27	47	60	13	20	0

Source: Technical data sets

Table VI.2: Comparative community need and demand for WSS (community)

Project	(Percentage)					
	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Water identified as main need	20	47	40	13	60	20
Project provided information on cost of alternative options	20	7	40	0	20	0
Aware of scheme cost	7	13	67	13	60	40
Community made the final decision about type of RWSS	0	0	73	7	40	20
Mean cash contribution	1371.4	1078.6	1051.0	2066.7	0	700.0
	(7)	(7)	(11)	(3)		(1)
Paying tariff	13	13	20	7	60	40

Source: Community data sets.

Note: Parentheses contain the number of communities who reported a cash contribution.

**Table VI.3:** Comparative household need and demand for WSS (household)

Project	(percentage)					
	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
HHs spending more than 15 mins. To collect water before WSS	40	44	43	15	48	21
Water identified as main need	43	52	61	17	57	37
Project provided information on cost of alternative options	4	4	32	8	9	17
Aware of scheme cost	2	0	28	5	20	12
Community made the final decision about type of RWSS	11	16	41	10	32	31
Mean cash contribution	1438.3	1260.4	1350.7	2826.1	0	683
	(72)	(86)	(93)	(23)		(9)
Paying tariff	47	53	80	20	60	40
Willing to pay for improvements	14	18	29	8	9	13

*Source:* Household data sets

*Note:* Parentheses contain the number of households who reported a cash contribution.

**Table VI.4:** Comparative social mobilization: awareness, decision making and training (community) (percentage)

Project	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Awareness of project rules	7	0	33	7	40	0
Aware of O & M responsibilities	33	20	67	20	60	20
Built WSS themselves	40	47	80	20	0	0
Felt community owned scheme	33	33	60	20	60	40
Trained (Nos.)	13	0	47	13	0	0
Considered training useful	13	0	40	13	20	0

*Source:* Community data sets

*Table VI.5.* Comparative social mobilization: awareness, decision making and training (Household)  
(percentage)

Project	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Awareness of project rules	8	7	29	2	8	8
Aware of O & M responsibilities	29	31	55	12	51	36
Felt community owned scheme	11	16	46	10	45	32
Trained (Nos.)	4	2	9	1	12	12
Considered training sufficient	3	2	5	0	8	7

*Source:* Household data sets.

*Table VI.6:* Comparative perceptions of performance and sustainability (Community)

Project	(percentage)					
	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Rating the RWSS as good	47	33	67	13	60	20
Cited existence of mal-practices	0	7	7	7	0	0
Viewing community as a source of funds for major repair	20	20	47	20	40	20
Felt community had financial capacity to keep scheme operational for 10 years	47	53	80	20	60	40
Felt community had the funds to replace scheme when necessary	0	7	13	13	0	0

*Source:* Community data sets.

*Table VI.7:* Comparative perceptions of performance and sustainability (Household)

Project	(percentage)					
	LGRDD		NRSP		PHED	
	S	NS	S	NS	S	NS
Satisfied with WSS management	32	32	71	17	57	40
Rating the RWSS as good	38	37	52	14	52	35
Viewing the RWSS as unreliable	3	5	8	0	0	1
Cited existence of mal-practices	7	11	3	4	0	1
Viewing community as a source of funds for major repair	28	37	37	10	21	25
Felt community had financial capacity to keep scheme operational for 10 years	37	39	60	14	56	39
Felt community had the funds to replace scheme when necessary	4	5	18	4	11	9

*Source:* Household data sets.

## Appendix VII

### Construction of Indices used for Multivariate Analysis

The three main indices utilized and the variables used to construct the indices are as follows:

#### Index of Sustainability (SS)

1. Physical condition
2. Consumer satisfaction
3. Operations and maintenance
4. Overall ranking of sustainability

#### Index of Demand Responsiveness (DR)

1. Project initiation
2. Contribution - cash
3. Willingness to maintain the system

#### Index of Social Mobilisation (SM)

1. Informed choice
2. Consumer satisfaction
3. Financial management

### Scoring Method

There are four types of questions in the survey:

**Yes/No questions:** Score is +2 if the answer contributes positively towards the indicator and 0 otherwise.

**Ordinal Ranking Questions:** If the answer indicated positive performance in that indicator category, it was given a score of +2. If the answer indicated neither positive nor negative

performance, it was assigned a score of +1 and if it did not contribute, it was given a score of 0.

**Multiple Choice Questions:** In some cases, multiple choice questions were used. Scoring of these can be explained with help of an example.

H18 Whose idea was it to build the project?

The answer was scored as follows:

- +2 water committee, neighbour, or community leaders
- +1 local government
- 0 project

In the regression analysis, we have used mean values for education (EDU) and training respectively.

EDU is defined as the mean level of education in the community across the household. We have given scores as follows:

- 0 if the person did not go to school
- 3 if the person attended primary school
- 5 if the person completed primary school
- 7 if the person attended secondary school
- 8 if the person completed secondary school
- 12 if the person attended college
- 14 if the person completed college
- 16 if the person studied beyond college

Training is defined as the mean household perception concerning the value of training and it has been given scores as follows:

- 2 if the person feels that training was useful
- 1 if the person feels that training was fair
- 0 if the person feels that training was useless/incomprehensible