

April 2014

Tracking Adaptation and Measuring Development (TAMD) in Pakistan

Institute for Social and Environmental Transition (I-SET)

Q4 Report - Feasibility Testing Phase

Pakistan Case Study: Rainwater Harvesting in Kashmir and Khyber Pakhtunkhwa

Tracking Adaptation and Measuring Development (TAMD) Feasibility Testing Phase - Quarter 4



Institute for Social and Environmental Transition (ISET) Pakistan

ACRONYMS

AJK	Azad Jammu and Kashmir
CEECC	Centre for Environmental Economics and Climate Change
CMTs	Construction Monitoring Teams
DRUs	District Reconstruction Units
DRAC	District Reconstruction Advisory Committee
ERRA	Earthquake Reconstruction & Rehabilitation Authority
EMEF	Earthquake Monitoring and Evaluation Framework
EMAC	ERRA Monitoring and Evaluation Advisory Committee
GCISC	Global Change Impact Study Centre
IUCN	International Union for Conservation of Nature
IIED	International Institute for Environment and Development
KP	Khyber Pakhtunkhwa
KAP	Knowledge, Attitude, Practice
MDAs	Ministries, Departments & Agencies
M&E	Monitoring and Evaluation
PC	Planning Commission
PIDE	Pakistan Institute of Development Economics
PMD	Pakistan Meteorological Department
PRWH	Promotion of Rain Water Harvesting
PSDP	Public Sector Development Programme
PERRA	Provincial Earthquake Reconstruction and Rehabilitation Authority
SERRA	State Earthquake Reconstruction and Rehabilitation Authority
SSTs	Social Survey Teams
TAMD	Tracking Adaptation and Measuring Development
ToC	Theory of Change
UCs	Union Councils
UNDP	United Nation Development Programme
WatSan	Water and Sanitation

TABLE OF CONTENTS

1. INTRODUCTION	4
1.1 Level of TAMD application.....	4
1.2 Progress of planned activities	4
2. STAKEHOLDER ANALYSIS/KEY ENTRY POINTS.....	5
3. THEORY OF CHANGE	5
4. INDICATORS DEVELOPMENT	6
5. DATA AND METHODOLOGY.....	7
5.1 Data	7
5.2 Methodology	7
6. CHALLENGES.....	8
7. EMERGING LESSONS.....	8
8. CONCLUSIONS.....	9
ANNEXTURE.....	10
ANNEX-1 ERRRA Meeting Minutes H.Q. Islamabad	10
ANNEX-2 Agenda, Notes of the Meeting, Participants' list	12
ANNEX-3 PRWH Preliminary Findings	15

1. INTRODUCTION

1.1 Level of TAMD application

The subject quarterly report covers the project activities implemented between December 2013 to March 2014. Currently, TAMD framework is being tested on ERRA's project entitled 'Promotion of Rain Water Harvesting (PRWH) Project'. The PRWH project, as a climate change adaptation intervention was selected from the portfolio of Public Sector Projects. Process of testing the TAMD on PRWH was initiated in first quarter of the TAMD. Since then a number of activities were undertaken to meet the project's objectives.

Some of the main activities include engagements with ERRA to workout implementation arrangements for testing the PRWH Project, selection and scoping of research sites, development of indicators, planning and designing of field research, data collection and entry, analysis and sharing of preliminary findings with relevant entities ([see Annexure](#)). The progress, during this quarter, may be synthesized as follows:

1.2 Progress of planned activities

In order to establish the TAMD framework's Theory of Change (TOC), impact of the PRWH, in terms of changes in socioeconomic conditions, has been analyzed based on the household primary data collected from project sites. The data was collected in the last quarter and was based on socioeconomic indicators developed with the consultations of PRWH stakeholders in last quarter (details in QPR-3). The collected data was analysed to examine the contribution of the PRWH towards the economic wellbeing of the beneficiaries' households.

As part of shared learning dialogue process, the preliminary analysis and the research findings were shared with the stakeholders of TAMD and PRWH, namely TAMD Consultative Group in Climate Change Division and Technical Advisory Group of PRWH at ERRA. The consultations were meant to elicit feedback on the research findings and further refine the methodology of TAMD framework. While the research findings were appreciated by the stakeholders, they gave their feedback in terms of comments and suggestions for effective application of TAMD framework in Pakistan ([see Annex-I, II](#)). The Research revealed that there is significant impact of the technology in terms of socioeconomic resilience of the communities. Especially, it has impacted the livelihood portfolio, water and sanitation, workload, and children education.

2. STAKEHOLDER ANALYSIS/KEY ENTRY POINTS

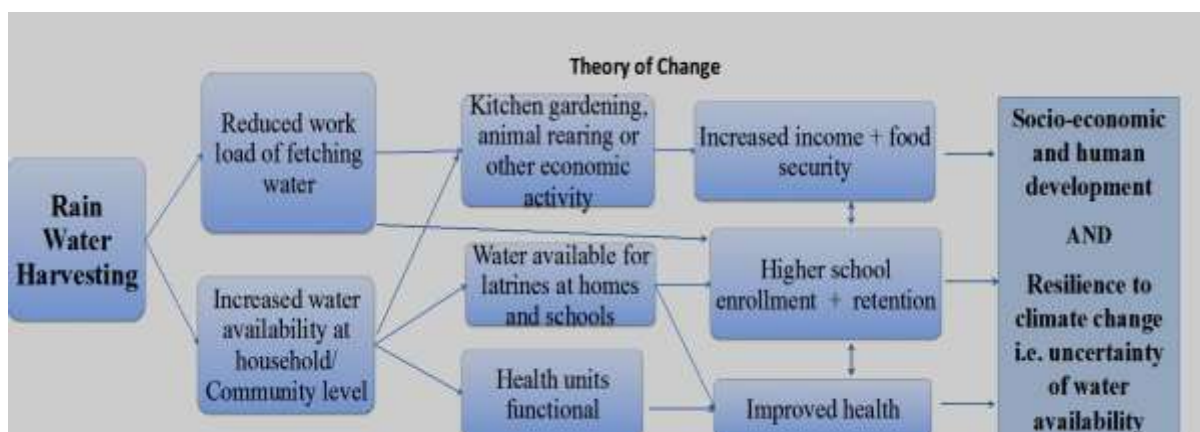
TAMD framework's stakeholders comprise three levels: national, sub-national (provincial and state) level, and local level (details in QPR-3). During scoping and study plan, national level stakeholders were involved, but later in second quarter of the project sub-national and local stakeholders were also engaged in consultations. In order to institutionalize the TAMD in the development planning and policies, government departments, particularly Planning Commission and Climate Change Division have been focused.

There is, gradually, a greater ownership towards the TAMD framework, resulting from active involvement of these stakeholders in different stages of implementation, which include the initial project screening, review, and discussion. Following the selection of PRWH project for testing the TAMD framework, consultations were organised with the Technical Advisory Group of the PRWH Project to devise the mechanisms for PRWH evaluation. The Technical Advisory Group also includes the members from the Planning Commission and Climate Change Division. Further to this, ERRRA's implementation agencies in AJK and KPK were also involved for facilitating field research in terms of putting in touch with the local NGOs and communities. Shared learning dialogues were also held at this level to elicit their views and further validate and refine the Theory of Change.

In this iteration of shared learning process, the TAMD Consultative Group, headed by the Climate Change Division was expanded by co-opting representatives from academic institutions and leading civil society members involved in climate change and environmental issues.

3. THEORY OF CHANGE

The PRWH is an initiative to augment the water supply in far-flung areas, where sanitation and hygiene, children education, household income, and livelihood depend on water. Through reduced water fetching time, increased water availability in dwelling units and schools, and improved agriculture and livestock output the intervention contributes to socio-economic development and also addresses water scarcity that is likely to worsen with changing weather patterns as a result of climate change (details in QPR-3). With reference to PRWH Project, the ToC was defined in terms of socioeconomic resilience of the communities, which was supposed to help them in adapting to climate change. Following is the TOC flow chart, evolved and developed during consultations processes (details in QPR-3) and tested in this quarter.



Initially a long list of outcome and impact indicators was prepared and discussed with the Technical Advisory Group, and subsequently narrowed down to more specific socioeconomic impacts indicators. The ToC has been tested using primary data against the hypothetical relationship of its different variables, presented in the flow chart. Findings of the research revealed that there is a strong relationship between rainwater and socioeconomic resilience and wellbeing of the beneficiary communities.

The results specifically exposed that livelihood of the households have increased significantly in terms of kitchen gardening and increased animal husbandry after the PRWH intervention (details at Annex-3). It augments their food and income generation activities, which would also diversify their livelihood sources. Increased water availability at household level has improved the sanitation and hygiene of household through reduced open defecation and increased frequency of shower.

Consequently this has reduced the incidence of disease and the average medical cost of the households. Through this initiative, water has been made available to community buildings such as school and health centres, which started working more effectively. The reduced water fetching and subsequent time saving has spared the women and school-going girls, which have positive effects on education of the children in terms of attendance and better up-bringing of children.

4. INDICATORS DEVELOPMENT

In the last quarter, a special consultation was carried out with the Technical Advisory Group of the Project in ERRa to discuss and finalize the proposed Track-II indicators (details in QPR-3). Prior to that, indicators were culled from the existing studies and relevant documents on PRWH.

Besides, ERRA's WatSan section also gave their inputs. A set of indicators was then discussed with the national, sub-national, and local stakeholders of the PRWH Project. The stakeholders were directly or indirectly involved in implementation of the PRWH Project and hence aware of the intended and unintended impacts of the intervention.

In-depth discussions and consultations with stakeholders followed and key indicators were finalized. Most of the indicators, finalized by the stakeholder, worked well and helped greatly in testing the Theory of Change as shown above and proving the logic behind the socio-economic impacts for testing the TAMD framework. Now, with the completion of this test stage, not all indicators need to be gathered and only between three to five indicators for socio-economic improvement will suffice to measure the adaptation impact of the intervention.

Track I indicators were tested in the first quarter of the testing phase. Both the list of indicators and the situation on the ground regarding policy and institutional setup have evolved ever since. Therefore, we will revisit and update the Track I indicators.

5. DATA AND METHODOLOGY

5.1 Data

The data and information gathered during the field research includes both quantitative and qualitative aspects. The quantitative data was collected through the questionnaire, while qualitative information was gathered in the form of key informants' interviews, focused group discussions, and shared learning dialogue (details in QPR-3.)

5.2 Methodology

The shared learning process and descriptive analysis approach has been used to study the socioeconomic resilience of the beneficiary communities qualitatively. For quantitative analysis 'difference in difference' technique was adopted to assess the impacts. Through this method we do not just measure the difference between the treated and the control group but rather compare the difference in socio-economic development of both over the project period. Since this project was part of ERRAs reconstruction program the project areas had multiple projects implemented in the same place in various sectors.

Therefore, in order to examine the difference made by PRWH in building the socioeconomic resilience of the communities, it was necessary to adopt a method that could determine the attribution of the socio-economic by excluding the impact of the other projects and socio-

economic factors. The downside of this approach, specifically in this case is that being a promotional project some of the impacts were also made on the non-treated population but we eliminated them as exogenous and actually under-estimated the full impact of the intervention. Finally, in order to check the robustness of the results, findings of the descriptive analysis were tested for statistical significance ([see Annex-III](#))

6. CHALLENGES

Separation of impacts and attribution was a challenge that has been discussed above but also leads to elimination of the promotional impact. We are devising a simple method to document adoption outside the treated group.

As discussed in earlier assessments and reports, neither the public sector statistics nor the project M&E records the indicators that are needed to determine the socio-economic impact as determined by the theory of change. Therefore, a stand-alone survey process was required to prove the theory of change and develop the indicators. The testing of theory of change has not allowed us to choose a few robust indicators to evaluate the interventions impact as and where needed. Therefore the level of effort involved in evaluation has been kept to a minimum.

As climate change spans all sectors, coordination among different arms of government is a difficult task. Through the TAMD Consultative Group and the Technical Advisory Group, comprising representatives from relevant key institutions, we have tried to keep most of the stakeholders on board for their ownership and to facilitate mainstreaming of TAMD. The Multi-Country Meeting (MCM) in Kenya will be a good opportunity for the counterparts to further strengthen this cross-sectoral coordination

7. EMERGING LESSONS

TAMD framework is a unique evaluative technique to influence the planning and policy process through applied research on monitoring mechanisms. The TAMD exercise has afforded few important lessons regarding the policy and planning research. In order to conduct the applied and policy research (e.g. TAMD testing) in Pakistan, secondary data may not be readily available, and as a result, relevant data can be collected from primary sources. Climate change is relatively a new subject in Pakistan and therefore, evaluation of adaptation projects and programmes cost effectively is completely at nascent stage.

We have learnt that the policy makers appreciate the simple and easy research methods, so that they can understand them better as opposed to sophisticated empirical modelling exercises. Moreover, for institutionalization of any research, it is very important to keep the key government officials and departments on-board so that they own the final product. TAMD framework can be used within the M&E systems of Pakistan; however, some specialised expertise may be needed for designing the TAMD framework within the program design.

8. CONCLUSIONS

TAMD framework has already been tested in Pakistan on PRWH project and process of testing the TAMD has revealed that this new policy tool can be very useful if applied thoroughly and carefully. In order to further firm up the framework, a second adaptation related project would be taken up for another test during the current quarter. There may be the need of capacity building of government staff to develop their technical expertise to use TAMD as a policy and planning tool. Now there should be more focus on the institutionalization of the TAMD, so that it can be integrated into national M&E systems.

ANNEXTURE

ANNEX-1ERRA Meeting Minutes H.Q. Islamabad

File No: 21-21(87)/2013/ERRA/WatSan/PRWHP

Date: 28-01-2014

To:

Technical Advisory Group

1. Mr.Irfan Tariq, DG (Climate Change), Ministry of Climate Change, Go Pakistan
2. Mr.Shahid Sohail, Director General (Services), CDA
3. Chief Engineer, PHED, Government of KPK
4. Director General (LG&RD), Government of AJK
5. Dr. A. D Khan, Director, Pakistan Council for Research on Water Resources
6. Mr. Hamid Mumtaz, UN-HABITAT; Pakistan
7. General Manager (DRM), NESPAK Office, Islamabad

Service Providers / Project Managers (PRWHP)

1. Project Manager (RWH), AFB, Muzaffarabad
2. Project Manager (RWH), MWF, Bagh
3. Project Manager (RWH), NHSD, Islamabad
4. Project Manager (RWH), SUKHI, Islamabad
5. Project Manager (RWH), WWOP, Poonch

Subject: Meeting on 04-02-2014 at 1130 Hours Regarding Indicators for Tracking Adaptation and Measuring Development (TMAD)

Respected Messer!

A meeting will be held on 2nd February 2014 (Tuesday) at 11:30 AM in the Conference Room at ERRA Headquarters, Islamabad. The Agenda of subject meeting is to review and decide the Indicators for Tracking Climate Change's Adaptation and Measuring Development (TAMD), as finalized by the IEED in pursuance to the decisions taken in the last meeting held on 20th September 2013. The respected Members of ERRA-WatSan Technical Advisory Group and the Service Providers of Promotion of Rain Water Harvesting Project are requested to kindly attend the meeting, please.

Mr. Bilal Usman, Office Manager-WatSan

CC. Mr. Syed Zaheer Hussain Gardezi,
DG (WatSan) / PC (PRWHP),
ERRA, Islamabad

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MINUTES OF THE MEETING

Subject: Minutes of Meeting held on 04 February 2014 at 11:30 Hrs in ERRA HQ, Islamabad, regarding Indicator for Tracking Adaptation and Measuring Development (TAMD).

On 04 February 2014 at 11:30 A.M, a meeting was held under Chairmanship of Syed Zaheer Hussain Gardezi, Project Coordinator, Promotion of Rain Water Harvesting Project at Auditorium, ERRA HQ, Islamabad. The list of Participants is as Annexure-1. The agenda of meeting was to share initial results of Field Survey Conducted by ISET regarding Indicators for Tracking Climate Change's Adaptation & Measuring Development in pursuance to the decisions taken in last meeting held on 20th September 2013.

The Chairman welcomed the Participants and thereafter the scope and latest implementation status

of PRWHP was briefed, with reference to determining the indicators to assess climate change adaptation and development effects. The Senior Associate, ISET gave a comprehensive presentation on the framework for assessing climate adaptation and development effects (TAMD). He informed that after meeting cum-workshop held on 20th September 2013 the ISET has conducted a comprehensive Field Survey in 2 Union Council of AJK and KPK. The Survey design / sample was based on a list of change-indicators, including the following with reference to impact of RWI-1 Project carried out by ERRA-WatSan.

Time Saving in fetching of Water from distant springs / streams
Girls Education enhancement viz absenteeism
Increase in kitchen gardening
Livestock holdings and yield
Sanitations: Open defecation and Toilets
Hygiene and shower frequency
Health-improvement/medical cost-reduction/water-fetching women illness
Mr. Fawad Khan circulated a RWH Socioeconomic Impact

Assessment Questionnaire among all participants along-with a briefing to indicate the socioeconomic benefit of Rain Water Harvesting with reference to the climate change adaptations practices. The Questionnaire has been formulated based on the above discussed Field Survey since conducted by the ISET, and the logical links found to easily determining the linkages of above listed 7 parameters, which indicate the changes happened in the family members after installation of RW1I systems. I-le informed that the ISET would undertake further work to firstly check the statistical testing of field survey data being tabulated; and will than identify all survey parameters in 3-5 variables, in order to revised the Track-1 Indicators; and would accordingly submit the results in Final Report on Evaluative Framework of TAMD, before the Consultative Group.

Thereafter, the Chairman invited comments from the House. The KPK-PIED Representatives called for reviewing existing water supply standards, keeping in view the high capital cost and ever increasing O&M charges of operating WS schemes. The Representative from Ministry of Climate Change recommended the adaptation of 1-lygiene Indicator including Hand Washing and Water Quality; develop new projects of RWH for whole country, and include construction of RWI-1 systems in Building Codes. The AFB Project Manager suggested that to take full benefit of RWH with reference to Climate Change, entire 100% Houses in Earthquake Affected Areas be supplied with RWH system.

Mr. Fawad Khan replied that the cost effectiveness of water supply schemes against the RW1-I schemes is being reviewed by the ISET through examining the project PC-Is/Documents, and the water use for human consumption and other domestic needs. The water quality issue including Hand Washing would be covered through the Survey Data pertaining to open defecation and toilets (if time available), etc. The Provincial Coordinator informed that the RW11 concept has been included in the Future Development Programmes of Galliyat Development Authority and in this connection, a Pilot Project Proposal has been recently approved by their Board.

The Chairman stated that Rain Water is the purest form of nature gifted to the mankind, but is misperceived unfit for human drinking. This aspect of good quality of Rain Water needs to be highlighted at all levels. The future water supply schemes should be designed on the demand/ need of human drinking, only; while the RW11 schemes design should promote use of indigenous materials and technology. I le supported the idea of including RWH as mandatory requirement of future Building Codes and Regulations, throughout Pakistan. Regarding Hand Washing proposal, the meeting was informed that ERRA WatSan has already implemented a program named WAQIPI-I (Water Quality Improvement and Promotion of Hygiene), wherein this issue has been addressed at large. However, to address the water quality issue of rain water, a project proposal has been submitted to the P&D Division to implement next phase of ongoing pilot PRWH Project. Its scope includes installation of low cost Rain Water Filters, to be fitted with the already installed RW11 systems.

The meeting ended with a note of thanks from the Chair.

ANNEX-2 AGENDA, NOTES OF THE MEETING, PARTICIPANTS' LIST

TAMD CONSULTATION MEETING TUESDAY, FEBRUARY 25, 2014, MARRIOT, ISLAMABAD

TIME	TOPIC	SPEAKER
10.30	Reception and Registration	
11.00	Welcome Address	MR. RAJA HASAN ABBAS, SECRETARY CLIMATE CHANGE DIVISION
11.15	The TAMD initiative – concepts, objectives and design, progress in other countries	DR. SIMON ANDERSON, HEAD OF CLIMATE CHANGE GROUP, IIED, UK
11.45	Questions/Answers (Discussion)	
12.00	Application of TAMD Framework in Pakistan: Research Findings	MR. FAWAD KHAN, SENIOR ASSOCIATE, ISET- PK
12.30	Questions/Answers (Discussion)	
01.00	Options for Second TAMD Prototype in Pakistan	MR. FAWAD KHAN, SENIOR ASSOCIATE, ISET- PK
01.30	Discussion and Way Forward	
01.45	Conclusion and Vote of Thanks	MR. IRFAN TARIQ, DG, CLIMATE CHANGE DIVISION
02.00	Lunch	

Notes of Consultation Meeting

TAMD Consultation Meeting was held on 25 February 2014 in Hotel Marriott, Islamabad. The agenda of the meeting include sharing of the preliminary results of the TAMD research, update on TAMD implementation in other countries, and way forward in terms of selection of second project for TAMD testing. Altogether 45 participants turned up, which include representatives from ministries and departments, NGOs, INGOs, the UN and universities. The Secretary, Climate Change Division, Mr. Raja Hassan Abbas chaired the session.

The Secretary, Climate Change Division, Mr. Raja Hassan Abbas delivered the welcome address. In his address, he highlighted the critical importance of technical support from international community to manage climate risks. He lauded the efforts of IIED in extending support to Government institutions for management of climate risk, particularly the TAMD evaluative framework, which will serve to identify cost-effective adaptation interventions and would help prioritize replication of such interventions at scale. He proposed that, in order to mainstream this evaluation tool, Planning Commission, which is the most appropriate forum, should be taken on board. He reiterated that Climate Change Division will continue o collaborate with IIED.

Dr. Simon Andersen, Head of Climate Change, IIED, made presentation on the relevance, importance and significance of TAMD framework in overall context of climate change adaptation discourse. He also apprised the participants about the implementation and experience of TAMD framework in other four pilot countries, namely Mozambique, Ghana, Nepal and Kenya.

Mr. Fawad Khan, Senior Associate, ISET-PK and the Lead Researcher in the TAMD Project, made the presentation on the initial findings of the research carried out to establish the Theory of Change and testing of TAMD over the ERRAs Rooftop Water Harvesting Project. He elaborated the process and methodology deployed to conduct the research as well as the difficulties in accessing and availability of data. As secondary data was not available, research from primary sources had to be carried out and a set of key indicators, in consultation with major stakeholder, was set. He shared the preliminary research findings, summarized as follows:

- Livelihood of the households have increased significantly in terms of kitchen-gardening and animal rearing and as a result increased their food and income generation as well as diversify their livelihood sources.
- Increased availability of water at the household level has improved the hygiene and sanitation of the households through reduced open defecation and more showers. And as a result, reduced the incidence of disease and cost of medical treatment.
- Timesaving, due to reduced water-fetching has spared the women and school going girls with positive effects on school better attendance and enrolment.

Towards the end, a brainstorming session held to select the second adaptation related project to test the TAMD framework. Mr. Fawad Khan presented a set of projects, selected from PSDP, as could be taken for the second round of testing. The participants suggested various relevant projects including GLOF, SLMP and RADP. There was, however, consensus that further spadework needed to be done, if these projects have the required data and the requisite timeline to conduct the test.

On behalf of Climate Change Division, Mr. Syed Nasir Mehmood, IG, Forest, summarized the proceedings and thanked the participants for their active involvement and the resource persons for their meaningful presentations.

TAMD Consultation Participants List

S.No.	Name	Designation	Organization
1	Mr. Raja Hassan Abbas	Secretary	Climate Change Division
2	Irfan Tariq	Director General	Climate Change Division
3	Syed Mujtaba Hussain	Deputy Secretary	Climate Change Division
4	Hamid Marwat	Chief Environment	Planning & Development Division
5	Sajjad Haider	Deputy Secretary	Climate Change Division
6	Dr. Qamr Zaman	Sr. Advisor Climate Change	LEAD Pakistan
7	Javed Ali Khan	Consultant	Un-Habitat
8	Dr. Munir Shiekh	Head, Climatologist	Global Change Impact Study Centre
9	Dr. Mohsin Iqbal	Head, Agriculture	Global Change Impact Study Centre
10	Brita P.	Country Director	Henrich Boll Stifting
11	Abdul Qadir Abbas	Consultant	Centre MDC
12	Dr. Yameen	Chief Executive	Management & Development
13	Prof. M. Iqbal Khan	Consultant	UNDP Pakistan
14	Ghulam Ali	Food & Livelihood Sp.	Save the Children
15	Rehmat Karim	Head of MER	SPO
16	Engr. Zafar Iqbal	Senior Engineer	Federal Flood Commission
17	Dost Muhammad	Internee	GLOF Pakistan
18	Khan Tasadduq	CDM Officer	CDM Cell
19	Nishat Kazmi		HBS Pakistan
20	DR. Bashir Ahmed	PSO/PL	PARC
21	Ayub Qutab	ED	PIEDAR
22	Hina Lotia	Director Programmes	LEAD Pakistan
23	Iftikhar Ahmed		DFID Pakistan
24	Dina Khan		CKDN/LEAD
25	Dr. M. Kamran	Professor	Hamdard University
26	Dr. Usman Mustafa	Chief	PIDE
27	Mazhar Hayat	Section Officer	Climate Change Division
28	Khalil Ahmed	NPM	GLOF Project
29	Ibrahim Khan	Chairman	DRMC
30	Hameed-ur-Rehman	GS	DRMC

31	S.Naveed Shah	Internee	GLOF
32	ZaheerGardezi	DG WatSan	ERRA
33	ShomailJameel	F&A Officer	ISET-PK
34	Ajaz Ahmed	Environmental Economist	ISET-PK
35	Javeria	Manager CC	Oxfam
36	Waqar Ali	Student	QAU
37	SaimaYounas	Student	PIDE
38	Sana Hussain	National Wash Coordinator	Climate Change Division
39	AnumQayyum	Student	QAU
40	Sara Umer	Student	QAU
41	RamlaToor	Student	QAU
42	Maryam Mehboob	Student	QAU
43	M. Wasim Khan	Student	QAU
44	Allah Dino	Student	QAU

ANNEX-3 PRWH Preliminary Findings

Testing TOC for PRWH

1. Increased water availability

Household Per Day Water Usage (litres) (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	115	175	60
Control	192	160**	-32
Difference	-77	15	28
Household Per Day Water Usage (litres) (Nathigali)			
Treated	142	177	35
Control	98	118	20
Difference	44	59	15

**Few households which have less distance from water source reported more water usage for sanitation which were excluded as outliers

2. Reduced workload of water fetching

Water Fetching Time* (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	180	60	-120
Control	120	162	42
Difference in difference	60	-102	-162
Water Fetching Time * (Nathigali)			
Treated	102	60	-42
Control	120	138	18
Difference	-18	-78	-60

*Per day average water fetching time (mins) of each household

School Going Girls in Water Fetching * (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	1.8	0.8	-1
Control	1.2	1.8	0.6
Difference in difference	0.6	-1	-1.6
School Going Girls in Water Fetching * (Nathigali)			
Treated	1.5	1	-0.5
Control	1.2	1.4	0.2
Difference in difference	0.3	-0.4	-0.7

*No. of school going age girls involved in water fetching

3. Kitchen gardening

Percentage Of Households Doing Kitchen Gardening (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	12%	35%	23%
Control	45%	41%	-4%
Difference in difference	-33%	-6%	27%
Percentage Of Households Doing Kitchen Gardening (Nathiagali)			
Treated	21%	21%	0
Control	30%	30%	0
Difference in difference	-9%	-9%	0

4. Kitchen gardening saving

Per Month Average Saving (Rs.) (Bagh)			

Groups	Before RWH	After RWH	Difference
Treated	458	1525	1067
Control	2080	1630	-450
Difference in difference	-1622	-105	1,517
Per Month Average Saving (Rs.) (Nathiagali)			
Treated	1016	1133	117
Control	1957	1957	0
Difference in difference	-941	-824	117

5. Livestock holding

Average No. Of Cattle Per Household (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	2	3	1
Control	1	0.8	-0.2
Difference in difference	1	2.2	1.2
Average No. Of Cattle Per Household (Nathiagali)			
Treated	0.4	0.6	0.2
Control	1.1	0.7	-0.4
Difference in difference	-0.7	-0.1	0.6

6. Livestock yields

Monthly Average Value (Rs.) of Livestock Yields (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	783	1798	1015
Control	1493	1329	-164
Difference in difference	-710	469	1179
Monthly Average Value (Rs.) of Livestock Yields (Nathiagali)			
Treated	750	1292	542
Control	2227	909	-1318
Difference in difference	-1477	383	1860

7. Livelihood (Monetary value of agriculture + kitchen gardening)

Monthly Livelihood Value (Rs.) (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	1241	3323	2082
Control	3573	2959	-614
Difference in difference	-2332	364	2696
Monthly Livelihood Value (Rs.) (Abbotabad)			
Treated	1766	2425	659
Control	4184	2866	-1318
Difference in difference	-2418	-441	1977

8. Sanitation

Open Defecation (Bagh)			
Groups	Before RWH	After RWH	Difference/Change
Treated	57%	3%	-95%
Control	55%	21%	-62%
Difference in difference	3.6%	-85.7%	53%
Open Defecation (Nathiagali)			
Treated	9%	3%	-66%
Control	29%	5%	-83%
Difference in difference	-68%	-40%	41%

Lack of Functional Toilet (Bagh)			
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Groups	Before RWH	After RWH	Difference
Treated	74%	11%	-63%
Control	85%	42%	-43%
Difference in difference	-11%	-31%	-20%
Lack of Functional Toilet (Nathiagali)			
Treated	15%	3%	-12%
Control	49%	23%	-26%
Difference in difference	-34%	-20%	14%

9. Hygiene

Average Frequency of Shower (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	2	3	1
Control	2	2	0
Difference in difference	0	1	1
Average Frequency of Shower (Nathigali)			
Treated	2	3	1
Control	1.7	2	0.3
Difference in difference	0.3	1	0.7

* Average no. of time a person takes shower in a week

10. Health Improvement

Per month medical cost of the whole household(Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	2158	1316	-842
Control	1860	3327	1467
Difference in difference	298	-2011	-2309
Per month medical cost of the whole household(Nathigali)			
Treated	3191	1865	-1326
Control	3414	4800	1386
Difference in difference	-223	-2935	-2712

Per month frequency of illness in water fetching women* (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	3	1	-2
Control	4	5	1
Difference in difference	-1	-4	-3
Per month frequency of illness in water fetching women* (Nathigali)			
Treated	5	3	-2
Control	6	7	1
Difference in difference	-1	-4	-3

* Per month frequency of illness in water fetching women due to WF diseases e.g. muscular spasm, backache, and headache

11. Children Attendance

Children Absenteeism * (Bagh)			
Groups	Before RWH	After RWH	Difference
Treated	1.5	0.2	-1.3
Control	1.4	1.6	0.2
Difference in difference	0.1	-1.4	-1.5
Children Absenteeism (Nathiagali)			
Treated	1.4	0.4	-1
Control	1.1	1.2	0.1
Difference in difference	0.3	-0.8	-1.1

* No. of days children of school going age remain absent from school due to water fetching in a month per child

Statistical Testing Using Mann-Whitney and Chi-Square Tests

Bagh Site					
Variable	Chi-Square Test	2-tailed Value	Mann-Whitney Test	2-tailed Value	Significance
Livelihood	214.514	0.000	287.500	0.000	99.9%
Medical Cost	58.143	0.000	43.500	0.000	99.9%
Girls School Attendance	79.800	0.000	248.000	0.000	99.9%
Water Fetching Time	133.657	0.000	371.500	0.002	95%
Total Water Usage	7.543	1.000	514.500	0.250	No
Abbotabad Site					
Livelihood	295.143	0.000	336.000	0.000	99.9%
Medical Cost	75.200	0.000	38.500	0.000	99.9%
Girls School Attendance	106.400	0.000	511.500	0.015	95%
Water Fetching Time	128.629	0.000	245.500	0.000	99.9%
Total Water Usage	70.400	0.003	510.500	0.230	95%



Project materials

Climate Change

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