

# Post Disaster Water and Sanitation Challenges in Earthquake Affected Areas (EQAAs) and Government's Response

By:

S. Zaheer Hussain Gardezi

Director WatSan – ERRA

&

Khadija Khan

Chief Knowledge Mangt. Cell-ERRA



# October 8, 2005 Earthquake

- A massive earthquake measuring 7.6 at the Richter scale struck Pakistan on October 8, 2005 that caused huge loss to life and devastated, in a spur of a moment, total physical infrastructure in ten districts, five in the State of Azad and Jammu Kashmir (AJK) and five in North West Frontier Province of Pakistan.
- These include Neelum, Muzaffarabad, Bagh, Poonch and Sudhnoti districts in AJK and Abbottabad, Mansehra, Battagram, Kohistan and Shangla districts in NWFP
- It rendered the normal business of life dysfunctional. The human and physical losses have been estimated as follows:



# Earthquake Damages

**Table - 1**

**Damages Caused by 8 October 2005 Earthquake in Pakistan**

Deaths	73,338
Injured	128, 304
Families affected	600,000
Population affected	3.5 Million
Area affected	30,000 Sq km
Educational institutions destroyed	6298
Health units destroyed	796
Houses destroyed	500,000
Water Supply Schemes damaged	Over 4,000
Services such as Telecommunication, Power, Water and Sanitation	50-70%

Source: ERRA/UN Early Recovery Plan, May 2006 (Updated by ERRA in September 2006)



# Brief Introduction of ERRA

- ERRA was established on October 24, 2005 as an autonomous body for undertaking the mammoth task of reconstruction and rehabilitation of earthquake affected areas/population;
- Its vision is to convert adversity into an opportunity through pursuing the policy of build back better;
- Its programme encompasses 12 major sectors as shown in the next slide;
- It is a policy making resource mobilization body. Its programme is being implemented through ERRA affiliates SERRA/PERRA, DRUs and Line Department

# ERRA Programme Sector

- **Hardware**

- Housing
- Education
- Health
- Water And Sanitation
- Government sector buildings
- Power
- Telecommunication
- Transportation



Risk reduction

- **Software**

- Livelihood
- Social Protection
- Environment
- Tourism



Gender equality



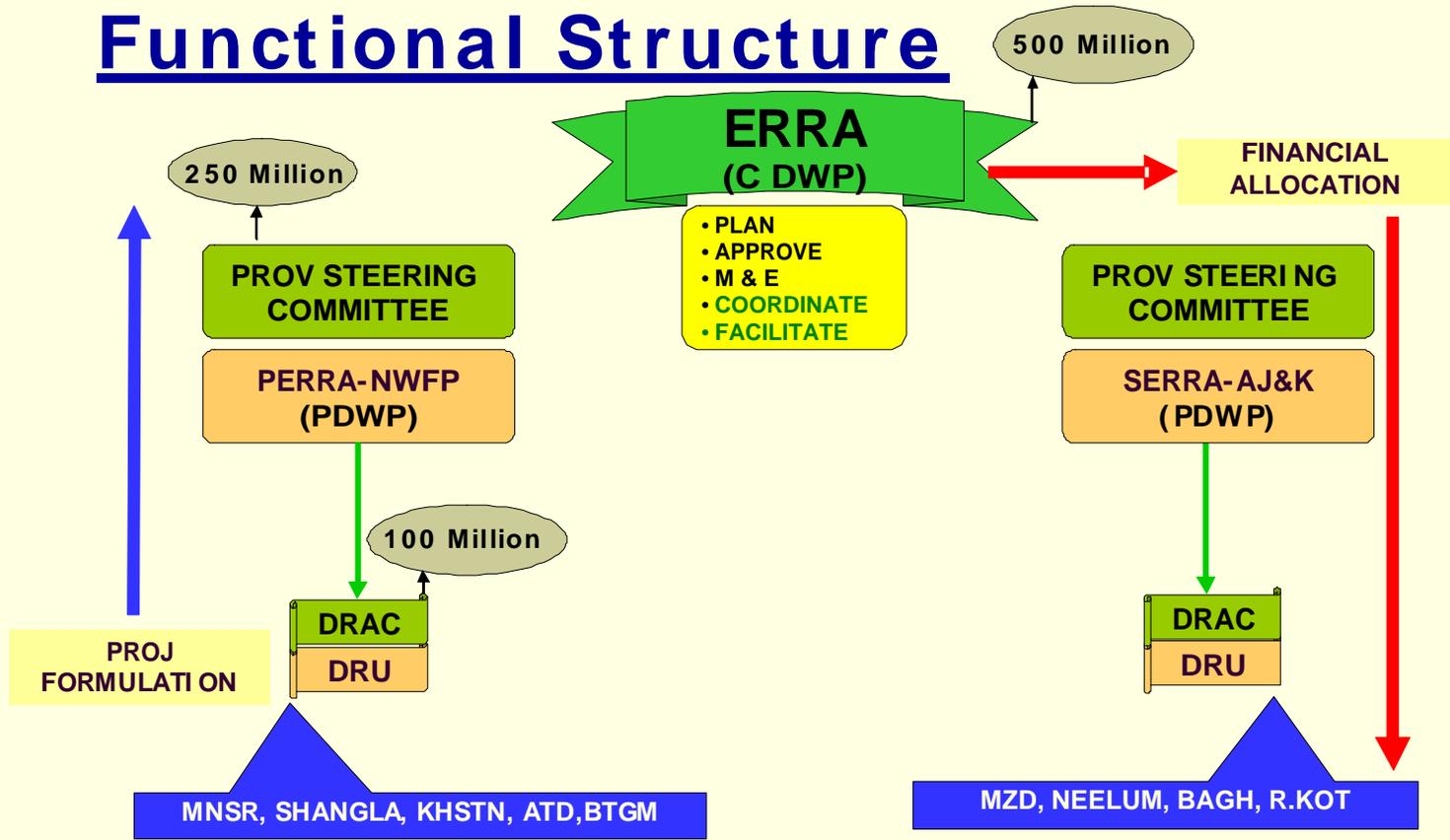
Environmental safeguards



# ERRA's Functional Structure

Build Back Better

## Functional Structure



# Aim and Contents of the Paper

This paper is aimed at highlighting the critical aspects of water situation in earthquake affected areas and post-disaster challenges that have been addressed through joint efforts by the Government of Pakistan under its Reconstruction and Rehabilitation Programme and development partners.

- Part I briefly discusses the importance and significance of water for human survival and the effects of disasters on water resources and subsequent effects on communities.
- Part II documents Earthquake Reconstruction and Rehabilitation Authority (ERRA)'s Water Supply and Sanitation (WATSAN) sector strategy and programme.
- Part III is about the issues and challenges that have emerged during the planning and implementation phases of the programme and how has ERRA addressed these issues.



# GUIDING PRINCIPLES

- **Building back better** (Improved service delivery, Use of Earthquake resistant materials and construction technique)
- **Integration of WATSAN issues with housing, health, education and environment sector**
- **Community participation** (to ensure better O&M and sustainability of rehabilitated facilities)
- **Capacity building** (of Line agencies, PERRA, SERRA, DRUs)
- **Effective monitoring/ Co-ordination and quality assurance**

# Water & Sanitation (Summary)

Sub Sector	Damages	Pledged	Implementation Status			
			Under Planning	Tendering Stage	Under Construction	Completion
Water Supply Schemes (No)	4080	2145	487	1087	1144	1362
Sanitation Sites (No. of Schemes)*	25 (576)	0	8 (356)	6 (143)	11 (77)	3(8)
Solid Waste Management**	23	0	5	15	3	In prog
Buildings (No)***	120	63	56	1	-	-

\* Sanitation schemes have been given as sites. However, within sites there are multiple schemes, 8 schemes are completed

\*\* PC-II for Solid Waste Program in NWFP has been approved and pending approval in AJK

\*\*\* Survey / Design in Process by NESPAK for GoP schemes

**Note:** PC-1s for 1591 W/S schemes, 21 Sanitation sites , 21 Solid Waste Sites and 45 buildings have been approved against GoP

# Water Supply Schemes: District wise Status



District	Schemes Status		Implementation Status					
	GoP	Sponsored	Sponsored		GoP Funded			
			Under Const.	Completed	Approved	Tendered	Work Awarded	Work Started
Muzaffarbad	599	716	135	449	499	343	343	0
Neelum	56	68	5	62	56	56	56	0
Bagh	224	374	124	240	224	120	120	0
Poonch	131	57	0	57	131	89	89	8
Sudhnoti	9	0	0	0	9	9	9	1
Mansehra	197	602	280	322	77	67	67	67
Abbottabad	173	15	0	15	163	163	103	103
Battagram	83	272	112	160	22	5	5	5
Shangla	343	30	3	27	289	288	241	241
Kohistan	120	11	0	11	121	121	88	88
<b>Total</b>	<b>1935</b>	<b>2145</b>	<b>659</b>	<b>1343</b>	<b>1591</b>	<b>1261</b>	<b>1121</b>	<b>513</b>

# CHALLENGES VS REMEDIAL MEASURES



Cont....

## 1. MANAGEMENT CHALLENGES

- Accurate damage assessment to develop reconstruction plan
- Lack of Coordination/Clarity on Roles & Responsibility of stake holders (ERRA/PERRA/ SERRA/DRU/Sponsor & Line Departments)
- Cutting down planning and implementation for early restoration of water facilities
  - Relevant Line Agencies of NWFP & AJK as well as Sponsor agencies working in relief and recovery activities were actively involved in preparation of damage assessments
  - To discuss commonly faced coordination and implementation issues, sharing of information as well as experiences and future plans, WatSan **General Advisory Groups** were formed at ERRA/PERRA/SERRA/DRU level and meetings held regularly
  - WatSan Core Groups formed to discuss policy level issues and any mid course correction / recommendation

# CHALLENGES VS REMEDIAL MEASURES



Cont....

## 2. SOCIAL CHALLENGES

- Fetching water – generally responsibility of woman
  - Laying/jointing of pipe network over private land
  - Individuals ownership of water sources
  - Community mobilization/hygiene promotion
- To address the above mentioned challenges **community based approach** was adopted which resulted as a key to the success of WatSan Sector so for
- More than 70% schemes are being rehabilitated/reconstructed through this approach

# CHALLENGES VS REMEDIAL MEASURES



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## 3. TECHNICAL & PHYSICAL CHALLENGES

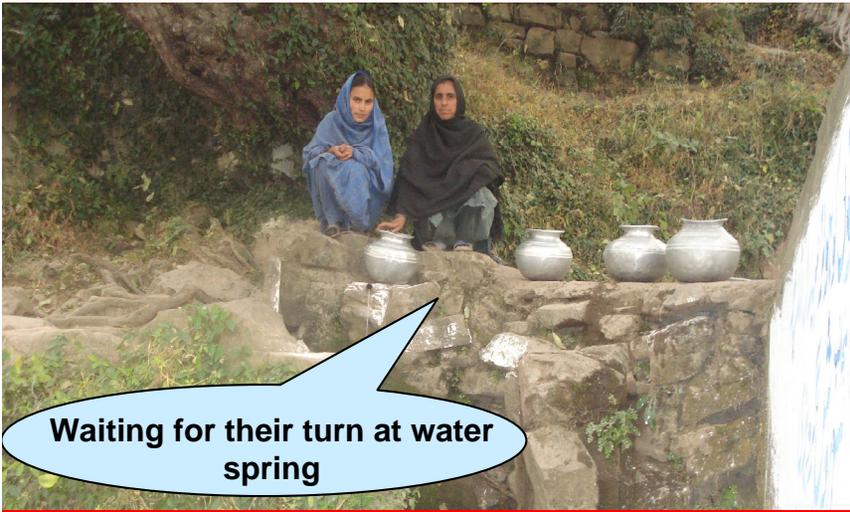
- **Difficult/Rugged terrain** of EQAAs
- **Exposed** distribution networks
- Use of unprotected water sources – A big threat to public health
- Decrease in the yield of water sources vis-à-vis increased water demand
- Community participation has played a vital role in **carriage and laying** **jointing of pipes** over mountainous EQAAs
- As per WatSan Strategy the pipe are to be laid **under ground**
- As a guiding principle all water sources are being tested for its quality. All water sources are being **protected** to avoid any contamination. Water quality awareness session being held with communities.
- **Linkages** of Line Agencies with Federal/Provincial Ministries/Organizations developed to address water quality issue in long term
- 8 Water quality labs (4 – AJK & 4 – NWFP) being established with Line Agencies of EQAAs
- PCRWR on the request of WatSan Sector ERRA has started its detailed water quality assessment as well as **training** program in EQAAs on priority basis.

# CHALLENGES VS REMEDIAL MEASURES

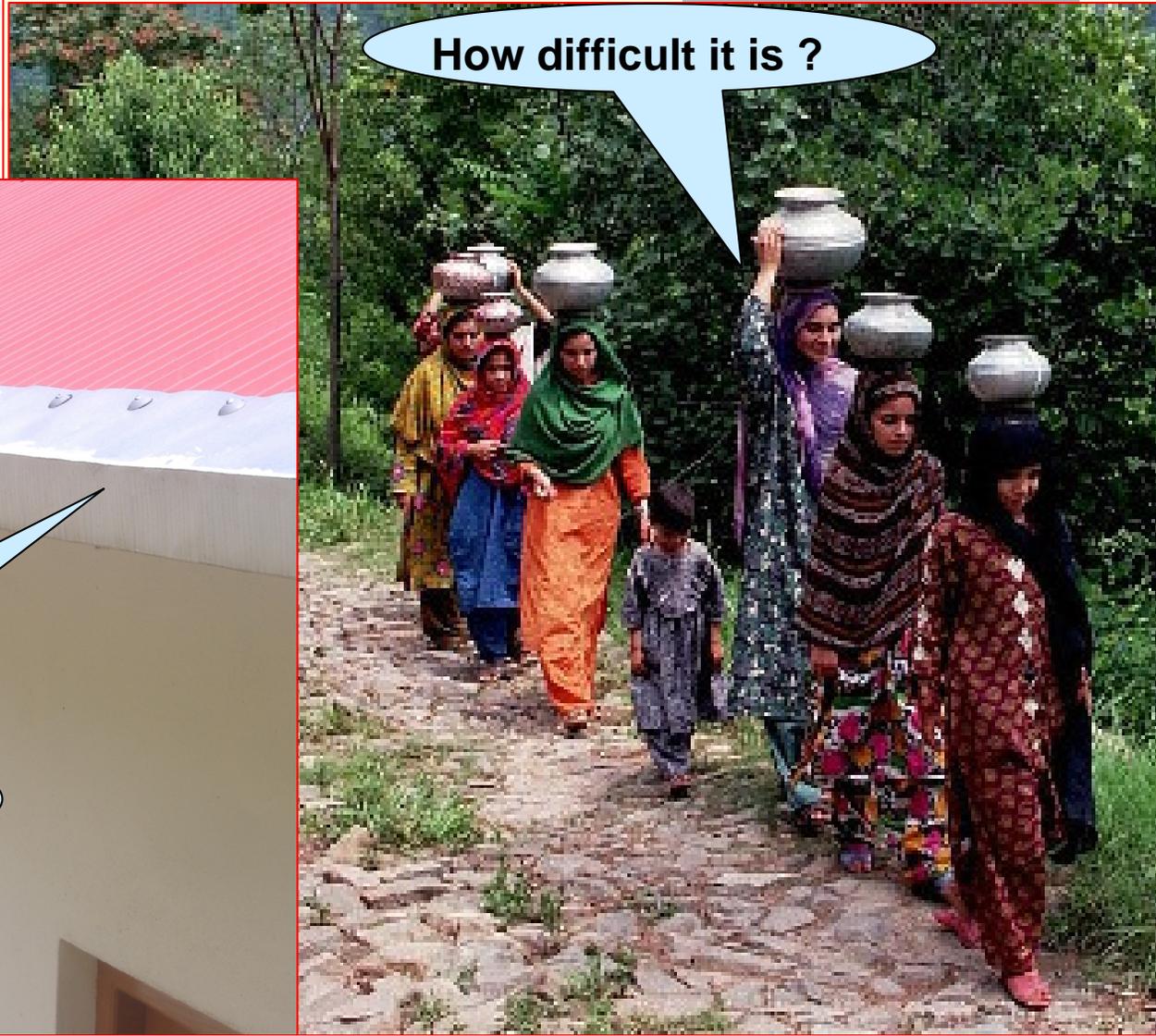


- To cope up with water scarcity issue in the EQAAs and to provide a sustainable solution, WatSan Sector ERRA has come up with the idea of Rain Water Harvesting (RWH) as a supplementary/alternate solution

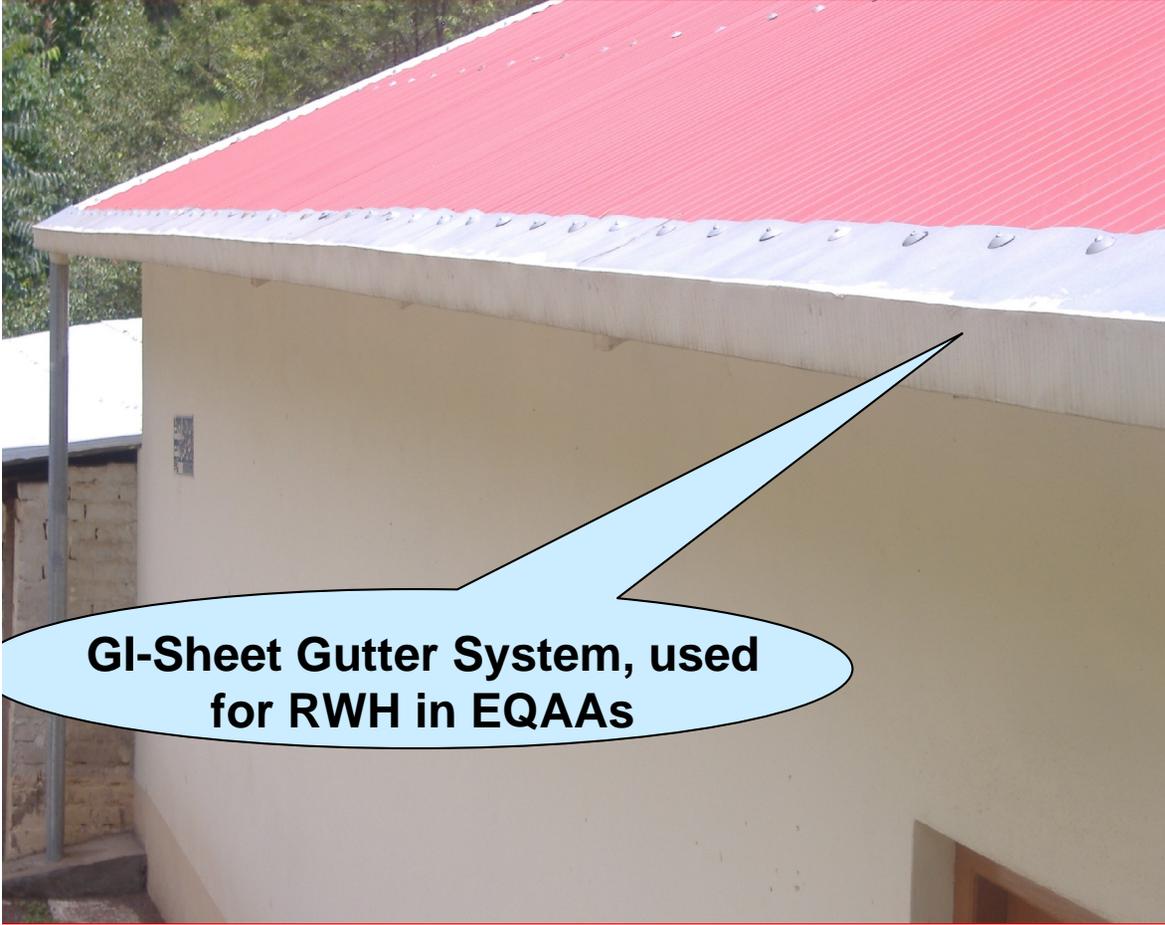
# Rain Water Harvesting (RWH) in EQAAS



Waiting for their turn at water spring



How difficult it is ?

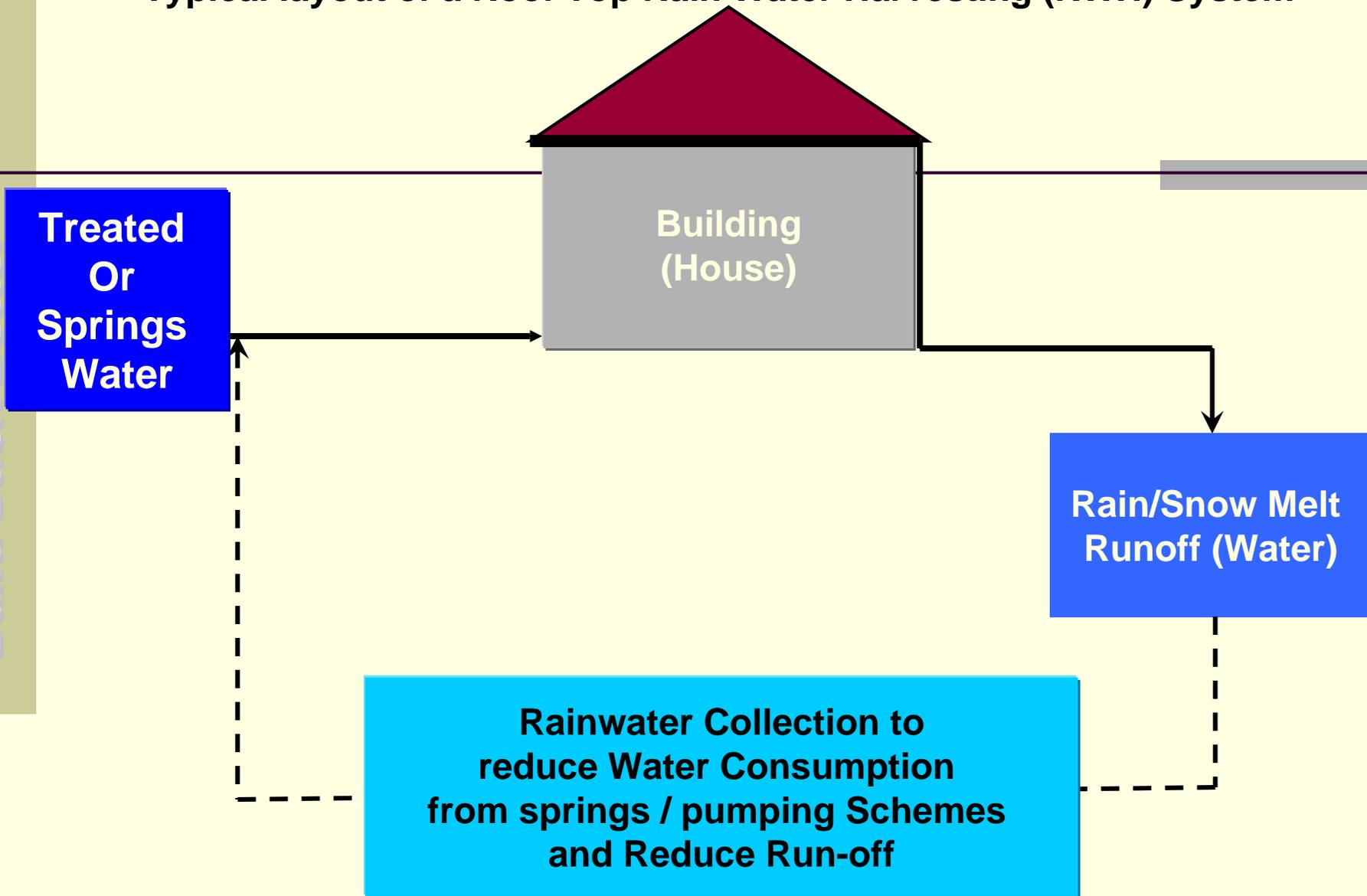


GI-Sheet Gutter System, used for RWH in EQAAs

# Typical layout of a Roof Top Rain Water Harvesting (RWH) System



Build Back Better



# RAIN WATER HARVESTING IN EQAAs

## General Perception about EQAAs:-

- Lot of Water Springs
- No Water Scarcity
- No Water quality issue

*Which is other wise*

Why Rain Water Harvesting in the most green areas of the country?



- Particularly during dry spell of the years (May - June, Oct - Nov) – water shortage
- In Rainy Season (March - April , July - August) **water quality issues rise.**

# Rain Water Harvesting (RWH) in EQAAs

Cont...



## **FACTORS -- WHICH COMPEL FOR ALTERNATIVE / SUPPLEMENTARY SOLUTIONS**

- Improved living standard caused increase in per capita consumption of water.
- Piped water supply at door step, caused more consumption.
- Increased water demand due to reconstruction/rehab. activities
- Reduced amount of water in the perennial streams
- Due to tectonic movements, Yield of the springs decreased
- Mettalled road network, increase in pucca buildings and other land development project caused increase in run off.
- Almost 95% buildings (Private houses / public sector buildings) are going to be of C.G.I Sheet roofing, causing increased flush floods/ speedy run off
- Reduced recharging of ground water
- Deforestation caused increase in run off, less precipitation and decrease in ground water recharging.

# Rain Water Harvesting (RWH) in EQAAs

Cont...



- Capital cost of Piped water supply scheme is higher.
  - Due to far-flung gravity sources
  - Due to lifting of water from rivers / springs or perennial streams
  - Due to spread population on high mountainous villages.
  
- ❑ Above said factors demand from Scientists / Engineers & Policymakers
  - ❑ to think about ! the alternative and long term solution(s)

✓ **ANSWER IS RAIN WATER HARVESTING**

# Rain Water Harvesting (RWH) in EQAAs

Cont...



*Under the over arching principal of “BUILD BACK BETTER”*

ERRA – WatSan Sector has proposed, promotion of Rain Water Harvesting as one of the best alternative & supplementary solution of water shortage in EQAAs

## POTENTIAL FACTORS

**EQAAs have the best annual average rain fall of >1500 mm**

- We need to harness the benefits of this potential source of water
- This is not a new idea – but centuries old method. Water Harvesting could be done; at – house hold level, community level and regional level.
- Now being revived and implemented in may parts of the world (Australia, many states of USA, Sri Lanka, India etc.
- Conventionally adopted in AJK & NWFP but never promoted as a policy.

# Rain Water Harvesting (RWH) in EQAAs



Cont...

## What benefits- we can have from RWH?

- 100 sqm (30'x11') roof top can catch 20,000 gallons (90,000 liters) of water annually
- If we put RWH system to all 750000 houses in EQAAs, 8000 public buildings  
3000 RW Ponds of 0.15 million gal/pond (*1- Pond in each village of EQAA*)  
We will be able to store 23590 mln. gal = 72362 AF = 1/6<sup>th</sup> of Mangla dam
  - CGI roofing \_\_\_\_\_ the best catchments area
  - Clean water \_\_\_\_\_ No polluted rains
- 60-70% of the daily demand can be met out of RWH
- By introducing “**FIRST FLUSH DIVERTER**” (FFD) and little treatment, RW could be used for drinking as well

# Rain Water Harvesting (RWH) in EQAAs



Cont...

## Daily demand

For drinking and cooking **15-20%**

For washing / bathing and live stock **80-85%**

- RWH is equally beneficial in rainy season as well
- This is the most decentralized supply of water at house hold level
- One time investment – life time **FREE**
- Promotion of RWH in EQAAs would reduce silt load on MANGLA & TERBELA DAM
- Increased life of these dams (EQAA is 12000 sq km catchments of these dams)

# Pilot Project of RWH

- Total cost=Rs. 761.20 million
- Implementation period = 1-Year
- Target area / beneficiary = 50 U/Cs ~ 750 villages of EQAAs, @ 600000 population~100000 HHDs

## ➤ Scope of Work

- 10,000 most vulnerable families to get full package of RWH system (unit cost = Rs. 28300/), 90000 to get the basic component of First Flush Diverter (unit cost=Rs.1700/)
- 1000 public / community institutions will be provided with RWH system (on average 20 inst./UC )- Unit cost =Rs. 55000
- 50 Rain Water Ponds (average size= 150000 gln. @ Rs.350000/pond)



# Pilot Project of RWH Contd.

## ➤ Implementation Mechanism

- PMU to be established at ERRA level
- 2- PIUs at SERRA / PERRA level
- Implementation through Services Providers, having expertise of Community Based approach
- Development of technical guide lines, awareness raising material and training of the local people will be carried out regarding RWH system
- Premises of ERRA HRCs would be utilized for Training on RWH System
- Help will be taken from Rural Housing and Vulnerability Survey data
- The project will be linked with ERRA Reconstruction Monitoring System for its complete visibility, quality control and regular progress updates
- Donors / Sponsors would be encouraged to invest in the program and its expansion to rest of the EQAAs

A photograph of two women in a mountainous region. One woman, wearing a red and black patterned headscarf, is filling a large metal pot from a public water tap. Another woman, wearing a teal headscarf, stands beside her, smiling. The background shows a lush green valley with small houses and a road. A green speech bubble is overlaid on the image, pointing to the tap. In the bottom left corner, there is a green oval containing the word 'Thanks'.

Let us supplement this tap with  
Rain Water Harvesting

Thanks