

Capacity Building for Transformative Change in the Water Sector

Azeem Ali Shah, PhD

Researcher and Chief of Party – WMfEP Activity

International Water Management Institute

13th August 2024

Innovative water solutions for sustainable development

Food · Climate · Growth



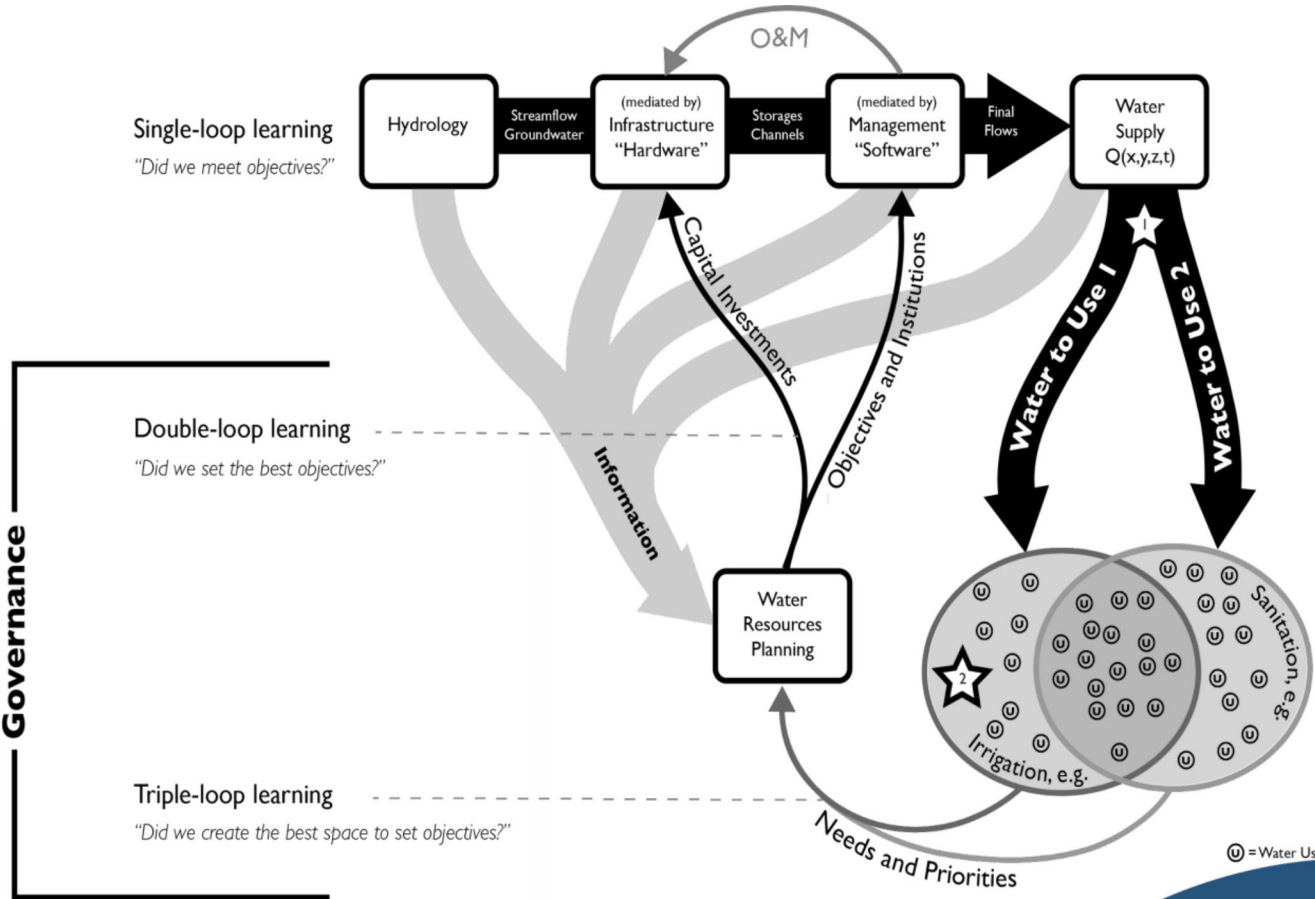
Discussion Points

- Understanding Water Governance
- System Change Approach in the Water Sector
- Identification of Stakeholders and Types of Capacity Building
- Capacity Building Interventions at different levels

Governance as a triple loop learning process

RESOURCE OUTCOMES

PROCESS OUTCOMES



(Bell et al., 2022)

Scaling up water governance

Large systems aren't just bigger versions of small systems

Water supplies are segmented, users are less connected, flows cross boundaries

At what scales do we
try to bound water
issues?

Administrative units

International

Federal

State

District

...

Municipal

Physical boundaries

Basin?

Irrigation command?

Something in between

Water districts?

Problemsheds

?



System Change Approach in Water Governance



Raise
Awareness

Empower
them

Build their
capacity

Build
Strong
linkages



Capacity Building of whom?

Individual Capacity Building vs Institutional Capacity Building ??

Individual Capacity Building

- Technical Training
- Managerial Trainings
- Induction Trainings
- Refresher Courses

Institutional Capacity Building

- Development of tools and techniques
- Laws and Policy implementation
- Training of Trainers
- Seminars/workshops
- automation/modernization of systems
- Updating rules/procedures

Stakeholders Mapping and Interventions

IWMI works collaboratively with key stakeholders in the **public sector** (GOP, **State Govs**) and in partnership with the **private sector** (for-profit and not-for-profit including civil society organizations, **farmers** and **academia**) to create an environment that is more conducive to the growth of agriculture sector in Pakistan.

IWMI also creates **professional networks**, and **incentives** for the private sector to take advantage of reforms and to undertake activities that introduce and demonstrate innovative practices in agriculture management, planning and development.

Stakeholders	Interventions
Farmers and Community	Productivity Enhancement Farm practices Water Efficiency Trainings and exposures
Agriculture and Water System Operators	Tools and Technologies Models and analytics Information Systems Capacity Strengthening Customized trainings Peer to Peer Learning
Decision Managers and Policy Makers	Information and Assistance Decision Support Systems Exposure Visits Policy Briefs and on demand advisories

Individual Capacity Building



Farmers and Community Focused Productivity Enhancement Interventions

- Micro drip irrigation kits and tunnel farming (Women and Youth Focused)
- Farm scale interventions: Precision Surface Irrigation, Pressurized Irrigation methods, and mechanization.
- Silage Making
- Climate awareness and adaptation methods (Farmers Field Schools)
- Bio-fertilizer wells
- Crop yield improvement through new seed varieties and water efficient techniques



Farmers Capacity Building (including women and Youth)

- Preparing farmers to deal with the climate shocks
- Livestock Management
- Preparing land for better crop and water productivity
- Development of Smart Spray Machine Kits for Women and Youth Farmers

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Technical Trainings for Water Professionals of KP

- Flow Measurement
- Google Earth Engine
- Groundwater Monitoring
- Computer Aided Design of Hydraulic Structure
- Soil Fertility Mapping
- Hydrological and Flood Modeling
- Gender mainstreaming



Executive Management Trainings to Public Sector Departments of KP including Academia

- Project Management
- Public Sector Procurement Management
- Agribusiness Value Chain Analysis
- Effective Leadership Through Problem Solving & Decision Making



LUMS Raising Executive Development Centre LAHORE UNIVERSITY OF MANAGEMENT SCIENCES IWM USAID Raising Executive Development Centre
Programme on Public Sector Project and Procurement Management
March 22 - 26, 2021



First Row (L to R): Farha Ghaffar, Azeem Ali Shah, Muhammad Israr, Shakeel Sadiq Jajja, Misbah Ullah, Bashir Alam, Reena Shahzad Soherwordi
Second Row: Fahim Hayat, Sukman Dhad, Masood Ahmad, Syed Ahmad Amin Shah, Syed Salman Ali Shah, Arshad Jamil, Muhammad Zubair
Third Row: Muhammad Asim, Engr. Nasir Zaman Khan, Dr. Sher Ali Khan, Tariq Ali Khan

Institutional Capacity Building

Revisiting Telemetry in Pakistan's Indus Basin Irrigation System

by Muhammad Tousif Bhatti * ✉, Arif A. Anwar ✉ and Muhammad Azeem Ali Shah ✉

International Water Management Institute, 12km Multan Road, Chowk Thokar Niaz Baig Road, Lahore 53700, Pakistan

* Author to whom correspondence should be addressed.

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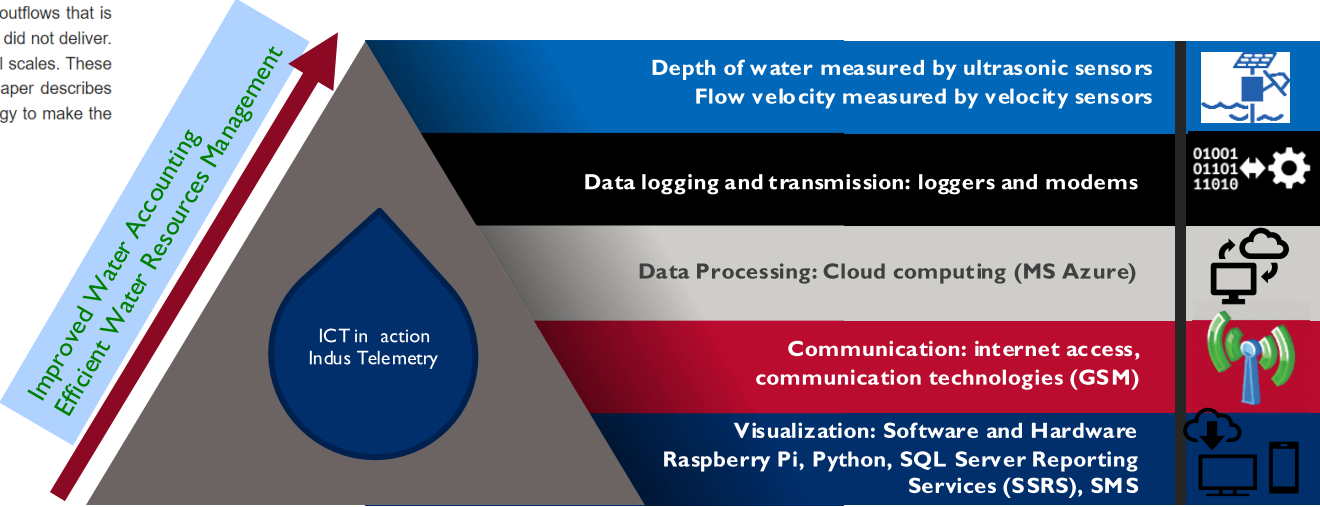
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Abstract

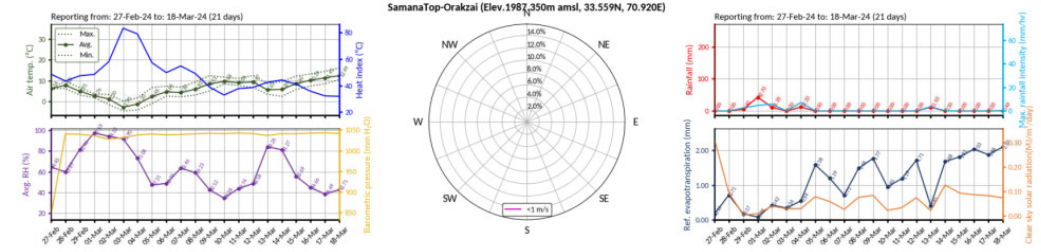
The Indus Basin Irrigation System (IBIS) lacks a system for measuring canal inflows, storages, and outflows that is trusted by all parties, transparent, and accessible. An earlier attempt for telemetering flows in the IBIS did not deliver. There is now renewed interest in revisiting telemetry in Pakistan's IBIS at both national and provincial scales. These investments are typically approached with an emphasis on hardware procurement contracts. This paper describes the experience from field installations of flow measurement instruments and communication technology to make the

- Many data dissemination and display options e.g. SMS, display screens, customizable detailed reports.
- IRSA can maintain water accounts of provincial share much conveniently and accurately based on Indus Telemetry data.
- A telemetry system can foster trust amongst provinces on water monitoring by adopting QA/QC procedures.





Weather station location	Date	Avg. air temp. (°C)	Avg. RH (%)	Avg. wind (m/s)	bar solar rad. (MJ/m ² /day)	Rainfall (mm/day)	Max. rainfall intensity (mm/hr)	Avg. barometric pressure (cm H ₂ O)	Ref. evapotransp. (mm/day)	Heat index (°C)
PCRWR-SialMore Sargodha	18-Mar-24	20.91	71.82	0.03	0.19	168.70	60.20	1033.29	2.84	21.95
PCRWR-DLR Lahore	18-Mar-24	21.52	59.51	0.25	0.13	0.00	0.00	1033.67	2.26	24.19
PCRWR-Tandjam	18-Mar-24	24.32	53.08	0.91	0.24	0.00	0.00	1011.12	4.23	26.84
PCRWR-Quetta	18-Mar-24	14.94	45.45	1.35	0.24	0.00	0.00	845.25	4.04	31.54
PCRWR-Multan	18-Mar-24	21.99	56.30	1.06	0.21	0.00	0.00	999.12	3.67	26.54
PCRWR-Bahawalpur	18-Mar-24	24.88	43.30	1.09	0.23	0.00	0.00	999.50	4.20	26.82
SamanaTop-Orakzai	18-Mar-24	12.49	42.71	1.43	0.07	0.40	0.40	1041.38	2.10	31.88



© Linux 64bit Screen res: 1920 x 1080 System reboot: 19-Mar-24 12:39:36 Hostname: raqberppl
 ython ver: 3.11.2 RPI serial #: 10000007864680 Build #: 2-03.11
 19-Mar-24 12:41:15 Data download: 19-Mar-24 12:39 Screen refresh in: 15s Enquires contact IWMR +92 (042) 35299504-07

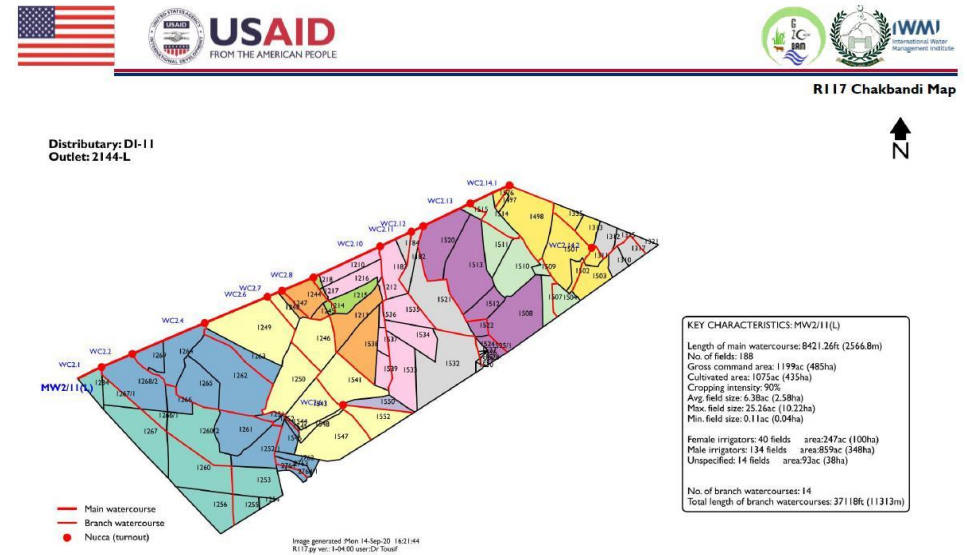


Weather Monitoring

First automatic weather station in merged districts of KP has been installed at Samana Top, district Orakzai.

Digital Chakbandi and Warabandi Tool

- This tool bases on GIS and relation database technologies.
- Land records and cadastral maps are digitized which are then used for developing digital Chakbandi and Warabandi using this tool.
- This tool has been applied in Gomal Zam Irrigation System (DI Khan and Tank), Shamizai Irrigation System.



Routing Field Channels through a Tertiary Unit with Heterogeneous Fields

Arif A. Anwar, Ph.D., M.ASCE¹; and Muhammad Tousif Bhatti, Ph.D.²

Abstract: The extensive irrigation systems of South Asia are predominately a hierarchy of canals delivering water to a tertiary unit. A network of field channels transfers water within the tertiary unit to the field where it is applied using surface irrigation. The network of field channels within a tertiary unit is often left to the farmers/farmer associations to construct, maintain, and operate. This paper develops a mathematical model/algorithm for routing the field channel along the existing field boundaries such that every field is serviced by a field channel and minimizing the total length of the field channel as a proxy measure of the cost of construction of field channels. The models developed in this paper are formulated as integer programs, implemented in a general-purpose solver. The model is applied to a tertiary unit of the Gomal Zam Irrigation System in Pakistan and shows that for this particular application, the optimized total length of field channels is 9,463 m compared with 11,313 m when an expert judgment is used, a reduction of 1,850 m (20%). **DOI: 10.1061/(ASCE)IR.1943-4774.0001592.** © 2021 American Society of Civil Engineers.

Author keywords: Tertiary unit; Indus Basin Irrigation System; Warabandi; Linear programming; Gomal Zam Dam; Pakistan.

Gomal Zam Water Information System



Gomal Zam Water Information System is developed as Mobile app as well as a Web version



It shows current flow in distributaries of Gomal Zam irrigation system and capable of archiving and reporting flow data.



Web version interface showing 'Insert Gage Data' and 'Check Flow Calculations' sections.

Insert Gage Data

Canal	Gage (m)
Main_HeadWorks	US 95
Main_RD 25000	Insert Gage RS25
Main_RD 29000	Insert Gage RS29
Main_RD 30000	Insert Gage RS30
Indent	Insert Indent

Buttons: Submit Gage, Open Main Page

Check Flow Calculations

Note: All Values in metric units (m and m³/s)

US Water Level (USWL):
 DS Water Level (DSWL): Optional
 Gate-1 Opening (G1O):
 Gate-2 Opening (G2O):
 Gate-3 Opening (G3O):
 Crest Level (CL): 176.8
 Gate-1 Width (G1W): 18.50
 Gate-2 Width (G2W): 8.00
 Gate-3 Width (G3W): 8.00
 C.d Gate-1: 0.60
 C.d Gate-2: 0.60
 C.d Gate-3: 0.60

Equation: $Q = C_d^2 A \sqrt{g} [18.62 * (USWL - CL)]$
 Where A = Gate_opening * Gate_width

Calculate Discharge

Open/Close Canal

Select to open/close canal:

Buttons: Press to close selected canal, Press to open selected canal

Logout

Mobile App interface showing 'GZWIS.0.0' and navigation buttons.

12:05 PM | 10.3KB/s

GZWIS.0.0

Logos: USAID, IWM International Water Management Instit.

Gomal Zam Water Informtaion System

Buttons: VIEW FLOW DATA, ENTER FLOW DATA, OPEN /CLOSE CANAL, EXIT, DATA ENTRY

Enter Your Password

Web version

Mobile App

KOBO Toolbox for e-inspection of irrigation infrastructure

- Kobo Toolbox is a data collection, management, and visualization platform used globally for research and social good.
- Kobo Toolbox enables inspections without internet in the field and it can capture pictures, videos, location information and digital notes while in field.
- GoKP-ID has used KOBO Toolbox for e-inspection of irrigation infrastructure.
- GoKP-AgD is using KOBO Toolbox for inspection in GZDCADP
- GOKP-IT Department has hosted database to archive reports of KOBO application by GoKP departments

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Government of Khyber Pakhtunkhwa Irrigation Department (Operation Section)

Ph:091-9210920

E-Mail: operationssection.irr@gmail.com

No. SO (OP)IRR/1-1/DSC/AOM&R/2023-24

Dated Peshawar, the 11th January 2024

To,

1. The Chief Engineer (South),
Irrigation Department,
Peshawar.
2. The Chief Engineer (North),
Irrigation Department,
Peshawar.

Subject: INSTRUCTIONS REGARDING AOM&R WORKS PROGRAM 2023-24.

In light of the directions issued during Provincial Cabinet meeting held on 04th January 2024 and discussion made during Departmental Sub Committee meeting for AM&R approval, it is stated that the Secretary Irrigation has issued the following instructions regarding execution of M&R related activities.

1. Arrangements for Inauguration of Starting of Desiltation by Honorable Chief Minister Khyber Pakhtunkhwa, and a plan be submitted to Secretary Office at the earliest for approval.
2. Ensuring E-Inspection through KOBO tool by Divisional offices.
3. Farmers participation shall be ensured in Desiltation of water courses.
4. Media Campaign: The wide media coverage shall be ensured during closure period.
5. All Superintending Engineers to submit consolidated report every three days to focal person which should include length of desiltation, repair and other quantifiable activities.
6. Monitoring teams notified for this purpose for each circle shall be assisted and facilitated during the visit.

I am therefore directed to request you to ensure the above instructions in true letter and spirit, please.


Section Officer (Operation)

Copy forwarded to the :-

1. PS to Principal Secretary to Chief Minister, Khyber Pakhtunkhwa Peshawar.
2. PSO to Chief Secretary Khyber Pakhtunkhwa, Peshawar.
3. PS to Secretary Irrigation Department, Peshawar.
4. PA to Deputy Secretary (Tech), Irrigation Department.


Section Officer (Operation)

Peer to Peer Learning

- Four months residential training for newly recruited water professionals of GoKP-ID in Punjab.
- Training of GoKP Agriculture Department by GoPunjab Forest Department on drone application in agriculture.
- Train the Trainers Program for the GoKP Agriculture Department



Seminars and Dialogues

- Climate Change
- Conference and Dialogues on Water related Themes
- Hill torrent management

Developing Academic Material

- First ever Post Graduate Diploma course co-development with University of Peshawar in **Climate Change Studies**
- **Vocational Training course** development for TEVTA for male and female farmers/technicians

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Support for the Implementation of KP Water Act 2020

- WMfEP developed the KP-Water Resources Regulatory Authority “**Strategic plan and organization structure**”
- WMfEP developed the **Resourcing Plan** for the KP Water Resources Regulatory Authority through a PCII document
- WMfEP established 02 **Resource Rooms**
- WMfEP developed the **ICT – Investment Plan** for the GoKP Irrigation Department

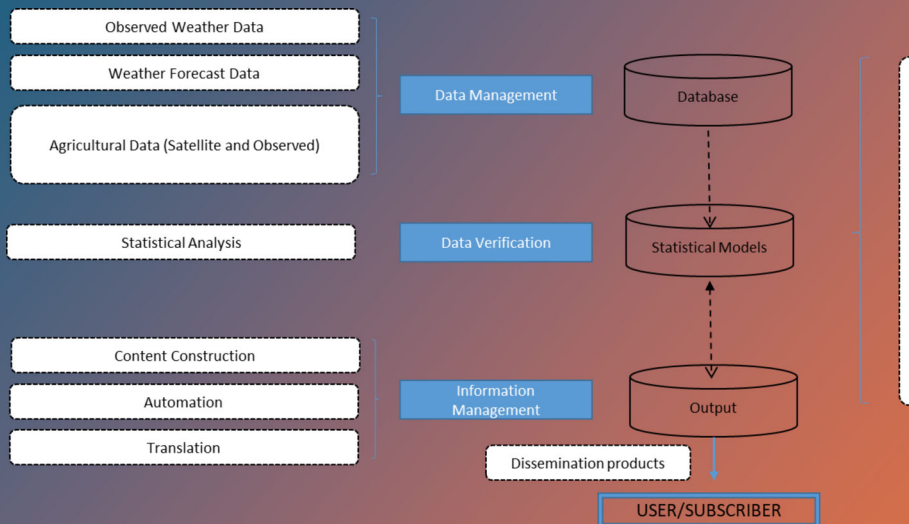


Chief Minister Khyber Pakhtunkhwa Mahmood Khan chairing the first meeting of Water Resources Commission.



WATER MANAGEMENT *for* ENHANCED PRODUCTIVITY
**Final Report of Consultancy for GoKP-
 ID, ICT Investment Plan**

WATER MANAGEMENT *for* ENHANCED PRODUCTIVITY
**KP-WRRA: STRATEGIC PLAN AND
 ORGAIZATION STRUCTURE**



Weather Forecast based Farmers' advisory and Indent System

- SMS based Farmers advisory linking information Global Forecast Model to farmers' action
- Water Indent based on crop water requirement in irrigated area using dynamic weather forecast

Agricultural and Forest Meteorology 317 (2022) 108888

Contents lists available at ScienceDirect

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journal homepage: www.elsevier.com/locate/agrformet

Statistical verification of 16-day rainfall forecast for a farmers advisory service in Pakistan

Muhammad Tousif Bhatti, PhD^{*}, Arif A. Anwar, PhD

International Water Management Institute, 12 km Multan Road, Chowk Thokar Niaz Baig, Lahore, Pakistan

ARTICLE INFO

Keywords: Advisory, Decision, Farmers, Forecast

ABSTRACT

Rainfall forecast is useful for farmers to avoid expensive irrigation decisions both in rain-fed and irrigated agricultural areas. In developing countries, farmers have limited knowledge of weather forecast information sources and access to technology such as the internet and smartphones to make use of these forecasts. This paper presents a case of developing Farmers Advisory Service (FAS) in Pakistan that is based on rainfall forecast data.

Policy Support to the GoKP through Analytical Studies

Analytical Studies

Water Governance

Proposed better model of water governance in KP and summary moved by the Chief Secretary to KP Assembly to implement it in Khanpur Dam command area

Evaluation of Irrigation and Water Laws in KP

KP Water Resources Assessment

Assessment of Economic Value of Water for KP

How corporate model in non-Agriculture sector can benefit Agriculture sector

Discussion Papers and Advisories

- Khanpur Dam
- Chashma Right Bank Canal
- Reform of Mechanical Division of the KP Irrigation Department
- Chashma Right Bank Lift Canal
- KP River Protection Ordinance 2002 Advisory

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Afghanistan– Pakistan Shared Waters: State of the Basins

First book on state of shared river basins between Afghanistan and Pakistan

- Authored by professionals from Pakistan, Afghanistan.
- Covers biophysical and social aspects of the basins

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Dialogues, Trainings and Exposure Visits on Transboundary Water Resources Management

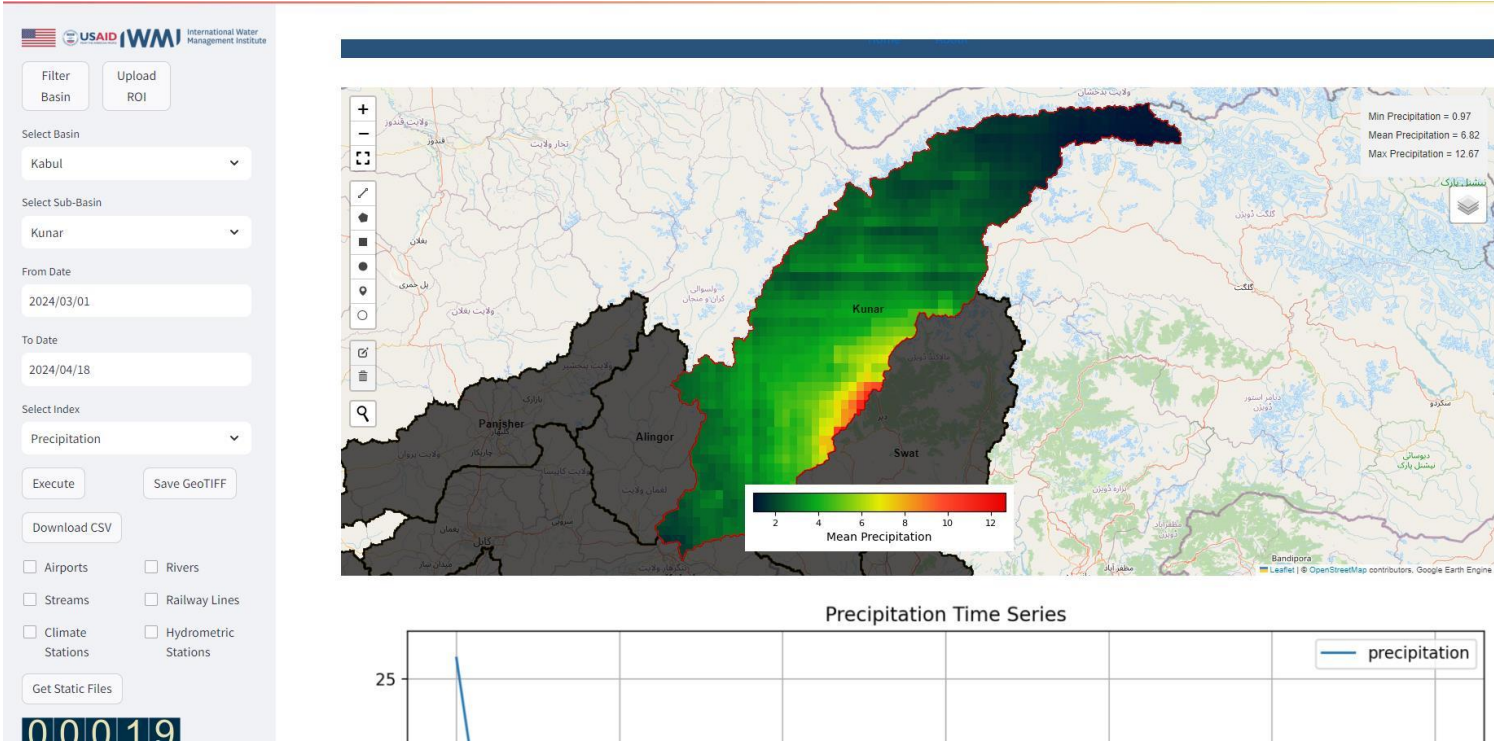


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29 Apr 2024

25

Knowledge Platform on Afg-Pak transboundary shared basins (upcoming launch..)



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Photo credit: IWM

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Dr Azeem Ali Shah (a.shah@cigar.org)

Chief of Party

International Water Management Institute

Delivered on 13 Aug 2024 at Crawford Fund Conference



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