



IWASRI

NEWS

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The main mandate of IWASRI is to conduct research on waterlogging and salinity to solve this problem by developing different research techniques. The technologies so developed are disseminated in the form of news letter on quarterly basis for the benefit of the researchers as well as farming communities. Moreover, IWASRI coordinates with other institutes and manages supervision of allied organizations namely Mona Reclamation Experimental Project (MREP), Lower Indus Water Management Project (LIM), SCARPs Monitoring Organization (SMO) and International Sedimentation Research Institute (ISRIP). The news letter also comprises other miscellaneous activities of IWASRI and its allied organizations.

IWASRI RESEARCH PAPERS

USE OF SALINE GROUNDWATER FOR CROP PRODUCTION ON SALT AFFECTED SOIL

By: Aziz Ahmed Malik, Khalid Mahmood Subhani and M. A. Shad

Abstract: The study was carried out on saline-sodic, non-gypsiferous and silty clay loam soil adjacent to Shorkot city. Ten treatments were tested in Completely Randomized Block Design. The treatments included:- T₁-

Irrigation with canal water-No amendment (control), T₂ -Irrigation with Canal Water + Gypsum @ 25 % GR of soil, T₃ - Irrigation with Canal Water + FYM @ 25 tons ha⁻¹, T₄ - Irrigation with Canal Water + Press mud @ 10 tons ha⁻¹, T₅ - Irrigation with Canal Water + Deep Ploughing, T₆ - Irrigation with Tubewell Water-No-amendment, T₇ - Irrigation with Tubewell Water + Gypsum @ 25 % GR of soil, T₈ - Irrigation with Tubewell Water + FYM @ 25 tons ha⁻¹, T₉ - Irrigation with Tubewell Water + Press mud @ 10 tons ha⁻¹, T₁₀ - Irrigation with Tubewell Water + Deep Ploughing. The initial EC_e and SAR of 0-30 cm soil ranged within 6.3 to 16.4 (dS m⁻¹) and 7.8 to 19.6 (mmol L⁻¹)^{1/2} respectively. Kharif fodder - wheat crop rotation was followed. Tubewell water having EC 4.03 (dS m⁻¹), SAR 8.74 (mmol L⁻¹)^{1/2} and RSC almost nil was applied to the crops. The EC_e of 0-30 cm soil depth decreased at the end of the study in all the treatments. Maximum reduction by 58 percent was recorded under the treatment where Pressmud @ 10 tons ha⁻¹ was applied with canal water irrigation. SAR of the soil decreased at the end of the study in all the treatments except T₆ under no amendment application. Maximum decrease by 56 percent was observed where Pressmud @ 10 tons ha⁻¹ was applied with canal water irrigation. The highest Kharif fodder yield of 18621 kg ha⁻¹ was observed with Pressmud application @ 10 tons ha⁻¹ with canal water irrigation. The

highest wheat grain yield of 2817 Kg ha⁻¹ was recorded with Pressmud @ 10 tons ha⁻¹ with canal water irrigation. Pressmud application @ 10 tons ha⁻¹ proved to be the best option for soil improvement and crop production. Use of poor quality groundwater with no-amendment reduced soil salinity to negligible extent, increased soil sodicity and produced lower crop yields. However, poor quality water can be used for sustaining agriculture in combination with amendments in the soil. Saline groundwater irrigation helped in mitigating crop water shortage, cropping on sustainable basis and lowering watertable at farm level and improvement of soil environment by reduction in upward movement of salts and crop production on sustainable basis on salt-affected soil.

GROUND WATER RECHARGE POTENTIAL IN PAKISTAN

By: Muhammad Nasim Khan and Muhammad Saeed

Abstract: Groundwater in Pakistan is under increasing threat from over-development, over-extraction and pollution, due to increasing population pressure, increasing living standards, industrialization and lack of proper management to match the demands and use patterns with the natural resource base. At present, no groundwater management approach has been developed to control over-exploitation. Populous agricultural areas of Pakistan, especially Punjab province, has seen exponential growth rates, in terms of number of wells and estimated accumulated pumping volumes, giving an impression of an explosion in groundwater pumping rather than a steady and controlled evolution. The studies indicate that if the present trend of excessive pumping of groundwater through installation of tubewells continues, it will not be possible to

pump groundwater by centrifugal pumping system by the farmers even in canal-irrigated areas because of declining watertable at a very fast rate. The farmers will have to install submersible pumps at a very high cost in order to irrigate the field crops. Water shortage is experienced in Pothohar area during major part of the year. Water level in the wells is also dropping. Groundwater in Balochistan province is falling rapidly due to its excessive abstraction as compared to the natural recharge. Groundwater in most of the areas of Balochistan province has gone so deep that small farmers are unable to bear its high pumping cost. The magnitude and extent of groundwater depletion has not been documented. Therefore, management of groundwater is lacking.

Keeping in view the above facts, IWASRI under its new PC-II, has initiated a research study entitled "Groundwater Recharge Potential in Pakistan". The study has been planned for a period of four years (2009-10 to 2012-13).

The main objectives of the study are to:

- (a) Identify areas of groundwater depletion and its extent;
- (b) Prepare zones of groundwater recharge potential;
- (c) Identify sources of surplus water available for groundwater recharge in different areas;
- (d) Evaluate groundwater recharge techniques at the selected sites.
- (e) Suggest measures for sustainable use of groundwater.

For achieving objectives (a), (b), (c) and (e), the study will be carried out in the irrigated areas of the four provinces. For achieving objective (d), sites will be selected, one in Punjab (Pothohar area) and one in Balochistan (Sailaba area).

To achieve the objectives of the study, literature/reports regarding the subject, within the country and abroad, were collected from various sources/downloaded from internet, and reviewed. Inception Report on the study "Groundwater Recharge Potential in Pakistan" was prepared. Historic watertable depth data was collected from SCARPs Monitoring Organization, WAPDA for the period 1987 to 2009 for all canal commands of the Indus Basin. Sindh and Balochistan, data was computerized. Hydrographs were prepared showing historic watertable fluctuations in the main canals of Punjab province. Annual rate of depletion/rise in watertable in the canal commands of the Punjab were worked out. Report (draft) was prepared on Historic Watertable Behavior along Main Canals of Punjab province.

LIM PUBLICATION

EVALUATION OF PANCHO IRRIGATION SYSTEM FOR RICE PRODUCTION

By: **Jawaid Mohyuddin and Muhammad Qaim Channa**

Abstract: This study was carried out in Dodai and Dhandi minors command area of Larkana and Tando Muhammad Khan districts in Sindh, during 2005-2007. The study comprised the following treatments: (a) Traditional irrigation method (T_1) also called pancho in local language, (b) Irrigation as required (T_2), i.e. application of water after an interval of ten days, (c) Irrigation at an interval of seven days (T_3) with the main focus to compare pancho irrigation with scheduled irrigation system for growing rice crop. These treatments were replicated thrice in a

Randomized Complete Block design. During the study impact of different treatments on electrical conductivity, sodium adsorption ratio, soil infiltration rate, watertable depth, groundwater quality and crop yield was monitored. Soil samples from 0-15, 15-30, 30-60 and 60-90 cm depth were collected for determining the physio-chemical properties. Soil infiltration rate was measured with the standard ring method. One observation well was installed at the experimental site to monitor watertable depth and groundwater quality. Crop yield estimation was carried out on the whole plot basis. Soil analysis showed that with the passage of time salinity built up occurred at watercourse 4R, Dodai minor and 16L Dhandi minor, whereas, watercourse 17-CR showed slight decrease. The increase might be due to rise of saline groundwater at watercourses 4R and 16L. SAR showed depth-wise increase as compared to initial values. Soil infiltration rate decreased over the time period at watercourse 17-CR, whereas, it increased at watercourse 16L. The water table data showed that the variation trend over the time period was prominent and it ranged between 0.63 to 0.84 meters and 0.51 to 1.74 meters at watercourse 17-CR and 16L, respectively.

The EC of groundwater ranged within 1700 to 1800 ppm and 1400 to 3400 ppm, falling under good to hazardous water quality range at watercourse 17-CR and 16L respectively. The SAR remained within safe limits ranging between 1.3 to 1.6 and 3.3 to 14.4 at watercourse 17-CR and 16L respectively. The crop yield data revealed that higher rice yield was obtained in T_1 followed by T_3 at all the watercourses.

IN-HOUSE SEMINARS, IWASRI, SMO & ISRIP

IWASRI organized three In-House Seminars during the quarter (April – June 2010). The detail of presentations is as below:

Paper/Topic	Speaker
Saline Water use in LBOD area.	Mr. Muhammad, Director (S&E) IWASRI.
Engineering Economics and Hydrology of Canal Lining	M/s Muhammad Zaheer Khan and Shabbir Hussain, Senior Engineers.
ISRIP Field Activities	Mr. Waseem Ali, Deputy Director, ISRIP.

INTERNATIONAL SEDIMENTATION RESEARCH INSTITUTE (ISRIP)

Monitoring activities with respect to the hydrographic and sedimentation survey on the following projects remained in progress during the quarter April-June 2010:

1. Bunji Hydropower Project
2. Hub Dam Project
3. Sabakzai Dam Project
4. Raine Canal Project–Extension of Existing Divide Wall at Guddu Barrage–Model Study

SCARP MONITORING ORGANIZATION (SMO)

- Pre-monsoon Depth to Water Table (DTW) observations of 5875 points in Punjab, KPK, Sindh and Balochistan provinces were recorded.

- Computerization of individual well data of Rechna Doab Vol-IV was completed.
- Contour maps of KPK (June 2009 and December 2009) were prepared.
- Area of 0.164 million acres of Rangpur Canal was surveyed. Whereas, 305 soil and 95 water samples were collected.
- Water samples of 33 Tubewells, 17 Drains, 14 Rivers and 3 Lakes and Ponds were collected for analysis.

POSTING/TRANSFER

- Mr. Nazir Ahmed, Director, Water Management and GIS transferred to Planning & Design Directorate, WAPDA, WAPDA House, Lahore.
- Mr. Abdul Rehman joined IWASRI as Director and proceeded on LPR with effect from 1st May, 2010.
- Mr. Abdul Rashid Alyani, Senior Engineer took over the additional charge of Director, WM-GIS, IWASRI on 16-06-2010.
- Mr. Muhammad Mumtaz joined as Junior Engineer, WM-GIS, IWASRI.
- Three Research Officers (Agro) namely Abdul Hakeem, Sardar Muhammad Chatha and Muhammad Hanif have recently joined Scarps Monitoring Organization.

MORE INFORMATION

For more information please write to:

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