



In this issue



DIRECTOR'S COLUMN



Water Management Issues and Strategies for Bringing Green Revolution in Eastern India

Northern and western India reaped the benefits of first green revolution, whereas, eastern India holds promise for a second green revolution. This can be achieved through proper management of soil, water, crops and human resources. Eastern India occupies about 21.85% geographical area and supports 34% human & 31% livestock population of the country. Agriculture is the mainstay of the economy in this region, as 83% population living in rural areas depends on agriculture for their sustenance. Most of the cultivated area of eastern region can support double cropping because the length of growing period, fertile soils and adequate water resources.

The average annual rainfall of the eastern region is about 1526 mm which is sufficient and substantial for growing any crop. The ultimate irrigation potential of eastern region is estimated as 52.73 M ha (19.66 from Major and Medium irrigation projects + 33.07 M ha

from Minor irrigation projects). Almost two third of the potential area is yet to be irrigated.

High population density with low per capita income is the major demographical issue of this region. Agricultural productivity has remained low due to lack of location-specific production technologies, inadequate and untimely supply of critical inputs and various social and economic constraints. Rice is the major crop of this region. However, abiotic stress such as drought, flood, submergence and salinity are the major factors which constrain its productivity. After rice in *kharif*, significant portion of the cultivated land remains fallow. The percentage of fallow land to gross cultivable land in eastern India is about 16.6% in comparison to the national average of 14.7%. Slow expansion of irrigation infrastructure is a major concern. The percent of cultivated area under irrigation is 45% only, which is even lower than national average (49%). Waterlogging in some parts of the region and drought in the other pockets causes disparity in water resources availability and management. Modernization of agriculture has escaped this region as evidenced from poor adoption of modern technologies. Low rate of spread of micro irrigation is also another issue. The area under drip and sprinkler irrigation in eastern India is only 1.5% and 9.5% of the country, respectively. In spite of having huge groundwater resources, the stage of groundwater development is low (36.5%). High arsenic and fluoride in groundwater is also a cause of concern.

To achieve second green revolution in eastern India, there is a need to harness the potential of the region with focused water management in agriculture and allied sectors. Out of total 11.6 M ha rice-fallow area in the country, 82% lies in eastern India. This offers a unique opportunity for enhancing the productivity through crop intensification. The strategy should be catching much of rainfall during monsoon seasons by all means, including large, medium, and check dams, and increasing groundwater recharge. A



ICAR - Indian Institute of Water Management

Chandrasekharapur, Bhubaneswar - 751023, Odisha, India

Phone : 91-674-2300060 (Director), 2300010/2300016/2301815, Fax : 91-674-2301651

E-mail : director.iiwm@icar.gov.in, director.dwm@icar.org.in // Web : www.iiwm.res.in

Concept :

Dr. Atmaram Mishra

Editors :

Dr. A. K. Thakur

Dr. K. G. Mandal

Dr. O. P. Verma

Dr. P. P. Adhikary

Mr. Ajit K. Nayak

coordinated plan is essential to ensure water is available during dry months of the year and also during prolonged droughts over several years. Different methods of capturing and storing rainwater under different agro-climatic, institutional, social and economic conditions should be assessed so that implementing line departments are aware of what combinations are most appropriate for their specific conditions. In this process, the rainfed agro-ecosystem can be partially converted to irrigated agro-ecosystem. Different rainwater management technologies like tank cum well system, field bunding, contour bunding, dugout pond in rice cultivation system has their potentials to harvest rainwater and enhance crop productivity. Construction of various check dams (ICAR-Flexi rubber dam) to harvest rainwater and to divert stream water for irrigation is a good option. Various intercropping and alley cropping in degraded uplands are the promising technologies to harvest rainwater *in-situ* and increase productivity. In the seasonal waterlogged areas, conversion of lowlands to aquaculture tanks, peripheral dykes for saucer shaped

waterlogged areas, aquatic crop based farming system, bio-drainage, sub-surface water harvesting structure and use of water logging resistant rice varieties are some of the techniques which can be successfully adopted. In flood-prone areas, construction of ponds are effective for fish farming as a remunerative option.

In the groundwater irrigated agro-ecosystem, utilization and management of groundwater is extremely important. Since the overall groundwater draft of eastern region is low, enhanced and planned government spending for groundwater extraction using solar energy is needed. Farmers should be encouraged to use pressurized irrigation technique for irrigating their cropped field during dry season. The hard rock regions are poor in groundwater resources. Recharge wells tapping the fractures in the hard rock aquifer is recommended for artificial groundwater recharge. The geogenic contamination of groundwater with arsenic, fluoride and iron has caused havoc in this region. Conjunctive use of groundwater with surface water can dilute the effect of arsenic contamination.

Groundwater treatments like adsorption through activated alumina/ granulated ferric hydrated oxide, precipitation and coagulation techniques can be adopted. To combat fluoride contamination in groundwater, Nalgonda technique, membrane technique, electro dialysis, ion exchange and adsorption with activated alumina can be adopted.

In canal command areas, there is need for introduction of rotational water distribution system (Warabandi system) in the outlet command. The Water users Associations (WUAs) need to be made functional and vibrant. In order to judiciously use canal water as per the crop water demand, canal automation is required to be implemented. Modern irrigation facilities with automation are the need of the hour. Coordinated research on water management, large scale implementation of appropriate water management techniques and awareness creation among farmers would certainly be congenial and catalytic to bring second green revolution in eastern India.

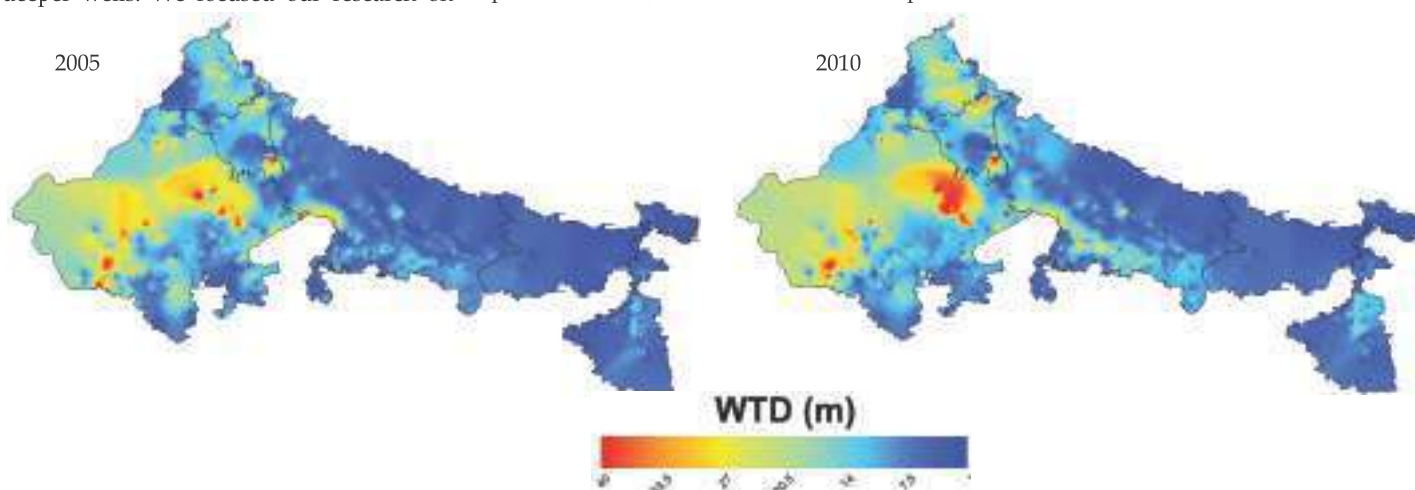
RESEARCH ACHIEVEMENTS

Groundwater Depletions in Northern India-Issues and Sustainable Prospective

India is world's largest groundwater user, to irrigate over 0.4 million km² area annually that is more than double the surface water irrigated area. However, most of this extracted water is non-renewable in nature, leading to large scale groundwater depletion and the associated footprints in terms of water quality impairments and high cost digging deeper wells. We focused our research on

northern India, where the Green Revolution flourished largely due to groundwater irrigation, to understand how sub-regional diverse socio-political, environmental and climatic factors contributed to the variability in groundwater withdrawals. We find the sub-surface hydrological system covering Punjab, Haryana and Delhi has been transformed into a human-controlled system overtaking the natural climate variability because of the substantial loss of about 90 km³ groundwater during 1985-2013. This can primarily be attributed to the land-use change to rice-wheat cropping sequence instead of traditional maize-wheat and also the conversion of land under coarse cereals and pulses. As such, the mean water table depth

over northern India has been declining at the rate of 1.99 cm per year, which is about seventeen-fold higher than the pre-2002 rate. Groundwater policies in India vary from state-to-state, and it is the responsibility of the district scale administration to implement sustainable measures. We also analyzed some notable districts of India, representing multidimensional aspects of human-environment interaction, to highlight the local scale footprints of anthropogenic, climatic and policy factors. Our observation-based findings can directly assist the state governments and local users to modify the existing practice to protect the aquifer and ensure sustainable crop production in northern India.



Spatial change in water table depth (WTD, meter below ground level) in northern India between 2005 and 2010

D.K. Panda

Enhancing Yield and Water Productivity in Rice Fallows of Eastern India through Super Absorbent Polymers (SAP)

The field experiment was conducted during the *rabi* and *kharif* seasons of 2016-2019 at the ICAR-IIWM research farm to evaluate the effect of super absorbent polymer (SAP) on growth, yield and water productivity of groundnut (*cv.* Smruti) and Rice (*cv.* Lalat). The SAP used in the study was a potassium polyacrylate based polymer that is water insoluble. The treatments [SAP-100 (100 kg SAP ha⁻¹), SAP-75 (75 kg SAP ha⁻¹), SAP-50 (50 kg SAP ha⁻¹), SAP-25 (25 kg SAP ha⁻¹) and C (No application of SAP)] were laid out in randomized complete block design with four replications. The groundnut crop was grown in a plot size of 5 × 4 m with a spacing of 30 × 20 cm during *rabi* season. The required amount of SAP was mixed with dry soil and uniformly broadcasted just before the final land

preparation of groundnut. In the final land preparation the SAP uniformly mixed with the surface soil. The recommended management practices were followed for raising the crops at field level. In the final land preparation, FYM was applied at the rate of 5 t ha⁻¹. The fertilizer dose applied for groundnut was 20:40:40. The soil moisture sampling in the root zone was found out by gravimetric sampling at frequent intervals to know the 50% soil moisture depletion at the root zone for irrigation purposes. Irrigation to individual fields was given by pipe using 1 hp pump at 50% soil moisture depletion in the root zone. After groundnut, rice crop (*var.* Lalat) was grown on the same plot with the recommended package and practices in the *kharif* season. Seedlings were transplanted 2-5 cm deep into a puddled field with 5-6 cm of standing water. The 5-6 cm of standing water was maintained during vegetative stage. However, during the reproductive stage 2-3 cm of ponded water was maintained. Before 15 days of harvest, all the standing water was drained. The spacing maintained for rice crop was 20 × 10 cm. The fertilizer dose applied for rice was 80:40:40.

The three season pooled data showed the plant height, canopy spread, intercepted photosynthetically active radiation and

greenness index in groundnut at flowering stage were not significantly affected by the different levels of SAP application. The root zone soil moisture storage was not significantly affected by the different levels of SAP for all the years of study. The three season pooled data also revealed that the pods/plant (12-13), kernel yield (1027-1123 kg ha⁻¹), pod weight (1692-1772 kg ha⁻¹) and haulm yield (3081-3471 kg ha⁻¹) were not significantly affected by different levels of SAP. The water used by groundnut was 274-283 mm with water productivity of 0.38-0.40 kg m⁻³. After groundnut, rice crop (*var.* Lalat) was grown on the same plot. The two season pooled data showed that the LAI, greenness index (SPAD) and intercepted photosynthetically active radiation of rice at flowering stage were not significantly affected by the SAP levels. The two season pooled data also revealed that rice yield and yield attributes such as panicles m⁻² (381-405), panicle length (25.1-26.9 cm), filled grain per panicle (52-54), 1000 grain weight (24.0-25.2 g), grain yield (4.24-4.46 t ha⁻¹) and straw yield (6.11 to 6.72 t ha⁻¹) were not significantly affected by different SAP levels. The water productivity of rice varied between 0.44 to 0.46 kg m⁻³. The residual soil moisture storage in rice after harvest between different SAP treatments was statistically at par.



Rice crop growth in control



Rice crop growth in SAP100

S. Pradhan, O.P. Verma, A.K. Thakur and S.K. Ambast

SCIENCE

COVID-19 Pandemic: Impact of Lockdown on Environment, Agriculture and Aquaculture in India

The coronavirus (CoV) disease or COVID-19 is an extreme event affecting 212 countries so far and has become the largest pandemic since World War-II and Indian Government decided for lockdown in a bid to slow down the pandemic. A group of scientists of our institute reviewed its impact on environment,



agriculture and aquaculture in our country. Lockdown has helped in reducing air pollution levels of major industrial cities (60-70%), due to significant improvement in the air quality index. This has also contributed in reducing global carbon emissions and greenhouse gas emissions. There has been a 40-50% improvement in the riverine water quality in terms of dissolved oxygen, biological oxygen demand, coliform bacteria levels and suspended particulate matter. India's decision to put the entire country under lockdown in a bid to slow the spread of COVID-19 resulted in massive drop in air pollution levels (60-75%), as the air quality index (AQI) of major industrial cities

improved significantly compared to the previous year. These short-term environmental benefits may even pose larger threat to the environment during the post-lockdown 'as usual scenario'. Due to lockdown, agriculture and aquaculture sectors have also been severely affected. In India, fisheries sector as a whole employs over 14 million people, of which the livelihood of more than 9 million active fishers, inclusive of

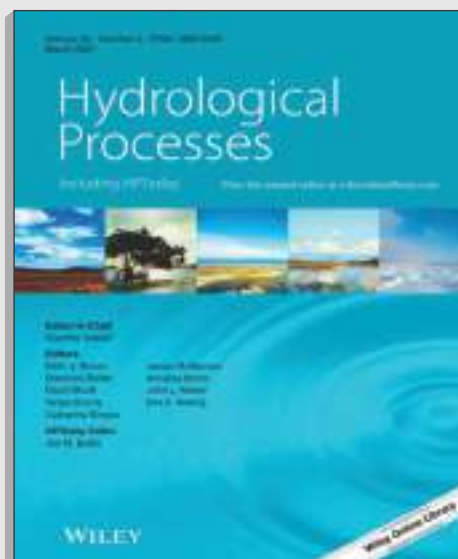
80% small-scale fishers, has been affected due to COVID-19 pandemic. The nationwide lockdown has severely affected both the capture and culture fisheries sector delayed harvesting in aquaculture negatively impacted the production cost, water productivity and footprint, total water use and water use efficiency. The COVID-19 crisis has shown the vulnerability of regional to global systems in protecting our health,

environment and economy. Further, this pandemic has forced us to re-examine our relationship with nature for better association.

Adapted from Mohanty, R.K., Mandal, K.G. and Thakur, A.K. (2020). COVID-19 pandemic: lockdown impacts on the Indian environment, agriculture and aquaculture. Current Science, 119(8), 1260-1266. View the full article online at doi:10.18520/cs/v119/i8/1260-1266

Groundwater Depletion in Northern India: Impacts of the Sub-regional Anthropogenic Land-use, Socio-politics and Changing Climate

Several regions around the world have started to experience more severe droughts accompanied by a hotter-than-normal climate (i.e., dry and hot events), the ubiquitous pressure on freshwater resources is imminent. Specifically, groundwater storage (GWS) losses in the world's agriculturally important aquifer systems have captured considerable attention of scientific community and policy makers. This raises the key scientific question- Can groundwater act as warning and climate change from increased greenhouse gases. Understanding the key drivers behind intensive use of groundwater resources and subsequent depletion in northern India is important for future food security of India. Although spatio-temporal changes of groundwater storage (GWS) and its depletion in northern India are mapped using the NASA's GRACE (Gravity Recovery and Climate Experiment) records, the sub-



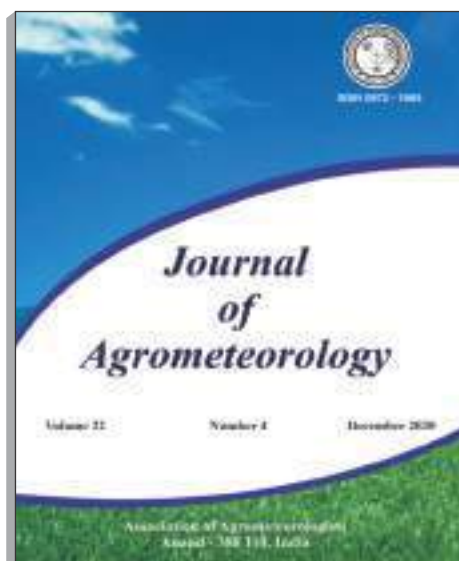
regional diverse socio-political and environmental factors contributing to the variability in groundwater withdrawals and renewals are not well documented. Scientists of ICAR-IIWM provided new evidence on changes in GWS at different spatial scales using both observations and satellite-based measurements applying both parametric and non-parametric statistical analyses. Their finding shows substantial loss of GWS has occurred since the beginning of the 21st century, and the decline in GWS is associated with some record-breaking dry and hot climate events. Also, they presented how

certain state-based policy decisions, such as supplying free electricity for irrigation, prompted farmers to extract groundwater unsustainably and thus led to widespread GWS depletion, which has been also accelerated by frequent dryness and rising temperatures. In the hotspot of Punjab, Haryana and Delhi of northern India, the extracted groundwater during 1985-2013 was found equivalent to a meter-high layer if spread uniformly across its geographical domain. They also found that the groundwater storage loss in northern India has increased rapidly from 17 km³ to 189 km³ between the pre-2002 and 2002-2013 periods. This loss in northern India is, therefore, an excellent example of rapid surface greening and sub-surface drying-a result of an interplay of socio-political and environmental factors. As groundwater continues to be treated as a common natural resource and no clear definition exists to guide policymaking, this study illustrates how the administrative district level approach can solve the widespread problem of depletion.

Adapted from Panda, D.K., Ambast, S.K., Shamsudduha, M. (2021). Groundwater depletion in northern India: Impacts of the sub-regional anthropogenic land-use, socio-politics and changing climate. Hydrological Processes, 35:e14003. View the full article online at <https://doi.org/10.1002/hyp.14003>

Mini Pan Evaporimeter for On-farm Irrigation Scheduling

In the scenario of water scarcity, it is imperative to utilize and conserve available irrigation water effectively to improve water productivity and in this context, scientific irrigation scheduling assists the farmers for effective utilization of the water resources. Scientists of ICAR-IIWM attempted to develop and standardize a small size and low cost pan evaporimeter which is easy to interpret and maintain at farm level for irrigation scheduling purpose. Mini pan evaporimeters made up of galvanized iron (GI) and PVC with different diameters (30 cm,



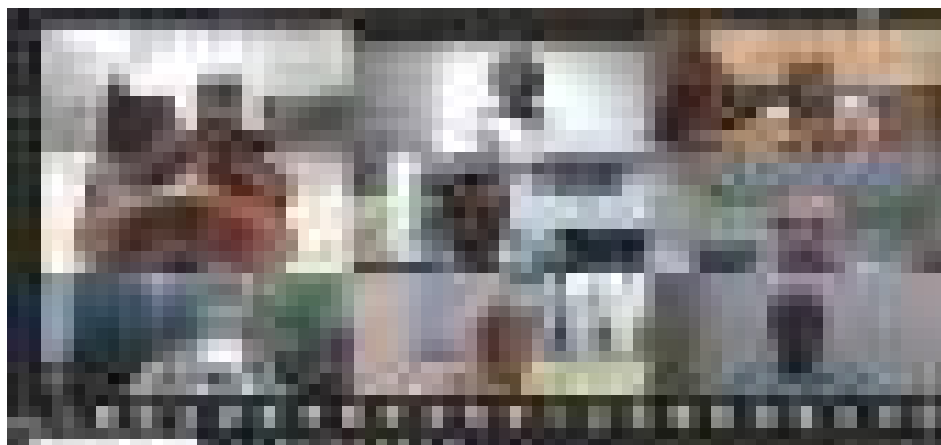
20 cm and 10 cm) and height of 25 cm. Regression analysis indicated that GI mini pan with 30 cm and 20 cm diameter had closest relation with USWB class A pan compared to other pans. Analysis by t-test showed significant difference between evaporation measured at 5, 7-days interval and daily evaporation cumulated for the same days but not for 3-days interval. It could be concluded that 30 cm and 20 cm diameter GI mini pans can be used for on-farm irrigation scheduling purpose.

Adapted from Manikandan, N., Panigrahi, P., Pradhan, S., Rautaray, S.K. and Kar, G. 2020. Evaluating mini pan evaporimeter for on-farm irrigation scheduling. Journal of Agrometeorology, 22: 243-247.

RESEARCH MEETINGS

Research Advisory Committee (RAC) Meeting

The second meeting of 8th Research Advisory Committee (RAC) of ICAR-IIWM, Bhubaneswar was organized on September 8, 2020 through virtual mode. Dr. P.K. Sharma, Former VC, Sher-e-Kashmir University of Agricultural Science & Technology of Jammu and the Chairman of the Committee presided over the meeting. Among other members of the Committee, Dr. B. J. Pandian, Former Director, Water Technology Center, TNAU, Tamil Nadu; Dr. A.K. Sarkar, Ex-Dean, Birsa Agriculture University, Ranchi; Dr. G.G.S. N. Rao, Ex-Project Coordinator, ICAR-AICRP on Agro-Meteorology, ICAR-CRIDA, Hyderabad; and Dr. Adlul Islam, ADG (S&WM), NRM, ICAR, New Delhi attended the meeting. During the meeting the Annual Report of the Institute for 2019 was released by the Chairman. Dr. A. Mishra, Director of the



institute presented an activities of the institute and Program Leaders presented their significant research findings during the last year, which were appreciated by the Committee. Chairman and members of RAC emphasized to use time tested efficient water management technologies for the benefits of farmers. They also mentioned that as we received sufficient monsoon water, thereby, we must reap bumper crop production while using scientific agricultural water management for

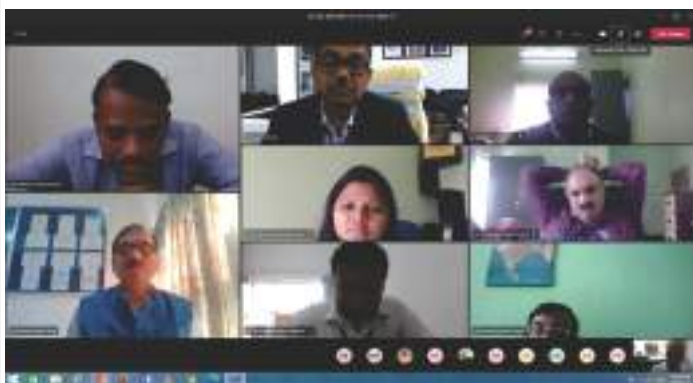
greater productivity. They emphasized for more research on use of micro-irrigation for cash crops, addressing problematic soils, robust agro-advisory service, and priority on use of ICT / DSS / automation. At the end of the meeting, Chairman and members expected to achieve the mandate of the institute, and hoped for continuance of farmer-oriented inter-institutional collaborative water management research activities by the institute.

Institute Research Council (IRC) Meeting

The 2nd meeting of the IRC for the year 2020-21 was held during December 15-16 and 21, 2020 with the welcome address by Dr. S.K. Jena, Principal Scientist & Member Secretary, IRC.

Thereafter, Dr. Atmaram Mishra, Director, ICAR-IIWM & Chairman, IRC delivered introductory remarks. There was presentation of 10 new project proposals during December 15-16, 2020. The progress of two ongoing institute projects were also presented. Results of 14 number of externally funded projects were presented on December 21, 2020.

Chairman, IRC made the concluding remarks with encouraging notes to continue good research work, timely reporting and systematic record keeping. He also emphasized for the improvement of IIWM research farm at Deras, Mendhasal and main campus.



Agri-Consortia Research Platform on Water Project Meeting

ICAR-IIWM organized two days concept note presentation meeting for Agri-CRP on Water for the period 2021-2026 on December 1-2, 2020. On first day, some of the ICAR, SAU, and other institutes, who were partners during the first phase of Agri-CRP on Water (2015-21)



presented their concept notes. On December 2, 2020, some of the ICAR, SAU, and other institutes, presented their new concept notes.

The meeting was presided over by Dr. Atmaram Mishra, Director of the Institute. In addition to the eight old themes, presentations were also made for four new themes, namely, Development and management of surface water resources using geoinformatics, robotics and nanotechnology; Automated canal irrigation system for efficient and smart irrigation water management; Strategies for sustainable groundwater management in India; and IOI enabled sensor based smart irrigation management system. Dr. S.K. Jena, Principal Scientist coordinated this meeting.

EVENTS, NEWS & CELEBRATIONS

ICAR-IIWM Organized Webinar

A webinar on 'Rubber Check Dam for Water Conservation and Irrigation' was organized by ICAR-IIWM, Bhubaneswar on July 29, 2020. Around 85 participants including Director, DSCWD; Joint Director, DSCWD; Executive Engineers, Assistant Engineers, PIAs, PDs, ADDs involved in watershed management in Government of Odisha participated in the webinar under the Chairmanship of Dr. A. Mishra, Director, ICAR-IIWM, Bhubaneswar. Dr. S.K. Jena, Principal Scientist of the institute gave the lead presentation on the topic.

Independence Day Celebration



The 74th Independence Day of the country was celebrated on August 15, 2020 with patriotic fervor and gaiety. On this occasion, national flag was hoisted by the Chief Guest & Director of the institute. He addressed the staffs and family members of the institute with encouraging words and urged upon the need for hard work and dedication by the staffs for the welfare of the farming community, and to make the institute as well as the country proud.

Chief Engineer and Team Visited ICAR-IIWM



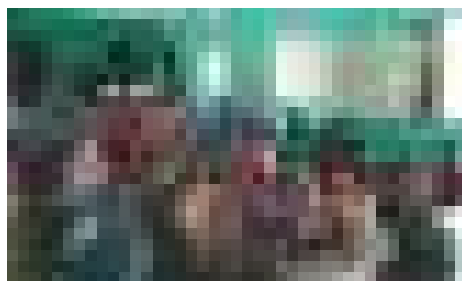
A team consisting of Chief Engineer and Executive Engineers of Department of Water Resources, Government of Odisha visited to the rubber dam installation site at Deras farm, Khordha on August 19, 2020. The team also interacted with scientists of ICAR-IIWM and discussed about feasibility and benefits of rubber dam. Dr. S.K. Jena, Principal Scientist coordinated this visit.

Hindi Pakhwada



ICAR-IIWM celebrated Hindi *Pakhwada* during September 14-28, 2020. During *Pakhwada*, various Hindi competitions were organized viz., noting and drafting, essay and letter writing, speech in Hindi, debate completion etc. A Hindi workshop on 'Information regarding the official language rules, acts and the problems in implementation' was also organized on September 25, 2020. Shri Hari Ram Pansari, Retd. Senior Manager (Rajbhasha), NALCO, Bhubaneswar was the key speaker in the workshop. Dr. A. Mishra, Director distributed prizes to the winners of the competition. Dr. O.P. Verma, Scientist and Mr. K.K. Sharma, Technical Assistant (Hindi Translator) organized this *Pakhwada*.

Celebration of Mahila Kisan Divas



ICAR-IIWM celebrated 'Mahila Kisan Divas' on October 15, 2020 and organized a *Mahila Kisan Gosthi* at Hansapada village, Nimapada block, Puri with the theme 'Empowerment of Women for Doubling Farm Income'. Nearly thirty seven women farmers participated this program by following the prescribed COVID norms.

ICAR-IIWM Celebrated Constitution Day



ICAR-IIWM celebrated 71st Constitution Day of India on November 26, 2020 by reading the preamble administered by Hon'ble President of India Shri Ram Nath Kovind. It was followed by talks delivered by Dr. P.S. Brahmanand, Principal Scientist on 'Constitutional Values and Their Significance' and by Mr. Ajit Kumar Nayak, Scientist on 'Fundamental Principles of Indian Constitution'. Later, Director of the institute addressed the staff and stressed the need for self-introspection regarding the sincere implementation of constitutional values and appreciated the views expressed in the talks regarding constitutional values and fundamental principles. This program was coordinated by Dr. O.P. Verma, Scientist of the institute.

ICAR-IIWM Observed Farmer-Scientist Interactions Meet



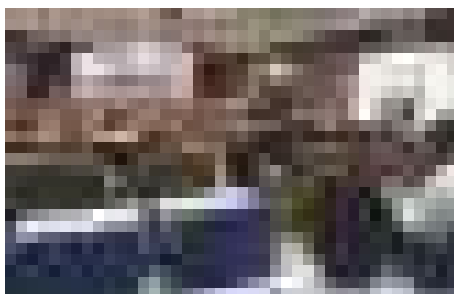
A Farmers-scientists interaction meet was organized by ICAR-IIWM at adopted village of Mera Gaon-Mera Gaurav i.e., Alisha, Puri district, Odisha on December 22, 2020. Overall, about 139 farmers participated and took active interest in registering on PM Kisan Website on the occasion of *Kisan Divas* Celebration.

PM-Kisan Samman Nidhi Yojana Program



Hon'ble Prime Minister of India Shri Narendra Modi interacted with the farmers and transferred ₹18,000 crore to the bank account of 9 crore farmers on December 25, 2020. ICAR-IIWM organized a program to view live telecast of address by the Hon'ble Prime Minister of India for the staff and farmers. This program was registered by the 904 number of farmers throughout the Odisha state at PM Kisan Website with the help of scientists of ICAR-IIWM.

ICAR-IIWM Observed Vigilance Awareness Week-2020



ICAR-IIWM observed vigilance awareness week during October 27 - November 2, 2020 with the theme 'Vigilant India, Prosperous India' (सतर्क भारत, समृद्ध भारत). Dr. A. Mishra, Director, administered the pledge to all the staff members of the institute. A debate competition and group discussion was organized for the staff. Lectures on vigilance were delivered by Dr. P. Nanda, Principal Scientist and Shri S.K. Das, FAO, ICAR-NRRI, Cuttack to the staff of ICAR-IIWM, Bhubaneswar. 'Vigilance Awareness Gram Sabha' was organized for the farmers at Bhakarsahi village, Baliana and 47 farmers participated in the program. Also, a social media platform through WhatsApp 'IIWM Vigilance Week 2020' was created for sensitizing about activities and e-pledge registration for the staff of ICAR-IIWM. Director of the institute distributed awards to the winners of various competition. Dr. P. Nanda, Principal Scientist and VO, ICAR-IIWM, Bhubaneswar coordinated these programs.

Celebration of 150th Birthday of 'Father of the Nation' Mahatma Gandhi



A weeklong celebration of 150th Birthday of 'Father of the Nation' Mahatma Gandhi was organized at ICAR-IIWM, Bhubaneswar during September 26 - October 2, 2020. Various programs, viz., painting competition for children, online Yoga program, online lectures, Swaraj, quiz program on Mahatma Gandhi, Swachhata and plantation activities, online workshop etc. were organized. An online lecture on 'Gandhian Philosophy on Agriculture and Gram Swaraj' were delivered by Dr. Bhagban Prakash, Eminent Administrator and Gandhian Scholar, and Mr. P.N. Mohanty, Social Worker and Gandhian Philosopher. Online Workshop on 'Relevance of Gandhian Philosophy and Teachings in Today's World' was also conducted. Dr. A. Mishra, Director of the institute felicitated the Chief Guest, Eminent Gandhian scholar Mr. P.N. Mohanty, and distributed the certificates and prizes to the winners of different competitions and. The program was organized by Dr. S. Mohanty, Dr. M. Raychaudhuri and Dr. H. K. Dash, Principal Scientists of the institute.

Distributed Planting Material under STC Project



Krishi Vigyan Kendras (KVK) under OUAT located at Sundargarh and Rayagada districts were mobilized for facilitating various planting materials in the adopted tribal

villages. Total 4350 nos. each of various planting materials of papaya, Baula, Guava and Drumstick were distributed to the farmers of two villages of Sundargarh and 3065 nos. of various planting materials like Papaya, Drumstick, Pomegranate, Lemon, Mango, Coconut, Bamboo and Aonla were distributed to farmers of STC project village of Rayagada district. They were advised for back yard planting for meeting their day to day need.

Activities under SCSP Project



Inputs distribution to Scheduled Caste farmers: To strengthen livelihood of SC families under SCSP project, nearly 10,000 fish fingerlings were stocked in three ponds covering 1.8 ha area at Chitra and Nijogkasoti Villages of Nimapara block. Fish feed (1.05 quintal) were distributed to participating groups for benefitting about 100 families. In other villages, i.e., Dangariguda and Pandigaon villages of Bhawanipatna block, 500 chicks of Kuroiler breed were distributed to hundred farmers. Similarly, vegetable seeds, bio-pesticides were distributed to the farmers of Pandigaon, Dangariguda (Bhawanipatna block), Ranga, Chitra, Budhei (Nimapara block), Nathipada (Banapur block) and Kadampal (Dhenkanal Sadar block). Farmers were also trained for using these inputs.

Group farming: ICAR-IIWM initiated group farming on a 1.5 ha land by growing winter vegetable crops at Ranga village of Nimapara block through supplying inputs like seeds, bio-pesticides, small tools etc., and providing demonstrations on use of neem-based pesticides, yellow stick trap and pheromone traps



Activities at farmers field under SCSP Project

TRAINING AND CAPACITY BUILDING OF IIWM EMPLOYEES

Official & Designation	Subject	Organization	Period
Mrs. Ankhila R. Handral, Scientist	Professional Attachment Training	ICAR-IIHR, Bangalore	May 5-August 4, 2020
Mr. Biswaranjan Behera, Scientist	Professional Attachment Training	ICAR-NRRI, Cuttack	May 5-August 4, 2020
Dr. A.K. Nayak, Principal Scientist Dr. S. Pradhan, Scientist	E-Office - Online training	ICAR - IASRI, New Delhi	June 17, 2020
Dr. A.K. Nayak, Principal Scientist	Introduction to Machine Learning using Python	NIT, Jalandhar	July 11-20, 2020
Dr. R.K. Panda, Principal Scientist Dr. Dibakar Ghosh, Scientist	Training Programme on Agriculture 4.0: Precision & Automated Agricultural Technologies	CAAST-CSAWM, MPKV, Rahuri	September 28 - October 2, 2020
Dr. A.K. Nayak, Principal Scientist	Generic Online Training in Cyber Security	Ministry of Electronics and Information Technology, Govt. of India	December 16, 2020

WEBINAR, SYMPOSIUM, WORKSHOP & MEETINGS ATTENDED

Officials	Name of the Webinar / Programs / Virtual Meetings	Organized by	Period
Dr. P.S. Brahmanand	Divisional Review Meeting of Foreign-aided Projects	NRM Division, ICAR, New Delhi at ICAR-CSSRI, Karnal	July 13, 2020
All Scientists of ICAR-IIWM	92 nd Foundation Day and Award Ceremony of the ICAR through Video- Conferencing	ICAR, New Delhi	July 16, 2020
Dr. K.G. Mandal	Web-Lecture on 'Soil Science in Sustainable Food Systems Beyond COVID-19'	ICAR-IISS, Bhopal, NAAS Bhopal Chapter and ISSS Bhopal Chapter	July 21, 2020

Officials	Name of the Webinar / Programs / Virtual Meetings	Organized by	Period
Dr. K.G. Mandal Dr. P.P. Adhikary Mr. P. Deb Roy	Achieving Land Degradation Neutrality- International Webinar	ICAR-IASWC, Dehradun	July 22-24, 2020
Dr. K.G. Mandal Dr. P.K. Panda Dr. A.K. Thakur	National Webinar on 'Underutilized Crops for Augmenting Farmer's Income in Abiotic Stress Regions'	Society for Abiotic Stress Research in Agricultural Sciences (SARAS) and ICAR- NIASM, Baramati	August 10, 2020
Dr. R.R. Sethi	National Web-Conference on 'Technological Approaches for Resource Conservation and Management for Environmental Sustainability'	Academy of Natural Resource Conservation and Management (ANRCM), Lucknow	August 16-17, 2020
Dr. S.K. Rautaray	Towards Self-reliance in Coastal Agriculture: Challenges and Way Forward	Indian Society of Coastal Agricultural Research, Canning Town	August 22, 2020
Dr. S.K. Jena	Online review meeting of DST Network Project on Revival of Village Ponds through Scientific Interventions	Director, NRDMS, DST, Govt. Of India, New Delhi	August 27, 2020
All Scientist of ICAR-IIWM	Inauguration of Academic and Administrative Building of Rani Lakshmi Bai Central Agricultural University, Jhansi by Hon'ble Prime Minister of India	ICAR, New Delhi & Rani Lakshmi Bai CAU, Jhansi	August 29, 2020
Dr. K.G. Mandal	Video-Conferencing Meeting on Precision Farming	ADG (ICT), ICAR, New Delhi and IARI, New Delhi	September 7, 2020
Dr. R.K. Panda	Online 7 th Dr. B. P. Ghildyal Memorial Lecture on 'Transforming Indian Agriculture in New Normals'	Indian Society of Agrophysics and Division of Agricultural Physics, ICAR-IARI, New Delhi	September 10, 2020
All Scientist of ICAR-IIWM	Inauguration of School of Agri-Business and Rural Development of Dr. RPCAU, Pusa, Bihar by Hon'ble Prime Minister of India	ICAR, New Delhi & Dr. RPCAU, Pusa, Bihar	September 10, 2020
Dr. H.K. Dash	Intellectual Property Rights in Agricultural Research and Education in India	NAHEP and IP&TM unit of ICAR Headquarters	September 12-28, 2020
Dr. P.K. Panda	Webinar on Farm Bills 2020 : Understanding the implications	ICAR- IARI, New Delhi	September 26, 2020
Dr. K.G. Mandal Dr. A.K. Thakur	Webinar on <i>Vaishwik Bhartiya Vaigyanik</i> (VAIBHAV) Summit- a Global Virtual Summit of Overseas Indian Researchers and Academicians	NITI Aayog, Govt. of India, New Delhi	October 2-5, 2020
Dr. K.G. Mandal	International Webinar on 'A New Measure: The Reform of the International System of Units'	The NASI Delhi Chapter & MHRD Institution Innovation Council (IIC), University of Delhi under the aegis of DBT Star College Program	October 6, 2020
Dr. R.K. Panda	CII Webinar on 'Evaluation of Science Indicators of Public Funded R&D Institutions'	Office of the Principal Scientific Adviser to the Government of India	October 14, 2020
All Scientists of ICAR-IIWM	World Food Day program through Virtual Mode & Digital Release of Commemorative Coin on the Occasion of 75 Years of FAO	ICAR, New Delhi	October 16, 2020
Dr. S.K. Jena	National Webinar on 'Hydro-informatics for Smart Water Management in Agriculture'	DRPCA, Pusa in collaboration with NIH, Roorkee; IIT, Roorkee and DAE, IARI, New Delhi	October 20, 2020

Officials	Name of the Webinar / Programs / Virtual Meetings	Organized by	Period
Dr. P.P. Adhikary	National Webinar on 'Quality Improvement and Proficiency Testing of Soil Laboratories in India – Towards Improving the Quality of Analytical Data and Harmonization of Soil Test Methods'	ICAR – IISS, Bhopal	October 31, 2020
Dr. R.K. Panda	Discussion on 'Planning for Water Harvesting in North Bengal and NE region	Uttar Banga Krishi Viswavidyalaya, West Bengal	November 6, 2020
Dr. R.K. Panda	19 th Water Talk on 'Conserving Ecology & Biodiversity and Securing Livelihoods through Rainwater Harvesting' (Online)	National Water Mission, Ministry of Jal Shakti, Dept. of Water Resources, RD & GR, GoI	November 20, 2020
Dr. H.K. Dash	Virtual Workshop cum Annual Review Meeting of ZTMCs/ITMUs/ ABIs under ICAR institutes of NRM, Education and Engineering Divisions under NAIF	IP&TM unit of ICAR	November 23-24, 2020
Dr. H.K. Dash	Intellectual Property Management in Agriculture	ICAR-IIAB, Ranchi	November 28, 2020
All Scientists of ICAR-IIWM	Online World Soil Day-2020 Meeting	Soil Conservation Society of India, New Delhi & International Soil Conservation Organization, New Delhi	December 5, 2020
Dr. S.K. Rautaray	Environment and Biodiversity	Odisha Environment Congress 2020 (11 th Edition)	December 20-22, 2020
All Scientists of ICAR-IIWM	<i>Pradhan Mantri Kisan Samman Nidhi</i> (PM-KISAN) programme	PMO, Government of India	December 25, 2020
Dr. P.K. Panda	National Web Conference on 'Sustainable Soil and Water Management for Biodiversity Conservation, Food Security & Climate Resilience'	Soil Conservation Society of India, New Delhi	December 29-30, 2020
Dr. R.K. Panda Dr. P.K. Panda Dr. P.P. Adhikary	National Webinar on 'Alternatives to Plastics for Sustainable Environmental Health'	ICAR-IISS, Bhopal	December 30, 2020

SWACHH BHARAT ABHIYAN

The Director and staff of ICAR-IIWM actively participated in the *Swachh Bharat Abhiyan* during July to December, 2020. Several cleanliness drive and *swachhta* awareness programs were conducted in the institute's main campus, research farm, guest house area, Sailashree Vihar area, Maitree Vihar area, schools and SCSP villages. The Director, ICAR-IIWM administered *Swachhta Spath* to all the staff of the institute during the celebration of 'Swachhta Hi Sewa' (September 11 to October 02, 2020) and *Swachhta Pakhwada* (December 16-31, 2020). During *Swachhta pakhwada*, several cleaning and sanitation drive were organized at main campus, research farm, residential area of staff, MGMG & SCSP villages. Establishment and store section of administrative wing were cleaned and unwanted old files were disposed of. *Swachhta* drive was organised at Bindhapada village of Tirtol block, Jagatsinghpur. Siam weed (*Chromolaena odorata* L.) was cleaned from the front foot path of the Institute's main entrance. The

swachhta campaigning was also organized at Shantali basti of Nalco Nagar, Bhubaneswar where around 20 households participated. We made people aware about the negative impact of the Congress grass (*Parthenium hysterophorus* L.) and suggested residents about the ways and means to eradicate the weed from the locality. Training on preparation of compost from household wastages and their use for kitchen garden was organized. A virtual talk on 'Importance of *Swachh Bharat* Mission (SBM) in ensuring human health' delivered by Mr. Anubhav Patnaik, Advisor, Electronics and Information Technology Department, Govt. of Odisha. On the closing day of *Swachhta Pakhwada*, Dr.P.K. Mishra, Former Director, ICAR-IISWC, Dehradun graced the occasion as Chief Guest in presence of Dr. Atmaram Mishra, Director, ICAR-IIWM, Bhubaneswar. *Swachha Bharat Abhiyan* activities at ICAR-IIWM were coordinated by Mr. N. Manikandan and Dr. Roomesh K. Jena, Scientists of the institute.





Activities during *Swachhta Pakhwada* organized by ICAR-IIWM, Bhubaneswar

AWARDS, HONOURS & RECOGNITIONS

- ♦ Dr. S. Pradhan, Scientist received the 'Outstanding Scientist Award 2020' presented by 'The Society of Tropical Agriculture', New Delhi.
- ♦ Dr. S.K. Jena, Principal Scientist has received 'Appreciation Award' for successful completion of DST-RVPS project, presented by WTC, ICAR-IARI, New Delhi.
- ♦ Dr. S. Raychaudhuri, Principal Scientist received 'Certificate of Appreciation' from Atal Incubation Centre, sponsored by NITI Aayog/ Atal Innovation Mission for contribution in the field of Organic Agriculture.
- ♦ Dr. P.P. Adhikary, Senior Scientist has been recognized as Impactful Peer Reviewer 2020 of PLOS ONE journal by Public Library of Science.
- ♦ Dr. P.S.B. Anand, Principal Scientist has been nominated by the ICAR as Member, IMC of ICAR-Directorate of Weed Research, Jabalpur, Madhya Pradesh and ICAR-Research Complex for Eastern Region, Patna, Bihar.
- ♦ Dr. S.K. Jena Principal Scientist has been nominated by the ICAR as Member, IMC of ICAR Research Complex for Eastern Region, Patna, Bihar.
- ♦ Dr. P.S.B. Anand, Principal Scientist has been invited as member, National level Technical Sub-Committee on Flood constituted by Credit Division, Ministry of Agriculture & Farmers Welfare, Government of India.
- ♦ Dr. M. Raychaudhuri, Principal Scientist was invited for special lecture on World Soil Day (December 5, 2020) on 'Keep soil alive, protect soil biodiversity' organized by Kumaraguru Institute of Agriculture, TNAU, Tamil Nadu.
- ♦ Dr. M. Das, Principal Scientist has been invited for lecture on 'ETP water quality and probability of use in mainstream agriculture' by HINDALCO, Muri on July 7, 2020.
- ♦ Dr. S. Raychaudhuri, Principal Scientist was invited for lecture on 'Principles of organic farming and recycling as the mainstay of organic agriculture' on July 7, 2020 during training program on 'Organic Farming' organized by Regional Centre of Organic Farming, GOI, Bhubaneswar.
- ♦ Dr. M. Das, Principal Scientist has been invited for lecture on 'Water quality issues, wastewater use preamble and outlook of use especially in farming' in the Brainstorming Session on Utilization of Wastewaters in Urban and Peri-urban Agriculture on November 17, 2020.
- ♦ Dr. S. Raychaudhuri, Principal Scientist was invited for lecture on 'Safe wastewater irrigation - policy perspective' in the Brainstorming Session on Utilization of Wastewaters in Urban and Peri-Urban Agriculture organized by NAAS, New Delhi.
- ♦ Dr. P.P. Adhikary, Senior Scientist has been nominated as adjudicator of a Ph.D. thesis submitted to Sidho-Kanho-Birsha University, Purulia, West Bengal, India.
- ♦ Dr. M. Raychaudhuri, Principal Scientist has been nominated as an external expert in Viva-Voce examination of Ph.D. Thesis on Agricultural Chemistry and Soil Science, Post-Graduate Studies, BCKV, Nadia, West Bengal on August 14, 2020.
- ♦ Dr. P.P. Adhikary, Senior Scientist has been nominated as adjudicator of a Ph.D. thesis submitted to Academy of Scientific and Innovative Research (AcSIR), CSIR-IMMT, Bhubaneswar during December, 2020.
- ♦ Dr. P.K. Panda, Principal Scientist acted as an external examiner and conducted thesis viva of students of Department of Agronomy, OUAT, Bhubaneswar.
- ♦ Dr. S.K. Jena, Principal Scientist has been nominated as member of the assessment committee for promotion of Technical personnel of ICAR-National Rice Research Institute, Cuttack.
- ♦ Dr. S.K. Jena, Principal Scientist has been invited for Dr. A.P.J. Abdul Kalam Endowment Lecture on 'Advanced rainwater harvesting technologies in watersheds' by Andhra Pradesh Akademi of Science on December 24, 2020.
- ♦ Dr. S.K. Rautaray, Principal Scientist has been invited for the panel discussion in the Technical session IV -Case studies on conservation of biodiversity in Odisha Environment Congress 2020 (11th Edition) held during December 20-22, 2020.

- Dr. P.K. Panda, Principal Scientist has been invited for the panel discussion on Research, Policy and Action Plan for Alternatives to Plastics in the National Webinar on 'Alternative to Plastics for Sustainable Soil and Environmental

Health' organized by ICAR-IISS, Bhopal on December 30, 2020.

- Dr. S.K. Rautaray, Principal Scientist has been invited as resource person for the training program on 'Irrigation

Management & Income Augmentation Farming in Command Areas' organized by WALMI, Odisha for the officers from Agriculture and Farmers' Empowerment Department and Water Resources Department, Govt. of Odisha.

DD Kisan/Radio Talk



- Dr. P.K. Panda participated as an expert in the panel discussion on 'Pradhana Mantrinka corona jana andolana ebam janasadharananka sahabhagita' (PM's corona jana andolan

and people's participation) on December 26, 2020 on Doordarshan.

- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on 'Jala surakhyara abasyakata' (Need of water conservation) at All India Radio, Cuttack on September 8, 2020.
- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on 'Agua rabi fasalare jala parichalana' (Water management in early rabi crops) at All India Radio, Cuttack on September 28, 2020.
- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on 'Krusaka sabuthu bada karona jodhha' (Farmers are greatest corona warriors) at All India Radio, Cuttack on October 4, 2020.

- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on "COVID talabandi hatiba pare krushaka manaka pain satarka suchana" (Guidelines for the farmers during COVID unlock) at All India Radio, Bhawanipatna on October 9, 2020.

- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on 'Corona pain pradhan mantrinka jana andolana' at All India Radio, Cuttack on November 15, 2020.

- Dr. P.K. Panda, Principal Scientist, participated as an expert in program on 'Corona saha sangram' (Jan Andolan of PM for COVID) at All India Radio, Cuttack on December 26, 2020.

Joining, Promotion & Transfer

- Dr. Dibakar Ghosh, Scientist (Agronomy) joined this institute on August 26, 2020 after transfer from ICAR-Directorate of Weed Research, Jabalpur, Madhya Pradesh.
- Dr. Roomesh K. Jena, Scientist (Soil Science) joined this institute on August 27, 2020 after transfer from ICAR-NBSS&LUP, Regional Centre, Jorhat.



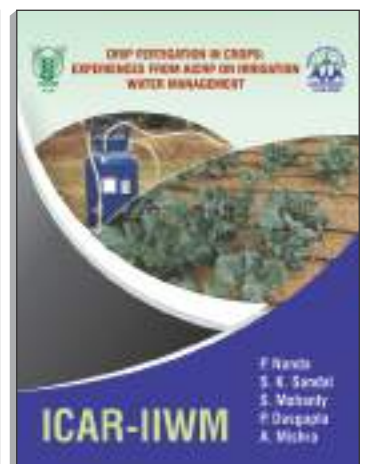
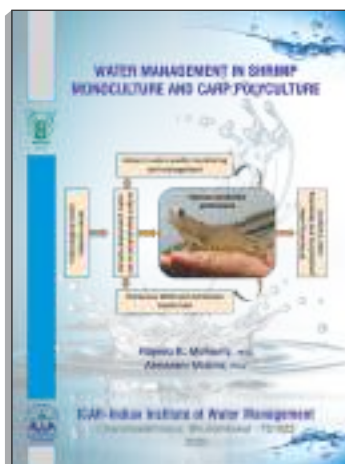
- Mrs. Sanghamitra Singh joined this institute as Skilled Supporting Staff on September 8, 2020 on compassionate ground.



- Dr. P. Panigrahi has been promoted to Principal Scientist through CAS of the ICAR w.e.f. September 11, 2018.

- Mr. N. Manikandan, Scientist (Agricultural Meteorology) transferred to ICAR-Central Research Institute for Dryland Agriculture, Hyderabad on November 9, 2020.

ICAR-IIWM Publications



भाकृअनुप-भारतीय जल प्रबंधन संस्थान
भुवनेश्वर-751023, ओड़िशा, भारत