



In this issue



DIRECTOR'S COLUMN



Re-Imagining the Next Generation Watershed Development in India

Watershed development activities have been continued during the last about 50 years in India in the name of river valley projects in 1960s to common guidelines in 2008 and afterwards under different programmes of the Government of India. There have been remarkable achievements in completed watersheds: reduction in soil loss and surface runoff by 52 and 58%, respectively, increase in irrigated area from 34 to 100%, increase in cropping intensity, increase in crop productivity and net returns by even 63%, benefit/cost ratio from 1.10 to 15.72, increased availability of drinking water, groundwater recharge, farmers income and employment generation in different parts of the country. Now the sustainable land management is a major challenge to achieve the 'land degradation neutrality (LDN)' by the year 2030 as set by the United Nations Convention to Combat Desertification. This target can be achieved through the next generation watershed development activities in the country.

The key elements of the next generation watershed development will be as: *Scale effects* i.e. watershed management activities be considered at the local, national and regional levels, freshwater supply be managed with established linkages and interactions between upstream-downstream; *Stakeholder's participation*- all stakeholders i.e. government institutions, NGOs and other concerned parties be involved from the very beginning i.e. from planning, designing for development; *Emphasis on water management*- to deal with water resources development, effective watershed management with adequate technologies; *Economic returns*- greater attention be needed to ensure the economic returns to all upland and downstream inhabitants with launching of payment for environmental and hydrological services; *Institutional arrangements*- need for better understanding and identification of institutional and organizational arrangements including legislative frameworks; *Long-term commitment*- not only the environmental conservation, watershed management be considered for the improvement of living conditions of rural communities which needs a long-term commitment from all stakeholders; *Professional courses on watershed projects*- support would be essential to the establishing institutions those offer certificate/ diploma/ degree programs with a specific focus on watershed management, rural livelihoods and rainfed farming; *Establishing dedicated departments for watershed development project*- for executing watershed development activities in the country, to improve the professional capacities and reduce the administrative hassles; *Convergence of activities under watershed and MGNREGS*- to develop common operating norms by converging NREGS and watershed development projects; *Comprehensive package for drought prone areas*- to revitalize rainfed agriculture and improving resilience of soil-crop-environment systems with climate change; *Groundwater management and regulation*- to ensure sustainability in

watershed development through regulated use of groundwater, water pricing and appropriate policy of regulated electricity use in irrigation.

Major points to consider while policy formulations are: i) the next generation watershed development should address doubling farmers' incomes, more crop per drop, water to every plot, soil health, and promotion of entrepreneurship, capacity building, coordination and convergence, and overall rural development; ii) Digitization of data on land resources inventory, hydrology and decision support systems covering soil and water resources, plan development using

water balance, water budgeting and cropping systems; iii) accuracy on model estimation of runoff, sediment yield, nutrient loss etc. and to identify the most vulnerable areas with respect to soil and nutrient losses within a watershed; developing network of meteorological and hydrological parameters across the country; iv) use of mathematical models, remote sensing, GIS and other tools and techniques for hydrologic evaluation of watersheds, historical changes in land use, and the changes in consumptive water use by major crops, livestock and allied farm activities; v) need to integrate hydrogeology and biophysical aspects in the watershed design, and to develop policy to accrue

biophysical and economic benefits of watershed management; vi) implementation of value chain development through promotion of farmer producers' organization and public-private partnerships in watersheds; vii) evidence-based water management technologies be incorporated rainwater conservation; viii) increasing use efficiency of harvested water through sensor-based micro-irrigation, and reducing electricity consumption using solar pumps; ix) capacity building of stake holders at different level- national, state, district, block, and watershed with the changing scenario and eco-hydrological systems.

RESEARCH ACHIEVEMENTS

Rainwater Harvesting Structures Along with Recharge Well : Option for Enhancing Farm Income in Hard Rock Areas

Out of total geographical area of 155,707 km² in Odisha, 98,498 km² (63.90%) is under upland (plateau, ghat, undulating) areas with more than 53.45% cultivable upland. Nearly 78% population is dependent upon agriculture but due to limited options for development of water resources either through surface or groundwater system, most of the area remained fallow in these areas. Rainwater harvesting structures at appropriate locations has proven to be one of the best method to conserve rain water and help to recharge the aquifer. A study was conducted in Srirampur village within Bargharianala micro-watershed located in Daspalla block, Nayagarh district of Odisha to know the impact of rainwater harvesting structures on recharge, availability of water in these structures during *rabi* and summer season, cropped area, yield and overall income of farmers. Suitable sites for construction recharge structures were delineated through remote sensing and GIS. Based on the potential recharge zones, series of three rainwater harvesting structures in Srirampur village were selected for the detail study. A recharge well of 12 m depth and 1.2 m diameter was constructed in one of the structure based on the lithological information of the area. The impact of recharge structures along with rainwater



Pre-intervention



Post-intervention



Increased dug well command area due to rainwater harvesting and recharge structures



harvesting structures were monitored during monsoon and post-monsoon season during 2017-2019. Water balance study showed that annually recharge from structure with 0.75 ha m capacity structure varied from 0.12 to 0.58 m. For 0.5 ha m structure recharge varied within 0.18 to 0.3 m. In case of structure of 0.2 ha m capacity, with a recharge well, recharge increased up to 0.86 m during the study period. The average annual runoff from Bargharianala micro watershed was estimated at 214626 m³ (21.46 ha m) amounting to approximately 39% of precipitation. Based on water balance study and multi criteria analysis in delineating potential area for recharge, nearly 22 number of rainwater harvesting structures up to capacity of 0.5 ha m would

be able to harvest 50% of the runoff from the watershed. The impact of these structures is extended up to 300 m areal extents covering the area of influence of 15 ha command area in hard rock areas of Odisha. This would also ensure in raising water table depth to 1m in nearby dug wells. Due to construction of rain water harvesting structures in Srirampur village, there was increase in *kharif* cropped area from 3.2 ha to 14.98 ha and *rabi*, summer cropped area from 1.21 ha to 11.54 ha. The annual net return from crop was increased to 1 29742/- as compared to 1 7292/- before the intervention. Hence the rainwater structures helped to recharge the top aquifer up to 10m depth by increasing water level in dug wells, it also helped to increase cropped area and enhanced the farm income.

R. R. Sethi, M. Das, B. Panda and S. K. Ambast

Water Use and Management in Carp Polyculture

Aquaculture is a highly profitable farm enterprise and livelihood option for a large number of farmers in India. It is one of the most vibrant sector of the global food production systems, providing roughly 50% of the worldwide fish consumption. Its impressive growth during the last two decades has generated both optimism and trepidation particularly among aquaculturists and policy experts, associated with global aqua food security. However, under the changing climate scenario, water scarcity has posed serious challenges to aqua food security and ecosystem sustenance, along with the threat of population growth expecting to reach 9.6 billion by 2050. In fact, erratic monsoon behaviour due to climate change and limited availability of freshwater resources necessitate wise-use of water resources in aquaculture and warrant a more holistic approach to water management. Since, aquaculture has been criticized widely for wasteful use of water resources, efforts to enhance productivity with less water are critical to manage the crisis in future. In this scenario, water budgeting and density-dependent water use are two major requirements in improving aquaculture performance. Therefore, enhancing the water productivity in aquaculture sector is of prime necessity. Further, more often than not,

farmers carry out unplanned water exchange during culture period that becomes counterproductive and uneconomical, thus there has been the need to determine optimum amount of water required for successful aquaculture operation. With this challenging mission, for the first time in India, ICAR-Indian Institute of Water Management, Bhubaneswar, quantified the optimum total water requirement and consumptive water



Fig.1 Aquaculture water management strategies

use through hydrological water balance study for improving water productivity, water use efficiency, production performance and profitability, while lessening water footprint in carp polyculture and integrated aquaculture based farming system. In freshwater aquaculture, enhancing productivity and profitability depends largely upon the degree of water

management (Fig.1), which in turn improves water productivity, water use efficiency and minimize water footprint. As water quality is of utmost importance, its assessment, monitoring and water budgeting play vital role in successful aquaculture operations.

In carp poly culture (IMCs), with BMP at the optimum stocking density of 8,000 fingerlings ha^{-1} , total water use could be minimized to 28,200 m^3 , without hampering the normal growth and production. With this stocking density, fish productivity enhanced to a level of 3.92 t ha^{-1} in 180 days with economic benefit (OV:CC) of 1.81. Further, net income of ₹10.3 was generated per m^3 of water used while only 2.9 m^3 of water was required to produce 1 kg of fish biomass. In this system, total water footprint (WF_t) amounted to 1633 $\text{m}^3 \text{t}^{-1}$.

The study was carried out to optimize water requirement of different freshwater polyculture systems under CRP on Water (Theme-5). Out of four different production systems such as (1) IMC grow-out culture : single stock-single harvest system, (2) IMC grow-out culture : single stock-multi harvest system, (3) IMC grow-out culture : multi stock-multi harvest system, (4) intercropping of IMC-Minor carp; Multi Stock-Multi Harvest system (MSMH) was found to be more efficient, productive and profitable (Table 1) in terms of water use efficiency (0.57 kg m^{-3}), productivity (4.6 t ha^{-1}), FCR (1.51), total water footprint (998 $\text{m}^3 \text{t}^{-1}$) and net consumptive water productivity (₹9.2 m^{-3}). Next to Multi Stock-Multi Harvest system, intercropping system of IMC-Minor carp was considered efficient, productive and profitable.

Table 1. Water use in different freshwater carp polyculture systems

Water management parameters	Single stock-single harvest	Single stock-multi harvest	Multi stock-multi harvest	Intercropping of IMC-Minor carp
Stocking density, ha^{-1}	10,000 IMC fingerlings	10,000 IMC fingerlings	4,000 IMC fingerlings**	8,000 fingerlings Including 50% IMC
Culture duration	360 days	360 days	360 days	360 days
Water depth (m)	1.2 up to 180 DOC 1.5 up to 360 DOC	1.2 up to 180 DOC 1.5 up to 360 DOC	1.2 up to 180 DOC 1.5 up to 360 DOC	1.2 up to 180 DOC 1.5 up to 360 DOC
TWU, ($\times 10^4$, m^3)	2.40	2.53	2.5	2.43
CWU, ($\times 10^4$, m^3)	0.73	0.84	0.82	0.76
CWUI, $\text{m}^3 \text{kg}^{-1}$	1.97	1.95	1.78	1.77
Productivity, t ha^{-1}	3.7	4.3	4.6	4.3
WUE _c (kg m^{-3})	0.50	0.51	0.57	0.56
FCR	1.76	1.63	1.51	1.72
NCWP, ₹ m^{-3}	7.7	8.1	9.2	8.3
Wf _t , $\text{m}^3 \text{t}^{-1}$	1122	1093	998	1026

TWU-total water use; CWU-consumptive water use; CWUI-consumptive water use index, WUE-water use efficiency; NCWP-net consumptive water productivity; WF_t-total water footprint; WUE_c-Consumptive water use efficiency; FCR-feed conversion ratio; DOC-days of culture, **partial harvesting was carried out at 6th and 9th month followed by restocking @1.25 times of the harvested numbers.

Rajeeb K. Mohanty, A. Mishra, P. Panigrahi, P. Sahu and S.K. Ambast

Automatic Drip Irrigation in Banana

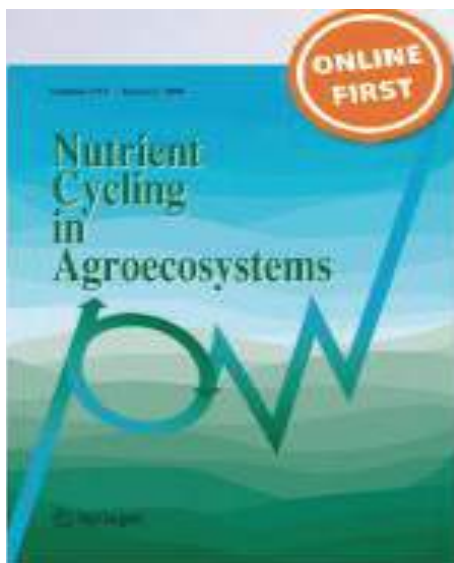


Water scarcity is one of the major factors affecting the productivity of banana. Drip irrigation (DI) has been found as a water saving technique in banana cultivation. Further, sensor-based automated DI which has been considered as a smart and real time water application technique might increase the water savings and enhance yield of banana. With this hypothesis, scientists of ICAR-IIWM, Bhubaneswar conducted a field experiment to study the performance of automated DI in banana (cv. Grand Naine). Five automated DI schedules: (i) soil water sensor-based irrigation (I_1) and timer based irrigation (ii) at 1 h interval 3 times daily at 80% crop evapotranspiration (ET_c) (I_2), (iii) at 2 h interval 2 times daily at 80% ET_c (I_3), (iv) at 1 h interval 3 times daily at 60% ET_c (I_4) and (v)

at 2 h interval 2 times daily at 60% ET_c (I_5) were compared with manually operated DI at 100% ET_c (I_6) in the crop. Sensor-based DI produced 15% higher fruit yield with 20% water saving, resulting in 40% higher water productivity (yield per unit quantity of water) compared with manually operated DI (water used, 820 mm; yield, 60.5 t ha⁻¹; water productivity, 6.2 kg m⁻³) in the crop. The fruit qualities (total soluble solids and acidity) of sensor-based irrigated plants were superior to manually irrigated plants. Overall, these results reveal that soil water sensor-based automated DI is a productive and water saving technique which may be adopted in banana cultivation in eastern India and anywhere else with similar agro-climates of the study site.

Adapted from P. Panigrahi, S. Raychaudhuri, A.K. Thakur, A.K. Nayak, P. Sahu, S.K. Ambast, 2019. Automatic drip irrigation scheduling effects on yield and water productivity of banana. *Scientia Horticulturae* (Elsevier) 257, 108677 View the full article online at <https://doi.org/10.1016/j.scienta.2019.108677>

Organic or Integrated Nutrient Management with *Sesbania* for Saving Energy & Fertilizer



Farmers apply increased rate of nitrogen fertilizer to produce more food grain and also to compensate for decline in productivity due to continuous use of chemical fertilizers. However, it is not possible to go on increasing fertilizer application rate at the cost of decline in soil and environmental health, increased pest and disease load, increased demand for fertilizer manufacture and import, unbearable burden on Government exchequer for subsidy, and undesired carbon foot print associated with fertilizer manufacture and transport. To reduce the use of chemical fertilizers, a multi-disciplinary team of scientists of ICAR-IIWM, researched on the role *Sesbania* as green manure-cum-cover crop in rice farming and analyzed its effect on fertilizer saving, energy efficiency, soil productivity and profitability. The role of *in-situ Sesbania* was studied under integrated nutrient management using (INM) and organic nutrient management (ONM). For the INM, green manure contributed 41.7, 6.8 and 13.3 kg N, P₂O₅ and K₂O ha⁻¹ and the remaining 38.3, 33.2 and 26.7 kg N, P₂O₅ and K₂O ha⁻¹ was provided through chemical fertilizers for rice crop. For the ONM, green manure contributed 58.3, 9.9 and 19.4 kg N, P₂O₅ and

K₂O ha⁻¹ and the remaining 21.7, 30.1 and 20.6 kg N, P₂O₅ and K₂O ha⁻¹ was provided through vermicompost (3 t ha⁻¹).

The results revealed that grain and straw yields of rice were similar with the INM and chemical fertilizers. However, the INM helped in reducing energy input (24%), improving energy efficiency (35%) and net return (20%). Soil organic C, available N and P contents increased significantly by 14%, 8% and 53%, respectively, for the INM at the end of 3-years study. As compared to chemical fertilizers, the ONM registered rice grain yield reduction by 8% but increased net return (8%) due to a higher premium of 1750 t⁻¹ paddy grain. The ONM reduced energy input (39%) and enhanced energy efficiency (57%) as compared to the chemical fertilizers. Soil organic C, available N and P contents increased by 23%, 39% and 12%, respectively, for the ONM at the end of three years. Thus, the practice of ONM or INM using *Sesbania* green manure-cum-cover crop saved energy and fertilizer, and maintained soil fertility. Wide adoption of this practice will help in avoiding the demerits of using chemical fertilizers and fulfilling the GoI's target to reduce the use of urea by 50% till 2022.

Adapted from S.K. Rautaray, S. Pradhan, S. Mohanty, R. Dubey, S. Raychaudhuri, R.K. Mohanty, A. Mishra, S.K. Ambast, 2019. Energy efficiency, productivity and profitability of rice farming using *Sesbania* as green manure-cum-cover crop. *Nutr Cycl Agroecosyst* (Springer). View the full article online at <https://doi.org/10.1007/s10705-019-10034-z>

RESEARCH MEETINGS

Research Advisory Committee (RAC) Meetings

The first meeting of 8th Research Advisory Committee (RAC) of ICAR-Indian Institute of Water Management, Bhubaneswar was held during August 16-17, 2019 under the chairmanship of Dr. P.K. Sharma. Dr. S.K. Ambast, Director, ICAR-IIWM welcomed esteemed Chairman and all members of RAC and presented research accomplishments of the institute. Action taken report (ATR) was presented by Dr. R.K. Panda, Principal Scientist and Member-Secretary, RAC. Theme-wise presentations were also made by theme leaders of different programs.

Recommendations:

- ◆ Research on 'Resilience to climate change' should be issue-based, and experiments be planned accordingly with clear-cut objectives and hypothesis. Research should focus on climate change effects for shorter periods (20-25 years).
- ◆ A pilot scale study may be conducted for automation of canal water / irrigation management using sensor-based technologies for a small branch canal targeting real-time situations.
- ◆ Up-scaling of water harvesting technologies / structures for different agro-ecological situations and effective utilization of harvested water may be taken up. Assessment of rainwater harvesting potentials may be taken up on priority.

- ◆ ICAR-IIWM should take a lead role in preparing guidelines and policy papers on current issues of national interest, viz., (a) free power / water to farmers (b) methods of irrigation practices in different agro-ecological regions based on ground reality (c) groundwater recharge (d) waste water management etc. The policy papers and guidelines should be communicated to respective state Governments / Stake holders for implementation.
- ◆ District-wise water contingency plans, similar to crop contingency plans, covering both flood and drought situations be prepared and communicated to respective Governments / Stake holders.
- ◆ Development of web-based system through android mobile Apps for water management technologies need to be converted into dynamic system by providing links to get information on current water level status in different

reservoirs, weather based agro-advisories, medium range weather forecast, crop market intelligence reports etc. and it should be interactive and user friendly for all stakeholders.

- ◆ The research survey exercise on groundwater contamination by nitrates due to excess use fertilizers be modified by segregating the samples collected from different depths, and the time of collection must be coinciding with crop stage / fertilizer application time. A fresh report based on modified analysis for the problematic areas in different states be prepared and submitted to the concerned State Government and ICAR simultaneously.
- ◆ ICAR-IIWM should prepare guidelines for identification of regions suitable for micro-irrigation in command areas taking into consideration of water availability, existing cropping system, soil factors, socio-economic factors, economic returns and payback period.



ICAR-IIWM Organized Chief Scientist Meet of AICRP-IWM

The Chief Scientist Meet of All India Coordinated Research Project on Irrigation Water Management (AICRP-IWM) was organized at Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhatisgarh during July 9-11, 2019. Dr. S.K. Patil, Hon'ble Vice Chancellor of IGKV graced the inaugural function as Chief-Guest and Prof. D.K. Marothia, National Coordinator, CINRM, NIE, New Delhi was invited as Special Guest. This meet was attended by more than 80 scientists of AICRP-IWM from across the nation. The Chief Scientists presented the achievements during 2018-19 and new technical programs for the year 2019-20 were discussed. Dr. S.K. Ambast, Director, ICAR-IIWM and Project Coordinator, AICRP-IWM, Bhubaneswar, presided over the 3-days meet. Dr. P. Nanda and Dr. S. Mohanty, Principal Scientist, ICAR-IIWM organized this meet.



EVENTS, NEWS & CELEBRATIONS

Visit of Secretary (DARE) & DG (ICAR) at ICAR-IIWM

Dr. Trilochan Mohapatra, Secretary (DARE) & Director General (ICAR), visited ICAR-IIWM, Bhubaneswar on July 21, 2019 and reviewed the activities of ICAR institutes and OUAT, Bhubaneswar on doubling farmers' income. The meeting was attended by the Vice-Chancellor, OUAT, Directors of ICAR-NRRI, ICAR-CIFA, ICAR-IIWM, ICAR-CIWA and Heads of RC-CTCRI, CHES, RC-CARI and scientists of different institutes. In opening remark, Dr. Mohapatra informed about some of the recent initiatives of Govt. of India such as 100-days target and *Jal Shakti Abhiyan*, and called upon the institution heads to work on the targets in a time bound manner. He also outlined the priorities and recent engagements of ICAR with other departments for spreading the reach of ICAR

technologies. Dr. P.K. Agarwal, Vice-Chancellor, OUAT, gave an account of the activities of OUAT and the KVKs in doubling farmers' income in selected villages and discussed the progress. Presentations were also made by Directors and Heads of ICAR institutes on the activities being implemented

and planned for doubling farmers' income and progress made in adopted villages. Dr. Mohapatra advised to work together with KVKs on convergence mode in selected villages of each district of Odisha and provide science-based solutions to the problems of farmers by leveraging the on-going programs of the government.



Independence Day Celebration

The 73rd Independence Day of the country was celebrated on August 15, 2019 by the Institute 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 farming community, and to make the institute as well as the country proud.

ICAR-IIWM Observed Scientist-Farmers' Interaction Meet

An awareness campaign on '*Jal Shakti Abhiyan Mela*' was jointly organized by ICAR-IIWM and Krishi Vigyan Kendra, Kendrapara at Suniti village, Mahakalapara block, Kendrapara district, Odisha during *Mera Gaon Mera Gaurav* programme on September 11, 2019. Dr. R.K. Panda along with Dr. S.K.



Jena, Dr. P.S. Brahmanand, Dr. R.R. Sethi and Dr. A.K. Nayak, Principal scientists of the Institute, Dr. Prabhanjan Mishra, Scientist, KVK, Kendrapara, Mr. B.K. Rout, Asst. Engineer, Department of Water Resources, Govt of Odisha attended the interaction meet. Around 100 farmers from the nearby villages - Suniti, Sugul, Kharianta, Benakandha, Panchagochhia, Kantilo participated in the program. The farmers were briefed about the

background and objectives of '*Jal Shakti Abhiyan*' and were explained about the various components viz., renovation of community ponds, strengthening of watershed activities for soil and water conservation, groundwater recharge and afforestation, which are being focused during phase-1 of the Abhiyan.

Hindi Pakhwada

ICAR-IIWM celebrated *Hindi Pakhwada* during September 16-30, 2019. During *Pakhwada*, various Hindi competitions were organized viz., noting and drafting, essay and letter writing, speech in Hindi,



Hindi-Angreji shbdawali, debate competition, drawing competition etc. A workshop on 'How to do official work in Hindi on computer?' was also organized at the institute. Dr. A. Mishra, Director (Acting) 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*.

ICAR-IIWM Observed Vigilance Awareness Week-2019

ICAR-IIWM observed vigilance awareness week during October 28 - November 2, 2019 with a focus on 'Integrity-A way of life'. Dr. S.K. Ambast, Director, administered the pledges to all the staff members of the institute. A debate competition 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. Dr. P. Nanda, Principal Scientist and VO, Dr. P. S. Brahmanand, Principal Scientist and Dr. O. P. Verma, Scientist, ICAR-IIWM, Bhubaneswar coordinated these programs.



Integrity Pledge by ICAR-IIWM Staff

ICAR-IIWM Organized Model Training Course (MTC)

A Model Training Course (MTC) on 'Climate Smart Water Management in Agriculture for Enhancing Farm Profit and Sustainability' was organized by ICAR-IIWM, Bhubaneswar during November 18-25, 2019. The training program was sponsored by the Directorate of Extension, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Govt. of India. A total of 22 officers of Agriculture, Horticulture, Soil Conservation and Water Resources departments from 12 states such as Himachal Pradesh, Haryana, New Delhi,

Rajasthan, Madhya Pradesh, Chhattisgarh, Jharkhand, Sikkim, West Bengal, Bihar, Odisha and Andhra Pradesh participated in the training program. Dr. P.K. Panda, Principal Scientist was the Course Director and Dr. S. Pradhan, Senior Scientist and Dr. D. Sethi, Scientist were Course Coordinators of this training program.



ICAR-IIWM Celebrated 'constitution Day'

ICAR-IIWM Celebrated Constitution Day on November 26, 2019. Dr. S.K. Ambast, Director of the institute administered the 'Preamble' of the Indian constitution to all the staff members of the institute and were informed about the activities during this auspicious occasion. An interactive session on Citizen's rights and duties was also conducted on this day. Dr. O.P. Verma, Scientist coordinated the program.



ICAR-IIWM Observed 'Kisan Diwas'

ICAR-IIWM Observed 'Kisan Diwas or National Farmers' Day' at Alisha village, Satyabadi block, Puri on December 23, 2019 to celebrate birthday of Ch. Charan Singh, the 5th Prime Minister of India. Along with Kisan Diwas, an awareness program on 'Climate resilient agriculture', 'Citizens fundamental duties', and 'Swachha Bharat Abhiyan' were also organized on this day. About 150 farmers from different villages attended this program. Dr. G. Kar, Principal Scientist, Dr. O.P. Verma,

Scientist, Dr. D.K. Panda, Principal Scientist were the organizing secretaries and Dr. Dr. H.K. Dash, Principal Scientist, Dr. N. Manikanandan and Dr. D. Sethi were the co-organizing secretaries of the program.

ICAR-IIWM Organized



Workshop

ICAR-IIWM organized a workshop on 'Water Management Interventions for Bridging the Yield Gap of Major Crops of India' on December 28, 2019. Dr. Trilochan Mohapatra, Hon'ble Secretary, DARE & Director General, ICAR graced this occasion as Chief Guest and inaugurated the Workshop and chaired the technical sessions. Dr. S.K. Ambast, Director, ICAR-IIWM welcomed the Chief Guest cum Chairman and delegates. The overview of international collaborative project of ICAR and University of Nebraska, Lincoln on 'Global yield gap and water productivity atlas (GYGA)' was presented by Dr. P.S. Brahmanand, Principal Scientist & PI of the project. Dr. Mohapatra appreciated the efforts of the Institute in addressing the issue of yield gap of major crops of India at national scale and suggested further refinement of methodology for assessment of potential yield of crops and comparison with crop cutting data at specific locations of climatic buffer zones for enhancing the accuracy. Chief Guest also released the publications of ICAR-IIWM.



TRAININGS & CAPACITY BUILDING

Staff of ICAR-IIWM, Bhubaneswar received trainings on various subjects at different institutions are listed below:

Official & Designation	Subject	Organization	Period
Dr. S.K. Jena, Principal Scientist	MDP on Priority setting, Monitoring and Evaluation (PME) of Agricultural Research Projects	ICAR-NAARM, Hyderabad	July 18-23, 2019
Dr. S.K. Ambast, Director	Executive Development Program on 'Developing Effective Organizational Leadership for Senior Officers of ICAR'	ASCI, Hyderabad	August 2-4, 2019
Dr. Rachana Dubey, Scientist Dr. S.K. Ambast, Director	Analysis of Experimental Data Executive Development Program on 'Developing Effective Organizational Leadership for Senior Officers of ICAR'	ICAR-NAARM, Hyderabad ASCI, Hyderabad	August 22-27, 2019 September 21-30, 2019
Mr. P. Deb Roy, Scientist	Advances in Application of Nanotechnology	ICAR-CIRCOT, Mumbai	September 23-27, 2019
Dr. H. K. Dash, Principal Scientist	'Intellectual Property Valuation and Technology Management'	ICAR-NAARM, Hyderabad	October 15-19, 2019
Dr. P. Nanda, Principal Scientist	Training Program for Vigilance Officers	ICAR-NAARM, Hyderabad	October 29-30, 2019
Dr. A.K. Thakur, Principal Scientist	Training Program on 'Multivariate Data Analysis using R'	ICAR-NAARM, Hyderabad	November 22-27, 2019
Dr. S.K. Karna, T-3	Training on 'Motivation, Positive Thinking and Communication Skills for Technical Staff'	ICAR-National Institute of Animal Nutrition & Physiology, Bengaluru	December 5-11, 2019

TRAININGS / PROGRAMS ORGANIZED & EXHIBITIONS PARTICIPATED

Training / Program

Subject	Place	Period	Participants
MTC on 'Climate Smart Water Management in Agriculture for Enhancing Farm Profit and Sustainability'	ICAR-IIWM, Bhubaneswar	November 18-25, 2019	22
Workshop on 'Water Management Interventions for Bridging the Yield Gap of Major Crops of India'	ICAR-IIWM, Bhubaneswar	December 28, 2019	40

Farmers' training programs

Subject	Place	Period	Participants
Farmer's Awareness Campaigns	Ladore & Badhgama villages, Gaighat block; Harkauli, Gangia & Ajitput Bakshi villages, Katra block, Muzaffarpur	July 30, 2019	30
Training on 'Doubling Farmers Income by Enhancing Economic Water Productivity'	Khuntapingu, Malarpada & Jamuda villages, Keonjhar	August 6-8, 2019	370
Scientist-Farmers' Interaction Meet under 'Jal Shakti Abhiyan Mela'	Suniti village, Mahakalpara block, Kendrapada	September 11, 2019	100
Farmer's Awareness Campaigns on Post-flood Crop Management Plan	Srimakundpur, Kanhas block, Puri	November 8, 2019	40
Farmers' Training cum Workshop on 'Revival of Village Ponds through Scientific Interventions'	Madana, Garadpur block, Kendrapada	November 13, 2019	50
Kisan Diwas (Technological Dissemination Program)	Alisha village, Satyabadi block, Puri	December 23, 2019	150

Students-Experts Interaction-cum-Exposure visit programs

Subject	Place	Period	Participants
Students from KIIT School of Rural Management (KSRM), KIIT University on ON-farm Water Management with special emphasis of Wastewater use as irrigation	ICAR-IIWM, Bhubaneswar	July 26, 2019	16
Inspirational Training Program for Preparation of Agricultural Projects under INSPIRE and MANAK	ICAR-IIWM, Bhubaneswar	August 27, 2019	200

Exhibition

Institute's achievements were displayed / showcased in the following exhibitions held in different locations:

Events	Place	Date/Period
Exhibition	ICAR-CIFA, Bhubaneswar	November 15-17, 2019
Confluences of Rice Ecosystem Stakeholders for Popularizing ICAR/SAUs Technologies in Odisha	ICAR-NRRI, Cuttack	December 6, 2019



SWACHH BHARAT ABHIYAN

The Director and staff of ICAR-IIWM, Bhubaneswar actively participated in *Swachh Bharat Abhiyan* activities. During July to December 2019, 22 number of cleanliness drive and 14 number of *Swachhta* Awareness Campaigns were conducted in the Institute main campus, public places, schools and MGMG villages. Backside area of guest house and drains of ICAR-IIWM was cleaned and weeds were removed for better sanitation. Awareness cum eradication campaigns with special emphasis on Parthenium weed were organized in nearby Lakhmipur Santal Salia basti, Bhubaneswar on August 19, 2019. The Director, ICAR-IIWM administered *Swachhta Shapath* to all the staffs of the Institute on September 11, October 2, December 16 and 31, 2019 during celebration of *Swachhta Hi Sewa* (September 11 - October 2, 2019) and *Swachhta Pakhwada* (December 16-31, 2019). During *Swachhta Hi Sewa* and *Swachhta Pakhwada* campaigns, awareness drive-cum-cleanliness were carried out with the special emphasis on 'Shun the use of single use plastics' as per the directives from ICAR, New Delhi. Single use plastic eradication and awareness drive were

conducted among the farmers, public and school children at MGMG adopted villages Alisha (Puri district), SSJ Mahavidyalaya and Makardhwaj Public School, Ersama (Jagatsingpur district), Balipatna (Khordha district). Staff of ICAR-IIWM have participated in *Swachhta* sensitization drive at tribal colony located near ICAR-IIWM campus; children's park, BDA park at Sailashree Vihar & Niladri Vihar; amongst the employees of IIWM main campus & Research Farm, Mendasal; and shop owners of Maitree

Vihar. Debate and drawing competitions were conducted amongst the school children of the Makardhwaj Public School, Ersama on theme '*Swachha Bharat Abhiyan* and ill effects of plastics'. A lecture on 'Plastic Waste Management in India' was delivered on December 31, 2019 by Dr. P.S. Brahmanand, Principal Scientist. *Swachha Bharat Abhiyan* activities at ICAR-IIWM was coordinated by Mr. N. Manikandan, Scientist and assisted by Dr. D. Sethi, Scientist and Mr. S.K. Karna & Kamlesh Sharma, Technical Assistants.



Activities during *swachhta* awareness-cum-cleanliness programs organized by ICAR-IIWM, Bhubaneswar

MEGA GAON - MERA GAURAV

Training and interaction meeting organized under adopted villages

Details of program	Place and Date	No. of beneficiary farmers
Farmers' interaction meet on field drainage system, water management in paddy and different irrigation methods	Khadala / Bindhapada, Jagatsinghpur July 27, 2019	15
Demonstration on mushroom production technology	Giringaput, Khorda July 27, 2019	25
Farmers-Scientists interaction meet and 'Swachhta hi seva' campaign	Churali village, Puri August 12, 2019	21
Awareness campaign on 'Jal Shakti Abhiyan'	Jagannathpur, Kendrapara August 24, 2019	21
Feedback collection from trained mushroom growers	Giringaput, Khorda August 31, 2019	9
Scientists- farmers interaction meet	Suniti, Puri September 11, 2019	97
Farmers-Scientists interaction meet and 'Swachhta hi seva' campaign	Alisha village, Puri September 21, 2019	54
Farmer-Scientist meeting on cultivation of rabi crops, fruits and vegetables	Jammujhari, Khorda October 26, 2019	15
Farmer's training cum workshop	Madana, Kendrapara November 13, 2019	53
Farmer's-Scientist's interaction meet and 'Kisan Divas' celebration	Alisha village, Puri December 23, 2019	100
Demonstration of mango and banana planation and sapling distribution	Jammujhari, Khorda December 31, 2019	50



AWARDS, HONOURS & RECOGNITIONS

Ganesh Shankar Vidyarthi Award-2018

Hindi magazine 'Krishi Jal', published from ICAR-Indian Institute of Water Management has received has received 'Ganesh Shankar Vidyarthi Award-2018' from ICAR, New Delhi during 91st ICAR Foundation Day Ceremony on July 16, 2019. Editors of this magazine are Dr. O.P. Verma, Dr. A.K. Thakur, Dr. M.K. Sinha and Dr. P.K. Panda.



Swami Sahajanand Saraswati Award-2018

Dr. G. Kar, Principal Scientist of the Institute has received the prestigious 'Swami Sahajanand Saraswati Award of ICAR -2018' for outstanding work on technology dissemination to farmer's field during 91st ICAR Foundation Day Ceremony on July 16, 2019.



- ◆ Dr. K.G. Mandal, Principal Scientist, has received the NABS Fellowship for the year 2018 conferred by the National Academy of Biological Sciences, during 11th NABS-National Conference held at Puducherry on 25-27 September, 2019.
- ◆ Dr. R.K. Mohanty and Dr. P.S. Brahmanand, Principal Scientists, have received the NESA (National Environmental Science Academy) Fellowship for the year 2019 on December 19, 2019 at Muddenahalli, Karnataka.
- ◆ Dr. M. Raychaudhuri, Principal Scientist, has received Fellow of the Indian Society of Soil Science on 15th November 2019 during 84th Annual Convention of the Indian Society of Soil Science held at BHU, Varanasi.
- ◆ Dr. S.K. Rautaray, Dr. S. Raychaudhuri, Dr. R. Dubey, Dr. S. Pradhan, Dr. S. Mohanty, Dr. R.K. Mohanty and Dr. S.K.

Ambast received 'IconSWM excellence Award 2019' at International Conference on Sustainable Waste Management towards Circular Economy at KIIT, Bhubaneswar held during November 27-30, 2019 for the paper entitled 'Sustainable agri-waste management at farm level through self-reliant farming system'.

- ◆ Dr. P.S. Brahmanand, Principal Scientist received 'Best Oral Presentation Award' for paper entitled 'Technological options for integrated rice-fish farming for doubling farmers' income in Eastern India' (authored by P.S. Brahmanand, R.K. Mohanty, S.K. Rautaray and S.K. Ambast) at the 4th PAF Congress on Increasing Aquaculture Production in India through Synergistic Approach between Multinational Industries, Domestic Entrepreneurs and Aquaculturists held at ICAR-Central Institute of Fresh Water Aquaculture, Bhubaneswar, Odisha during 15-17 November 2019.
- ◆ Mr. Ajit Kumar Nayak, Scientist awarded with third prize in National Essay Writing Competition on the innovative concepts of 'Agricultural Waste to Wealth', organized by Ministry of Agriculture and Farmer Welfare, GoI on the commemoration of 150th birth anniversary of Mahatma Gandhi.



- ◆ Dr. K.G. Mandal, Principal Scientist has been selected as Associate Editor (three years, 2020-2022) for the 'Agronomy Journal', published by the American Society of Agronomy, USA.
- ◆ Dr. P.S. Brahmanand, Principal Scientist was felicitated by ICAR-CIFA, Bhubaneswar for his outstanding two Guinness World Records and for his motivational speech on 'Relevance of Ideology of Swami Vivekananda in Nation Building' on July 24, 2019.
- ◆ Dr. P.S. Brahmanand, Principal Scientist was invited as Chief Guest and felicitated during Felicitation Ceremony-2019 of CBSE Std-XI and Std-XII toppers organized by BJEM School, Bhubaneswar on July 5, 2019.
- ◆ Dr. P.S. Brahmanand, Principal Scientist was invited as Chief Speaker and felicitated during Talcher Science Exhibition organized by Odisha

Development Youth Association at Talcher, Odisha on October 19, 2019.

- ◆ Dr. R.K. Panda, Principal Scientist acted as Nodal Officer in Session-13 on 'Micro irrigation for improved agricultural economy' during India Water Week-2019 held at Vigyan Bhawan, New Delhi on September 27, 2019.
- ◆ Dr. M. Das, Principal Scientist has been nominated as an expert member of DPC at ICAR-IISWC, Dehradun, Uttarakhand during December 19-20, 2019.

Deputation Abroad

- ◆ Dr. S.K. Ambast, Director, visited Bali, Indonesia to attend 3rd meeting of the World Irrigation Forum (WIF) and 70th International Executive Council (IEC) meeting of the International Commission on Irrigation and Drainage (ICID) and a training workshop on 'Online Irrigation Bench Marking Services (OIBS) and Systematic Asset Management System (SAMS)' during September 1-4, 2019.



- ◆ Dr. S.K. Ambast, Director, visited Europe to attend an Executive Development Program on 'Developing Effective Organizational Leadership for Senior Officers of ICAR' organized by Administrative Staff college of India (ASCI), Hyderabad during September 21-30, 2019. During this program, he visited Netherland, Belgium, Germany and Switzerland.
- ◆ Dr. S.K. Ambast, Director visited Hangzhou, China to attend 37th Meeting of the International Organization for Standardization on Irrigation and Drainage Equipment (ISO/TC23/SC18) during 4-9 November, 2019.
- ◆ Dr. P.S. Brahmanand, Principal Scientist visited Bali, Indonesia to attend and present papers in Regional Partners Meet of CCAFS and 5th Global Science Conference during October 6-10, 2019.

DD Kisan/Radio Talk

- ◆ Dr. P. Nanda and Dr. P. K. Panda participated as an expert in the panel discussion on 'Jala Sampadara Suparichalana' (Efficient utilization of water resources) under Pallishree program on November 26, 2019 on Doordarshan.
- ◆ Dr. P.K. Panda, Principal Scientist, delivered a radio talk on 'Fasala Chasa Pain Barsa Jala Sanchaya ra Bivinna Prakar Upaya' (Different rainwater harvesting techniques for better crop production) on August 15, 2019 at All India Radio, Cuttack.



- ◆ Dr. P.K. Panda, Principal Scientist, delivered a radio talk on 'Bhutala Jalara Upajogita O Ehara Suparichalana' (Importance of groundwater and its utilization) on August 28, 2019 at All India Radio, Cuttack.
- ◆ Dr. P.K. Panda, Principal Scientist, participated as an expert in 'Live Phone in' program on 'Sorisha Chasara Bivinna Diga' (Various aspect of scientific mustard cultivation) at All India Radio, Cuttack on November 1, 2019.



Joining and Transfer

- ◆ Dr. P.P. Adhikary, joined ICAR-IIWM as Senior Scientist (Soil Physics and Soil & Water Conservation) on November 30, 2019.
- ◆ Mr. Ajit K. Nayak, joined ICAR-IIWM as Scientist (Land and Water Management Engineering) on December 2, 2019.
- ◆ Dr. Rachana Dubey, Scientist (Environmental Science) transferred to ICAR-Research Complex for Eastern Region, Patna on November 30, 2019.
- ◆ Dr. S. Roychowdhury, Principal Scientist of the Institute joined (on lien) as Dean (Research), College of Basic Sciences, Dr. RPCAU, Pusa, Bihar.



ICAR-IIWM Team participated in TEZ, 2019 at ICAR-NRRI, Cuttack



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