

# .....SUCCESS STORY



**“Enhancing water productivity of seasonal coastal flood prone areas of Odisha through innovative water and crop management strategies”**



**Gouranga Kar, Narayan Sahoo, Ashwani Kumar  
Directorate of Water Management, Bhubaneswar, Odisha.**

The coastal deltaic region in Odisha extends from Rushikulya in the south-east to Subarnarekha in the north-east comprising of the undivided districts of Ganjam, Puri, Cuttack and Balasore. This area known as the 'rice bowl' of the state but now is facing land degradation problems such as flooding, salinization, land erosion, sand casting, waterlogging due to impeded drainage etc. and thereby posing a serious threat to the food security of the state. Coastal Odisha with high concentration of population and economic activity are particularly vulnerable to multiple weather hazards like flood, drought and cyclone. The saucer shaped land forms, high rainfall (average 1500 mm) due to southwest monsoon

(June–September), poor drainage condition, slow disposal of accumulated water from the plains to the ocean make the coastal region susceptible to waterlogging and flood prone and area remains submerged for about 2-3 months (July – September) under water depths varying from 0.5-2.5 m. Waterlogging and drainage problem have reached an alarming dimension in the deltaic region of Mahanadi River. Farmers grow only rice during rainy season but success of obtaining profitable crop depends on distribution of south west monsoon rain. Drainage of water from the upper catchment is also responsible for waterlogging problem in coastal areas during July to September.



Conditions of seasonal flood prone areas of a coastal district, Puri, Odisha during rainy season.



Creation of earthen embankment in waterlogged areas for harvesting floodwater.

On the other hand, the winter and summer rainfall (November-May) is meagre and erratic. As a result after December, the land becomes dry and evapo-transpiration loss of any crop is not fulfilled with the available soil moisture of the land. Therefore, successful growing of *rabi*

crops without supplemental irrigation is also not possible during winter/summer season in the region. Poor aquifer characteristics and saline ground water also limit crop production potential.



Condition of land of coastal areas during dry season

Thus, coastal waterlogged areas are subjected to receive both extreme events. In one season the area is under-productive due to excess water, in other season successful agriculture is not possible due lack of soil water or irrigation facilities. But there is a tremendous scope to harvest rainwater of rainy season and to introduce aquatic crops, pisciculture etc. in the waterlogged ecosystem. By harvesting some portion of excess water of rainy season, provision of supplemental irrigation can be made to grow *rabi* crops during post-rice period. Development of rice-fish integrated diversified farming system and growing of aquatic crops will also improve socio-economic conditions of farmers of the region.

Although, sporadically some research works were undertaken to enhance crop and water productivity in coastal waterlogged ecosystems in India and abroad but in coastal India still scope exists to work for improving productivity of seasonal waterlogged areas of the region by

adopting ecology-specific integrated farming system or pond based agricultural diversification. This will augment farmers' income and generate year-round employment for the people of that ecosystem.

Realizing the importance of improving productivity of coastal waterlogged areas due to seasonal flood, scientists of Directorate of Water Management, Bhubaneswar (PI: Dr. Gouranga Kar, Principal Scientist, DWM) identified the problems of that ecosystem and initiated a project on "Impact of climate induced natural disasters on productivity of deep-water rice ecosystem and agricultural diversification options for their mitigations" in 2005. After seeing the success of the project, Technology Information Forecasting and Assessment Council (TIFAC), GOI, New Delhi sponsored another project in 2006-07 on "Enhancing productivity of deep water rice area" to enhance the water productivity of this challenging ecosystem.



## Coverage of Memorandum of Understanding in Press Media. The Indian Express on 19.10.2005

# Pact inked to tide over waterlogging in coastal farmlands

EXPRESS NEWS SERVICE

Bhubaneswar, Oct 19: Two premier bodies have come to the rescue of farmers of coastal belt facing the problem of waterlogging in paddy fields,

The Water Technology Centre for Eastern Region (WTCER), a body under ICAR, has now joined hands

with the Technology Information Forecasting and Assessment Council (TIFAC) for raising productivity in rainfed areas of the State using a new technology.

These two units, imparting technical knowhow for greater productivity, signed an MoU recently to implement a deep-water project and an upland acid soil project in

the State. Director, WTCER Dr Ashwani Kumar and former V-C, OUAT, Dr IC Mohapatra were present when the agreement was inked.

The project at an estimated cost of Rs 70 lakh, can be replicated over 70,000 hectare upland acid soil area and 50,000 hectare deep-water area.

The deep-water project would be

implemented in Puri sadar, Brahmagiri and Satyabadi blocks. In these areas, waterlogging is a perennial problem for the farmers.

"Prolonged waterlogging (above 1 metre) render the fields unsuitable for farming. That's the reason why farmers of Puri, Kendrapara and Balasore have been struggling to achieve food security," senior sci-

entist of WTCER Dr Gourang Kar said.

The upland acid soil project would be implemented in Balasore's Remuna and Mayurbhanj's Badasahi blocks.

If the projects are successfully replicated, farmers can earn anything between Rs 15,000 and Rs 35,000 per hectare using the technology.

The Pioneer on 19.10.2005

# MoUs signed to enhance rice productivity

## ...in Puri, Kendrapara, Balasore districts

Pioneer News Service | Bhubaneswar

**P**rolonged waterlogging for most areas of the State affected the rice growth. The crop growth is tillering and normal rice growth has been affected and large area has remained unproductive.

Too much of waterlogging makes the fields unsuitable to grow any other crop in that deepwater rice ecology, as a result, farmers of the deep-water rice area Orissa (Satyabadi, Kanas, Brahmagiri blocks of Puri district, Kendrapara and Balasore) are struggling to achieve food security.

To bring an technology for the farmers to achieve food security MoUs were signed on Thursday by Water Technology Centre for Eastern India (ICAR), Bhubaneswar, Ministry of Agriculture, Technology Information

Forecasting Information and Assessment Council (TIFAC), Ministry of Science and Technology, Government of India, New Delhi and NGOs (AID, Bhubaneswar, SREE, Balasore) with a projected cost of Rs 70 lakh in presence of renowned International Agriculturist and former Vice Chancellor, OUAT, IC Mahapatra and Director, WTCER, Bhubaneswar, Ashwani Kumar.

To enhance the productivity, profitability and cropping intensity of rain-fed challenging areas of Orissa, Water Technology Centre for Eastern India (ICAR), Bhubaneswar proposed the Technology Information Forecasting Information and Assessment Council (TIFAC), Ministry of Science and Technology, Government of

India, New Delhi for possible fundings for two project proposals like enhancement productivity of deep water rice area, enhancing productivity of acidic upland of Eastern India, prepared by the Centre. The proposals were based on the field experiences and lessons learned from earlier works of WTCER, Bhubaneswar.

Gouranga Kar, Senior Scientist of WTCER is the Principal Investigator of the projects. The deep water projects 'enhances productivity of deep water rice area,' which will be executed in Puri Sadar, Brahmagiri and Satyabadi blocks of Puri district and upland acid soil project 'enhancing productivity of acidic upland of Eastern India' will be executed in Remuna block of

Balasore and Badasahi, Mayurbhanj districts.

Kar said the results of these projects can be implemented in 70,000 hectares of upland acid soils area and 50,000 hectares of deep water areas of Orissa.

Farmers can earn Rs15,000-35,000 per hectare with the adoption technologies and socio-economic conditions of the poor farmers of these challenging areas of the State will be raised. The secretaries of NGOs Asutosh Das from AID, Bhubaneswar and Manoj Kumar Das from SREE, Balasore were present as the signatories of MoUs.

On that occasion, Director, WTCER said that to enhance the productivity of challenging areas of the State, these projects were executed by the WTCER, Bhubaneswar.

The team initiated systematic study by investigating rainfall-flooding pattern, depth and duration of floods, existing cropping pattern, soil physical and chemical properties, hydro-geological conditions of the site and socio-economic status of the local people. We also organized on-farm brain storming session on 1.12.2005 and 2.2.2006 where different technological options for seasonal flood prone areas were discussed and farmers'-experts interactive meeting was held. Eminent scientists like Dr I.C.Mahapatra, Former Vice Chancellor, OUAT, Dr Ashwani Kumar, Director, DWM, Bhubaneswar, Dr P.N.Bahl, Former DDG (Crop Science), ICAR, Dr. J.K.Roy former Joint Director, CRRRI, Cuttack, Dr N. Panda, former head, Agril. Entomology, OUAT and district officials like Mr. Ashwini Kumar Das, the District

Magistrate and Collector of the Puri, Project Directorate, DRDO, District Agricultural Officer and Deputy Director of Agriculture, Puri were among the prominent officials/experts. A meeting was also organized on 12.03.2006 at Bhubaneswar to appraise about the sustainability of the technology to Dr. R. N. Bohidar, Agricultural Production Commissioner, Government of Odisha and Dr. H.S.Chahar, Principal Secretary of Agriculture, Government of Odish and Smt. Ranjana Chopra, Director of Agriculture, Government of Odisha. It was decided in that meeting to make an effort to bring the deep water rice variety 'Hangseswari' into state seed chain of Orissa and start seed multiplication programme in State Government's farm for larger availability of seeds to farmers.



On-farm brain storming session is in progress at Alisha village, Puri, Odisha.



Organizing scientist – stakeholder's meet at Puri; Dr Ashwani Kumar Das, DM & Collector, Puri chairing the session

After conducting field trial during 2006-09 and discussion and deliberations with many experts, following technologies were suggested to increase productivity, profitability, cropping intensity and sustainability of seasonal flood prone waterlogged ecosystem, namely.

**(i) Deep water rice production technology**

Due to prolonged waterlogging of 0.5 to 2.0 m depths, during rainy season normal rice fails to grow in seasonal

flood prone areas. As per the technology developed by DWM, Bhubaneswar, improved deep waterlogging rice cultivars like 'Hangseswari', 'Saraswati' were introduced with improved technology (line sowing with 20 cm distance, row to row and fertilizer dose of 20:20:20) in the seasonal waterlogged areas. These varieties were found to produce about 3.0 t ha<sup>1</sup> grain yield during rainy/*kharif* season if flood commences after second week of August. The technology has potential to replicate in 3.4 mha waterlogged areas of eastern India.





Deep water rice cultivar 'Hangseswari' in the farmers' field during vegetative stage



Deep water rice cultivar 'Hangseswari' in the farmers' field during ripening stage

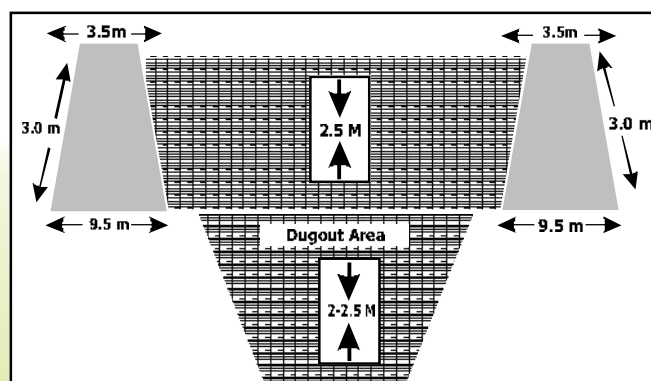
**(ii) Growing of extra early variety for contingency planning**

If flood commences early, rice even waterlogged tolerant varieties fail to grow during rainy season and land becomes fallow within *kharif*/rainy season only. To compensate that loss, as a contingency crop, a very short duration (75 days) rice variety, 'Heera' was introduced in the Alisha village, Puri which grew successfully with carry-over flood water from October to mid-December. Within 75 days the variety produced average grain yield of 2.6 t/ha and was found to be very promising as contingent crop when main *kharif* rice crop fails to grow due to early flash flood.

**(iii) Design and construction of water harvesting structures and its multiple use**

The rainwater harvesting pond was constructed in about 25-30% of the total field of a farmer, rest of the field was utilized for intensive cultivation with that harvested water of the pond. The pond was dug in inverted trapezoidal shape with the side slope of 1:1 because soil texture was clay to heavy clay. The bund was made widened and strengthened enough to resist the horizontal and vertical pressure of stagnant water during flood period. For the seasonal flood prone areas, minimum bund bottom width of 9.5m and top width of 3.5m are recommended. The height of the bund was determined by the flooding depth. Study revealed that maximum flooding depth of 2.5 m occurred in saucer shaped flood prone seasonal coastal areas. Therefore,

keeping a free board of 0.5m, maximum 3 m bund height of the pond can be constructed for water harvesting in that ecosystem. Since pond bund remained under continuous stagnant water for 3 months, the bund was strengthened by dub grass matting. The depth of the pond ranges from 2-3 m depending upon the water requirement. Shallow depth is avoided as it favours high evaporation losses. One or two inlet systems were designed and constructed on two sides of ponds for capturing outside floodwater into the pond. Since water level inside the pond was always remains below the maximum height of the bund, no spillway was required for the system. It is to be mentioned that the designed pond based farming system was tested in farmer's field of Puri district and was found profitable and sustainable.



Design of water harvesting structures in seasonal deep waterlogged areas





Construction of water harvesting structures is in progress at Alisha, Puri



Construction of water harvesting structures is in progress at Sukal, Puri

**(iv) Integrated pond based farming system for seasonal waterlogged areas**

An integrated farming system was developed with the constructed rainwater harvesting structures in the form of deep water rice varieties during rainy season, rearing of fishes inside the pond, cultivation of *rabi* crops with the harvested water and growing horticultural crops

(vegetables and short duration fruit crops) on the dyke. During 2013-14 a survey was made regarding profitability of the system and about 55000/- to 85000/- per hecter net returns were obtained from the pond based farming system and net water productivity was enhanced upto Rs. 8.18/m<sup>3</sup> through adoption of field crops, vegetables, fishes with harvested water. The cropping intensity of farmers was increased with the range between 150-250%.



On-dyke horticultural crops during flooding period



Harvested water inside constructed water harvesting structures during flooding period (August)

Harvested water inside constructed water harvesting structures during post-flood period (November)





Bumper banana crop on the Dyke of pond



Harvested fish from the created pond

**(V) Rice cultivation during post-flood/dry period with harvested rainwater**

High yielding medium duration rice varieties like '**Lalat**', '**Konark**', '**Parijat**' and '**Khandagiri**' were transplanted during last week of December to first week of January using carry-over flood water and

harvested water of rainy season. The yield of rice varied between 3.08 to 4.55 t/ha in different farmers' field under scientific management practices. This dry season rice is a total gain to the farmers of the region and it also gives food security to farmers when rice of main season (kharif /rainy) fails.



Bumper rabi rice crop after receding flood with irrigations from harvested water of pond



Transplanting of rabi rice after receding flood

To obtain more profit, vegetable crops like watermelon, okra, cauliflower, spinach, brinjal, ridge gourd were also cultivated with harvested water of ponds. Besides increasing cropping intensity, the

vegetable crops enhanced water productivity with the range of Rs. 4-5/m<sup>3</sup>. Seasonal water use was measured as 545, 605, 495, 750 and 575 mm for watermelon, okra, spinach, brinjal and ridge gourd, respectively.



Growing of vegetable crops during post flood period with supplemental irrigations from harvested water

## (VI) Cultivation aquatic plant species

The aquatic crops like water chestnut, medicinal plant (*Acoras calamas*) was introduced in seasonal flood prone areas and package of practices for their

cultivation were standardized. From water chestnut and *Calamas* cultivation net returns of Rs. 19,000/ha and Rs. 35,000/ha respectively were obtained.



Introduction of water chestnut in seasonal waterlogged areas



Introduction of Bacha (*Acoras Calamas*) in seasonal waterlogged areas



Cultivation of Bacha (*Acoras Calamas*) in seasonal waterlogged areas

## Community mobilization; Technology identification, Demonstration & Training

After thorough and dedicated investigation, the team prioritized the following aspects to improved the productivity and profitability of coastal waterlogged areas.

- Identification and introduction of high yielding waterlogging tolerant rice varieties through farmer's participatory on-farm research / demonstration programmes for mass cultivation of deep water rice in the *Kharif* season.
- Developing Seed-village or seed bank of suitable deepwater rice varieties for easy access to the farmers.
- Popularization of line-seeding/dibbing in place of broadcasting for optimum plant population.
- Adoption of bunch planting, Popularization of delayed planting, kharuan cultivation i.e. double nursery system.
- Intercultural operations of post-flood standing crop (application of fertilizer etc.) to recoup growth.
- Creating water source for raising crops during post flood period in dry season..
- Rice-fish-horticulture based integrated diversified farming system to enhance land and water productivity of seasonal waterlogged areas.
- Making proper water management/ drainage facilities for favourable low lands where surface drainage is economically viable.



# Make use of excess water, farmers told

Express News Service

Bhubaneswar, Sept 28: Integrated water harvesting structures and proper use of excess water in aquatic crops can transform the food of farmers living in coastal areas, says a scientist at Water Technology Centre for Eastern Region (WTCER) here.

Keeping the coastal salinity and agro-economic parameters in mind, an integrated water harvesting system, the programme on 'deep-water rice' was conceptualised by WTCER here on Friday.

Kept for some of the districts, the programme is simple and can be adopted in coastal areas through use of improved genotypes. Excess water is stored in ponds through which it seeps into the ground, creating a reservoir of water available to the plants.

Ecologists through introduction of aquatic crops, salt-tolerant varieties and principal investigators of the project Gouranga Kar.

Coastal Orissa with high concentration on population and economic activity is vulnerable to outside water. Less rice like food, drought and cyclone. Farmers are unable to grow any crop, but at times of drought profitable crop depends on distribution of water from rain.

On the other hand, the water and

summer rainfall is meagre and erratic. As a result after December the land becomes dry and the crops suffer. So growing of profitable crops with low supplementary irrigation is not possible. For a better crop varieties and saline ground water also have to be used. In rain water harvesting, the surplus water is stored in ponds during stagnant season of rainy season, so that it can be used to irrigate water through integrated farming system, the scientist stressed.

WTCER Director Gouranga Kar admitted that deep-water rice is a neglected area. The fields are utilized to harvest a multi-crop and damaged by the salt water. Two months of water logging also makes the fields unsuitable for any other crop, he said.

Renowned agricultural and horticultural scientist, Joint Director of ICAR, Bhubaneswar, J.P. Rout said that

introduction of some three years on programme for adoption of paper horticultural crops.

Asst. Dir. District Alisha Puri has been selected as one of the project to enhance productivity of deep water rice area in Satyabadi block.

For more information, contact, Joint Director, WTCER, J.P. Rout and Dr. Kar, Bhubaneswar.

## Deep-water rice



Single crop can be supplemented by cash crops for better returns

# Integrated option brings multiple yields

Express News Service

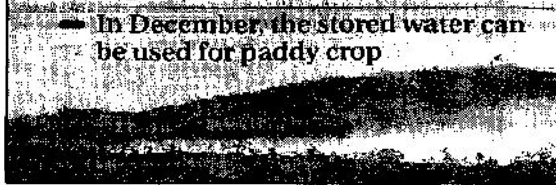
Bhubaneswar, Jan 29: Farmers of many areas in the coastal belt face a typical problem. Though their agricultural lands have excess water in the rainy season, in summer and winter water scarcity often forces them to abandon the cropping plans. Thanks to a "pond-based farming system" developed by scientists at Water Technology Centre for Eastern Region (WTCER) here, now farmers with an integrated option can have multiple yields.

The pond-like water harvesting structure can help farmers both in coastal and upland areas, but the farmers along the coast can benefit more as the excess water through flood is almost an annual feature. Earlier, farmers were using deep-water paddy varieties to face the situation, but if the flood water comes earlier than August 15 then there is no way one can save paddy saplings and thus this method

plays a vital role, says WTCER senior scientist and principal investigator of the project Dr Gouranga Kar.

## POND-BASED FARMING

- The system would help farmers both in coastal and upland areas
- 'Two-in-one method' can yield vegetables and fish varieties
- In December, the stored water can be used for paddy crop



So to face the typical situation, the 'two-in-one method' of composite farming through pond-based system can help the farmers get

vegetable crops in the rainy season along with pisciculture option to have fish varieties like 'rohu', 'katla' and 'mrigal' and during a single season which can grow up to a kg each. On the other hand, when the water dries up around the pond towards December, the stored water can be used to have paddy crop and the yield is rewarding, explains Kar.

The pond can be constructed with a bund width of 3.5 metre and height of 3 metre though the depth would vary according to the flooding depth of the area concerned. Bund with more width helps the farmer get usual vegetable crops like cucumber, ladies finger, pumpkin and cowpea including banana plantation, which has water logging tolerance properties.

The WTCER pilot project was implemented in Alisha and Churali villages of Satyabadi block in Puri district and they can be replicated in other water logged areas of coastal Orissa, feels the scientist.

## Capacity building and awareness programme organized

Several front line demonstration, technology dissemination and capacity building programmes were organised for popularization of the viable technologies to enhance productivity of coastal waterlogged ecology. Three 7-days farmers training programme on "Scaling up of water productivity in Agriculture for livelihoods" were organized at Alisha village, Puri and farmers were trained to increase the water productivity through different means such as deep water rice production

technology, crop management planning and practices, crop diversification, rainwater harvesting, integrated farming, livestock management, in-situ water conservation techniques, integrated pest management, irrigation scheduling and water requirement of various crops, pisciculture etc.

Training programme on "Quality seed production, preservation & use for increasing productivity of deep water rice areas" were organized on 06.12.2008 and 31.03.2009 in the village Alisha in Satyabadi block of Puri district. About 100 farmers from Alisha and neighbouring villages participated in the training programme.



Organizing farmer's training programme at the project site, Puri district, Odisha

A field day was held on "Enhancing productivity of deep water areas" on 28.10.2009 at Sukala Block, Puri which was presided by Dr. J.S. Samra, CEO,

National Rainfed Area Authority, GoI. About 250 farmers participated in that field day.



Dr. J.S. Samra, former DDG (NRM), ICAR and CEO, National Rainfed Area Authority interacting with farmers of Puri district.

- A field day was organized on 17.3.2010 on "Enhancing productivity of deep water areas" where Dr. Panjab Singh, former DG, ICAR and

VC BHU was the Chief speaker. More than 500 farmers participated in the training programme.



Dr. Panjab Singh, former DG, ICAR & Secretary, DARE and Vice-Chancellor, B.H.U. addressing the farmers of seasonal waterlogged area of Puri district.

- To create awareness among the farmers and to train different aspects of improved management techniques, Directorate of Water Management, Bhubaneswar organized a training cum awareness programme on 28.9.2007 at Bhubaneswar. In that programme, 70 male and female farmers were got trained. On the occasion Dr Aravind Kumar Padhee, Director of Agriculture, Govt. of Odisha was present as chief guest.

- Recognizing the importance of the technologies for increasing crop and water productivity of seasonal waterlogged areas and their sustainability the Directorate of Water Management organized a press conference on "Enhancing productivity of seasonal deep waterlogged areas" on 25<sup>th</sup> April, 2011 where personnel from 35 print and electronic media participated.





Dr. Arvind Kumar Padhi, then Director of Agriculture, Govt. of Odisha, briefed about the deep water rice technology.



Dr. Anupam Verma, Former Dean, IARI, New Delhi, interacting with farmers of Puri district.

### Impacts of the interventions

- The State Department of Agriculture, Government of Odisha started seed multiplication of identified improved deep water rice variety 'Hangseswari'. Earlier the seeds of improved deep water rice cultivar Hangseswari' was not in State Seed Chain, now the State Government of Odisha released the variety to put under State Seed Chain and adopted for seed production in State Farm to supply to farmers on large scale.
- State Bank of India, Puri has identified pond based farming technology as Bankable Technology and farmers of the area have received loan to implement the technology to enhance productivity of waterlogged areas.
- The Pond based farming technology has also been adopted under 'Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

for large scale dissemination to enhance productivity of the seasonal flood prone and waterlogged areas.

### Assessment of the impact of technology on production and income of farmers.

The assessment of impact of the technology on farming situation and livelihood of farmers was carried out in June 2014 covering a sample of 20 farmers of Alisha, Churali and Talajanga villages of Puri district. Study revealed that the yield of paddy during *kharif* increased from 7.5-13.2 to 15.28-28.9 q/ha in different farmers' field. The productivity of *rabi* paddy increased by about 2 times, while net income from pond based farming system was 55,000/- to Rs. 80200/- per annum in different farmers' field. Assessment of Impact technology on production and income of farmers in study areas of Puri is given in Table below.

### Assessment of impact of technology on production and income of farmers in study areas of Puri (Based on survey at Kharif, 2014).

Name of the farmers	Name of the village	Rice productivity (q/ha) during <i>kharif</i>		Rice productivity (q/ha) during <i>rabi</i>		Net income (Rs/ha) from pond based framing system	
		Before intervention (local variety)	After Intervention (improved deep water rice)	Before intervention	After Intervention	Before intervention	After Intervention
1. Bhajman Biswal	Alisha	11.25	18.25	20.30	41.00	-	55000
2. Indramani Swain	Alisha	10.55	17.20	32.21	39.95	-	61000
3. Prabhakar Biswal	Alisha	8.45	18.75	24.55	42.00	-	-
4. Indramani Jena	Alisha	8.50	21.30	20.45	40.05	-	69000
5. Jagabandhu Swain	Alisha	7.50	17.88	25.55	41.50	-	60000
6. Sarbeswar Pradhan	Alisha	12.20	15.28	21.55	39.50	-	40000
7. Sibanarayan Mohanty	Alisha	10.0	16.50	21.50	42.00	-	82000
8. Pandav Biswal	Alisha	11.40	21.25	22.45	44.00	-	66000
9. Prafullya Sahoo	Alisha	10.40	23.25	25.50	44.00	-	-
10. Chandramani Sahoo	Alisha	11.20	18.50	28.75	38.00	-	-
11. Surendra Pradhan	Churali	12.50	17.68	28.50	35.90	-	-
12. Ganesh Das	Churali	10.60	17.55	25.50	41.00	-	-
13. Budhi Jena	Talajanga	9.65	28.90	22.50	39.00	-	-
14. Brajabandhu Swain	Talajanga	9.50	27.50	20.50	40.00	-	-
15. Krupasindhu Parida	Talajanga	12.50	28.90	25.50	30.05	-	-
16. Abhimanyu Swain	Churali	13.20	18.55	26.50	39.50	-	-
17. Laxman Mohapatra	Alisha	12.60	23.50	28.70	40.00	-	-
18. Indramani Sahoo	Alisha	12.80	20.50	22.35	40.05	-	60000
19. Gandharba Pradhan	Talajanga	13.20	27.0	25.50	39.70	-	-
20. Rabi Narayan Jena	Churali	10.40	20.25	26.80	37.00	-	-

## Coverage of the success story in print media

The Indian Express on 26<sup>th</sup> April, 2011

### WATER-LOGGING NO MORE A WORRY

## Low-cost Technology a Boon for Farmers

#### Express News Service

**Bhubaneswar:** With over 85,000 hectares of agricultural land in coastal Orissa suffering from acute water-logging, the low-cost technologies developed by Directorate of Water Management (DWM), Bhubaneswar, a unit of the Indian Council of Agricultural Research (ICAR), have come handy for the farmers.

Fields which otherwise would have remained barren throughout the year have been put to good use through the multi-cropping techniques. In several districts where the techniques have been adopted have seen a 200 per cent increase in income of the farmers, said Ashwani Kumar, Director of the Directorate of Water Management here on Monday.

The 'pond-based farming system' which

stabilises and enhances the productivity of areas where water-logging is around 1.5 m to 2 m deep, farmers have successfully grown deep water rice in kharif and salt tolerant vegetables like watermelon, ladies

#### FARMERS HAVE SUCCESSFULLY GROWN DEEP WATER RICE IN KHARIF AND VEGETABLES LIKE LADIES FINGER, SPINACH AS WELL AS FISH

finger, spinach as well as fish. The technology has been successfully implemented in Puri. The cropping intensity was enhanced to 200 per cent and net returns have risen to Rs 35,000 per hectare, he said.

Similarly, farmers in Balasore and Jagatsinghpur are using Integrated Farming

System which includes cash crops with fisheries, poultry, duckery and short-duration horticulture on the dykes. In Cuttack, it was found that the system has potential to enable a farmer to earn about Rs 1.5 lakh per hectare a year.

The scientists have also developed four deep water rice varieties for waterlogged areas during kharif. Sub-surface water harvesting structures were designed and implemented to tap freshwater in saline areas, he said.

Directorate of Water Management is also working on several projects to make agriculture more profitable and sustainable for farmers by making the best use of rainwater resources, multiple crop management and integrated crop management particularly for the waterlogged areas of coastal Orissa, Kumar informed.

The Hindu on 26<sup>th</sup> April, 2011

## New farming by DWM in waterlogged areas

**Bhubaneswar, April 25:** As many as 85,000 hectares of waterlogged areas in coastal Orissa will benefit from an agricultural water productivity plan being launched by Directorate of Water Management (DWM).

Waterlogged areas remain unproductive during rainy season. Saline soil profile also restricts production in the coastal areas of Jagatsinghpur, Balasore, Cuttack and Puri. The area extends from Chilika to Subarnarekha areas.

Through innovative ideas, DWM has successfully enhanced productivity of coastal areas through pond-based farming system like deep water rice and salt tolerant vegetables such as watermelon, ladies finger, spinach and chilly in winter and on-

dyke vegetables and fish inside ponds. This has enhanced crop intensity by 200 per cent and increased returns of Rs 35,000 per hectare due to technology application. In non-drainable areas, integrated farming system is being implemented. Fisheries, poultry, duckeries, and short duration horticulture on the dykes has given valuable returns. A case study in Cuttack found the system effective and yielding as much as Rs 1.5 lakh per hectare per annum.

In deep water congested areas, rice fails to grow as flash floods inundate the standing crop. The DWM has tested four rice varieties. The Hangeswari variety brought from Bengal is yielding 2.5 tons per hectare in waterlogged areas during Kharif season in Puri district.

DWM Director Ashwani Kumar said, "Technologies were disseminated through State governments, Krishi Vigyan Kendras and NGOs. Collaborative extension programmes through private participation is mooted to make technology application successful. A large number of farmers in coastal districts such as Jagatsinghpur, Balasore, Cuttack and Puri have adopted the technology and found it profitable and sustainable. This has improved their socio-economic conditions." Former Vice-Chancellor of OUAT and Birs Agriculture University Dr. IC Mahapatra said the DWM is mostly into technology research and development. These programmes are implemented through Government agencies and NGOs.

The Telegraph on 26<sup>th</sup> April, 2011

### Scientists suggest multi-cropping technique to enhance production

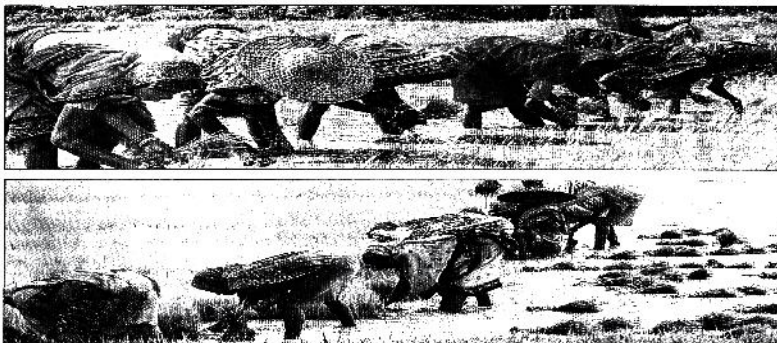
## Plan to tackle waterlogged farmland

#### SURBHASHINI MOHANTY

**Bhubaneswar, April 25:** The agricultural scientists of the directorate of water management, a unit of the Indian Council of Agricultural Research (ICAR), have developed a multi-cropping technique to tackle the problem of under-productivity over an area of 85,000 hectares in Orissa that face waterlogging.

Director of the directorate of water management Ashwani Kumar said: "We have developed four deep-water rice varieties — Hangeswari, Ambika, Saraswati and Sabitri — particularly for the waterlogged areas during kharif season. Hangeswari is giving a higher yield of 2.1-2.5 tonne per hectare."

In addition to the deep-water rice varieties, the scientists have developed waterlogging tolerant crops, medicinal plants and fishes. They have designed a cropping pattern for farmers for maximum cultivation of waterlogged areas of coastal Orissa during the year. The technology has been successfully implemented on a pilot basis in many parts of coastal Orissa. The scheme has helped farmers to double



Farmers sow saplings during kharif season. Telegraph pictures

their income. Kumar said: "Farmers are advised to prepare in advance to store water in their fields

during the rainy season and follow the crop pattern prescribed by the agricultural scientists for maximum yield

and productivity." The technique named pond-based farming system has been devised to stabilise

and enhance the productivity of coastal deep waterlogged areas where waterlogging is around 1.5 metre to 2.0 metre deep.

Salt tolerant vegetables such as watermelon, ladies finger, spinach, chilly (in winter), and dyke vegetables, fruit and fish can be cultivated in the waterlogged areas. The technology has been successfully implemented in the representative deep waterlogged areas of Puri district. The cropping intensity was enhanced to 200 per cent and net returns were also increased up to Rs 35,000 per hectares from the technology," he said.

Kumar said that sub-surface water harvesting structure has also been designed and implemented to tap freshwater from the waterlogged areas.

Along with waterlogging tolerant crops such as, water chestnut, Colocasia and medicinal plant (Acorus) an air breathing fish has also been integrated with water chestnut cultivation for maximum yield. The technology has potential for adoption in 15,000 hectares of potential waterlogged areas of coastal Orissa, he said.



The Times of India on 26<sup>th</sup> April, 2011

# Waterlogged land to now yield more rice in state

TIMES NEWS NETWORK

**Bhubaneswar:** Nearly 85,000 hectares of agriculture land in coastal Orissa that was lying fallow due to waterlogging, will soon be able to produce more than double its capacity. The multi-cropping technology developed by scientists at the Directorate of Water Management (DWM) of Indian Council of Agriculture Research (ICAR) is expected to help farmers in the region successfully enhance income from Rs 5,000 per hectare to Rs 35,000 per hectare.

"These areas used to remain submerged in 1.5 to 2 metres of water. So we conceptualized pond based farming system and suggested the farmers to produce deep water rice varieties and salt-tolerant vegetables like watermelon, ladies finger, spinach, chilly along with fish. We found the cropping intensity was enhanced by 200 per cent and a farmer could earn a profit of Rs



REUTERS

35,000 per hectare," said director of DWM, Ashwani Kumar. The technology has been successfully implemented in Puri, Balasore and Jagatsinghpur districts of the state, he added.

The integrated farming system included cultivation of field crops, fish, poultry, ducks, short duration horticultural crops on the dykes. In a case study in Cuttack district, it was found that the system has the potential to earn about Rs.1.5 lakh per hectare per annum, said former director of Central Rice Research Institute (CRRJ), Cuttack, J K Roy. "To get maximum production

from these waterlogged areas, rice varieties like Ambika, Saraswati, Sabitri and Hangeswari were introduced and surprisingly Hangeswari produced highest yield during kharif," Roy added.

Along with rice several other water-logging tolerant crops like water chestnut, colocasia and medicinal plant (acorus), an air breathing fish catfish (magur) was for maximum yield. "The catfish-water chestnut integrated technology has the potential to derive about Rs 60,000 to 70,000 per hectare net return each year," Kumar said.

The Statesman, on 26<sup>th</sup> April, 2011

## DWM stresses water management and agricultural production

statesman news service

**BHUBANESWAR, 25 APRIL:** Emphasising on water management and increased agricultural productivity even in waterlogged coastal areas of the state, senior scientists of the Directorate of Water Management (DWM) highlighted the technologies introduced by them and other ICAR institutes here.

Dr Ashwani Kumar, director of the DWM, said: "Over 85,000 hectare land in the state suffers from water logging, rendering it sub-productive." Some of the other scientists

present pointed out that at least 10 lakh hectares of land were flood-prone, three lakh saline inundation-prone, seven lakh drought prone.

Specific interventions in terms of technology and other inputs are required to deal with each of these problems, they noted.

The agricultural scientists of the DWM here have developed multi-cropping technique in waterlogged areas of the coastal belt. In addition to innovating deep water rice varieties water-logging tolerant crops, medicinal plants and fishes, the scientists

have also designed crop pattern for the farmers for maximum utilization. Already some of the areas have successfully implemented the technology and it has increased the agricultural income of farmers to 200 per cent, they said.

The farmers are advised to prepare in advance to store water in their fields in the rainy season and follow the crop pattern prescribed by the scientists for maximum yield, said Dr Ashwani Kumar.

The technique named pond based farming system includes deep-water rice in khirki

plots, vegetable, fruit and fish inside ponds.

It has fetched returns to the farmers in coastal districts of Puri, Balasore and Jagatsinghpur where the increase in income has been around Rs 35,000 per hectare, he said. The salt-logged land is waterlogged during the monsoon and remains submerged for long months and then it becomes dry in winter and summer. Deep-water rice varieties like Hangeswari, Ambika, Saraswati, and Sabitri produced higher yield in water-logged areas during kharif season, he said.

In fact, Hangeswari is the first variety in the state which was brought from outside-West Bengal and introduced in 2009, they informed.

Sub-surface water harvesting structure designed and implemented to tap freshwater lens above the saline water etc have been disseminated through the state government, Krishi Vigyan Kendras and NGOs.

The DWM has also undertaken new research initiative to address emerging issues of coastal area management, through physiological characterisation and agronomic stan-

darisation of over-aged rice seedlings cultivation under water-logged situation, fitting in and evaluation of bio-drainage in different agro-ecological situations of the delta region in the state, optimum use of farm land interface with shrimp farming in coastal areas, etc.

The scientists pleaded that their mandate was confined to research and technology initiatives and they were not in a position to even state whether the extent of water logging was increasing over the years or even to what extent farmers were adapting to their technology.

The Orissa Post on 26<sup>th</sup> April, 2011

## New farming by DWM in waterlogged areas

**Bhubaneswar, April 25:** As many as 85,000 hectares of waterlogged areas in coastal Orissa will benefit from an agricultural water productivity plan being launched by Directorate of Water Management (DWM).

Waterlogged areas remain unproductive during rainy season. Saline soil profile also restricts production in the coastal areas of Jagatsinghpur, Balasore, Cuttack and Puri. The area extends from Chilika to Subarnarekha areas.

Through innovative ideas, DWM has successfully enhanced productivity of coastal areas through pond-based farming system like deep water rice and salt tolerant vegetables such as watermelon, ladies finger, spinach and chilly in winter and on-

dyke vegetables and fish inside ponds. This has enhanced crop intensity by 200 per cent and increased returns of Rs 35,000 per hectare due to technology application. In non-drainable areas, integrated farming system is being implemented. Fisheries, poultry, duckeries, and short duration horticulture on the dykes has given valuable returns. A case study in Cuttack found the system effective and yielding as much as Rs 1.5 lakh per hectare per annum.

In deep water congested areas, rice fails to grow as flash floods inundate the standing crop. The DWM has tested four rice varieties. The Hangeswari variety brought from Bengal is yielding 2.5 tons per hectare in waterlogged areas during Kharif season in Puri district.

DWM Director Ashwani Kumar said, "Technologies were disseminated through State governments, Krishi Vigyan Kendras and NGOs. Collaborative extension programmes through private participation is mooted to make technology application successful. A large number of farmers in coastal districts such as Jagatsinghpur, Balasore, Cuttack and Puri have adopted the technology and found it profitable and sustainable. This has improved their socio-economic conditions." Former Vice-Chancellor of OUAT and Birsra Agriculture University Dr. IC Mahapatra said the DWM is mostly into technology research and development. These programmes are implemented through Government agencies and NGOs.

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27	Bijaya Borata	2.50	ବିଜୟା ବୋରା
28	Nambardhar Borata	1.00	ନାମବରଦହାର ବୋରା
29	Indramoni Patra	1.50	ଇନ୍ଦ୍ରାମଣି ପାତ୍ର
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32	Laxmi motapatra	0.50	ଲକ୍ଷ୍ମୀ ମୋତାପତ୍ର
33	Nobina pradhan	1.22	ନବିନା ପ୍ରଧାନ
34	Laxmidhar Sethi	1.00	ଲକ୍ଷ୍ମୀଦହାର ସେଥି
35	Dilip Kumar mahanty	1.00	ଡିଲିପ କୁମାର ମହାନ୍ତ
36	Jemina Borata	0.66	ଜିମିନା ବୋରା
37	Ramesh Swain	1.00	ରାମେଶ ସ୍ୱାଇଁ
38	Bhagirathi Biswal	1.00	ଭାଗିରଥି ବିସ୍ୱାଲ
39	Bairajidhar jena	0.70	ବାଇଜିଦହାର ଜେନା
40	Sukanta Kumar Sethi	0.80	ସୁକାନ୍ତ କୁମାର ସେଥି
41	Rajkishore jena	1.50	ରାଜକିଶୋର ଜେନା
42	Rameshwar Biswal	0.66	ରାମେଶ୍ୱର ବିସ୍ୱାଲ
43	Botarama Biswal	1.00	ବଟରାମା ବିସ୍ୱାଲ
44	Laxman mahapatra	1.50	ଲକ୍ଷ୍ମୀ ମହାପାତ୍ର
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57	PURNACHANDRA BISWAL	0.70	ପୁରନାଚନ୍ଦ୍ରା ବିସ୍ୱାଲ
58	ABHIMANU BARALA	0.71	ଅଭିମାନୁ ବାରାଲା

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