Proceedings of Seminar and Farmer's Interaction on Coastal Ecosystem of Indian: Recent Developments and Future Strategies

Organized by: Indian Society of Coastal Agricultural Research (ISCAR)
Venue: ICAR-NIRJAFT,Regent Park, Kolkata
Date: 18th March 2017

Indian Society of Coastal Agricultural Research, Canning Town, South 24 Parganas, West Bengal organised a Seminar and Farmer's Interaction on "Coastal Ecosystem of Indian: Recent Developments and Future Strategies"at ICAR-National Institute of Research on Jute & Allied Fibre Technology (NIRJAFT), 12 Regent Park, Kolkata- 700040 on 18th March2017. The seminar was attended by over more than 100 delegates including farmers from different areas of the *Sundarbans*.The inaugural function was presided over by Dr. Gautam Roy, Director (Actg.), ICAR-NIRJAFT as the chef guest of the function. After the inaugural function, the technical session comprised of three invited lectures which were delivered by eminent scientists from different institutes as given below. This session was chaired by Dr. S. Dam Roy, Director, ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands & a Vice-President of ISCAR.

1. Application of remote sensing for coastal agricultural development - delivered by Dr. D. Dutta, General Manager & Scientist/Engr – 'G', Regional Remote Sensing Centre (ISRO)- East, Kolkata, West Bengal.
2. Future research planning for stressed environment under coastal ecosystem - delivered by Dr. S. K. Ambast, Director, ICAR-Indian Institute of Water Management, Bhubaneshwar, Odisha.
3. Coastal ecosystem of India - recent development and perspective planning - delivered by Dr. S. Dam Roy, Director, ICAR-Central Island Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands.

Following are the important issues that were flagged by the eminent speakers during seminar.

- **Dr. Dutta,General Manager, RRSC-East (ISRO), Kolkata** in his lecture dwelled upon the capabilities of remote sensing tools in agricultural applications which would enable managers to take appropriate management and policy decisions.
- He pointed out that thermal infrared sensors can be used to monitor the canopy air temperature difference which is an excellent surrogate indicator of plant stress. He informed that surface soil moisture derived from synthetic aperture radar (SAR) has been operationally used in irrigation management and also polarametric SAR data helps in identifying crop type and characterizing plant bio-physical properties.
- Besides conventional sensors, the use of a large number of unconventional sensing systems that are available in space viz., imaging spectrometer, scatterometer, atmospheric LIDAR, limb sounder, microwave ranging, photometry, etc. need to be explored in agricultural sciences.
- Hyper-spectral remotesensing by virtue of its advantage of capturing data over numerous narrow and contiguous spectral bands has the capabilities of detecting subtle stress generated under field condition, as well as, in the estimation of plant biophysical and biochemical components. However, apart from the sensor, data processing mechanism, algorithm development and indices are important to gainfully utilize the hyper-spectral data in agriculture.

- **Dr. Ambast, Director, ICAR-Indian Institute of Water Management, Bhubaneswar & a Vice-President of ISCAR**highlighted the production system constraints in the coastal regions and the factors are mainly due to: inundation by tidal water and sea water ingress in aquifers; impeded surface and subsurface drainage conditions; high soil salinity due to shallow saline groundwater in winter/summer months; high and erratic rainfall causing lack of irrigation water in dry periods and second crop; lack of irrigation infrastructure; unscientific integrated farming system; conflict between farmers practicing agriculture and brackish water aquaculture; sea level rise, extreme weather events and cyclones/storms in climate change scenario.
- He pointed out that the option for improving agricultural productivity is through rain water management by providing effective land drainage, precision farming and improved irrigation methods, land shaping interventions. Horticulture/ livestock based integrated farming systems would also play an important role in maximizing farm returns in the coastal areas.
- It was also pointed out that the climate change would have a profound influence on the coastal ecosystem with the major impact from the sea level rise due to global warming. He emphasised that there is an urgent need to intensify in-depth research work with an aim: to analyse recent experiences in climate variability and extreme events, and their impacts on regional water resources and groundwater availability/quality; to study the spatial and temporal variation of rainfall and its impact on run-off and aquifer recharge pattern; to study sea-level rise due to increased run-off as projected due to glacial recession and increased rainfall; to study sea-water intrusions into costal aquifers; to determine vulnerability of regional water resources to climate change and identify key risks and prioritize adaptation responses; to evaluate the efficacy of various adaptation strategies or coping mechanisms that may reduce vulnerability of the regional water resources.
- Future research should focus on developing database on crop/farm/system productivity for coastal districts to set the priority areas of concern; application of modern techniques such as remote sensing and geographical information system; monitoring of planned surface drainage improvement schemes to identify the reasons of poor performance and suggestive measures for improvement; evaluation of different farming system options, available in each coastal sub-region, for water productivity apart from land productivity and their economics; evaluation of land shaping interventions at different sub-regions for suitable modification and adoption as a mitigation measure in the wake of sea level rise due to climate change.
- **Dr. Dam Roy, Director, ICAR-Central Island Agricultural Research Institute, Port Blair & a Vice-President ISCAR** informed that the coastal zones are the most fragile, dynamic and productive ecosystem and are quite often under pressure from both anthropogenic activities and natural processes. Regular monitoring of the coastal zone is indispensable for preparation of suitable coastal zone management plan, as well as, in implementation of regulations in the coastal zone.
- He highlighted that the east coast is more prone to sea surges and cyclones compared to the west coast. Climate change can have profound impact on the coastal and island ecosystems leading to bleaching of coral, destruction of plantation and agricultural crops due to sea water incursion and also these zones are highly risk prone to invasive diseases and species.

- Highly unscientific agriculture, aquaculture and other unscrupulous activities like illegal poaching are leading to widespread degradation of the rich natural resources and biodiversity of the coastal ecosystem.
- He opined that policy intervention for protection of vulnerable resources is the need of the hour and a good interface between the researchers, policy makers including other stakeholders is required, so that judicious decisions are taken for conservation and sustainable development.

Recommendations:

- Considering the potential of remote sensing applications in agriculture, latest remote sensing sensors like imaging spectrometer, scatterometer, atmospheric LIDAR, microwave ranging, photometry, etc. including the emerging hyperspectral remote sensingtechnology need to be explored in research on agriculture and allied sectors with special reference to the coastal zone. As continuous cloud cover is a problem in the coastal areas, application of microwave remote sensing to overcome this constraint should be given due attention for research.
- Climate change is expected to have a profound influence on the coastal ecosystem with the major impact from the sea level rise due to global warming. Hence there is a need to undertake in-depth research to - Develop agricultural vulnerability index to climate change, identify key risks and prioritize adaptation responses; Analyse climate variability/extreme events, and their impacts on regional water resources, groundwater availability and aquifer recharge pattern; Study sea-water intrusions into coastal aquifers; Evaluate various land and water management strategies that may reduce regional vulnerability.
- Future research programmes should focus on - Development of detailed resource inventories for coastal districts to set the priority areas of concern in coastal eco-system; Monitoring of surface drainage schemes to assess their performance and identify reasons for poor performance and suggestive measures; Farming system options needs to be fine tuned for optimal land and water allocation to maximize farm profit; Land shaping, as mitigation measure to sea level rise, needs to be evaluated in coastal sub-regions for adaptation.
- Suitable policy interventions should be arrived at for protection of vulnerable resources and a good interface between the researchers, policy makers including other stakeholders is need of the hour, so that judicious decisions are taken for conservation and sustainable development of the fragile and vulnerable coastal ecosystem.

Farmers' interaction:

More than 50 farmers, scientists from different ICAR organizations like CSSRI,RRS, Canning Town, NBSS&LUP, NIRJAFT, CRIJAF, CIFE, University of Calcutta, experts from NGO, along with press personals participated in the farmers' interaction meet. This session was chaired by Dr. K.K. Satapathy, Former Director, ICAR-NIRJAFT and following experts formed the panel for discussion.

Dr. B.K. Bandyopadhya, Former Head, CSSRI, RRS, Canning Town

Dr. B.K. Mahapatra, In-charge, CIFE, Kolkata

Dr. Kapil D. Sah, Principal Scientist, NBSS&LUP, Kolkata

Dr. Sitansu Sarkar, Principal Scientist, CRIJAF

At the outset Dr. K.K. Satapathi highlighted the importance of this type of interaction meet.
Sri Sunil Mandal from Canning, NGO representative raised the issue of coping with the mechanism of global warming and climate change impact on coastal agriculture.

Agricultural sector has been severely affected due to climate change impact. The effect was much severe in coastal region of West Bengal and Andaman Nicobar islands. Already people can remember the devastation of cyclone *Aila* in West Bengal during 2009 as well as *Tsunami* in Andaman and Nicobar Islands during 2004. Average agricultural productivity was lower in coastal region than other parts of the country. If the atmosphere become warmer there is a possibility of further decline of groundwater level, also more severe cyclone may occur in the coastal region. Coastal region has to be prepared to cope up with those extreme events of weather calamities.

Dr. B.K. Bandyopadhyay highlighted the technology of land shaping developed by CSSRI, RRS, Canning along with integrated farming systems approach of crop, fish and animal husbandry to enhance the household income of the farmers. The rain water harvested during rainy season can be used for irrigation during *rabi* season for off season vegetable cultivation as well as pisciculture. Dr. H.S. Sen, President, ISCAR informed the house that ATARI, Kolkata had developed a site specific district contingency plan to cope up with the climate change impact for West Bengal region. Dr. BK Bandyopadhyay advocated few management aspects like more tree plantation, application of more organics in the field, no burning of crop residue to reduce the CO_2 level in the atmosphere.

Availability of quality seed in coastal villages was also raised by farmers as another major issue for enhancing crop production in the coastal areas. As most of the coastal villages are in remote locations there is severe shortage of good quality seed and ultimately farmers get low yield with poor quality seed. House suggested to purchase seed through community basis which not only reduce the price for transport but also farmers could bargain to reduce the price of seed.

Though the farmers knew the importance of Kisan Credit Card (KCC), they raised that it was difficult to get KCC from bank. Dr. Subhasis Mandal, Join Secretary, ISCAR informed that non-availability of proper documents required by the respective bank was the major cause of difficulties in issuing of KCC and ultimately farmers were deprived of the benefit of KCC. Dr. HS Sen, mentioned that the matter may be discussed with the higher government officials to s~~h~~ort out the problem.

Farmers also raised the difficulties of getting quality pesticide for controlling disease, pest and weed which was emerging due to climate change impact. Most of the times they have to depend on local vendors' recommendation for the use of appropriate pesticides. Dr. Sitanshu Sarkar highlighted few recommendations regarding controlling white fly, mealy bug which were prevalent in South and North 24 Parganas district of West Bengal.

Another major problem farmers raised during interaction was regarding appropriate stocking density of fish in pond. Sometimes farmers were not getting appropriate growth of fish because of higher stocking density. Dr. B.K Mahapatra acquainted the farmers regarding appropriate stocking density of fish which would be 1000-1200 fish per *bigha*(0.133ha). The thump rule is one common carp or 4 prawns or 2 telapia per square meter. He also advocated the composite fish culture for better yield and highlighted the management of pond using lime and *muhua* cake.

The meeting ended with thanks to the chair and particularly the farmers attending from long distances. The scientists participating the interaction were also profusely thanked by Dr.Subhasis Mandal, Joint ISCAR who conducted the programme.

(D.Burman)
Secretary, ISCAR