SOIL CONSERVATION SOCIETY OF INDIA

# SOIL AND WATER CONSERVATION Today

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## IN THIS ISSUE



International Decade of Soils 2015-2024

## FROM THE PRESIDENT'S DESK

Agriculture is a primary production system in the country and reduces significant contribution to the wealth and quality of life. It is facing various challenges to gather manifest into sustainability issues.

*"Sustainable agriculture is the successful management of resources for agriculture to satisfy the changing human needs, while maintaining or enhancing the quality of environment, improving the social and economic conditions of the farmers, their employees and local communities, and safeguards the health and welfare of farmers and conserving renewable natural resources"*

Infect, since independence especially after 1960's, the emphasis in Indian agriculture has been more on exploitation of natural resources of land and water and less on improving, restoring, reclaiming and enhancing their productivity and sustainability. Presently, it is facing the challenge of feeding of growing human population under degradation of natural resources quality and changing climatic conditions. India supports18 per cent of the human and 15 per cent of livestock population of the world, only 2.2 per cent of the world geographical area, 4.2 per cent of freshwater resources, 1 per cent of forest area and 0.5 % of pasture land. Further, the extent of arable land is 46 per cent of the country's land mass. With the best efforts sustainability of the productivity is inquisition in many production systems, though problems were recognized yet total solutions were not found.

The per capita availability of forest supplementing livelihood in India is only 0.08 ha, against the world average of 0.8 ha. The agriculture farmlands in India are under constant threat from various forms of land degradation and loss of productivity. Various pockets, in almost all the states, are fast turning into "hot spots" reflecting the devastating effects of prolonged, reckless and injudicious use. The utilizable surface water resource is estimated to reduce by 7% due to deforestation and soil erosion while the loss due to water pollution is put at 20%. Inefficient use of water in irrigation also leads to environmental degradation through water logging and induced salinity. The productivity of Indian forests is only 0.7 t/ha which is far below its potential of 2 t/ha/yr and the world average. The loss of biodiversity is endangering the livelihood

of over 300 million people living in about 2 lakh villages within and on the fringe of forest lands.

Intensive use of natural resources, the degradation of land resources base associated with impacts on biodiversity and agricultural productivity and also effects of climate change are also posing a serious threat to the survival and welfare of the people. Hence, natural resources need to be managed in a holistic manner as there are direct linkage among the various components.

**Dr. Suraj Bhan**
**President SCSI**

# Cup Type Water Wheel Pumping System

JITENDRA SINHA
Associate Professor, Soil and Water Engineering,
IGKV, Raipur

India is an agricultural country and there are many rivulets, stream, rivers and elevated canals. Under drop/fall condition the water flows with great velocity. The kinetic energy of flowing water can be utilized for some useful work like pumping. The energy of flowing water can be utilized for lifting and carrying water for irrigation purposes, filing the small ponds and also for other rural works in remote areas. The regulated water can be allowed to flow through parshall flume, installed in gate of check dam which help the water to directly strike the cups of pumping system. The pumping system has been developed in the workshop of Swami Vivekanand College of Agricultural Engineering and Technology and Research Station while the research work/observations were taken in the nallah of Krishi Vigyan Kendra, Raipur, I.G.K.V., Raipur (C.G.). The drawing of CTWWPS was prepared in Auto-CAD software. The overall dimension of CTWWPS was 103 cm x 44 cm x 84 cm as shown in Fig. 1.

## Components of cup type water wheel pumping system

**Frame:** The frame forms the main body of the CTWWPS on which various components are assembled and it gives stability to the unit during the pumping operation. The frame consists of the front portion on which the wheel is mounted at the center. The overall dimension of the frame is 103 cm x 84 cm x 44 cm.

**Cart wheel:** A 66 cm diameter wheel (without tyre) of a common hand pulled cart/goods carrier has been used as drive wheel.

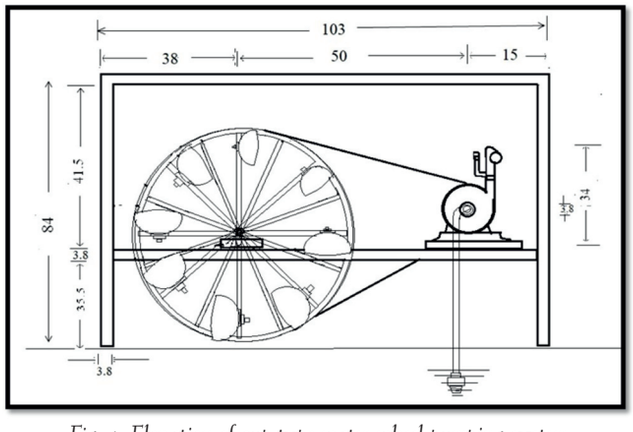


*Fig. 1: Elevation of cup type water wheel pumping system*

**Axel:** A rod that serves to attach a cart wheel and provide support for bearings on which wheel rotates. The diameter and length of axel are 1 cm and 50.8 cm respectively.

**Cups:** Cups of 12.5 cm diameter are fixed on both outer side of the cart wheel with suitable fasteners.

**Bearing:** It transfers axial and radial loads from the source of the load to the structure supporting. The inner and outer diameters of bearing are 1 cm and 2.5 cm respectively.

**V- Belt:** For transmitting power from the wheel to the pump pulley B section belt of length 243 cm has been used.

## Pump Selection

The most suitable type of pump for the study was found to be a centrifugal pump. Its compact size, simplicity of design, relatively low cost, light weight and widespread availability of spare parts made it ideal for use in this study. The CTWWPS was capable of developing maximum 1400 RPM and this pump was capable of lifting water at below 1400 RPM also.

Testing and performance evaluation of developed pumping systems for lifting and carrying water

The suction was kept constant (0.56 m) as per the site condition while the delivery head and carrying distance was varied and its effect on discharge of the pumping system was evaluated. Under the constant suction head of 0.56 m, constant delivery head of 0.17 m and upstream depth of flow of 0.44 m, the pumping system can discharge nearly 24000 litres of water per day to a sink 30 m far from the pumping site and can constantly feed open well or pond using the kinetic energy of flowing water. (Fig. 2)

## ACKNOWLEDGEMENTS

The author is thankful to the administration of Department of Soil and Water Engineering, SVCAET and RS, I.G.K.V., Raipur (C.G.) for providing the required facilities of the study through University Funded Project SWE-01.

*Fig. 2: Testing of cup type water wheel pumping system at fisheries nallah*

# Conjunctive Use of Groundwater and Canal Water in the Command Area - Lower Bhavani Project Area

**G. Thiyagarajan, A. Raviraj and M.Manikandan**
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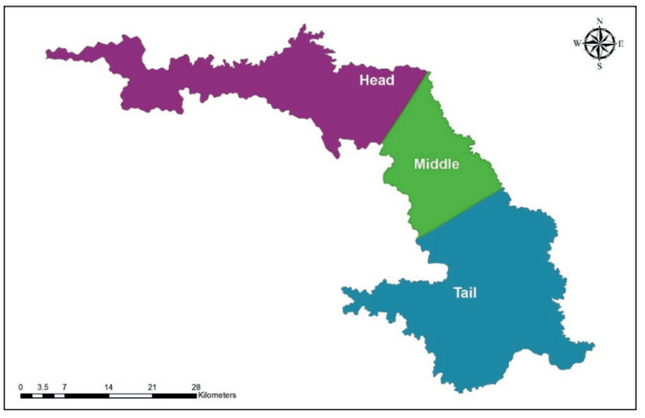
A critical problem that mankind had to face and cope with is how to manage the intensifying competition for water among the expanding urban centers, agricultural sectors and in-stream water uses. Water planner can achieve a better management through basin wide strategies that include integrated utilization of surface and groundwater which may bedefined as conjunctive use. Conjunctive use is the simultaneous use of surfacewater and groundwater. Conjunctive use of surface and groundwater is not a new concept but it has been in practicesince last three decades. The term 'conjunctive' used here is to integrate surface andgroundwater resources. It includes interaction between surface water and groundwaterthrough groundwater recharge, hydrological cycle, water balance components etc. Theseparameters will be used for modelling the groundwater flow and its interaction with surface water. Conjunctive use modelling of surface water and ground water has wide applications inwater resources management, ecology, eco-hydrology and agricultural water management.Conjunctive use model are developed based on the purpose and objective. It will help the decision makers, policy makers, practicing engineers andagricultural scientists to prepare the action plans for the overall development in the basin.

Bhavani is more or less a perennial river fed mostly by South-West monsoon. North-East monsoon also supplements its water resources. Bhavanisagar dam was constructed in the year 1956 at theconfluence of two rivers, the Bhavani and the Moyar. The Lower Bhavani project (LBP) is formed across the river Bhavani just below its confluence with river Moyar. The LBP was constructed during the first five year plan period ofthe Government of India and this was the first major irrigation project takenup after independence in Tamil Nadu.

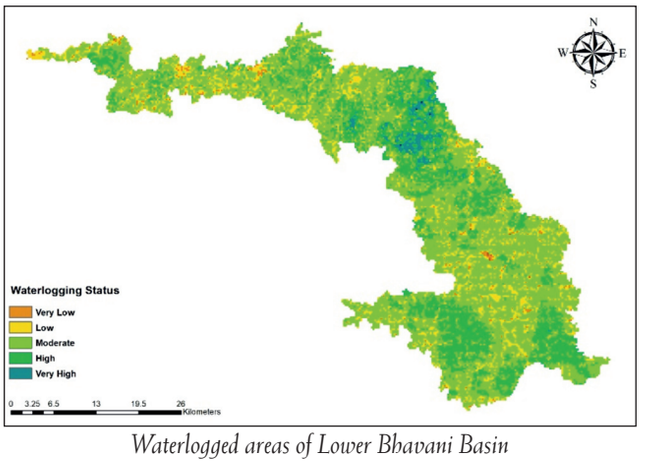
In this system, most of the command area has porous, red soil, gravelly mixed with pebbles and leads to seepage losses. An allowance fortransmission losses of 33.33% was made in the design. The Lower Bhavani Project is known for its well-developed irrigated agriculture using moderntechnology in the form of electric pump sets, huge canal systems and all otherfeatures of Green revolution of India during the 1960's. Tanks are mainlyrain-fed and remain dry throughout the year, except during rainy seasons. The Lower Bhavani study area map with different reaches is shown in Figure.

Waterlogged areas in LBP was identified spatially by using multi-criteria analysis. The thematic maps used were slope map, relief map, stream density map, rainfall map, groundwater table fluctuation map, landuse map and soil map. The areas were classified as very high, high, moderate, low and very low waterlogged areas. By classifying the waterlogged areas, it was useful in planning and suggesting proper drainage in those areas. It will assure crop safety as well as provides an opportunity for water saving.




*Lower Bhavani study area map with different reaches*

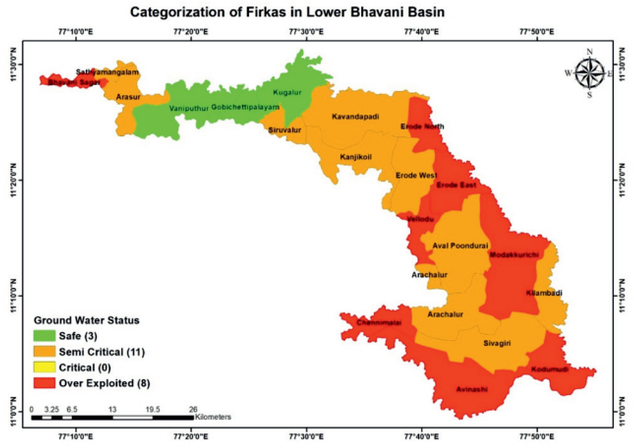
Groundwater development of LBP taluks are slightly changed from 2016 to 2019 estimation. LBP covers few taluks of Sathyamangalam, Gobichettipalayam, Bhavani,



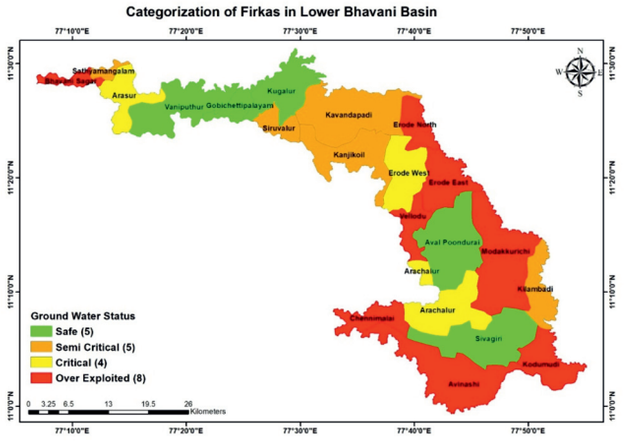

*Waterlogged areas of Lower Bhavani Basin*

Erode, Perundurai and Kangeyam of Erode and Tiruppur district. The groundwater status at firka level was spatially mapped to identify the existing scenario. It was found that two firkas' status changed from semi-critical to safe (Sivagiri and AvalPoondurai). The Erode West, Arasur, Arachalur changes from semi-critical to critical stage.

The canal command was originally designed for alternate wet and dry crops in a calendar year. But farmers are practicing high water consuming cash crops such as Sugarcane and Banana throughout the year irrespective of low or no flow situation. Adoption of micro irrigation in canal command areas will greatly influence the water use efficiency and water productivity. This can also reduce the excess usage of groundwater in the Lower Bhavani Basin. Conjunctive use for Lower Bhavani Project can be achieved through application of the optimization model which provides an estimate of sustainable yield from both groundwater and surface water. The amount of surface water and groundwater withdrawals in the feasible region was used for optimization. The optimal conjunctive use of surface water and groundwater




*Categorization of Firkas in Lower Bhavani Basin in 2016*




*Categorization of Firkas in Lower Bhavani Basin in 2019*

thus leads to sustainable development of the region within the given constraints. Policy decisions need to be centred on these results while planning the overall water resources development of the region.

# Ridge-to-Valley Treatment of Hilly Terrains for Efficient Soil and Water Conservation

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Hills are an important source of water, energy and biological diversity. As a major ecosystem representing the complex and interrelated ecology of our planet, hill environments are essential to the survival of the global ecosystem. However, the hill ecosystems are changing rapidly. The steep slopes of hills are highly susceptible to accelerated soil erosion and landslides due to high intensity of rainfall. The primitive cultivation practices like *jhum* and *bun* further enhances these degenerative trends. Rampant deforestation, wild fires, extensive grazing, and unscientific mining etc. are adversely affecting the overall ecological condition of the hills.

With an intention to conserve every drop of water starting at the ridge and reduce to a considerable extent both the surface run-off volume and the velocity of water, the ridge-to valley approach seeks to detain, divert, store and use available rainwater. This allows better management of water flowing from the ridge to the valley and ensures conservation of rainwater, which in turn, bring agricultural and economical stability. This approach also helps in strengthening the durability of soil and water conservation structures downstream.

Under ridge-to-valley approach, the soil and water conservation activities can be taken up as area treatment and drainage line treatment.

## (1) Area treatment:

### (a) Arable area treatment:

**Contour bunds:** These are trapezoidal earthen or loose-boulder embankments constructed on contour. These bunds intercept runoff and hold the water for subsequent absorption and there by conserve soil and moisture. Bunds of small cross section (0.05 $m^2$) laid at 0.3 to 1.0 m vertical interval on hill slopes are used as conservation measures. Experience reveals that it takes 4 to 8 years for contour bunded plots to get converted into bench terraces. However maintenance of contour bunds is highly required in order to avoid escape of deposited soil.

**Bench terraces:** It consists of construction of step like fields along contours by half cutting and half filling. Original slope is converted into leveled fields. The vertical and horizontal intervals are decided based on slope level. Bench terraces are most effective conservation measures. Slopes ranging from mild to steep (>100%) have been converted into benches for growing irrigated rice crops. In most of such areas excess water disposal and irrigation with application system consists of allowing the water to flow from one terrace to another by providing opening in the ridge bunds. Wherever bench terraces are without any source of irrigation water, they are needed to be maintained properly.

**Half-moon terraces:** Circular level benches with 0.5 to 1.0 m diameter are used for planting fruit trees in hill slopes. Area on hill slope marked in half-moon shape is cut and earth filled in half-moon shape to downhill side provides circular bed. With shoulder bund at the lower periphery of circular bench, the bed works as a good conservation measures.

**Boulder bunds:** This is a bund across the slope constructed by using locally available stones/boulders in the sand mixed soils and in the shallow soils. This is an alternative to the contour bund, when enough soil is not there to form bunds.

**Vegetative bund:** A live vegetative barrier on the contours is made which will decrease the velocity of rain water in turn soil erosion is controlled. These checks could also be formed in between the contour bunds.

**Water ways:** These are formed along the slope for safe disposal of excess rain water from cultivable areas to nalas. Grass is also grown in the water ways to avoid further scoring.

**Farm ponds:** Farm ponds are opened across the water ways

*Figure 1: Area treatment with bench terraces*

by digging the soil. The excess rain water is harvested and the harvested water is used for various activities like giving protective irrigation to vegetables and orchards including drinking water to animals and birds.

(b) Non-arable area treatment

Treatment of non-arable land has been inevitable to reduce the runoff and to create water storage at field level. They help to distribute moisture uniformly on sloping land so that natural vegetation grows successfully and restores the bio-diversity.

**Contour trench/'V' ditches:** These are trenches / V-ditches dug on contour in non-arable lands of more than 3% slope to hold run off for conservation and reducing erosion. They are established for development of trees and grass species and are adoptable in areas with annual rainfall of up to 950 mm.

**Pits with crescent-shaped bunds:** These consists of staggered rows of pits with crescent-shaped bunds for planting trees and are adoptable in non-arable lands having less than 3% slope in areas with annual rainfall of less than 950 mm.

**Catch pits:** These are large pits dug at rill points and in waterways to trap runoff water. They are adoptable in hilly lands with rock outcrops.

**Continued contour trenches:** Trenches are opened at a distance of 5 to 10 meters with 0.45 meter depth and 0.6 meters width in the areas where annual rainfall is less than 750 mm. The rain water is collected in the trenches and then the plants could be planted.

**Staggered contour trenches:** These are opened where there is undue soil slope with humps.

**Graded contour trenches:** These trenches are made in the black soil areas where rainfall is more than 750 mm, for safe disposal of excess water and forest plants are planted.

**Vegetative filter strips:** These are made to reduce the velocity of rain water coming from hills, forest area across the slope at intercepting areas where cultivable and uncultivable areas joins. Once the vegetative strips are grown fully it will act as a barrier to check the flow of water from slopes and soil erosion is controlled.

**Water recharge pit:** The pit is opened in the uncultivable area in the direction of diversion channels/water ways or nearby areas where there is flat lands. Dry stone pitching on the three sides of upstream side also be done.

**Diversion channel:** Diversion channel is formed to avoid the rain water that flows form pasture lands, hills areas, and forest areas into t he cultivable area. A drain across the slope is opened for safe disposal of water.

### (2) Drainage line treatment:

### (a) Upper reaches treatment

**Vegetative filter strips:** These are made to reduce the velocity of rain water coming from hills, forest area across the slope at intercepting areas where cultivable and uncultivable areas joins. Once the vegetative strips are grown fully it will act as a barrier to check the flow of water from slopes and soil erosion is controlled. The different types of filter strips are sod strips, sodded earthen strips and shrub checks.

**Boulder checks:** These are porous checks across the nala constructed using boulders to check water velocity and to arrest silt.

**Rubble checks:** Rubble check is constructed where the gully width is up to 10 meter and depth is 1 to 3 meters with a vertical interval of 2-2.5 meters. The catchments area considered is from 8 to 15 hectares. This should also serve to control soil erosion and silt flow. Agaves row could also be planted on up-stream and down-stream side at a distance of 0.3 meters.

**Brush wood checks:** These are porous checks constructed across the gully with wooden pegs and brush wood and are adoptable in all areas.

**Gabions:** These are dams made of wire-woven baskets filled with stones placed in trench of suitable size across steep sloped gullies to trap erosion debris during rains. They are adoptable in all areas of high slopes and high rainfall.

**Water recharge pit:** Pit is opened in the soils where there is less water infiltration rate. The pit is opened in the gentle slope nalas/gullies where the upper reaches are already treated and so there is less scope of siltation. These should be opened preferably adjacent to water harvesting tanks.

### (b) Middle reaches treatment:

**Dry stone checks/Rock filled dam:** These structures are constructed where there is no necessity of impounding more water and to avoid further scoring. There are constructed at the points where gullies join and gullies of serious nature. The availability of stones should be within 40 kms distance.

**Small sunken ponds:** The rain water that would have flown in gullies will be sorted so that the moisture percentage around the cropped area is increased. The excavated soil is put as bund so that water storage is increased.

**Ravine Reclamation structure (RRS):** RRS is a masonry structure consisting of a body wall, apron and header. The banks are protected by stone revetment to further scouring. They are constructed to control head movement of gullies, avoid further widening and deepening ravine. Reduce sedimentation of tanks/reservoirs to provide protective irrigation, drinking water for the cattle and wild life, increase moisture regime and recharge underground water table. They are constructed in ravines with depth of 2.5 to 3.5 m width 8 to 15 m and catchment area 15-25 ha.

### (c) Lower reaches treatment:

**Check dams:** These are stone masonry structures constructed across deep nala with the objective of controlling runoff water, reducing sedimentation of tanks/reservoirs, providing protective irrigation, drinking water for the cattle and wild life and to recharge underground water table.

**Vented dam:** Masonry work taken up in the high rainfall area. The vents are provided to allow the water flow during the


*Figure 2: Drainage line treatment*

rainy season and store water after the decrease in rainfall. Wooden Flanks are provided to close the vents. The stored water is used for irrigation.

**Nala bunds:** This structure consists of homogenous earthen embankment constructed across the nalas/valleys in arable and non arable lands to store run-off for recharging ground water and make water available for social and agricultural use at surface level.

**Percolation tank:** This is also nala bund but with stone, cement masonry out let to drain the excess water. This is opted where there is less scope for cut-out let.

Soil and water conservation in hilly terrain requires a well-planned and rational land use combined with engineering and cultural measures. Steep slopes may essentially be brought under permanent forests and gentle slopes should be terraced and valley bottom should be put under suitable agricultural crops. To achieve maximum benefit, it is essential to treat various areas on a complete watershed basis for rational use of forestry and agriculture, including horticulture.

## Obituary

Sh. Vasant Wasudeo Ambekar, served Department of Agriculture, Uttar Pradesh since 1961 in various capacities and retired as Director of Agriculture UP in the year 1996. He was instrumental in handling various schemes related to Soil & Water Conservation & Watershed Management along with Ravine Land Reclamation & Salt Affected Soils. Sh. Ambekar also worked as team leader of behalf of Soil Conservation Society of India for preparation of "Bio Industrial Watershed Development Plan" for UP State Land Use Board. He was activity associated with Soil Conservation Society of India (SCSI). On July 30, 2021 he breathed his last and in the moment of great sorrow, members of the SCSI pay their homage to Sh. V.W. Ambekar and remember him with gratitude. We are deeply saddened by the loss and will be truly missed by the entire fraternity of the SCSI family.

## 70th SCSI FOUNDATION DAY OBSERVED BY MEGHALAYA STATE CHAPTER

The Meghalaya Chapter observed 'Foundation Day' of the Soil Conservation Society of India on 24th September, 2021 at village Thadnongiaw of Bhoirymbong Block in Ri-Bhoi district with farmer friends.

Dr. N. Janaki Singh, Secretary of the SCSI-Meghalaya Chapter, while welcoming the farmers apprised that the Soil Conservation Society of India was first established at Hazaribagh, Bihar (now in Jharkhand) in December 1951 and later on the HQ was shifted to New Delhi. He informed that this year, they are celebrating 70th foundation day of the society. He added that the SCSI is mandated for the welfare of farmers and all the rural people whose livelihoods are associated with the management of natural resources. The Society is continuously working for the cause of conservation, development, management and sustainable use of the soil, land, water and other associated resources of plants and animals. The SCSI extends its activities by establishing State Chapters in various parts of the country and presently, 23 State Chapters of the SCSI are functioning including the Meghalaya State Chapter at CPGS-AS, Barapani.

Dr. Popiha Bordoloi, SMS from KVK, Ri-Bhoi and an active member of Meghalaya Chapter during her address to the farmers highlighted the importance of maintaining soil health in hilly regions. She emphasised that since we are not using chemical fertilizers in our region, it is very much required to meet the nutrient demand of crops by adding sufficient quantity of organic nutrient sources like FYM, vermicompost and bio-fertilizers. She announced that for making this foundation day remarkable and memorable, many farmers will be provided with free vegetable seeds, HDPE vermicompost beds, agricultural lime for managing soil acidity and bio-fertilizers, etc.

Dr. Sanjay Swami, Professor (Soils) & Chairman of the SCSI-Meghalaya Chapter, in his presidential remarks, said that the mandate of SCSI has more relevance in hilly regions like Meghalaya as the steep slopes of hills are highly susceptible to acute soil erosion problems due to high intensity rainfall. The primitive cultivation practices like *jhum* and *bun* further enhances these degenerative trends. Rampant deforestation, wild fires, extensive grazing, unscientific mining and quarrying, etc., are adversely affecting the overall ecological condition of the region. Control efforts have not succeeded to desired scale. He emphasized that soil conservation in hilly areas requires a well-planned and rational land use programme combined with engineering and cultural measures. Steep slopes may essentially be brought under permanent forests and gentle slopes should be terraced and valley bottom should be put under suitable agricultural crops. To achieve maximum benefit, it is essential to treat various areas on a complete watershed basis for rational use of forestry and agriculture, including horticulture.

Dr. Swami also appraised the house about various activities taken up by the Meghalaya Chapter of SCSI for improving soil health in the hilly tract of Meghalaya and shared that their efforts in this direction has been recognized by the SCSI Hqr. and the Meghalaya Chapter is conferred with prestigious Best Chapter Award - 2020 among 23 state chapters of SCSI in the country during the SCSI Hqr. Foundation Day Celebration today itself. He added that this is the result of hard work and dedication of all its members and I congratulate them. He also congratulated the farmers who are getting free inputs today, and requested them to utilize these inputs in judicious way to draw maximum benefit.

Thereafter, the free inputs were distributed among the

farmers. Many members of SCSI- Meghalaya Chapter also participated in this event. The programme ended with vote of thanks proposed by Dr. N. Janaki Singh, Secretary of the Meghalaya Chapter.


*(Interaction with farmers during SCSI Foundation Day celebration)*


*(Farmers posing with free inputs received from Meghalaya Chapter on foundation day of SCSI)*

# Entrepreneurial Avenues in Indian Dairy Sector for Rural Youth

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The Livestock Sector particularly the dairy sub-sector has been identified as an important gamechanger in doubling the farmer's income and sustainable growth of agriculture particularly if it is integrated with Agriculture and allied operations converting the waste and byproducts of agriculture sector into nutritious food. Dairying including Dairy processing is a source of continuous income as well as wealth to the nation as it contributes significantly to the food security and socio-economic development of the farming community as well as the nation even during the natural calamities like the pandemic/flood/drought and crop failure. The sector plays very important economic and socio-cultural roles for the rural households such as food supply, source of income and livelihoods, asset saving, soil nourishment, transport, agricultural traction, agricultural diversification and sustainable agricultural production.

Milk, with an estimated milk production of about 208 million tonnes in 2020-21, is one of the biggest agri-commodity in terms of value. The milk production has been witnessing Compound Annual Growth Rate (CAGR) of about 5.0 per cent during the last decade. This consistent positive growth trend could be attributed to various factors such as different government dairy development initiatives, sound cooperative structure comprising micro-level production, economic scale processing at district level and large scale marketing at state level with a brand; formation of Milk Producer Companies devoid of bureaucratic interventions; building infrastructure like cold chain/bilk milk cooling etc., empowering women in dairy activities and availability of regular and dependable cash to sustain the family. The dairy farming is gradually shifting from subsidiary occupation to a commercial enterprise. Similarly, significant positive trend has been observed in the milk processing sector over the last 2 to 3 decades with the introduction of novel, functional and innovative dairy products and processing techniques.

Milk with its varied benefits is the only source of high-quality affordable animal protein for the vegetarian population of the country. Factors such as absence of taboos, organized supply chain management, increasing consumer interest in high protein diets and increasing awareness & availability of value-added dairy products through organized retail chains are also driving its demand. The consumption of milk and milk products is rising, commensurating with the increase in purchasing power of people, rapid urbanization, changing lifestyle/food habits and demographic growth.

A good number of interventions like the National Livestock Mission, National Programme for Bovine Breeding and Dairy Development (NPBBDD), Rashtriya Gokul Mission (RGM), Animal Husbandry Infrastructure Development Fund (AHIDF), Dairy Processing and Infrastructure Development Fund (DIDF), Dairy Entrepreneurship Development Scheme (DEDS), National Dairy Plan, etc. have been introduced to accelerate the growth and export potential of dairy sector. These interventions coupled with technological advancements are changing the dynamics of the sector.

The new and innovative "agri-start ups" and "dairypreneurs" with creativity, innovation and use of modern digital technologies like the and the biotechnological advances are fostering the entrepreneurial culture. Some of the potential and successful technologies include RFID tags, Online/Digital Marketing, Collar technology, automation and use of drones and robotics, Cloud-based dairy supply chain management, hydroponic green fodder production (Fig. 1), health tracking devices, precision dairy farming, sexed semen technology, Internet of Things (IoT), cloud computing, Digital farm management tools, and blockchain technology for product traceability.

The dairy sector paves way for sustainable organic agriculture and yield improvements, feed efficiencies, use of human food byproducts and manure as an effective fertilizer resulting in mitigation of climate change. It offers multiple opportunities to people and leave a sustainable impact on society, environment, and economy.

The different avenues in dairy farming sector include dairy farm (Fig. 2), bull farm, organic dairying, feed processing, veterinary pharmaceuticals, feed and fodder production, dairy farm worker, Veterinary services, Artificial Insemination, procurement and marketing etc. Similarly, in dairy processing sector, the avenues are milk procurement and marketing of milk; management of chilling centres, bulk milk coolers and cold chain; processing of milk; manufacture of traditional and non-traditional dairy products such as dairy based sweets, Ghee, UHT milk, fermented and probiotic products, dairy whiteners, whey protein concentrates, lactose and marketing and distribution of dairy products, etc. The service-oriented entrepreneurial activities/ service includes manufacturing of Food and Dairy Processing Equipment, IT enabled Support and Automation, Management of Food Safety Standards and Quality Testing, HRD Activities and Capacity Building, Veterinary services and Pharmaceuticals.

India has been rightly christened as "Oyster" of global dairy industry. It offers a good range of entrepreneurial avenues in dairy farming, processing, and service-oriented activities besides providing the nutritional security, socio-economic development of rural households and facilitating role in doubling farmer's income. The positive interventions and eco-system in the form of supportive Schemes and technological advances are enhancing the potential.

*Fig. 1: Hydroponic green fodder production*

*Fig. 2: Dairy Farm*

## 30th National Web Conference
## on
## "Soil and Water Management Technologies for Climate Resilience, Agricultural and Environmental Sustainability"

14-16, December, 2021
Bhubaneswar, Odisha, India
Organized by
Soil Conservation Society of India,
New Delhi
Collaborators
ICAR-Indian Institute of Water Management, Bhubaneswar, Odisha
and
Orissa University of Agriculture & Technology,
Bhubaneswar, Odisha

### Themes of the Conference

- Soil and water management for enhancing productivity
- Climate Change Impact on soil and water resources and mitigation strategies
- Suitable measures for control of soil and water erosion
- Water conservation and water harvesting techniques for agriculture, horticulture and forestry
- Smart conservation agriculture techniques for watershed management and socio-economic development for livelihood security
- Technological options for enhancing water in irrigated agro-ecosystems
- Resource management and environment sustainability
- Conservation agriculture techniques and integrated coastal Ecosystem for sustainable agriculture
- Policy issues for management of resources to ensure food, nutritional and livelihood security
- Integrated nutrient management, soil health and organic farming to achieve sustainable agricultural goals
- Environmental and social impacts on soil, water and biodiversity conservation and management
- Innovative ICT applications and effective decision support systems to combat climate change, disasters and droughts.

### Important Dates

- Last date for receipt of abstract –31.10.2021
- Intimation of acceptance of abstract–07.11.2021
- Submission of full length paper–30.11.2021
- Last date for registration without late fee– 05.12.2021

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