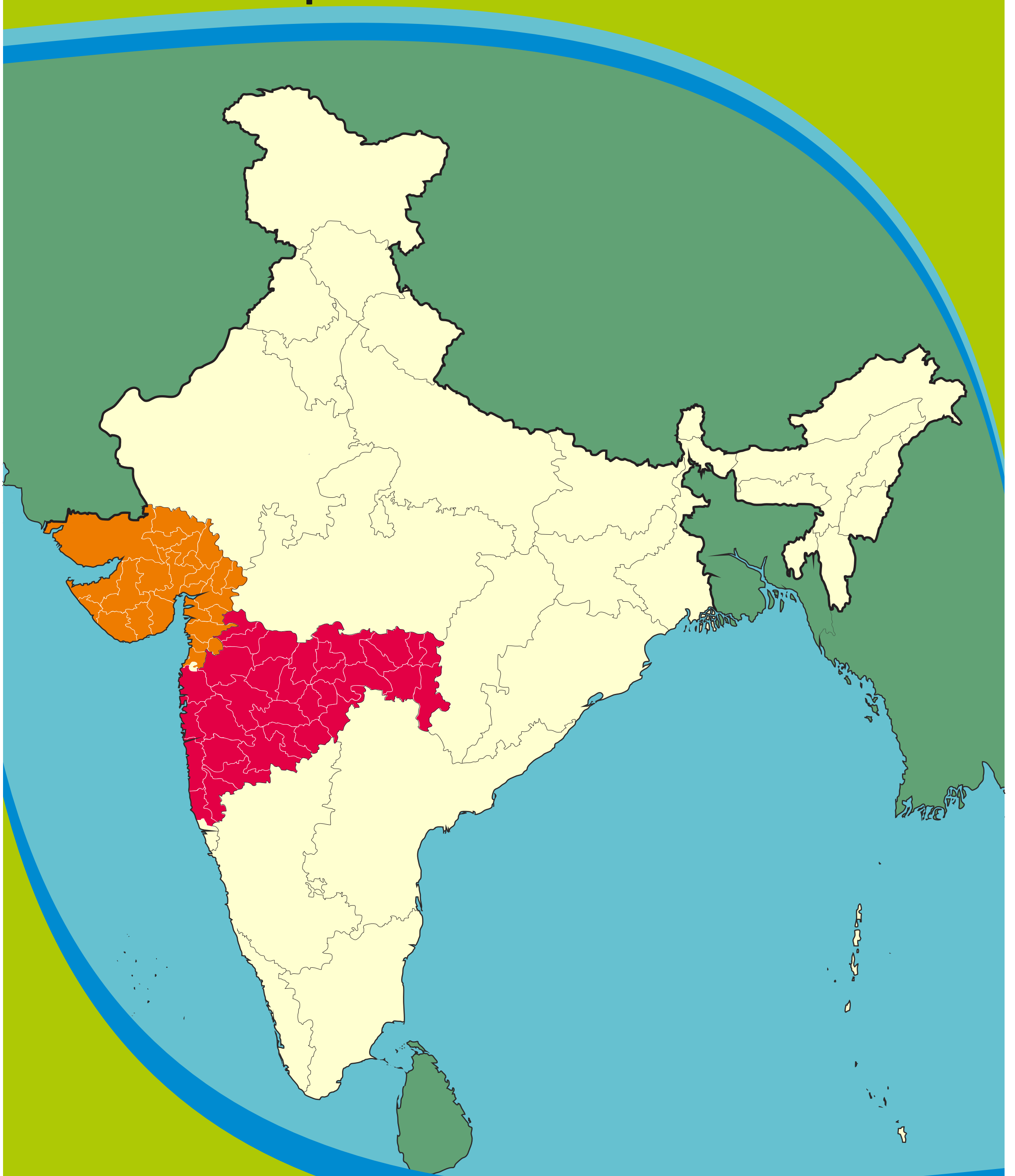
Building Climate Smart Farmers

An Indian Perspective



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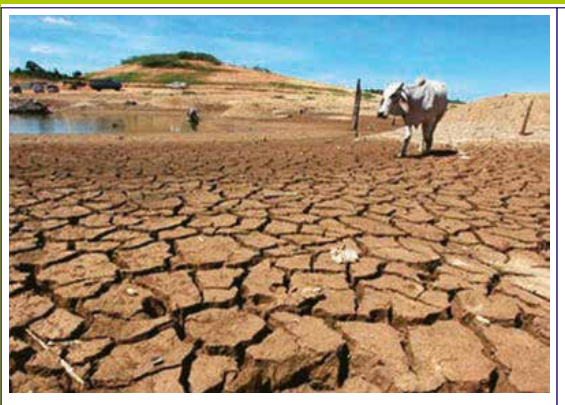
Impact of Climate Change and Remedies



Draught

The adverse effect of drought can be managed as under:

- If rain is prolonged up to 8 to 10 days no effect on crop
- If rain is prolonged beyond 15 days, irrigation becomes essential
- In absence of irrigation facility, take out the alternate row of crop.

Heat Waves

- Heat waves burn the crops.
- Agro forestry, mix cropping, alternate cropping can help to some extent. Irrigate the land at short interval.
- The protective safety fence of shivery for Banana and Papaiya trees and planting of 5 to 6 lines of Sorghum around summer maize can help a lot.
- Timely information about weather forecasting can help in taking preventive steps.

Cyclone

Warnings of cyclone, heavy rains, heat and cold waves are made available by Indian Meteorological Department, Government of India. The farmer must keep himself informed about it through various communication links. Planting trees like Mangroves and Bamboos prevent soil erosion and save crops from high wind velocity and floods.

Cold Waves

- The cold waves and un-seasonal rain affect horticulture crops.
- The heap of waste grass can be burnt to create warmer effect.

Air Pollution

Vegetation and agricultural greenery absorb the CO_2 from the atmosphere through the unique natural photosynthesis process. Climate smart agriculture reduces air pollution caused by CO_2 and in exchange gets Oxygen released.

Water Pollution

The climate smart agriculture also includes innovative technology of recycling of dirty water caused by industrial processes and converts it into reusable clean water. Thus, water pollution is reduced to a substantial extent. Moreover, it also emphasizes the economic use of scarce water resources in a smart manner.

Flood

Earthquake

Tsunami

Forest Fire

The climate smart agriculture emphasizes on the timely information available from weather forecasting mechanism. It will enable all concerned about timely proactive steps. The Disaster Management Authority gives timely warning. Farmers will have to remain alert to prevent loss of family members, properties animals and standing crops.

Impact on Agriculture

The irregular rain, off - season rain and increased heat affect the agriculture adversely. Excess rainfall, excess cold and excess heat reduce and destroy agro produce. The climate smart agriculture resorting to latest technology and its planed extension services save the agriculture and also maintain the land productivity on a sustainable basis.

Impact on Marine Life

The marine life is adversely affected by the polluted water released by industrial processes in rivers and seas, which destroy the marine life. The culture ponds be made insects-free and fresh waters be replaced. The heat waves and cold waves compel the migration of fishes. The fishermen be informed about this, so that they can manage their fish farming accordingly.

Impact on Livestock

Excessive heat disturbs milk productivity, growth and life of livestock. Adverse impact of climate change on vegetation and agriculture adversely affect the availability of fodder- green as well as dry. Cattle and poultry need to be provided shelter in time of drought, heat or cold waves.

Impact on Human Beings

The recurrences of flood, tsunami, earthquake, droughts, forest fire etc. directly affect the human habitation and lives. The devastating effects resulting into loss of lives and properties, standing crop and livestock, can be saved to a considerable extent through preventive and precautionary action plan.

DROUGHTS IN GUJARAT

Gujarat is a drought prone state in our country. Droughts in Gujarat can be traced back to 12th century. The state gets highly unevenly distributed rainfall, varying from 300 – 350 mm in Kutch to 600 – 700 in Saurashtra and North Gujarat to more than 1500 mm in South Gujarat. in the in the of climate change this situation is being mer dense. In the area of climate change, this situation is becoming more intense.

Drought is a situation caused by lack of rainfall. It affects basic requirements of life i.e. water and food. Almost three quarters of Gujarat is arid or semi-arid and suffers from recurrent water scarcity. This climate is a major factor contributing to regular drought, desertification and in some areas salinization. Kutch is the largest district of Gujarat frequently experiences extended droughts. Of the past 50 years 33 have been classified as drought years.

REASONS OF DROUGHT IN GUJARAT

- Late onset and early withdrawal of monsoon.
- Lean rainfall due to paucity of depression and low pressure system.
- Prolonged breaks in monsoon rainfall.

Impacts of Drought

- Declined ground water levels, drinking and irrigation water scarcity, reduced agricultural productivity and production, fodder scarcity and reduced food scarcity.
- The loss of crops and subsequent changes in cropping pattern as a result of drought and ground water depletion has been extensive in most villages in Gujarat.

How Drought changes life of people?

- Shifting of focus from agriculture to animal husbandry.
- Increased dependence on wage labour.
- Migration from rural areas to city slums
- Involvement of women in the labour force spikes.
- Development of non-agricultural livelihood sources

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CASTOR A WATER RESISTANT CROP

Castor plant is a tropical/ sub-tropical species and grows in areas of low rainfall. It is sensitive to extreme climatic changes, especially extreme changes in rainfall distribution. The minimum rainfall needed by the castor crop is 38-50 cm (15-20inch).

Castor grows in tropical and subtropical regions as a perennial plant and in temperate climate as an annual plant. Since the roots of castor penetrate deep into soil, and get water from deep soil, it is good for drought prone areas. The crop favours hot and humid climate. It can grow in lands with small soil layer on rocks. In India, it is cultivated in Telangana, Bihar, Gujarat, Tamilnadu, Maharashtra and Uttar Pradesh. It is largely cultivated in drought prone areas where rainfall is 380 to 500 mm per year. This can be cultivated as a cash crop in areas where rainfall is good and reliable. The cake is used as organic fertilizer.

FREQUENCY OF IRRIGATION IN CASTOR CROP DEPENDS ON

Soil type I Climate I Crop stages

- Castor beans can be grown on marginal lands which are usually unsuitable for food crops.
- The farmers sow the seeds using Dibbling method where minimum gap of 5 to 8 feet is left for better growth of the crop. 2 seeds are sown per hole.

IRRIGATION & HARVESTING OF CASTOR

Castor crop requires minimum water so two types of irrigation methods are used in Gujarat.

- **Drip irrigation:** It saves 24% of water consumption and provides 36% higher yield.
- **Flood irrigation technique:** Is used by farmers in hot weather climate.

Castor cultivated as an annual crop a multiple harvest method is adapted, where the spikes of castor are handpicked using a sickle. Multiple harvests with an average of 4 to 6 pickings are obtained from the same crop.

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SUSTAINABLE CASTOR FARMING

Castor is Cultivatedmostly in the arid and semi-arid regions of the world. Castor producing states in India are Gujarat, Rajasthan, Andhra Pradesh and Telangana. Gujarat being a drought prone state, has led to several crop failures. Castor being a no failure crop has become the future crop for this state.

In Gujarat Emphasis is provided on promoting the use of only government certified seeds for gaining qualitative yield. The hybrid seeds are then treated with Thyrum for making them fungi resistant.

In Gujarat Cross ploughing of the land is promoted for better aeration and separation of the soil. This is further followed by field levelling and smoothening process with the help of a bullock or a tractor.A mixture of De-oiled Castor Cake, Sulphur and Di-Ammonium Sulphate (DAP) is normally used as fertiliser for increasing the fertility of the soil.

TYPE OF SOIL REQUIRED FOR CASTOR:

- All types of well drained soils.
- Grown on light, sandy, sandy loam and medium black soils

TEMPERATURE REQUIRED FOR CASTOR

- Grows well in moderately high temperature with low humidity throughout the growing season for maximum seed yield.

Cultivation of Castor Crop

- Sown in months of July and August.
- The farmers sow the seeds using Dibbling method where minimum gap of 5 to 8 feet is left for better growth of the crop. 2 seeds are sown per hole.
- Harvesting commences around December to February.
- Crop yields in 3-4 months.
- Can be cultivated round the year.
- Crop can sustain changes in weather very easily.
- Requires minimum water.
- Saves almost 24% of water consumption.
- Provides 36% higher yield.
- Castor is a non-food crop, having genetically modified varieties that are resistant to lepidopteron pests.
- Helping in improving productivity to higher levels.
- Minimum pesticides are utilised in Castor crop.
- Farmers are trained to understand the physiological maturity of the castor seeds, which is attained when most of the capsules of the spikes would turn light yellow.

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INDIA AS A WORLD LEADER OF CASTOR PRODUCTION

Castor oil in the early fifties was only used for oiling the grains and illuminating the lamps. In the later fifties it was felt that castor would be the oil for future. Its uses as a lubricant and in the cosmetic industry in Europe and USA had increased. Brazil was a leader in castor production contributing to 65% of Global Castor Production.

After research high yield variety of castor was developed in India. This variety was drought resilient crop, which needed less water, minimum pesticides and had minimal failure. This led to success of castor cultivation in India. India exports 75 products of castor to more than 70 countries of the world.

Today 88% of Castor crop globally is grown in India. The demand for castor oil started growing and became an export oriented crop. Initially the seeds and later on the oil started getting exported.

- Visible by efforts of the farmers.
- Guidance by several organisations and companies.
- A journey of adaptation of several innovative scientific farming practices by the farmers in the villages of Gujarat.
- Emphasis on promoting the use of only government certified seeds for gaining qualitative yield.
- Companies provide certified GCH-7 seeds which are resistant to wilt and nematode and tolerant to root-rot.

REASONS FOR SUCCESS OF CASTOR CULTIVATION IN INDIA

- Direct trade linkages with the companies
- International standards of research and development infrastructure
- Continuous marketing
- Improvement in storage facilities
- Easy access to the ports.
- Increase in castor processing units in India.

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CASTOR AND INCOME GENERATION

Castor Crop is a climate resilient and salinity resistant crop which has proved to be a boon for the farmers.

Castor is a plant that provides handsome revenues with minimum expenditures. The crop used to provide revenue of Rs.7500 to Rs.10, 000 per ton in 1966; now in 2017 it provides Rs.35,000 to Rs.50,000 per ton. It provides sustainable crop and livelihood to farmers.

Since 1969 several different hybrids of castor have been released which includes GCH3 in 1969, GAUCH 1 in 1973, GCH2 in 1984, GCH4 in 1986, GCH5 in 1995 and GCH7 in 2007 has now increased the average yield capacity to 2000 kg s to 2500kgs/ha. This breed has a potential to grow up to 6000kgs/ha involving best farming practices.

Farmers are provided with capacity building trainings to understand the physiological maturity of the castor seeds which is attained when most of the capsules of the spikes turn light yellow under Public - Private Partnershio by JAOL, Kalyan Foundation, NCCSD with State Agri. Extension team. There is focus to make them aware and understand changes in weather conditions and take adaptive measures.

Castor can be cultivated as an annual crop where in a multiple harvest method is adapted, the spikes of castor are handpicked using a sickle. Leveraging the scientifically designed system for Castor cultivation, multiple harvests with an average of 4 to 6 pickings are obtained from the same crop.

CASTOR FETCHES HIGH REVENUES WITH MINIMUM EXPENDITURES.

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- Rs.7500 per ton to Rs.10, 000 per ton.
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INDUSTRIES WHICH USE CASTOR

Castor is used in adhesives, automobiles, plastics, paper, paints, inks, telecommunications, cosmetics, health care, and foodproducts.

PRODUCTS WHICH CAN BE MADE WITH THE HELP OF CASTOR

Castor oil and its derivatives are used in the products like soap, lubricants, hydraulic and brake fluids, dyes, coatings, polishes, nylon pharmaceuticals and perfumes.

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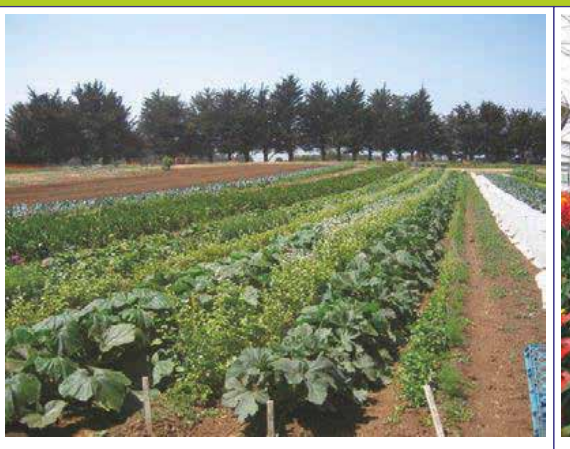
Impact of Climate Change and Remedies

Agro forestry

Agro forestry serves as a safety measure for some of the natural calamities like cyclone, natural cooling under heat waves etc. Agro forestry conserves micro nutrients, prevents soil erosion. Thus, it maintains and enhances the productivity of land. It brings the fallow and barren land to active use. Agro forestry shades are conducive to the growth of some crops which are to be kept away from direct sun-rays. It also contributes to cattle farming. The photosynthesis by agro forestry /vegetation helps in reducing the CO_2 level and mitigates unfavourable impacts of climate change. It provides an extra income source in case of failure of main crops.



Mix Cropping

One of the important characteristics of the bio-mass is that they become complementary to each other for their survival and growth. Mix crop is a glaring example of such phenomenon. Some illustrative unique mix cropping as under proves advantageous:

- Cotton and pulses
- Pigeon-pea and Maize
- Ground-nut and sunflower
- Soyabin and sunflower
- Castor and green gram

The mix crop is advantageous to farmers because it reduces the weeds and increases total farm produce. It reduces pests and the micro-insects. It increases the productivity and fertility of land. If one crop fails, the other crop provides income to the farmers.

Net House

High-tech green house as "Protected Farming" reduces the effect of heat, cold or rain and contributes to better and high value horticulture and agro produce. It is more suitable to high value horticulture produce like fruits, vegetables and flowers. It enables the farmers to get long term financial rewards from one time high-cost investments. Alongwith the conventional high-tech farming like cut-flower, jerbera, capsicum, the newers crops like cashew nuts, shaffrony, cucumber, arvi, ginger etc. provide high returns. Government subsidies are available for these types of agricultural activities.

Solar and Wind Energy

Solar and wind energy are natural sources of energy. It can be generated anywhere including remote rural areas eliminating the transmission losses. It does not generate air pollution like thermal fuel. Solar energy is used for lighting, water lifting, water heating, crop dehydration, computer, and refrigerator.

Unlike thermal power, it reduces the Co_2 generation and the resultant global warming. It is an eternal source and fear of scarcity of fuel like oil or coal is not there. It avails the power at local level and thus can help in improving the agricultural production and productivity at local level at low cost. Government subsidy is available.

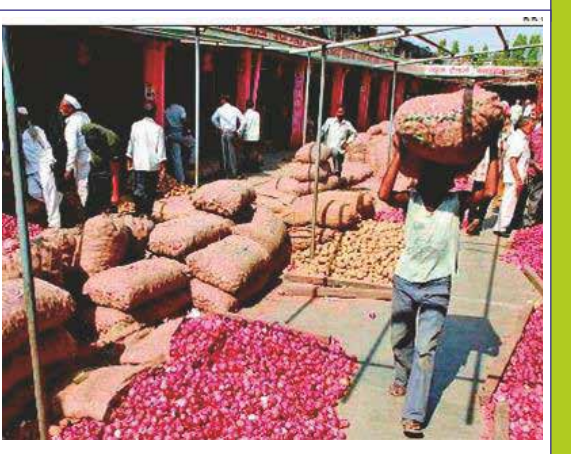
Check Dam

Check dam is a simple technique of accumulating the flowing water in a reserviour and to use it during non-monsoon days. It is a part of watershed programme and the unique schemes of Public – Pvt. Partnership (PPP). Check dams are very important in rainfed areas. They help to conserve the moisture of the soil and improve the agricultural productivity. It prevents the soil erosion caused by flowing water. It brings up the water level of wells and replenishes the water drawn from the tube wells. It helps in using the fallow, saline and barren lands. It makes local population aware about the importance of water, its accumulation and the use of water in critical days. The local leadership can play an important role in popularizing this concept. Government subsidies are available.

Drip Irrigation

Drip irrigation enables the use of scarce water resources effectively because the water is flown through holes in a plastic pipe directly to roots thus transitory water absorption is reduced and it also reduces soil salinity in saline areas.

Moreover, it monitors the water supply as per requirements. Soluble fertilizers and pesticides can be added in water to feed the plants directly. It improves profitability and productivity. Government subsidy is available.



Warehousing

Warehousing facilitates the storing of the perishable agro-produce. It helps in maintaining the self-life by providing required temperature.

It reduces the wastages caused by unfavorable climatic conditions and insects. It helps in assuring food security for human and animals. It helps in maintaining the self-life of perishable product.

It helps the farmers to fetch better price through marketing in off- season. Government subsidy is available.

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Climate Smart Practices

Crop rotation,
Inter cropping, Drip irrigation,
Mix farming, Composting, Weather advisory, Animal husbandry including biogas & solar

By promoting legume as intercrop - Total Nitrogen fixed in soil is 103 MT equals to 224 MT of Urea

By promoting drip irrigation in 3684 Ha area, 10 Million Cubic meter (10% of total storage capacity in basin area) water is conserved.

By promoting drip irrigation through awareness campaigns improvement in irrigation effciency is achieved.

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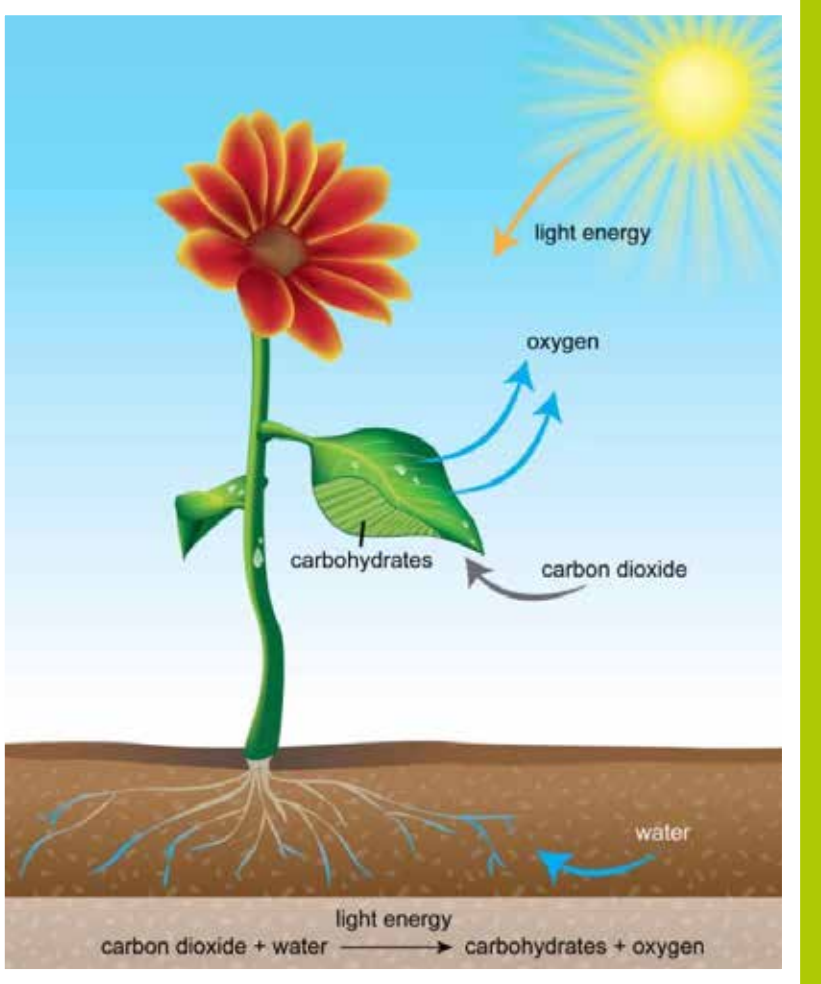
Integrated River Basin Management (IRBM)

Burning Issue for the Earth: Climate change and major culprit of it is increasing CO_2 in the atmosphere.

Solution for Mitigating Climate Change: Promoting PHOTOSYNTHESIS to consume CO_2

Landscape Approach for promoting photosynthesis: INTEGRATED RIVER BASIN MANAGEMENT



Farms, forests, water bodies and settlement are not isolated elements, but part of a wider landscape in which all land uses are integrated. A landscape approach entails viewing and managing multiple land uses in an integrated manner, considering both the natural environment and the human systems that depend on it.

IRBM is the process of coordinating conservation, management and development of water, land and related resources within the river basin, in order to maximize economic and social benefit while preserving and where necessary restoring freshwater ecosystems.

- Better Soil & Water Management
- Soil Health Management
- More Vegetation & Green Cover
- Promoting Waste Recycling for Composting
- More Photosynthesis
- Better Animal Waste Management
- CO_2 fixation
- Less Methane Generation

Mitigation leads to Positive Impact on Climate change

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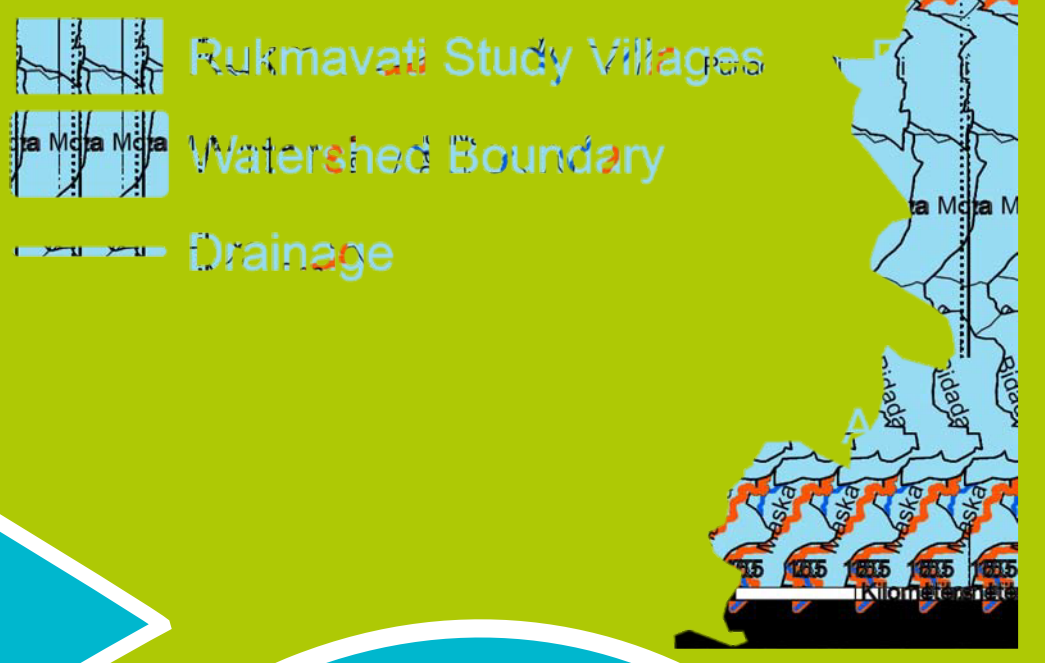
Rukmavati River Basin

Casestudy from Kutch, Gujarat

No of Villages - 55
Total population - 1,26,148
Total Area - 72,030 Ha.
Total Agricultural Land - 42,207 Ha.
Irrigated Land - 18,526 Ha.
Cultivable Wasteland - 9,649 Ha.
Forest Area - 4,282 Ha.
Other Land - 21,801 Ha.



Water Resource Management (Hydrology):

New check dams – 107,
Storage capacity - 40 Million Cubic Feet,
Beneficial farmers – 1692, Area under irrigation - 3784 hectares

Desilting in 84 structures and 504 hectares benefitting 379 farmers resulted in reduced requirement of chemical fertilizer.

50% saving in water through promotion of drip irrigation in 3684 Ha area.

Natural Resource Management

2000 MT waste converted to compost from 400 Ha of area by 750 farmers resulted in improvement in soil fertility

Promoting legume as inter crop – nitrogen fixation in soil and also providing food security (Nitrogen fixation - 103 MT in 3600 Ha (224 MT urea saving)

Animal husbandry

Pasture land development in 500 Ha of land to provide fodder security.

Farm bunding to conserve soil moisture and control soil erosion, in 64 hectares of land resulted in improvement of productivity by 8 – 10%.

Improving market linkage, 20% increase in income

Tree plantation

35,000 trees planted in basin area to improve greenery

Horticultural plantation of Date palm, Pomegranate, Mango, Ber, Banana and Papaya in 500 Ha to provide income to farmers.

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Use of Biotechnology for Climate Smart Agriculture (CSA)

Tissue culture,
Biotechnology tools,
Madhyam for composting,
Cow Urine (Gaumutra), Liquid fertilizers.

Composting: Farm and animal waste for soil improvement. This activity was carried out with about 750 farmers.

Use of cow urine for soil improvement:
30 farmers, 145 Ha land area

Tissue culture plantation:
67 Ha land area
(date palm)

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Value Added Agriculture

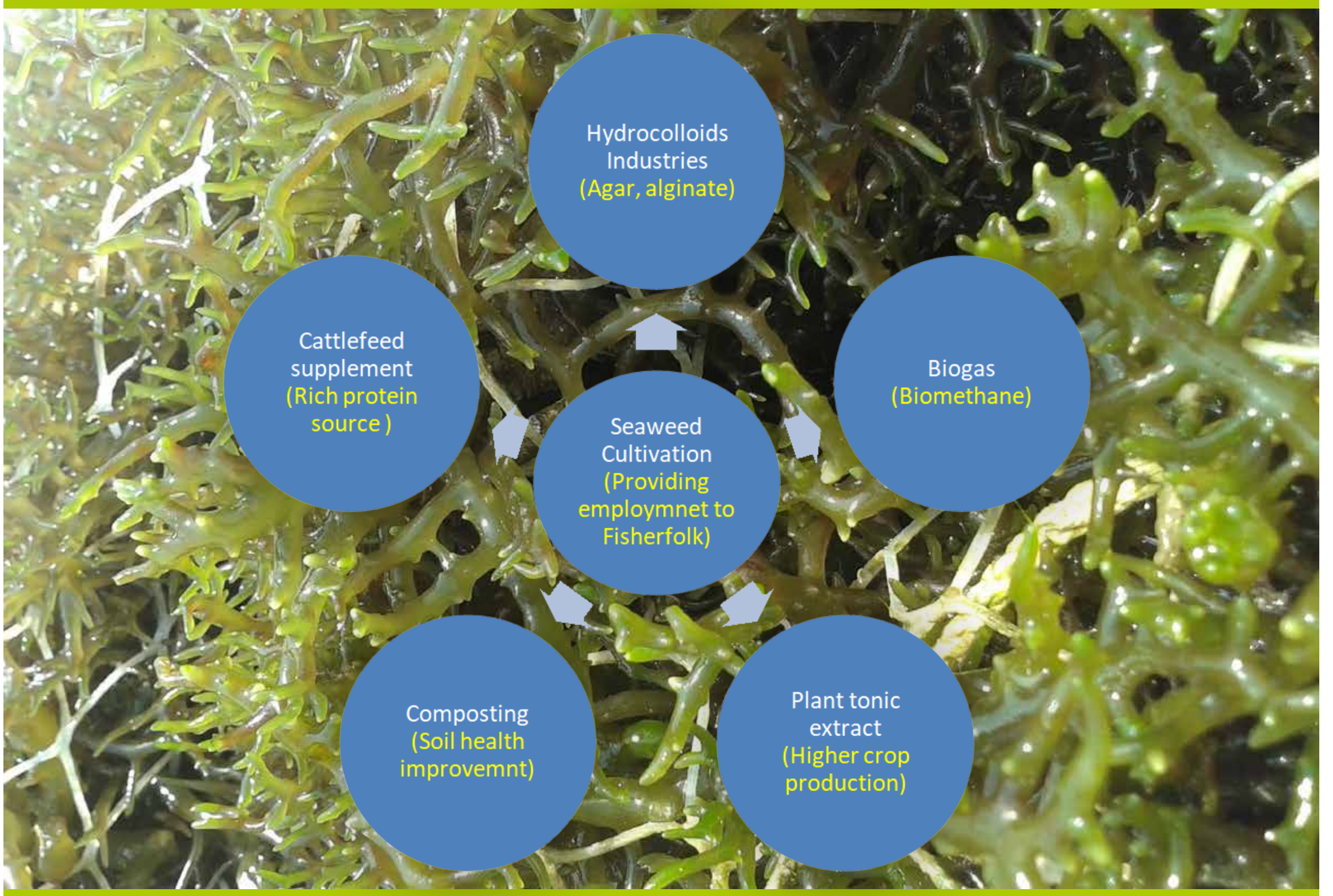
Grading, Packing & Marketing, SHG activities, Direct marketing for mango & dates, Producer Company

Women empowerment through micro finance activities: 68 Self Help Groups (SHGs) were formed and 840 women have initiated monthly saving and microfinance related activities. Till date saving of these women is around 1.5 million INR (Indian Rupees). This activity has developed leadership skills and social status upliftment for women.

Grading, packing & marketing of agriculture produce by SHGs: 240 MT

Mango marketing to end user: 60 MT

Seaweed cultivation for 'Climate Change Mitigation'



- Increased carbon dioxide in the atmosphere is responsible for rapid climate change
- The ocean provides unlimited space for capturing solar energy by different marine plants through photosynthesis, Seaweed cultivation is one such option
- Seaweed is important not only as part of the marine ecosystem, but also as sources of foods, nutrients and other natural products
- India has a coastal line of around 7,500 km and potential seaweed farming zones can be identified along the coastal states
- Seaweed farming can be considered as a supplementary income source of livelihoods for coastal community including fisherfolks
- Carbon sequestration through seaweed farming. From 1 ton red seaweed (Eucheuma seaweed), the sequestered CO_2 = 1.4 ton/Yr. About 4 ton of wet seaweed can grow in one hectare (ha) area.

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Seaweed cultivation for 'Climate Change Mitigation'

The Concept:

The project aims at establishing & demonstrating following components:

- Seaweed farming unit in coastal area of Kachchh which will serve as raw material source for biomethane generation
- A model power generation unit utilizing biomethane produced though seaweed fed biodigester
- A composting unit producing liquid fertilizer and solid compost from slurry obtained as left over material from biodigester

Project Rationale:

- The seaweed cultivation has potential to provide triple win situation by providing employment opportunities, clean power and higher agricultural production through its use as compost
- It can be developed as a successful cottage or co-operative sector industry. Gujarat has good potential for seaweed farming as it has longest seacoast in India

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Farmer to Farmer Project
Building Climate Smart Farmers

Climate Change and Farmers:

The continuing and increasing adverse weather events all are affecting farmers across the world. While Global Warming is International Phenomena- its adverse impact is at village level on Farm Land- most often farmers finds his only source of Income depleting – by crop failure or low productivity.

Developing Climate Smart Farmers:

Vision - In the arena of changing climate, develop a one-stop Center to serve local, regional, national, and global farmers, and provide them with solutions for different climate-resilient agricultural practices

Mission - The Mission of the Center is to build the capacity of farmers on the subject of climate resilient agriculture through hands-on training, which will help them not only sustain farm productivity under adverse climatic conditions, but to increase productivity, and thus profitability

Objectives:

- Strengthen the portfolio of agricultural technologies at that would help improve the productivity
- Assist to develop a five year strategic plan for the Non formal Education Center, in its role as a non formal education and outreach facility for extending climate smart agriculture to farmers across the state of Gujarat and India.
- Address and transfer locally suitable bio technology for value addition in existing crops.
- Develop good agricultural practices for better price in market.
- Identify local level processing of agri-commodities to generate wealth in rural areas and provide entrepreneur opportunity to rural youth.
- In short project aim to “Promote sustainable livelihood and contribute to food security for hungry millions

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Farmer to Farmer Project
Building Climate Smart Farmers

Strategic partners - convergence of efforts for global technology transfer through Public – Private Partnership

- Florida Agriculture & Mechanical University (FAMU), Florida – USA with USAID
- National Council for Climate Change & Sustainable Development
- Vivekanand Research & Training Institute
- Anand Agriculture University
- Junagadh Agriculture University
- Agriculture Technology Management Agency, Government of Gujarat, Government of India

Project highlight:

- No. of FAMU experts completed training assignments – 13
- Total no. of trainees – 4,654 from 13 Districts of Gujarat

  Male trainees: 3,370

  Female trainees: 1,284
- Training of Trainers were also conducted to continue this project
- Training modules of the subjects covered by FAMU volunteers have been developed in local language

Farmer to Farmer Project
Building Climate Smart Farmers

Major recommendation adopted by farmers:

- Proper manure management and application of organic matter in soil
- Rain water harvesting and water management
- Involving women farmer in farm decision making
- Post harvest management in different crops

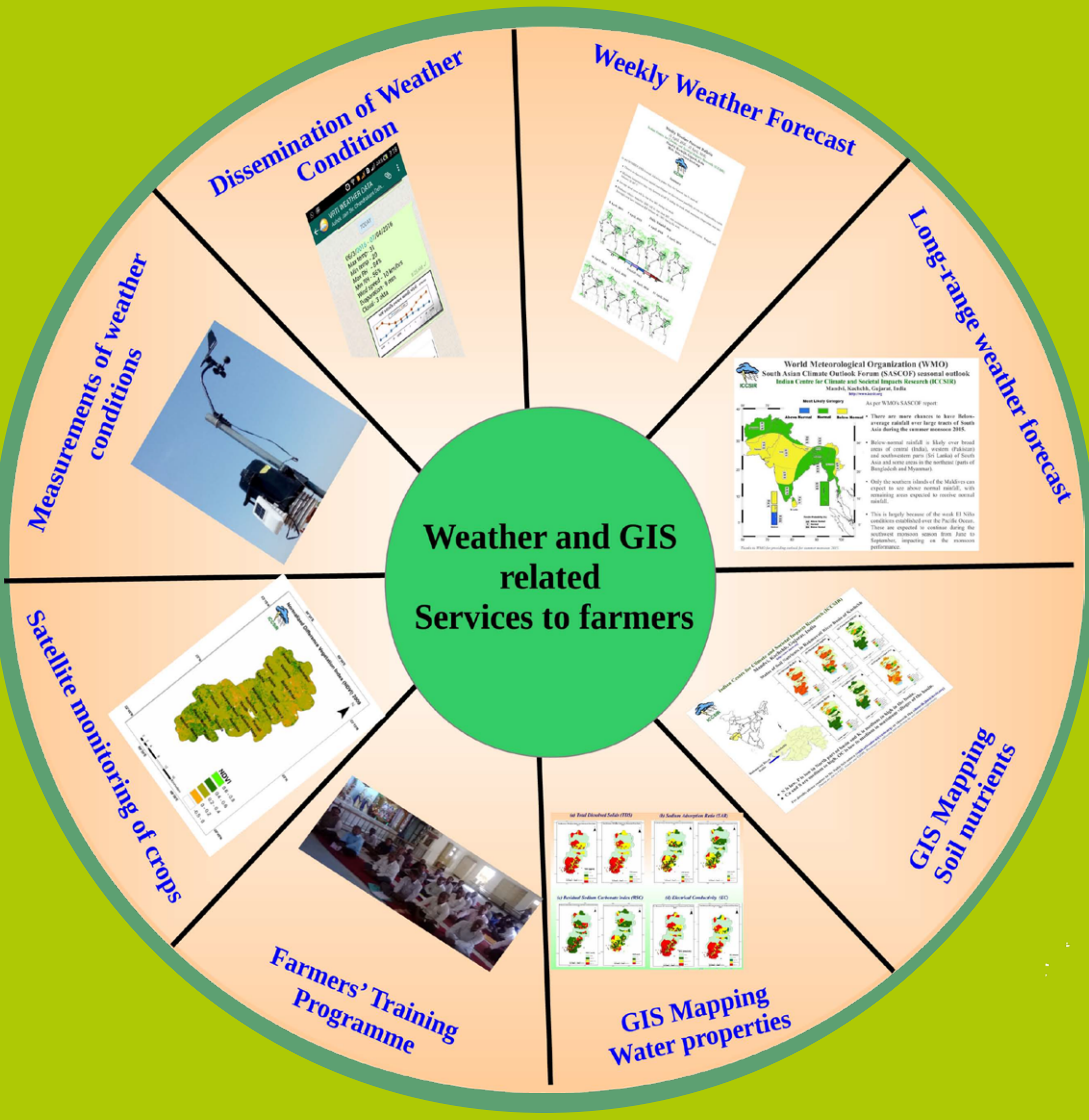
The next phase:

Strengthening the Project:

VRTI has set up :

- Permanent“ Non Formal Education Center” – under banner of this center about 350 farmers have been trained for by local trainers
- Soil and Water Test Lab.
- Demonstration- Model Farm.
- Identified and developed 50 farmers who have setup model farm in their villages
- Guidebook in local language for farmers is in developing phase

Weather and GIS Related Services to Farmers



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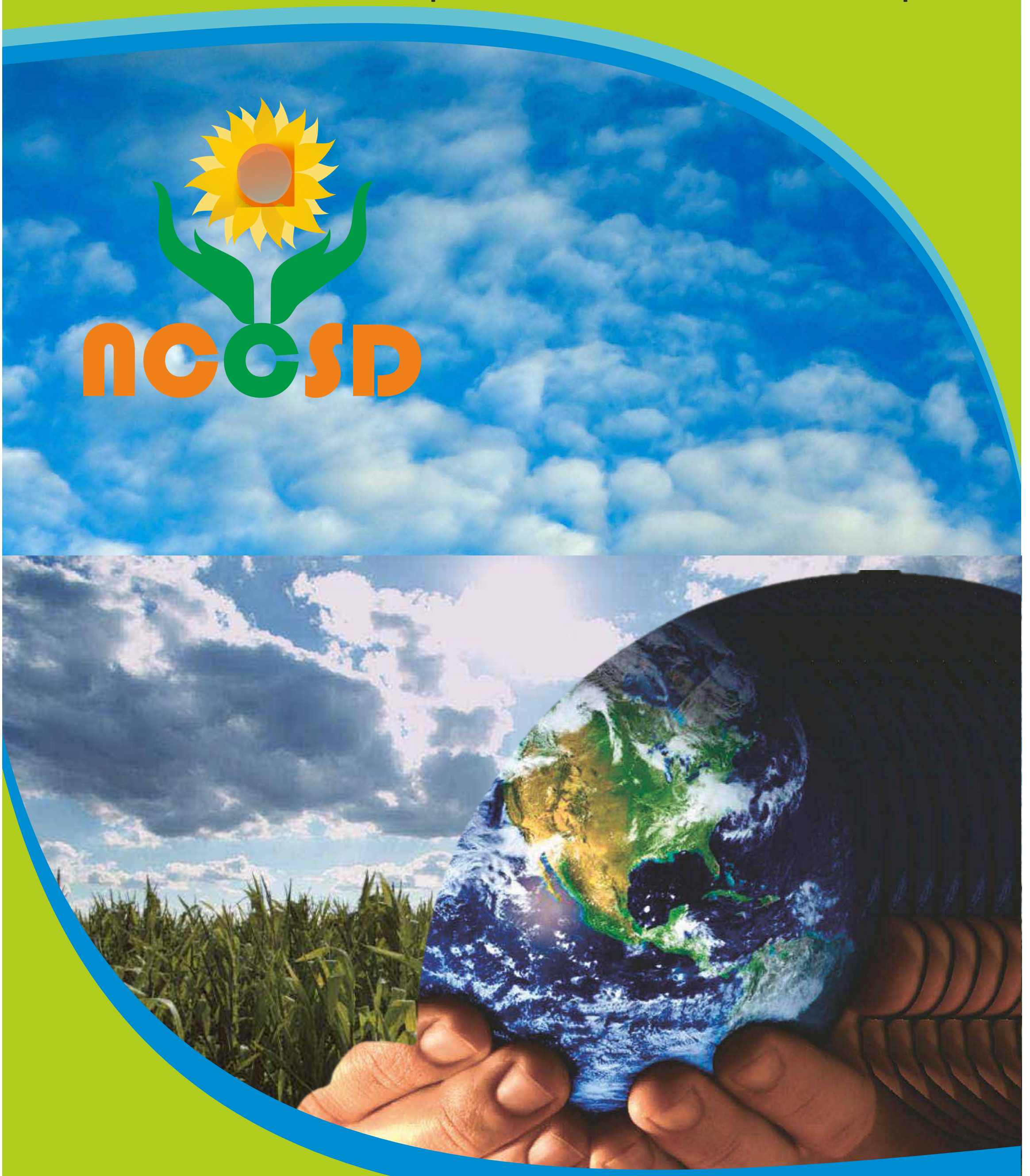
National Council for Climate Change

Sustainable Development and Public Leadership



Continually evolving locally adapted climate smart agriculture through involvement of public leadership.

"ZERO TILL" Conservation Agriculture Technique for RICE & Rice based Crops.

✗	✓
Yields are Low			Higher Yields
Loss of fertile Soil			Earthworms colonies formed sustaining soil ecosystem
Flooding			Top fertile soil retained
Drudgery, expensive, time consuming			No Drudgery
Transplantation Tillage			Direct Seeding
Nursery			Permanent raised beds
TRADITIONAL		**ZERO-TILL**	

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Farmer to Farmer Project
Building Climate Smart Farmers

Dr. O.S. Mbuya
Dr. Kirit Shelat

Climate Smart Agriculture Project INDIA

National Council for Climate Change Sustainable Development and Public Leadership (NCCSD)- India

Initiate 1 year project with FAMU ,NCCSD and VRTI Mandvi in 2016

-Dr. O.S. Mbuya: Integrated Soil Management Practices

Improving Organic Carbon in Saline Soil Using Organic Compost

Trainers demonstrate how to develop compost.

30/10/2017

Training of Trainers (TOT) for Extension & agricultural development programme

Trainers also visit farmers- interact with village Community at Village Level.

Current Status :

- No. of FAMU experts completed training assignments – 13
- Total no. of trainees – 4,654
  - Male trainees: 3,370
  - Female trainees: 1,284
- This covers about 13 District of Gujarat
- Training of Trainers were also conducted to continue this project
- Training modules of the subjects covered by FAMU volunteers have been developed in local language

Major recommendation adopted by farmers

- Proper manure management and application of organic matter in soil
- Rain water harvesting and water management
- Involving women farmer in farm decision making
- Post harvest management in different crops

Strengthening the Project

- VRTI has set up :
  - Permanent“ Non Formal Education Center” – under banner of this center about 350 farmers have been trained for by local trainers
  - Soil and Water Test Lab.
  - Demonstration- Model Farm.
  - Indentified and developed 50 farmers who have setup model farm in their villages
- Guidebook in local language for farmers is in developing phase

The Outcome of this project is VRTI set up the “Non formal Education centre” at Mandvi -Kutch for farmers with demonstration farm .

Non-Formal Education center (under final Stage of Construction.

Demonstration Farm

VRTI - Soil & Water testing laboratory **at VRTI**

The future action plan: Phase II – FAMU Farmer to Farmer Project- India.

- Consolidating the work done in phase one-
  - Development of Non- Formal Education Center-VRTI-Mandvi-Kutch.
  - Setting of Test lab for Soil & Water- at Mandvi-Kutch.
  - Development of Model Farms.
  - Monitoring and Feedback from Model Farms and Farmers.
  - Development of Training Material.
  - Development of Guide Book-
    - Trainers.
    - Farmers.
  - Development of Web Site.
  - Dissemination knowledge to non-participating farmers.
  - Strengthening of Networking between FAMU-VRTI-NCCSD- ATMA –AAU, JAU,SDAU- Government of Gujarat.

- New Subjects:

- Future Agriculture:
- Enhancing doubling income of farmers.
- Food Security.
- Food For hungry millions.
- Development of Livelihood Resilience
- Bio Technology: Tissue culture Bio-pesticides, Bio- Fertilizer genetic crops.
- Livestock Management:
  - Fisheries
  - Sea Weeds
  - Agri- Entrepreneurship
  - Sea- Water – over ground and underground ingress and its control.
- Exchange Visit:
  - Trainers.
  - Farmers.
  - Facilitator.
  - Extending the module developed in first phase to other states of India and in other countries.

Partnership with State Agricultural University

- Sign MOU Between Florida Agricultural & Mechanical University (FAMU) and Anand Agricultural University (AAU) in nearer future for partnership on national and global issues of mutual interest.
- Also Partnership with Florida Agricultural & Mechanical University (FAMU)and JAU-Junagadh Agriculture University


Understanding and
Developing Synergistic
Policy


INTERNATIONAL CONFERENCE
ON


NCCSD

Thanks

Impact of Climate Change and Remedies

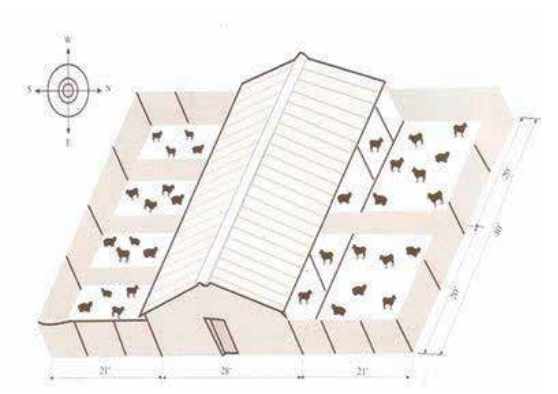
Gir Cow

Kankreji Cow

Jafrabadi Buffalo

Mehsani buffalo

Original or local breeds are climate resilient and capable of bearing heat stresses and cold waves. These breeds possess area specific resistance power. So, while buying them, this has to be kept in view. They are sturdy and have very good stamina and can walk through long distances for grazing. The milk production can be increased by adopting proper cattle feed and its mix. Milk and ghee of these cows enjoy premium price.



Cattle Shelter Management

Cattle should be housed in appropriate shelter. Such shelter helps to maintain milk yield even during heat waves or cold waves and enhances yield during normal season. The shelter may be housed in covered area. Cattle may be provided clean drinking water as it increases milk productivity. Fans, foggers and sprinklers may be added for cooling during heat waves.

The cattle shed should face East- West with gates and windows in North – South direction. The middle part of shed be kept 15' high and the ends be kept at 10' high and upper part must have air exhaust arrangements. The slope of the floor be towards drain and wood-saw-waste be spreaded over it on regular basis. For each cattle 3m X 1.5m space be provided. Around the shed, the neem (Azadirachta indica), banyan (Ficus bengalensis) trees be planted, which help in cooling the average climate.

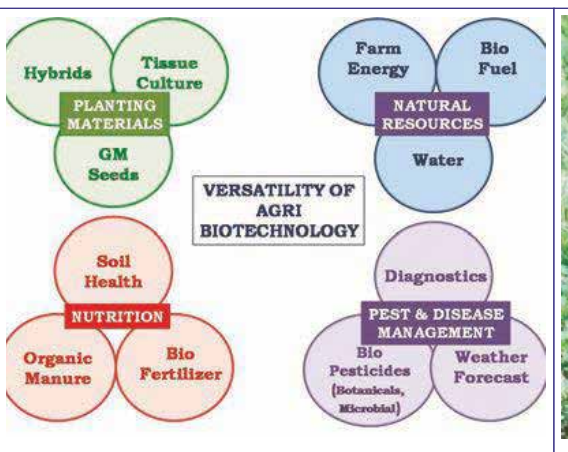
In case of those animal holders who cannot afford shed or have no land – need to keep buffaloes in community ponds and cows under the trees – preferably Neem Tree, Banyan Tree. They can also take advantage of NAREGA and RKVY to construct community sheds in common Grazing Areas (Gauchar)

Bio-gas plant

Community Biogas Plant is a cooperative endeavour which uses dung for decentralized domestic gas generation for cooking. The residue slurry of bio-gas plant is used as valuable organic manure. It can be converted in vermi compost which can be used in farms or can be sold in packed bags. This helps in mitigation of methane gas. Government subsidies are available for installing community and individual bio-gas plant.

Organic Farming

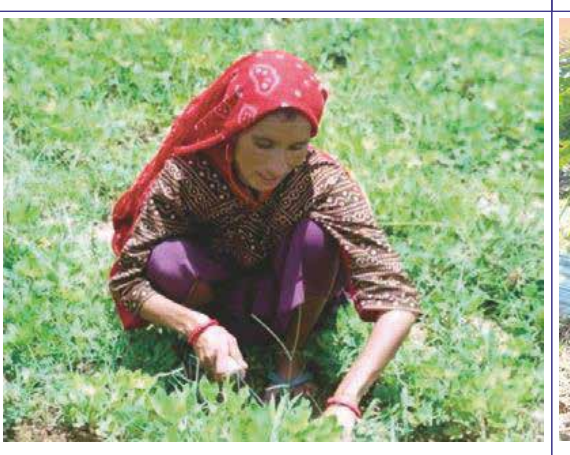
Organic food and vegetables with high nutritive contents have high value as health products. Organic farming reduces the cost of production through replacing the costly chemical fertilizers. It reduces the green house gas generation. The organic products fetch premium price. The land fertility and micro nutrients are sustained for longer time. Organic farming has dual advantages a) It fosters market demand with premium pricing and b) It helps in sustaining the soil health. But while taking up production, farmer need to keep in view (i) Market chain – for product and (ii) Soil health – whether it is suitable as otherwise it takes long time to become viable.



Bio-technology

Application of biological research on agriculture - Genetically Modified (GM) seeds, hybrid seeds, tissue culture, bio-fertilizer, bio-pesticides improve crop productivity and are climate resilient.

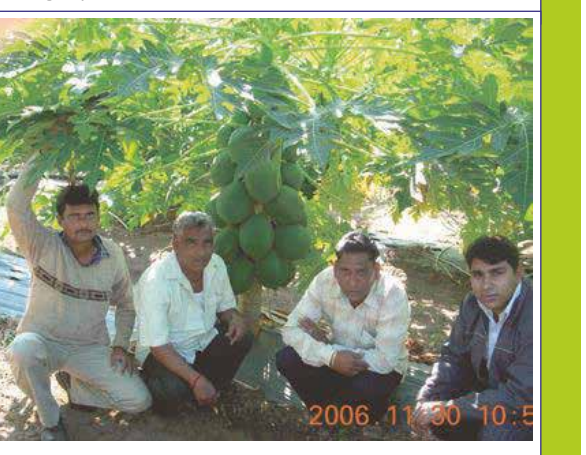
Tissue culture provides healthy plants through seedling process with identical size and attributes. It improves farm productivity. It reduces mortality and can be planted once rains arrive and are very good solution for delayed rain. The GM Seeds like BT Cotton – increase the yield and reduce cost by minimal use of pesticides and reduce Green House Gases.



Women Farmer

Women have been working on farm and cattle management along with the household responsibilities. Increasingly they are replacing men who go to work outside and all farming decisions are taken by them. They are new farmers and need to be guided by door-step approach.

Moreover, avenues of self-employment can be provided to woman though encouraging Self Help Groups (SHGs) for conducting micro economic activities. The encouragement of micro savings helps in controlling the addiction and bad habits of male members. Women farmers also add value to agro produce through cleaning, sorting, grading etc. making of pickles, papad etc. They take up handicraft – tailoring also which provide additional source of income.



Youth

The rural youth, especially the sons of the land holders – farmers with educational background have started taking interest in high-tech agriculture. They have become the instruments for accepting agriculture as a professional enterprise. Such shift contributes towards entrepreneurship development by taking up micro enterprises. The educated youth with scientific farming can also contribute in extension activities for replacing the traditional farming in their respective areas.

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EXCEL

CASTOR A WATER RESISTANT CROP

Castor plant is a tropical/ sub-tropical species and grows in areas of low rainfall. It is sensitive to extreme climatic changes, especially extreme changes in rainfall distribution. The minimum rainfall needed by the castor crop is 38-50 cm (15-20inch).

Castor grows in tropical and subtropical regions as a perennial plant and in temperate climate as an annual plant. Since the roots of castor penetrate deep into soil, and get water from deep soil, it is good for drought prone areas. The crop favours hot and humid climate. It can grow in lands with small soil layer on rocks. In India, it is cultivated in Telangana, Bihar, Gujarat, Tamilnadu, Maharashtra and Uttar Pradesh. It is largely cultivated in drought prone areas where rainfall is 380 to 500 mm per year. This can be cultivated as a cash crop in areas where rainfall is good and reliable. The cake is used as organic fertilizer.

FREQUENCY OF IRRIGATION IN CASTOR CROP DEPENDS ON

Soil type I Climate I Crop stages

- Castor beans can be grown on marginal lands which are usually unsuitable for food crops.
- The farmers sow the seeds using Dibbling method where minimum gap of 5 to 8 feet is left for better growth of the crop. 2 seeds are sown per hole.

IRRIGATION & HARVESTING OF CASTOR

Castor crop requires minimum water so two types of irrigation methods are used in Gujarat.

- **Drip irrigation:** It saves 24% of water consumption and provides 36% higher yield.
- **Flood irrigation technique:** Is used by farmers in hot weather climate.

Castor cultivated as an annual crop a multiple harvest method is adapted, where the spikes of castor are handpicked using a sickle. Multiple harvests with an average of 4 to 6 pickings are obtained from the same crop.

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INDIA AS A WORLD LEADER OF CASTOR PRODUCTION

Castor oil in the early fifties was only used for oiling the grains and illuminating the lamps. In the later fifties it was felt that castor would be the oil for future. Its uses as a lubricant and in the cosmetic industry in Europe and USA had increased. Brazil was a leader in castor production contributing to 65% of Global Castor Production.

After research high yield variety of castor was developed in India. This variety was drought resilient crop, which needed less water, minimum pesticides and had minimal failure. This led to success of castor cultivation in India. India exports 75 products of castor to more than 70 countries of the world.

Today 88% of Castor crop globally is grown in India. The demand for castor oil started growing and became an export oriented crop. Initially the seeds and later on the oil started getting exported.

- Visible by efforts of the farmers.
- Guidance by several organisations and companies.
- A journey of adaptation of several innovative scientific farming practices by the farmers in the villages of Gujarat.
- Emphasis on promoting the use of only government certified seeds for gaining qualitative yield.
- Companies provide certified GCH-7 seeds which are resistant to wilt and nematode and tolerant to root-rot.

REASONS FOR SUCCESS OF CASTOR CULTIVATION IN INDIA

- Direct trade linkages with the companies
- International standards of research and development infrastructure
- Continuous marketing
- Improvement in storage facilities
- Easy access to the ports.
- Increase in castor processing units in India.

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DROUGHTS IN GUJARAT

Gujarat is a drought prone state in our country. Droughts in Gujarat can be traced back to 12th century. The state gets highly unevenly distributed rainfall, varying from 300 – 350 mm in Kutch to 600 – 700 in Saurashtra and North Gujarat to more than 1500 mm in South Gujarat. in the in the of climate change this situation is being mer dense. In the area of climate change, this situation is becoming more intense.

Drought is a situation caused by lack of rainfall. It affects basic requirements of life i.e. water and food. Almost three quarters of Gujarat is arid or semi-arid and suffers from recurrent water scarcity. This climate is a major factor contributing to regular drought, desertification and in some areas salinization. Kutch is the largest district of Gujarat frequently experiences extended droughts. Of the past 50 years 33 have been classified as drought years.

REASONS OF DROUGHT IN GUJARAT

- Late onset and early withdrawal of monsoon.
- Lean rainfall due to paucity of depression and low pressure system.
- Prolonged breaks in monsoon rainfall.

Impacts of Drought

- Declined ground water levels, drinking and irrigation water scarcity, reduced agricultural productivity and production, fodder scarcity and reduced food scarcity.
- The loss of crops and subsequent changes in cropping pattern as a result of drought and ground water depletion has been extensive in most villages in Gujarat.

How Drought changes life of people?

- Shifting of focus from agriculture to animal husbandry.
- Increased dependence on wage labour.
- Migration from rural areas to city slums
- Involvement of women in the labour force spikes.
- Development of non-agricultural livelihood sources

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SUSTAINABLE CASTOR FARMING

Castor is Cultivatedmostly in the arid and semi-arid regions of the world. Castor producing states in India are Gujarat, Rajasthan, Andhra Pradesh and Telangana. Gujarat being a drought prone state, has led to several crop failures. Castor being a no failure crop has become the future crop for this state.

In Gujarat Emphasis is provided on promoting the use of only government certified seeds for gaining qualitative yield. The hybrid seeds are then treated with Thyrum for making them fungi resistant.

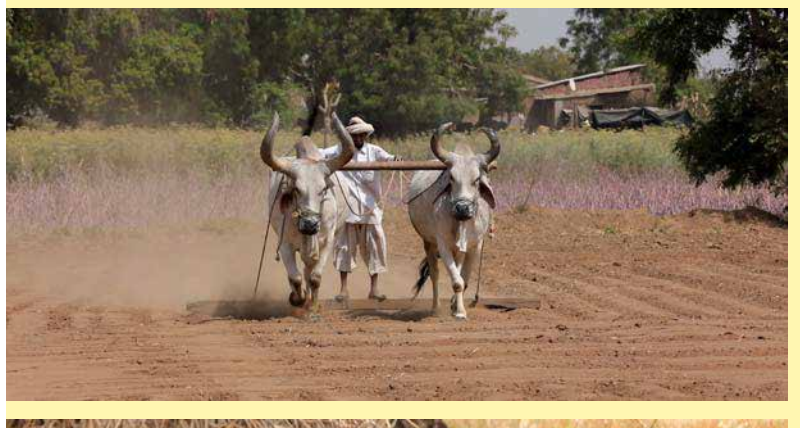
In Gujarat Cross ploughing of the land is promoted for better aeration and separation of the soil. This is further followed by field levelling and smoothening process with the help of a bullock or a tractor.A mixture of De-oiled Castor Cake, Sulphur and Di-Ammonium Sulphate (DAP) is normally used as fertiliser for increasing the fertility of the soil.

TYPE OF SOIL REQUIRED FOR CASTOR:

- All types of well drained soils.
- Grown on light, sandy, sandy loam and medium black soils

TEMPERATURE REQUIRED FOR CASTOR

- Grows well in moderately high temperature with low humidity throughout the growing season for maximum seed yield.



Cultivation of Castor Crop

- Sown in months of July and August.
- The farmers sow the seeds using Dibbling method where minimum gap of 5 to 8 feet is left for better growth of the crop. 2 seeds are sown per hole.
- Harvesting commences around December to February.
- Crop yields in 3-4 months.
- Can be cultivated round the year.
- Crop can sustain changes in weather very easily.
- Requires minimum water.
- Saves almost 24% of water consumption.
- Provides 36% higher yield.
- Castor is a non-food crop, having genetically modified varieties that are resistant to lepidopteron pests.
- Helping in improving productivity to higher levels.
- Minimum pesticides are utilised in Castor crop.
- Farmers are trained to understand the physiological maturity of the castor seeds, which is attained when most of the capsules of the spikes would turn light yellow.

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