

# AGRONICA

A Newsletter from Centre For Agri-Management  
Department of Business Administration, Utkal University

## GREEN BUSINESS MARKETING

Newsletter  
Series  
**6**

Oct - Dec  
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Enabling Solar  
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Tata Power Solar installs the first  
Floating Solar Plant on twin  
ponds with a capacity of  
1.4 MW at Nellore, TN.

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Renewables

# Adani Green



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# GREEN BUSINESS

Green business is an enterprise that has minimal negative impact on environment, human health and society. The concept originated in the 20th century because of consumers concern over environmental issues and scarcity of natural resources because of its high utilization. Already it has taken long 20 years for the companies to adopt this practice of green business. It is necessitated due to high industrialisations and use of chemicals, air, water and soil have been polluted, affecting human health. Continuous use of harmful agricultural inputs like chemical fertilizers and pesticides are causing serious environmental issues. The crops cultivated in chemical-laden soil have severe ill effects on the health of consumers. There is an urgent need to adopt agricultural practices which are economically viable as well as biologically sustainable. Maintaining soil health without compromising on the environmental sustainability is one of the biggest challenges in agriculture today. Organic farming is the answer by using environment friendly, animal and plant based local organic resources rich in nutrients required for crop plants. Such type of business has no negative impact on the environment and human health. The vermin composting is one such that has no negative effect on environment. The determining factors are i.e. Green buildings, sustainable transport water management and waste management. The business also harnesses fewer natural resources besides being used to recycling of products and reuse of materials.

Going gree is credited with some pros & some minus points.

### +VE

- (1) Minimum waste resulting massive savings, like turning off office light at night and recycling of paper
- (2) Healthier work place resulting decrease in sick leave, less medical bill, increasing human productivity and organic food in cafeteria goes for healthy environment
- (3) Cost reduction due to less use of paper, printer ink and documents
- (4) High consumer demand, due to increased demand for organic food
- (5) Green companies are more sustainable; more employment oriented and shelter for experienced employees.

### -VE

- (1) The initial high cost initially due to lack of new technology, as installation of solar power is a costly investment
- (2) High cost of production leads to higher market price of the product and service causing lack of demand
- (3), Difficult to find out new vendors and suppliers for new green product.



The green business in developing economies is indeed a challenging job for the producers. The producers re-design their product attributes, since the use of chemical is prevented and scarce resources are not exploited. The developing economies strive hard to achieve green business as they solely depend more on natural resources. In addition, they face challenge basically related to power, water, ecological problems, social and economic problems and also problems related to weather and climate change. The challenges associated with green business depend on cost analysis, where it is quite expensive for a poor and developing economy to meet the initial cost due to lack of required technology. Moreover, the treatment for wastewater, water resource management, treatment for disposal of effluents and toxic waste are not successfully utilized. The developed economies need to import modern technology and imparts technical knowledge to the developing nations. The Government need to provide subsidies to support the challenges of green growth and development. The short-term subsidies may not benefit more since it may hamper the production and demand by raising the price and cost. But as for the long term is considered these reforms may provide more effectiveness in productivity and thereby lead to changes in technologies. In a developing economy doing a green business is no longer considered as a cost issue but considered as a primary issue for modification and exploring of new markets and also for profit optimization. The company should adopt strategies and finds creative solutions to face the environmental challenges through mutual support of the govt policies and incentives. The green behaviour is not only the sole concern of the consumers but also it is also the social responsibility of the producers to maintain green environment. The customers perceive that the green decisions are made due to personal reasons rather than global benefits and they feel that green products are much safer since it is considered as a protective measure for health and safety. Different countries try to solve the issues related to green decisions. The UK government have started introducing several schemes in their country to support green environment in order to meet the goal of reaching a target in the year 2020 of about 80% reduction in the emission of carbon dioxide. It's indeed very crucial for companies to utilize the opportunities of green practice so as to maintain their potential with the competitors and build a rapport with stakeholders. In short, Green business holds the key for future socio economic development of the country and the society will be free from all types of pandemic diseases.

**Prof. Benudhar Bhuyan**

Advisor , Center forAgribusiness Management  
Utkal University

# NAFED

Paving way for greener mother earth and sustainable environment

The NAFED is a Multi-State Federal Cooperative Society established, with the objective to organize, promote and develop marketing, processing and storage of agricultural, horticultural and forest produce with the overall aim of providing a ready market and remunerative prices to farmers.

**Profit making is not the main objective of NAFED. Being a cooperative, NAFED is an ethical organization that believes in the values of social responsibility and concern for the environment. NAFED has been implementing various green business initiatives over the years for sustainable agriculture and environment.**



## NAFED Brand Bio Fertilizer

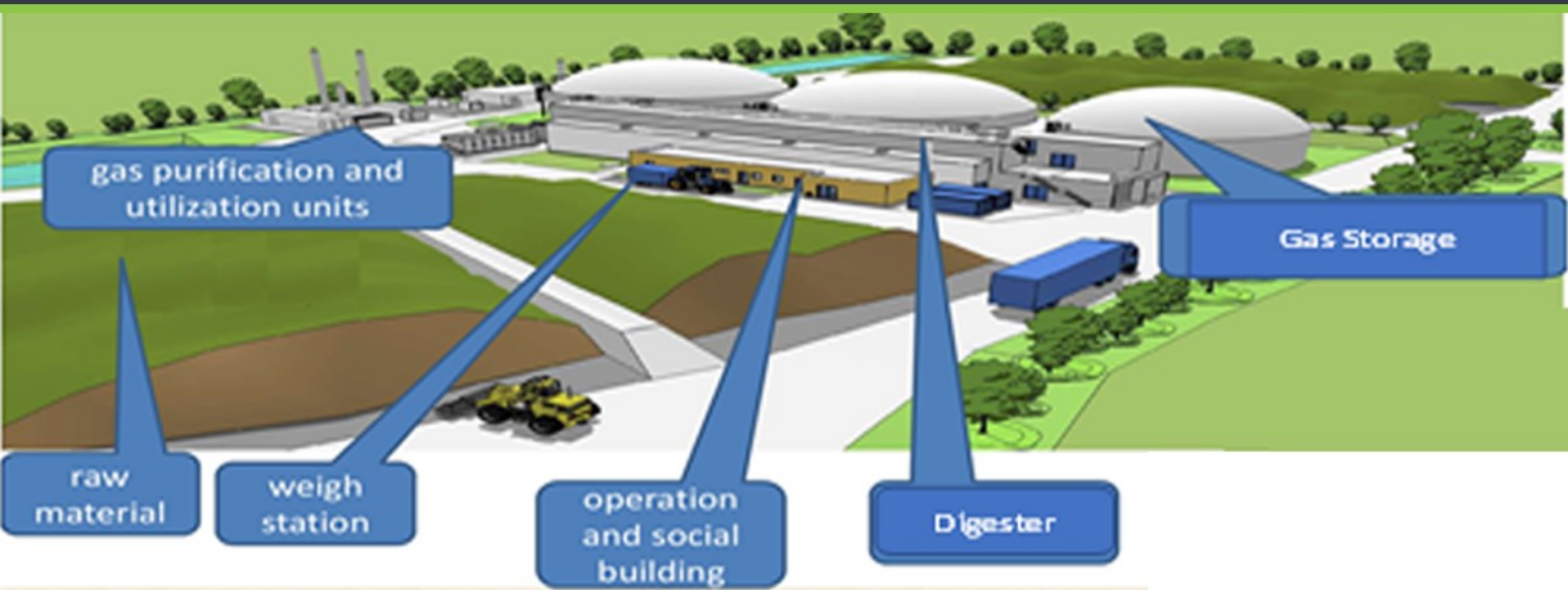
The use of Bio-Fertilizers is one of the means for improving soil health. NAFED ventured into the Green Business of Bio-Fertilizers way back in 1984-85 when its first Bio-Fertilizer manufacturing unit was set up in Indore, Madhya Pradesh with a production capacity of 450 MT PA. The product range of NAFED Brand Bio-Fertilizers comprising of Rhizobium, Azotobacter, Azospirillum, PSB, Composting Culture and Trichoderma Viride Bio fungicides. These bio fertilizers provide an "eco-friendly" soil enriching organic agro-input alternate to the farmers by fixing the nutrient availability in the soil.



Organic farming Project under Implementation in Odisha

## Promotion of Organic Farming

NAFED has also been implementing organic farming adoption and certification projects in several states for more than a decade with the aim of encouraging farmers to switch over to this soil friendly traditional agriculture practice. Organic farming provides a natural way of crop cultivation by using environment friendly, animal and plant based local organic resources rich in nutrients required for crop plants. NAFED is presently implementing Adoption and Certification Organic Farming Project for Horticulture Crops under MIDH (NHM) scheme in Odisha. Department of Horticulture, Odisha has allotted 1250 hectares of land in Koraput, Rayagada, and Kalahandi districts of the state for the project.



## Diversification to Green Business of Bio CBG Production for waste Management

India is an agro-based economy with year-round crop cultivation which generates a large amount of agricultural waste. As per reports India generates about 500 Million tons of crop residues per year. A majority of this residue is used as fodder, fuel for other domestic and industrial purposes. However, there is still a surplus of 140 Million MT out of which 92 Million MT is burned each year causing excessive particulate matter emissions and air pollution. We are all aware of the alarming rise of air pollution levels caused by crop residue burning in the city of Delhi and other parts of North India.

Crop residue burning has become a major environmental problem causing health issues as well as contributing to global warming. The solution lies in the effective implementation of sustainable management practices.

NAFED ventured into production of green business of Bio CBG with the aim of finding a sustainable management solution for agri and other waste. NAFED has signed MOUs with Municipal Corporations of several States and several other organisations across the country for setting up of Bio CBG plants. It has been planned to set up 100 such plants pan India in association with empanelled technical partners.

The first 150 TPD Bio CBG plant of NAFED, set up in association with M/s Turquoise Natural Bio Energy Pvt. Ltd was inaugurated in Bharuch, Gujarat in April this year. Production has already started and the CBG produced is being marketed locally. The bye products obtained are converted to manure and marketed for organic farming. NAFED Bio-Fertilizers are being used for enrichment of manure. The Federation has also signed MOU with IOCL for sale of CBG and manure/fertilizer at retail outlets of their petrol pumps.

**NAFED aims to be a leading proponent in the quest to solve India's waste processing problems by converting waste to Energy Products.**

**Dr. S. Chadha**  
M.D, NAFED,  
New-Delhi



Uses Of Bio-CBG

# Waste Management in Bhubaneswar



The waste management is one of the determining factors for Green Business which has no negative effect on environment. About 10 lakh population of Bhubaneswar city are subject to unhealthy living due to air pollution, water logging, generation of huge amount of garbage and plastic materials by 2 lakh households in 67 wards and 436 slums. Recently the Bhubaneswar Municipality Corporation has taken responsibility for solution of this chronic problem through solid waste management, to clear the garbage, waste plastic materials and desilting the 542 km long drains in the city. The sanitation work of BMC in its three zones, involves, Door to Door Collection of garbage, Street Sweeping, Conservancy Cleaning, bush cutting, Drain de-silting, transportation from Primary/Municipal bins to TTS and Transportation to dumping site at Bhuasuni, in peri pheri of Bhubaneswar.

The B.M.C has ventured into this gigantic task of waste management and sanitation work as per its Solid Waste Management By Law-2018. Following the policy of decentralisation system, BMC has taken up waste management in 10 wards. Leaving the management of the rest 57 wards to three

private agencies namely JAGRUTI, PMR and RAMKY on PPP mode for which inhabitants have now getting sigh of relief. Also it is managing waste plastic materials as per the Plastic management Rule, 2016.

The Corporation has switched over from the traditional sanitation services in its jurisdiction to the decentralized system of Waste Management by way of establishing Micro Composting Centres (MCCs) and Material Recovery Facilities (MRFs) in different parts of the city in a phased manner. The 57 wards are grouped into four packages for the purpose of the solid waste management activities (solid waste collection & transportation, conservancy cleaning, drain cleaning & de-silting). Three private agencies working in Public Private Partnership (PPP) mode are carrying out the entire SWM (Solid Waste Management) activities in the privatized 57 wards on daily basis, which includes door-to-door garbage collection, street sweeping, MSW (Municipal Solid Waste) transportation, drain cleaning, drain de-silting, conservancy cleaning and bush cutting. In the remaining 10 wards, BMC is carrying out daily the SWM activities .The Tricycles are used for door-to-door garbage collection.







BMC has deployed adequate number of Tri-cyclers, trollies, auto-tippers and 120-240 litres of bins for door-to-door collection of garbage.

The ULB is motivating the households through NGOs for source segregation of solid wastes. Emphasis is given on kitchen waste to be used as compost in backyard of individual houses. Road sweeping is carried twice a day in commercial areas including Sunday/holidays. Also night sweeping of main roads is done through mechanical sweeping in BMC jurisdiction by engaging a private sanitation agency. Tipper, trucks, dumper placers or compactors transport the MSW collected from various part of the city to Temporary Transfer Station (TTS), an area of 25.806 acres near the Sainik School is being used. At the TTS the collected waste are weighed and recorded. The payment to the private agencies is being on monthly basis based on quantity of waste collected & transported.

Implementation of online monitoring and tracking of MSW Management activities are done in PPP mode under Bhubaneswar Smart city plan. Currently the BMC is tracking 65 vehicles as daily part of the project. It is carrying out mechanical sweeping in 80 kms in commercial area by engaging two agencies and number of vehicles.



The BMC has taken up Mass Cleanliness awareness drive among the citizens about the waste generation and its handling practices in a participatory approach. For maintaining sanitation of the city NGOs, Senior Citizens, and Civil Society are involved. Followings are the awareness campaign

**By Subhendu Sahu, OAS**  
 Dy. Commissioner, BMC  
 Bhubaneswar Municipality

## The Awareness Campaign

### 1 Go Green Campaign

Distribution of saplings, books and cotton bags for use instead of plastic bags for healthy climate and environment of the city.

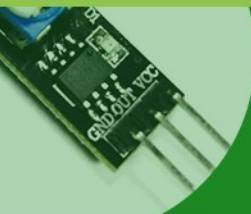
### 2 Mass Source Segregation

Awareness campaign among the citizens on waste segregation at source is taken up, for smooth implementation of decentralised waste management system involving NGOs, Senior Citizens, and Civil Society.

### 3 Non Motorized day (each Friday)

The BMC, BDA & BSCL Officers and staffs do not use petrol vehicles on Fridays for protection of environment of the city.

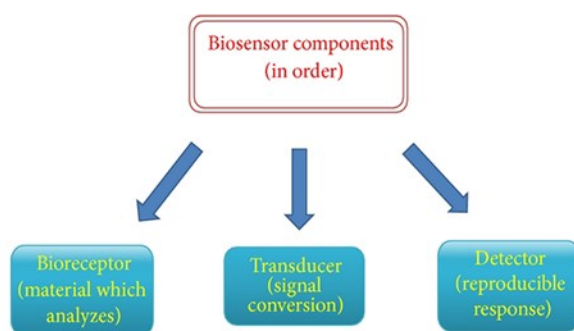




# Nanobiosensing : A novel Key to Eco-Applied Business

The Biological responses has assumed great significance in the current dynamic environmental developments and corresponding altered homeostatic happenings occurring at both in vivo as well as in vitro levels. The behavior of ever changing materials has assumed significance in areas like environmental applications. The development of biosensors deserves urgent attention. A key component of biosensing is the transduction mechanisms, responsible for converting the responses of bioanalyte interactions in an identifiable and

reproducible manner using the conversion of specific biochemical reaction energy into an electrical form. Nanomaterials can be wonderful incumbents in this dimension as they have high surface area, used in a better and diversely functional manner. The main function of a biosensor is to sense a biologically specific material. Often, these materials are antibodies, proteins, enzymes, immunological molecules, and so on. Moreover, their electromechanical properties are the wonderful assets for the biosensor technology.



## ECO-Applications

This is relatively a broader area of bio-application. This is regarding environment which undergoes rapid scale changes in almost every second. The detection of pollutants, toxic intermediates, heavy metals from waste streams and monitoring of weather conditions like estimation of humidity and many other vital features are really highly detailed and comprehensive tasks. The sensors based on nanomaterials can be very versatile in terms of their detection and monitoring. The nanomaterials based sensing tools can be used to find the particular kind of damaging extent of a material present or prevailing in the environment. In one such study, a Chinese hamster ovary cell line has been coupled with fluorescent reporter system and used to monitor various toxicants in highly diverse aqueous environments. Carcinogens and harmful intermediates leading to the disruption of proper hormonal systems in the living beings have been isolated through the use of highly sophisticated and specific compounds, particularly named as endocrine-disrupting compounds. Similarly, in one such study, biosensors are used to monitor the abiotic conditions that are essential for optimization of biological recovery applications like those of bioremediation. In this way, the technique of bioremediation can be scaled up and used to optimize the environmental quality and decontaminate the hazardous contaminants.

## Future Prespects

Nanotechnology has proved to be significant blessing in the development of biosensors. The overall mechanisms have become quicker, smarter, less costly, and user friendly. The transduction mechanisms have significantly been improved with the use of nanomaterials and nanostructures like those of quantum dots. Nanoparticles are applied for enzyme immobilization and hybrid nanostructures with multiple functionalities. These materials are right now being increasingly considered for the merging of chemical and biological sensors to make the overall process fast, easy to execute, and better in terms of performance. The increasing advancement of miniaturization and nanomaterials research has stimulated the application of these materials for sensing several key pathways and regulatory events. With the current progress and exhaustive research pace of nanomaterial exploration, the sensing technology has become more and more versatile, robust, and dynamic. No doubt, biosensor development for a task is still very cumbersome and costly due to its technical complexities, but the incorporation of nanomaterials has proved to be a big boon for this green technology and result oriented experimental support.

**Dr. Ashutosh Debata**

*Former Principal  
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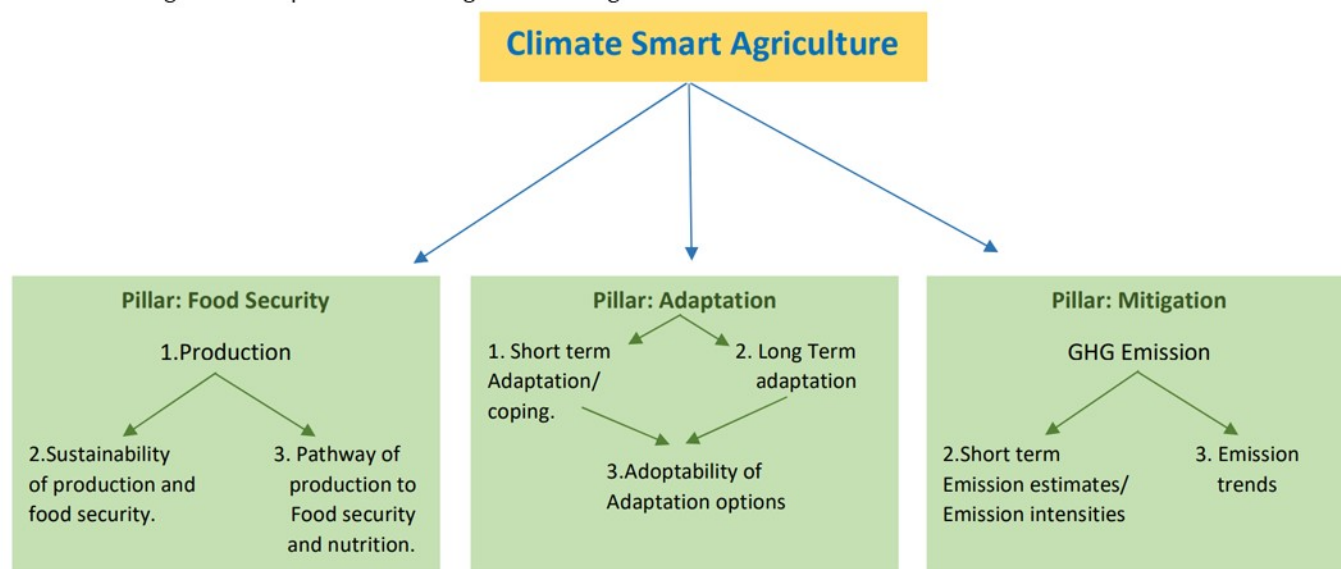
# Climate Smart Agribusiness

## Need of the Hour

The Climate change has significant impacts on agribusiness, calling for an effective strategy in addition to mitigation policies. The negative impact of global warming includes heat waves, storms, floods, variation in rainfall pattern and soil degradation, have major implications for essentials like food, water, land and environment. The climate change affects crop and livestock production systems besides creating problems, such as water scarcity, pollution and degradation of the ecosystem. Agriculture contributes a major share of greenhouse gas (GHG) emissions, causing global warming and climate change – 17% directly by agricultural activities and 7-14% through land use. The agricultural GHG emissions are the nitrous oxide from soils, fertilisers, manure and urine of grazing animals; and methane production by ruminant animals and from rice fields. These gases have more negative effect than the carbon dioxide. To meet the climate change targets, the contribution of agricultural production in greenhouse gas

emissions is increasingly coming under scrutiny.

Agribusiness deals with the production, processing, and inventory of agricultural goods besides management of equipments, technologies, raw materials, work force and other resources. It caters to all the stages in between: trade, management and consultancy in food chains, agricultural entrepreneurship, innovation marketing and retails. The negative impact of climate change is increasingly felt, in form of high temperatures, weather variability, shifting agro-ecosystem boundaries, invasive crops and pests, and frequent extreme weather events. The climate smart agriculture is the key for achievement of sustainable and climate resilient agribusiness. Climate-smart agriculture (CSA) is to manage the challenges of food security, enhanced productivity, very resilient and reduced emissions. The three pillars of climate smart agriculture are given below.



It is needless to emphasise interface between climate change and agribusiness through agricultural production and marketing, but climate hazards have also impacts on storage, processing and marketing of the produces. It is realised that climate-smart technologies can address challenge of transition to climate-smart agribusiness at a large scale for enabling agricultural systems to support food security under the realities of climate change. The climate smart technologies can address the challenges to make a climate smart Village. It is a climate-smart technological option that can be adapted to different locations to maximize value of interventions and finance. It can promote local, adaptation and transformative options while building local capabilities to continue to innovate, experiment. It can understand the effectiveness and develop solutions to meet the future climate change impacts. With participatory action, climate smart village can play the role of a platform for multi-stakeholder

collaboration, generate effectiveness at local scales and plan out strategies for diversified investment. It will be the “cornerstones” to show where communities implement, test, develop and adopt strategies, for scaling up investment and innovations for sustainable agribusiness management. But to be a successful entrepreneur in agribusiness management in the new millennium, there is a need to configure climate risk and sustainability’s ranging from adaptation to production, processing, value addition, distribution and management through innovation and smart solutions. All this implies understanding of the climate change science and global response, its policy, regulations and implications, Green and Sustainable Finance, Instruments and Markets, Climate Risk Measurement and management of current issues in sustainability and climate risk.

Continue to next page >>>

Climate smart solutions and strategies aim at development of clean technologies comprising of a host of clean low green house gas emission tools to facilitate adaptation and mitigation to achieve resilience directly and indirectly against climate change impacts across all sectors of agribusiness. It may include smart farms, sustainable soil health enhancement and irrigation, smart homes, offices, stores, smart technologies, smart energy, risk mitigation through credit and insurance and smart business solutions.

Climate smart agriculture is a major component of agribusiness management. It aims to tackle three main objectives: sustainably, enhancement of agricultural productivity and incomes. Climate-smart agriculture (CSA) is an integral approach to manage landscapes—cropland, livestock, forests and fisheries—that address the interlinked challenges of food

security and climate change. Climate-smart agriculture has been developed to attain 'triple wins' in agriculture, increased productivity and, adaptation to change in gas emissions. IPCC has estimated that the GHG emission will escalate in days to come due to growth of population and changing food consumption pattern. There would be higher emissions of CH<sub>4</sub> and N<sub>2</sub>O owing to greater use of nitrogen fertilizers. There is need of mitigation practices for livestock systems and fertilizer applications to check increase in emissions from agriculture beyond 2030. The future strategy of agribusiness requires synergy among climate change policies, sustainable development and improvement of environmental quality.

**Professor G.K Panda**

*Prof. Emeritus, KISS ( Deemed ) University  
Bhubaneswar*

## Reverse Logistics in Agricultural Waste Management

Assessment of global food loss and waste in each year as per estimate of the FAO ( Food and Agricultural Organisation ) is about one-third of the total food production of the world . This affects not only food security, but also a sheer wastage of natural resources used for food production, processing, and packaging, transporting, and marketing of food. The Food balance sheet of the FAO, ( 2011 ) indicates that 3.6 GtCO<sub>2</sub> eq, is emitted per year due to wastage of food, which does not include the 0.8 GtCO<sub>2</sub> of deforestation and managed organic soils associated with the food wastage. Thus, the total carbon footprint of food wastage, including land use change, is around 4.4 GtCO<sub>2</sub> eq per year. A global level, it is found that 10% of Greenhouse gas emission occurs due to wastage of food. Therefore, minimising and reusing the food and agro-waste not only help alleviating hunger but also protects the environment.

In the agricultural sector, wastage is generated at each stage of the supply chain, starting from harvesting, assembling, thrashing, grading, sorting, winnowing, cleaning, drying, packaging, transportation, and storage.. A study in India has revealed that annual post-harvest losses of major agricultural produces at national level was of the order of Rs. 44,143 crore at 2009 prices. In food processing sector on an average, the fixed capital per registered factory is Rs. 4.27 crore and most of the factories belong to micro and small enterprises with limited capacity for waste management.

10%  
Greenhouse  
gas emission



Generation of waste in agril sector is due to various reasons i.e over-purchasing, premature harvesting, inappropriate labelling, defective storage, transportation, and packaging and incorrect weighing. In developed countries responsibility of producers in all sectors of waste management, particularly in e-waste, hazardous waste, battery waste and plastic waste, are highly effective and reverse logistics plays the most crucial role in the success of EPR schemes. Reverse Logistics (RL) implies the examination of the patterns associated with the flows of products whose life cycle has been ended. In RL the flow is from the point of consumption to the point of origin is for proper disposal of recapture value.

The problem with reverse logistics processes for agro-food products lies with nature of perishability which can become unsafe even due to small failures in process control, and can subsequently pose a possible threat to the health of consumers. Agribusiness companies try to avoid returns and rejects whenever possible. If a return occurs, the process usually consists of checking the batch number, writing off the shipment, and sending the product to the nearest disposal facility.

Secondly, each return that occurs in the food supply chain is treated as a unique, separate transaction, and therefore, these returns tend to involve higher costs. They can also disrupt the existing supply chain since they may repurpose buildings and personnel to handle a transaction they do not usually do. Therefore, in the food industry, it is very important to monitor the supply chain and disruptions due to food spoilage. Reverse logistics in the food industry demands carefully developed practices tailored to a reverse supply chain as well as transportation assets and facilities.

Some of the key factors in setting up the Reverse Logistics operations in agriculture supply chain are Segregation and sorting, Transportation management, Warehouse management, and Information Management. However, in India RL in waste management has not been very successful largely due to limited ability for forecasting and planning, weak customers perception about RL, lack of organisational resources, weak commitments from the top management, and absence of a robust monitoring system. Thus, many agro-based waste either end up in land disposal or burning causing further environmental damage.

Landfill disposal might be the simplest option, but it should be the last resort in view of both financial and environmental reasons. Ideally, recalled food product should be composted and any packaging recycled. Organic waste should be converted to renewable energy and polymeric materials should be recycled and reused.

**Nihar Ranjan Sahoo**

*Chief Environmental Engineer*

*State Pollution Control Board*

*Mob no: 9861031605*

*ODISHA*



Landfill



Incineration



Waste  
Compaction

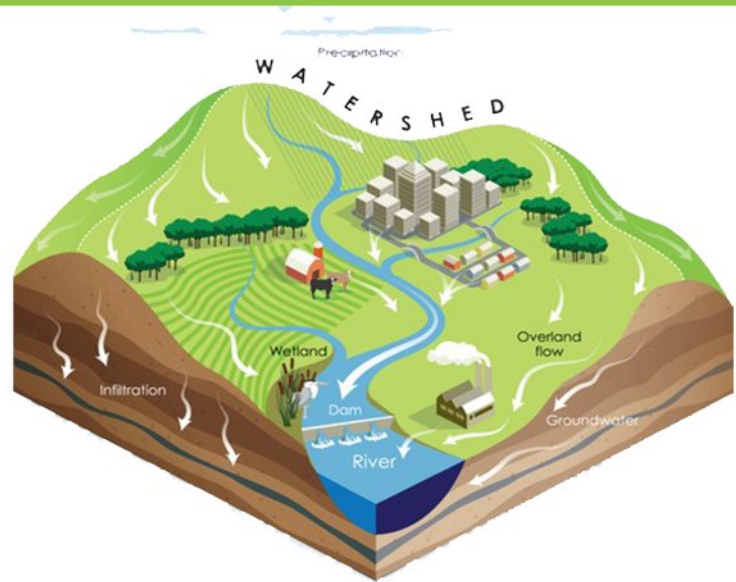


Biogas  
Generation



Composting

# CLIMATE CHANGE AND WATERSHED MANAGEMENT



Watershed based development approaches are age old and are being practised by both government and non-government agencies. Strategies in management range from technical approaches to participation of beneficiaries. Based on bottom up approach, the watershed projects performed better than the vice-versa approach due to participation of beneficiaries at grass root level with infusion of technical knowledge. The watershed management yield rich dividends and valuable insights into management of natural resources particularly land and water. It enhances productivity of rain-fed area and makes the farming community more resilient to weather aberrations benefitting the vulnerable section of the population.

Watershed Management practices imply soil conservation, regeneration and the judicious use of natural and human resources within the watershed project areas. It brings out a judicious balance between the environment and natural resources with human and other living beings. Components of watershed management are community development, soil and land management, water management, crop management, afforestation, fodder development, livestock management, rural energy management and other farm and non farm activities. Integrated Farming System models involving diversification of farming to ensure sustainable livelihood are being promoted to minimise risks due to climatic variability.

There is a shift from rice-based mono-cropping to two-crop sequence in addition to diversification to income-generating crops such as cotton, groundnut, onion and few vegetable crops in rainfed-watersheds. Farmers have also started cultivation of groundnut on uplands during the Kharif seasons. This is clear evidence to change from the age-old practice of rice cultivation to more attractive cropping pattern.

Stronger groups in watersheds had better solidarity and many group activities could be pursued effectively. Wherever the social capital is high, the community is more resilient to handle climate shocks effectively. The diversification to multiple crops and the landless to non-farm activities reduce the vulnerability during the climate stress conditions. Convergence among agencies has been helpful to deal with the climate stress conditions. "Every willing farmer can have a farm pond-supervised by women SHGs" is one such scheme which has helped farmers to come over the recent drought situation in the State. The programme has also empowered women SHGs through building social and financial capital. The groups, because their exposure to participatory planning process is better able to manage the common property resources and have better preparedness than the areas where such groups are either non-existent or loose.

Wide-spread NRM interventions, augmented agricultural activities, and the evolution of sensitized farming communities indicate a strong resilience against the impending climate-induced natural disasters (such as flash floods, droughts, moisture stress conditions etc.) in watershed area. The future watershed programme, REWARD- "Rejuvenating Watersheds for Agricultural Resilience through Innovative Development" will be a science-based watershed development programme which will use Land Resources Inventory (LRI) and precise site-level data for efficient watershed planning and resiliency supported by (b) hydrological assessment and (c) weather information dissemination and adoption of climate resilient practices

**Sri Hemanta Kumar Panda**

*Director, Soil Conservation & Watershed Development,  
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# SUSTAINABLE WAREHOUSING AN OPTION FOR GREEN BUSINESS



The International concerns regarding Greenhouse Gases have reached a defining stage. The increased climatic variability and its disastrous effects have started affecting socio-economic fabric of the countries. Carbon footprint first advocated by William Rees and Mathis Wackemagel in the early 90s have now become the central concept to fight ecology destruction. Issues involving clean air, healthy diet, shifting to solar energy have taken centre stage. This has impacted warehousing also. The warehousing market in India is currently valued at INR 1,050 bn and it is expected to expand at a compounding annual growth rate (CAGR) of 14.86% between 2021 and 2025. Thus sustainable warehousing is not only a compulsion but also business with an enormous profitability. In warehousing the general focus areas where maximum energy is consumed are lighting, refrigeration heating. As estimated a warehouse consumes approximately 9kwh/sq feet of electricity. Due to high consumption of lighting focus has to be given on forms of lighting to reduce carbon footprint. The modern smart lighting in combination with technology ensures lighting of specific areas instead of whole area of warehouse. Thus with help of new technology used area can be well lighted and exposure of light can be felicitated as per requirement and this can be controlled by sensors and warehouse management system. The movement around warehouse can also be spotted and lighted with the help of such technology. Such smart lighting can arrest the profligacy of energy use. The use of LED technology can also reduce the cost of energy by 80%. These can also reduce substantially CO<sub>2</sub> emissions which generally emanates from using normal light bulbs. The critical factor in warehousing is the

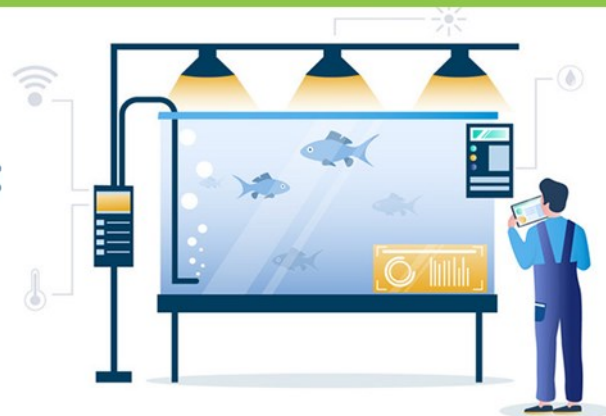
temperature control necessary to maintain goods in proper condition. The modern bigger warehouses require huge amount of energy for cooling or heating sustainable designing focuses on right kind of insulations. An insulated space maintains the temperature at a steady level negating the additional requirements of energy. One need not heat or cool the space all the times irrespective of availability and non availability of wares inside the structure. Proper utilization of space is also a key parameter of modern warehousing, though additional space can be made available through mezzanine flooring. Such smart way of designing can provide profit to the entrepreneurs as well as address the cause of sustainability. The third most important factor is to take care of our surroundings through liberal use of Greens by emphasizing on land scrapping. This can provide balanced climate surroundings to the ware house. The concrete structure generally radiate heat absorbed from the sunlight during the day till late evening requiring more energy for cooling effect. Thus landscape and green grass in surroundings can reduce such an impact. The above and such other similar steps can make the warehousing a sustainable process. Such type of strategies does not involve huge capital expenditure rather it become profitable for the entrepreneurs to pursue the process. Such practical solutions emerging by the day require acceptance of the business entrepreneurs so that we can rapidly move ahead to protect our environment in a meaningful way.

**By Sri Sukumar Dash**

*Agri-entrepreneur and guest faculty (CAM)  
Utkal University Bhubaneswar*



# Organic Freshwater Aquaculture: Way to sustainable production



Sustainable aquaculture involves reduced use of materials and chemicals from inorganic and industrial sources. Organic aquaculture practice is a new and novel method of low inputs, healthy and sustainable practices. Organic aquaculture attracts the attention of researchers as well as industrial sectors and innovators. In Europe, organic aquaculture is practised in Atlantic Salmon, Mediterranean species Seabass and Seabream, freshwater salmonids (Rainbow and Brown Trout), and Carp. In Latin America, whiteleg shrimp operations in Ecuador, Peru and Brazil. Most common in China is carp production in polyculture, i.e. in combination with crabs, shrimps or other local species; Asian countries, Black Tiger Shrimp (e.g. Bangladesh, India, Thailand, and Vietnam), Pangasius catfish (e.g. Vietnam) and micro algae (e.g. India).

Organic aquaculture is an environment friendly method of farming and has impact on industrial aquaculture and reduce the negative impact on environment and health issues. It protects the consumer health by reducing overall exposure to toxic chemicals and antibiotics. It's a method of manufacturing eco-friendly certified seeds. These have natural fish production, conventional production improvement, and high productivity with low stocking density. Organic aquaculture is vital for improving soil fertility, lowering production costs, and ensuring the safety of consumers. Toxic plant residues are left behind by chemical fertilizers. Long-term consumption of these inorganic foods can result in serious health problems. Chemical compounds also combine and contaminate the soil as well as the water.

Organic aquaculture promotes environmental and socio-economic sound production. Main aim of organic aquaculture is to maintain sustainability in system by restricting the incorporation of harmful substances and practices. Basically organic aquaculture is rooted by the principles like health, ecology, fairness and care. Organic food production and farming are part of the solution to many challenges. Organic aquaculture is the farming of aquatic animals like shrimp, fishes, bivalves etc and aquatic plants without using antibiotics, chemicals, and fertilizers by preserving the ecosystem and biodiversity. It is a farming process carried out in harmony with nature. It does not use harmful synthetic chemicals. Organic aquaculture practices would help in raising aquatic products in a human manner i.e. sustainable and pollution free. Organic feed optimizes the health of the animal and reduce its reliance on drugs, including antibiotics. Alternate organic fish production systems, apart from the conventional culture systems, are explored in recent years to add to the fish production baskets of the country.

## Benefits of organic aquaculture:

- Higher incomes than traditional farming systems
- Greater stability in yield, especially in risk-prone tropical ecosystems
- Improved soil fertility and long term sustainability of farming systems
- Restoration of degraded or abandoned land
- Access to attractive markets through certified products
- Reduced dependence of farmers on external inputs
- Chemical residue free safe and healthy food for consumers.
- New partnerships within the whole value chain, as well as a strengthened self-confidence and autonomy of farmers .



Organic Fish Ponds at ICAR-CIFA, Kausalyaganga, Bhubaneswar, Odisha

*F1 generation of advanced  
Fingerlings produced by  
pituitary glands at ICAR-CIFA,  
Kausalyaganga, Bhubaneswar,  
Odisha*



**Dr. Satyanaran Sethi, *Principal Scientist***

&

**Dr. Nagesh Kumar Barik, *Senior Scientist.***  
*CIFA, Kausalyaganga, Puri*



# Protected Cultivation For Profitability and Sustainability

Protected cultivation a green business is the technique to control the micro climate surrounding the plant body as per the requirement of crop species during their period of growth. Among the protective cultivation practices, poly green house, net house, shade house, plastic tunnel & lath house etc. are very much useful. Presently total area under protected cultivation in our country is approx. 30,000 ha.

Green house cultivation aims to produce more per unit area with increased input use efficiency.

The productivity of vegetable crops inside green house can be increased by 3-5 times as compared to open environment. Vegetables can be grown throughout the year. It provides excellent opportunity to produce high quality yield and assure regular supply in huge quantity of vegetables for export. Off-season nursery can be raised inside poly house which advances the harvesting period. High quality seed production attributes can be undertaken. Insect pest and diseases can be controlled easily. However, the main problem is high cost of establishment of greenhouse, lack of greenhouse technology and illiteracy of the farmers.

Greenhouses are covered with transparent or translucent material either fibre glass or UV stable polythene i.e. Fibre glass/Polythene film/Ordinary glass house/Poly carbonated houses/UV stable Polythene film. Based on materials used these are **Naturally ventilated or Low cost greenhouse** (It costs around Rs.300 to 600/m<sup>2</sup>), **Medium-tech greenhouse** (This type of GH is suitable for vegetable cultivation during mild winter and mild summer only. It costs around Rs. 800.00 to Rs.1100.00/m<sup>2</sup>) and **Hi-tech greenhouse** (This type of GH are used for growing high value crops like cherry tomato, cucumber, capsicum, strawberry for long period. It cost around Rs.1465 to Rs.4000/m<sup>2</sup>).

## Crops grown under Greenhouse are:

**Flowers:** Chrysanthemum, Carnation, Gerbera, Rose, Lilium, Orchid, Gladiolus, etc.

**Vegetables:** Tomato, Coloured Capsicum (Yellow and Red Bell Peppers), Cucumber, Broccoli, Red Cabbage, Leafy vegetables, Radish, etc.

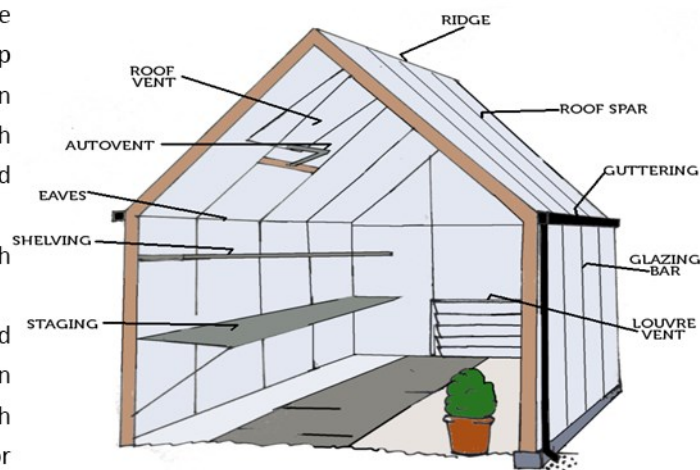
Fruits: strawberry and papaya

**Seedling and Nurseries:** Vegetables, Flowers, Tissue Culture, Clonal for Forestry, Fruit Grafting (like Lemon, Citrus, Mango, Pomegranate, Guava, Litchi, etc.)

Orientation of green house is important aspect. In plains orientation of green house should be North-South direction so that longer sides avoid sun scorching and in hills, South/ South-west/ South-East direction orientation is better for maximum use of sunlight.

**Sarat Chandra Sahoo**

*Ex-Principal Investigator  
PFDC, OUAT, Bhubaneswar*



Low Cost Green House



Medium Cost Green House



High Cost Green House

# Green Business Marketing with a Perspective of Agri Input Sector

## A Novel Case Study

Today there is a great rush in the business sector to go green, it may be their positive strategic step towards a long-term business goal or merely be a social responsibility mask to showing their concern towards the environment and society.

The term Green business marketing means any business or business promotion that prioritizes no negative environmental impact returns against their investment. Green or Sustainable marketing is the promotion of environmental and socially responsible products, practices, and brand values. Businesses can use sustainable marketing for a specific product, time-sensitive cause, or even as their businesses' USP

Any business drives if want to imbibe green business factor, need to consider following four key areas:

- Lowering energy consumption and improving efficiency.
- Eliminating waste and using sustainable materials.
- Adhering to environmental laws, regulations, and best practices.
- Purchasing and producing green equipment, products, and services.

Now all the possible stakeholders, from producer to customers, feel today the importance of adopting green business practices.

**The key benefit of green business marketing is enumerated below:**

- Environment friendly
- Increases scope for Innovations.
- Profitability enhancer
- Helps in creating a credible positive image
- Opportunity to enter New market.
- Long term Growth
- Enables a competitive edge

**Few great glaring examples.**

- Once Apple launched its new MacBook Air and MacBook Mini. by using 100% recycled aluminum. That year their slogan was, "Truly Innovative products leave their mark on the world but not on the planet."
- Johnson and Johnson have set a goal for the reduction of carbon emission by 20% by 2020 and to maximize product recycling.
- IKEA (Swedish giant) has established its own strategy for environment-friendly practices named "People & Planet Positive". IKEA offers its customers stylish furniture at affordable prices along with sustainability.
- Unilever, one of the giant companies around the world, has made green investments and made a sustainable living plan as an essential part of their programs. The company is making changes to save energy, water, and to reduce waste.

In the Agri-input sector, we found the leading agrochemical companies like Syngenta, Dow-DuPont, Bayer-Monsanto, FMC Corporation etc. and other technology-driven companies are focusing more on the development and introduction of innovative green technology offerings like..

- Low or optimized dosage novel chemistries like Sulphonyl Urea groups of Herbicides
- Environment-friendly high efficient novel Green chemistries like Chloroantraniliprole.
- Combination of different active ingredients, both chemical and biological, for better efficacy,
- Biological as plant growth promoters and pest control agents.
- Genetic engineering tools & technologies that increase the ease of introduction of desired traits into key crops.
- The commercialization of microbial products such as biostimulants, biopesticides, plant growth promoters, etc.
- The practice and adaptation of Integrated Pest Management (IPM), Integrated Crop Management (ICM) and Intergrated Nutrient Management (INM) focuses on rational use of pesticides, nutrients, and efficient cropping cycle.
- Additionally, the technological advances in genetic engineering (GE) that can introduce traits of interest be it drought and salinity tolerance, increasing nitrogen and water use efficiency or resistance to different crop pests in crops with precision are efforts in the right direction.

Being having knowledge as well as a great heritage of Environment respecting culture since the Vedic era, we must lead and show the world that Vikash ( Development ) is not always associated with Vinash ( Destruction) if it is dealt with honesty and respect for all, including Environment, society, people and each individual.

*There are two kinds of companies: those that sell sustainable products... and those that will...*

**Prakash Jha**  
Regional Sales Manager  
FMC



# VERMICOMPOSTING

## A Kind Of Green Farming



Application of Vermicompost as green manure in crops is becoming more and more popular day by day, as it has no harmful effect on human health. It is the process of decomposition of organic waste through micro organisms. It is biodegradable stabilized and mineralized humus transformation process by bacteria, micro- and higher-level organisms of decomposable organic constituents in solid wastes. It can be carried out in both aerobic and anaerobic conditions. It is also a process of composting where decomposition process is carried out by using various species of worms. It is a mesophilic bio oxidation and stabilization process of organic materials that involves the joint action of earthworms and microorganisms. It has higher rate of stabilization thus modify soil's physical and biochemical properties, with low C N ratio and create homogenous product. Due to high adaptability to waste, minimal gut transit time, fast growth rate, and high reproductive potential earthworms are considered as most suitable. The Vermicomposts are excellent sources of bio-fertilizer and their addition improves the physiochemical and biological properties of agricultural soils. In addition, earthworms from the vermin-composting can be used as rich source of protein to fishes and mono-gastric animals. Vermicompost is rich in NKP (nitrogen 2-3%, potassium 1.85-2.25% and phosphorus 1.55-2.25%), micronutrients, and beneficial soil microbes and also contain 'plant growth hormones & enzymes'. It is scientifically proving as 'miracle growth promoter & also plant protector' from pests and diseases.

The Rural Technology Park has given strict emphasis on green and eco-friendly farming. Vermicomposting is one of its components.

Each compost pit is connected with water sources. Micro irrigation is done for which fogger is connected in the out let to reduce water wastage and uniform irrigation. In this pit all farm wastes such as vegetable wastes, tender leaves, dry leaves, banana plant's succulent parts etc. are utilized. Cow dung is used as a major ingredient of vermicompost.

The compost is usually ready for harvesting within 60 to 90 days depending upon the raw materials used. Gradually material becomes moderately loose, crumbly with dark brown in color. It is black, granular, lightweight and humus-rich with some traces of earthworm castings on the bed which indicates the harvesting time.

This organic manure has high demand in the market and popular in the urban areas for kitchen gardening, roof top, terrace farming etc. The marketing of vermin-compost is not a problem because it sold like hotcakes. We have collaboration with PPL and we pack the product properly with level and brand as VERMIPLUS. Cost of production for one pit involves, Rs 700 for cow dung including transportation & labour, Rs 200 for green vegetables, Earth-worm, Rs 450 and fixed cost, Rs 65,000/ kg of vermicompost sold at Rs 20/for processed and Rs 15/ for unprocessed. The total produce from one pit is estimate to be 300 kg

It is the most important organic matter which not only helps the plant growth but also enriches the soil condition.

**Dr. Aditya Ranjan Samal**  
Faculty  
CAM, Utkal University



# Green Marketing

## A Sustainable way to innovate

Air pollution, plastic in ocean, global warming, food waste and deforestation are the major threats being faced by our planet. To mitigate the effects, many companies are coming forth with marketing gimmicks and eco-friendly products. Moreover, the level of ecological awareness as well as inclination towards use of eco-friendly products among consumers is increasing day by day. As per study by Unilever reveals that 33% of consumers are more inclined to buy from companies which are doing well socially or environmentally.

### Green Marketing- Concept

“The process of searching and finding out, forecasting and satisfying the preferences and wants of people in an economically sound way at the same time eco-friendly (Ken Peattie, 1995) is green marketing. Due to the rising concerns for the environmental issues, these days, the concept of green marketing is gaining much thrust (Chan, 2012).” Other similar terms used are Environmental Marketing and Ecological Marketing.

Companies developing improved products and services have access to new markets, increase in profitability and competitive edge over competitors. Companies risk their stature, if their business doesn't match green marketing practice as 'Authenticity' is the key factor in green marketing. Strategies which companies should focus upon are:

- Lifestyle of Health And Sustainability(LOHAS)
- Origin of Product
- Product Packaging
- Digital Product Marketing
- Product disposal

### Green Marketing Stories:

The stories listed below reflects over long term environmental impact of Companies business practices. They have launched different campaigns and used different kind of marketing strategies to educate people and setting example to the society. Here's How.



green toys  
SHOP TOYS - OUR STORY  
100% RECYCLED - MADE SAFE IN THE USA

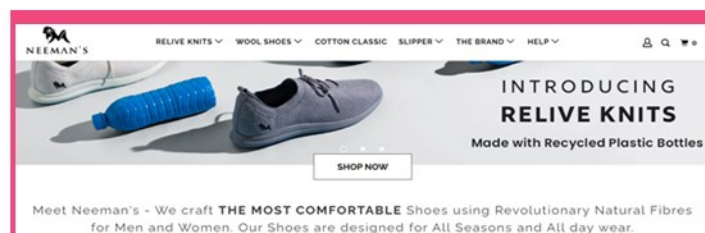
Green Toys Are Made With 100% Play. Check It Out!

Started in 2007, Robert von Goeben and Laurie hyman -the co-founders of Green Toys Inc., based in the San Francisco Bay area. Company is using recycled milk jugs of high-density polyethylene (HDPE) as the material to make toys for children. Till now company has recycled "112,493,000" & counting milk jugs recycled to date.



Ather

Started in 2013, Swapnil Jain and Tarun Mehta—the co-founder of Ather company, based out of Bengaluru, to disrupt Electric Vehicle segment along with charging infrastructure. Ather has launched electric scooter with digital touchscreen dashboard, multiple riding modes including a custom mode and changes the power mode when energy level is low.



NEEMAN'S  
RELIVE KNITS - WOOL SHOES - COTTON CLASSIC - SLIPPER - THE BRAND - HELP

INTRODUCING  
**RELIVE KNITS**  
Made with Recycled Plastic Bottles

SHOP NOW

Meet Neeman's - We craft **THE MOST COMFORTABLE** Shoes using Revolutionary Natural Fibres for Men and Women. Our Shoes are designed for All Seasons and All day wear.

Another Indian Startup in 2018 by Taran Chhabra and Amar Preet. Company has launched shoes made with Merino Wool, suitable for Indian subcontinent making it apt for all-day wear. Startup has also launched sustainable flip flops and recycled cotton sneakers.



### Starbucks becoming resource positive

Starbucks aims to reduce footprint by half in terms of Carbon Emissions, Waste, Water. Areas of focus will be:

- Expanding Plant based menu options
- Shifting from single use to reusable packaging
- Investing in regenerative agriculture, forest conservation and water replenishment.
- Waste management
- More responsible store, operations, manufacturing and delivery

Starbucks will donate 1\$million to Ocean Conservancy and is planning to achieve above points by 2030.



### Coca Cola – World Without Waste

Coca Cola is focusing on three segments around the world for a sustainable business.

- Design- Make 100% of our packaging recyclable globally by 2025. Use at least 50% recycled material in packaging by 30%
- Collect- Collect and recycle a bottle or can for each one we sell by 2030.
- Partner- Bring people together to support a healthy, debris-free environment.

### Conclusion

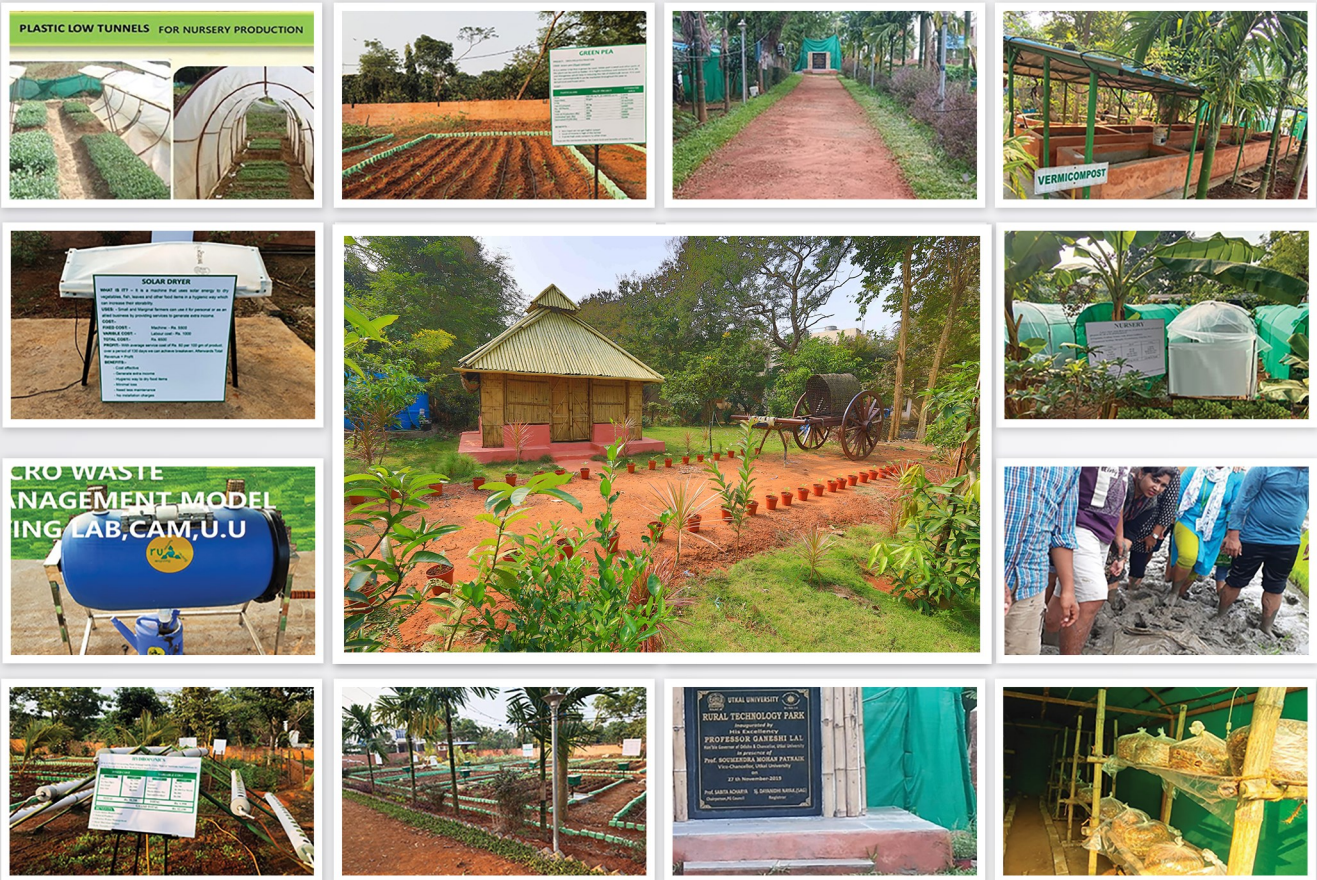
As environmental problem holds to have an effect on human activities, society now regards them with much concern. Most companies have commenced the use of sustainable framework that is referred to as green marketing and have acknowledged green products as eco-friendly. Green marketing is capable of create an ecological balance even as pleasing customer's needs. Companies should modify their policies and create a suitable green marketing strategy in which they can target consumers demand and personality.

**Mayank Raj**

Associate Consultant- Mindtree Ltd



# LIVING LAB. IN R.T.P, UTKAL UNIVERSITY DEVELOPED BY CENTRE FOR AGRI-MANAGEMENT



## AN ETHICAL INVENTIVENESS OF CENTRE FOR AGRI-MANAGEMENT, UTKAL UNIVERSITY

Centre for Agri-Management (CAM) offers a two-year Post Graduate Program in Agribusiness Management -MBA (Agribusiness) in Utkal University since 2006 with a consistent placement record and academic excellence. The CAM developed a Living Lab (learning & experimental platform) at the Utkal university campus as a live project hub , to guide students, SHG members, farmers and any interested person, to develop sustainable Agro -Enterprises involving Nursery, Mushroom cultivation, Duck-Fish integrated farming, Natural Farming, Vermin Compost, Bio Compost, Bee Keeping, Protective farming, Urban farming etc.

The CAM is planning to develop some campus garden with nutritional value in different Schools with the support of Government, public sectors and private sectors.

Pioneer By  
**Prof. Nishith Parida**  
Esteemed Member, Advisory Board



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# Make Every Day Earth Day