

Bio Resources for the Development of Green Society

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Abstract: *The word 'Environment' carries diverse meanings. The things that we see in the external world outside our place of dwelling, with which we co-exist, interact or resist is usually what we call by the name, Environment. It plays a pivotal role to maintain a perfect balance between Ecology and Nature on one hand and Man and Nature on the other. Man's deep concern for healthy environment of which he is an integral part is as old as human civilization. His efforts to protect Environment from all sorts of pollution such as air, water, sound and food etc. continue to remain unabated. At the same time man never ceases his endeavours to derive multiple Bio-resources that are abundantly available in Environment by way of animals, plants etc. in order to develop a Green Society for sustenance of humankind. The paper deals with how to tap Bio-resources to create such a Green Society.*

Keywords: *Environmentalism, Animal Husbandry, Green Society, Rural Forestry, Community Forestry.*

1. INTRODUCTION

In the most simply way environment can be defined as “the study of animals and plants in their relationship to each other and to the environment. This word ‘environment’ is the total sum of various abiotic and biotic forces that affect the existence of organisms in relation to man. This environment constitutes what we Indians call the basic elements or “PANCHA BHOOTAS” or the 5, ingredients of nature namely.

1) Prithvi (land), 2) Apo (water), 3) Tejo (light), 4) Vayu (air) 5) Akash or sky (infinite Talva). There are the mainly responsible for regulation of human life. Environment does not simply mean the surroundings only, but it includes a variety of issues related with human activity.

It is very important to have sustainable development of any country. Sustainable development by avoid pollution of all sorts. For that using of bioresources is one of the ways to have pollution free society to same extent. Forests are our most valuable wealth of any nation. Forests are the most important part of biosphere in any region of the world. Environment is one subject that is actually global as well as local in nature. Issues like global warming, depletion of ozone layer, dwindling forests and energy resources, loss of global biodiversity etc. which are going to affect the mankind as a whole are global in nature and for that we have to think and plan globally.

There are some environmentalists in the present time who have made a mark in our country through environmental activism. Sh.Sunderlal Bahuguna, known for his ‘Chipko movement’ and ‘Tehri Bachao Andolan’, Smt. Medha Patkar and Ms. Arundhati Roy Known for their ‘Narmada Bachao Andolan’, the Magsaysay awardee Sh.Rajender Singh known for his water conservation efforts are some such contemporary figures. Salim Ali is a renowned ornithologist, famous for his work on Indian birds. In modern India, our late Prime Minister Mrs. Indira Gandhi was instrumental in introducing the concept of environmental protection in the constitution of India as a fundamental duty while Mrs. Maneka Gandhi, formerly Environment Minister, has worked a lot for the cause of wildlife protection. Citizens’ report on environment was first published by Sh. Anil Aggarwal, the founder chairman of centre for Science & Environment. Even with many such key persons leading the cause to environment, India is yet to achieve a lot in this field.

There is a Chinese proverb “If you plan for one year, plant rice, if you plan for 10 years, plant trees and if you plan for 100 years, educate people”. If we want to protect and manage our planet earth on sustainable basis, we have no other option, but to make all persons environmentally educated.

In that process bioresources have to be used and people as well Government Non-Government Institutions are being taken incentive implement to this in the way they follow are same ways of using of bioresources programmers by which pollution can be avoided to same extent.

Two noted personalities, who need a mention here, are Justice Kuldeep Singh, known Popularly as the green judge and Sh. M.C. Metha, the green advocate, who have immensely contributed to the cause of environment. A product that is made, used or disposed off in a harmless manner is called eco-friendly and is awarded this eco-mark.

In a drive disseminated environmental awareness 'eco-clubs' for children and 'eco-task force' for army men have also been launched by the government. Today everybody talks of environment, but only a few have clear ideas about what needs to be done and still fewer people have the actual experience or expertise in the field.

2. ANIMAL HUSBANDRY

Animal husbandry is a branch of agriculture that deals with the breeding and rearing of animals. Animals are fed with and managed for various uses like food, work and fiber. Latest techniques are used to generate animal products at commercial level. Estimates suggest that more than one fourth of the agricultural products in terms of value come from the animals. In USA the animal goods make more than half of the income from agricultural goods.

Many domesticated animals have multiple uses. Animals that are reared for milk can also be used to pull the load, meat, leather and many other uses. The uses of animals depend upon the culture and experience of the people. Environmental factors also play their role in the domestication and uses of animals. Water buffalo for example is used in South Asia as draft animal to pull the load where they are adapted to high temperature and humidity. In temperate areas horse is the major draft animal to pull the load because horses do well in these areas. Cattle of India which is adapted to hot climate cannot thrive in the European Climate.

Draft Animals

Draft animals are used primarily for work and transport. Major draft animals are horse, camel, buffalo, ox, donkey, mule, yak, etc. Camel is used in the deserts because it can live comfortably in the dry conditions. The hump is the store of food and fat that is used during scarcity of food. Horses have been in use for transport, warfare, agriculture and sports. It is known for its speed, strength and endurance. They are, therefore, preferred for long distances. Total population of horses throughout the world is estimated to be more than 60 million.

Horses are the largest of any land animal. Positioned on the sides of head, the eyes facilitate horse to look almost behind while facing forward. Male llama is reared mainly for carrying load and female llama is reared for milk and meat. Long hairs of both are used for textiles. Their skin is used for making leather. Alpaca is closely related to llama. It is not reared for transport, but for wool. Tallow of llama is used to make candles. Yaks are domesticated for transport, meat and milk. Their hairs are spun to make ropes and clothes. Dogs are also used as draft animals in Alaska and Siberia. In other parts of the world they are used to control the herds of sheep and other animals.

Cattle

Cattle have two main uses: milk and beef. However some cattle are reared for both. The total cattle population of the world is believed to be around 1.4 billion. India ranks first in the world in the number of cattle. Beef cattle are reared separately for meat. Important byproducts of milk are butter, cheese, curd, dry milk, etc. that are extensively marketed.

Sheep and Goats

Sheep and goats are reared for their wool and meat. In some cases milk is also obtained from them. Rearing of sheep is also done on small tracts especially in the semiarid areas where farming is not possible due to steep slope.

Poultry Animals

Poultry farming is the commercial rearing of chickens, turkeys, geese and ducks. They are reared for their meat and eggs. Poultry farming picked up during Second World War due to shortage of meat. It takes five to seven months for poultry animals to be ready for meat and eggs.

Pigs

Pigs are also referred to as swine. Very close to swine are hogs which are also included in the category of pigs. Pigs are mainly reared for their meat which is known as pork. Other uses of pigs are soaps, leather, fat, glue and hormones like insulin.

Other Animals

Other domesticated animals are banteng, reindeer, raccoons, muskrats, mink, fox, etc. banteng resembles cattle and is found in Myanmar and Indonesia. Reindeer is deer that is found in the sub-arctic regions of Asia and Europe. They are used for pulling load, milk, flesh, hides, etc.

Muskrat is a semi aquatic rodent. Muskrat is used for its fur. Fur is highly valued in the market. Fox is also valued for its fur. Different types of foxes provide different types of fur. Foxes of arctic region provide a variety of fur.

3. RECENT TRENDS

Increasing human population is putting pressure on animals also. Demand of animal products is increasing day by day. Scientists are working hard to increase the production of these products. They have made intensive research on animals. They have been successful in most of the cases like increasing the size of sheep to get more wool.

Scientists are also working on other animals that are capable of providing various products. In Peru the research is being conducted on guinea pigs and iguana lizard. Research on sheep is showing that better results can be achieved if they remain confined to small areas. However this method is being criticized for being cruel to the animals. Cloning is the recent research in which animals can be reproduced artificially.

According to FAO (Food and Agriculture Organization) of United Nations only 1500 of the total 5000 species of domesticated animals have been left and most of them are also heading towards extinction. Various conservation programs are being launched to protect the endangered species.

Use of Compost: Compost is a source of organic matter for the soil. Organic matter increase soil's ability to retain water and provide valuable nutrients.

Use of animal manure: Spreading the livestock and poultry manure provides not only nutrients required for plant growth, but has a major beneficial effect on soil tilth and particle aggregation. The organic materials contained in manure act as binding agents in stabilizing soil structure. This positive change in soil structure caused by the addition of manure is equally, if not more important, than the nutrient contribution provide. Change in structure of this manure positively affect water infiltration, water holding capacity and aeration, as well as resistance to wind and water erosion.

Practice minimum tillage: Crop residue conservation during tillage is affected by equipment type, speed, depth and frequency of tillages, as well as soil and climatic factors. Limiting tillage depth, speed and the soil moisture.

Plantation in the grassland: Grass and small plants in grassland slow down the flow of water and soil erosion gets reduced.

This is the most inexpensive way to prevent soil from washing of blowing away. If vegetation covers about 70% of the ground surface, there will be adequate protection against soil erosion.

Integrated farming system: Integrated farming system is directly related with sustainable agriculture. It has the following advantages — it protects our environment, it supports profitable production, It uses and utilizes natural resources efficiently, it generally avoids the uses of non-renewable resources. It also enhances the quality of life the people who are associated with the system.

Green manuring: Green manuring is the practice of turning into the soil undecomposed green plant tissue. The function of green manure crop is to add organic matter to the soil. As a result of the addition, the nitrogen supply of the soil may be increased and certain nutrients made more readily available, thereby, increasing productivity of the soil.

Farmyard manure: This is the traditional manure and is mostly readily available to the farmers, Farm yard manure is a decomposed mixture of cattle dung and urine with straw and litter used as bedding material and residues from the fodder fed to the Cattle. Farmyard manure is the rich source of nitrogen.

Biopesticides: Brushing of insects and larvae from leaves, branches and trunks of trees are also included in biopesticides. Extract of neem and leaves of neem can be used as biopesticides, i.e. it helps in biological pest control.

Social Forestry: Social forestry refers to the planting of trees, often with the involvement of local communities in unused and fallow land, in and around agricultural field, etc. The term “social forestry” was first used in India in Asian countries.

Social forestry includes

1. Small timbers supply
2. Fuel wood supply and replacement of cow dung
3. Fodder supply
4. Recreational needs.

Social forestry is gaining more importance in developing countries. It is also known as rural forestry, extension forestry and enrichment forestry etc. Extension forestry mainly includes growing trees on roadside land, canal banks, railway lines, etc. Community forestry is essentially a people oriented, value based, joint management of forestry with a major objective of satisfying the needs, wants and aspirations of both people and government.

The National Commission on Agriculture, Government of India, first used the term ‘social forestry’ in 1976. It was then that India embarked upon a social forestry project with the aim of taking the pressure off the forests and making use of all unused and fallow land. Social forestry scheme can be categorized groups: farm forestry, community forestry, extension forestry and agro-forestry.

Community Forestry: Another scheme taken up under the social forestry programme, is the raising of trees on community land and not on private land as in farm forestry, All these programmes aim at providing for the entire community and not for any individual, The Government has the responsibility of providing seedlings and fertilizers but the community has to take responsibility of protecting the trees. Some communities manage the plantations sensibly and in a sustainable manner so that the village continues to benefit.

Extension Forestry: Planting of trees on the sides of roads, canals and railway, along with planting on wasteland, is known as ‘extension’ forestry increasing the boundaries of forest.

Joint forest management: JEM or Joint forest management was introduced by Government of India around 1980s. In JFM, local communities play an important role in forest conservation, protection and management of forest resources. One of the successful examples of JFM is Tamil Nadu Afforestation Project (TAP). In the TAP villages, 2500 self-help groups comprising 25000 women were formed. They are working to meet the basic needs of the people.

Environment and Forests, Government of India issued policy guidelines for the involvement of village communities and voluntary agencies in the regeneration of degraded forest lands on 1 June 1990 under JFM (joint forest management) programme.

Joint Forest Management is a concept of developing partnerships between fringe forest user groups and the FD (forest department) on the basis of mutual trust and jointly defined roles and responsibilities with regard to forest protection and development.

Agro-Forestry

Agro-forestry is a farming system that integrates crop and or livestock with trees and shrubs. The resulting biological interactions provide multiple benefits, including diversified income sources, increased biological production, better water quality, and improved habitat for both humans and wildlife. Farmers adopt agro-forestry practices for two reasons. They want to increase their economic stability and they want to improve the management of natural resources under their care.

Agro-forestry involves combining tree planting with another enterprise –such as grazing animals or producing mushrooms-or managing a woodlot for a diversity of special forest products. For example an agro-forestry system might produce firewood, biomass feedstock, pine straw mulch, fodder for grazing animals, and other traditional forestry products.

Advantages of Agro-Forestry

Agro-forestry reduces the farmer's dependency on forests.

Thus, agro-forestry is sustainable if it is well managed. By growing trees and crops in harmony, by returning to the earth, in one way or the other, most of the nutrients taken from it-by organic or inorganic means- the system can be biologically sustainable

Biological Pest Control: A project on Biological Control of crop pests was implemented for the benefit of rural population awareness generated about the usage of biopesticides instead of chemical pesticides among farmers, women, and backward population. Use of botanicals as biocontrol agents to show their efficacy at field level as well as techniques of mass producing antagonists such as entomopathogenic fungi for pest control were also undertaken. Production of biological agents; bio-fertilizers & bio-pesticides was implemented by an NGO, samples of bio-pesticides and bio-fertilizers were tested in the laboratory.

Fruit-Plant-Nursery: Fruit plant nursery raising and use of biological software was undertaken for farmers. Demonstrations were conducted and fruit plant nurseries with vermicompost were established at farmer's field. Commercial nursery raised fruit plants like Mango, Guava and Aonla were supplied to farmers for raising plantations using vermicompost, Neem oil, bio-fertilizer and bio-pesticide by raising quality Fruit plant nursery, beneficiaries could earn as an additional income.

Fish-Culture-in-Horticulture-Ponds: A project on enhancement of rural farmers through fish culture in horticulture based polythene lined farm ponds are being undertaken. Farmers and unemployed youths were trained on polythene lined farm ponds for the use of with the use of stunted fingerlings. Beneficiary farmers are provided aquaculture inputs in the form of fingerlings and floating formulated fish feed. Farmers were guided through relevant literature on fish farming.

Value Addition: Bio-Technological Intervention for Employment Generation was undertaken through value addition in Amla fruit and brewed vinegar production

Integrated-Biotechnological-Interventions: A project was implemented on integrated biotechnological interventions at Chennai to provide alternative income to the rural population through various interventions such as vermicomposting, mushroom cultivation and clonal propagation. The project implementation helped in employment generation and effective and judicious resource utilization and waste management.

Bio-Resource-complex: The department has taken bold initiatives on the establishment of rural bio-resource complexes in the country with an aim of utilizing rural bio-resources in a more meaningful and sustainable manner and to create large number of avenues for the rural community. The concept was supported with an end to end approach and integrated networking, sharing resources, funding and benefits from state resources with technological innovations and S&T and BT inputs. The RBC projects were implemented in a holistic manner to benefit the rural community through sustainable and judicious utilization of bio-resources.

Bio-events: At the rural level by bringing awareness among the rural population on various enterprising activities viz., biofertilizers; biopesticides; sericulture; aquaculture; mushroom cultivation; spirulina production; vermicomposting; floriculture; animal husbandry; cultivation of medicinal and other economically important plants, waste utilization; marine resources; value

added products and processing. Nine such bioevents were organized in various parts of the country. Besides farmers, various NGO's and agencies dealing with sanitation, health management and agro service centers etc. participated in these events. The success of Bio-events has been praiseworthy as more than lakhs of farmers have participated including scientists and extension personnel.

Artificial-Insemination: Artificial Insemination (AI) training programme was carried out with superior germplasm at farm-gate level to enhance pig productivity in the tribal region of Meghalaya. Nearly 240 pig breeding farmers were trained on scientific breeding, reproductive management and artificial insemination in pigs. 80% of tribal farmers adopted this technology in selected villages and with increased litter size (2-3 piglets).

Silkworm-Rearing: Popularization of bio-intensive farming techniques for organic silk production was implemented through TNAU, Coimbatore. Farmers were trained on establishment of separate mulberry garden and the techniques involved in chawki rearing, egg incubation, brushing, feeding, cleaning, moulting care, disease prevention etc.,.

Bio-control-Agents: Literature published on importance of Neem seed kernel was distributed to the farmers. Off campus training programme was organized at farmer's fields and covered 486 acres of land under cultivation of cotton, redgram and bengalgram. Demonstrations and production of biofertilizers and biological control agents was taken up. Demonstrations were conducted on production and use of biofertilizers, vermicompost, neem oil and Trichoderma at the farmers' field. Farmers were also trained on mass production and use of biological control agents for mulberry and silkworm pests and diseases.

Cultivation-of-Medicinal-Plants: To promote the cultivation of herbs viz., Triphala, Amla, Hare, Bahera, Bael, Podina, Tulsi, Arjuna, Turmeric, Radish etc.. 120 traditional birth attendants were trained in pre and post natal care and health services.

Mushroom-Cultivation: Beneficiaries were given training on mushroom (Pleurotus species) cultivation from substrate preparation to the harvesting and processing and preparation of various recipes for value addition. Training and demonstration units were established in the vicinity of the target population.

Integrated-Aquaculture: Technology transfer and diffusion was undertaken to benefit community through an Integrated Duck-Fish-Scampi Culture and Apiculture by Allahabad University. Integrated Scampi-Fish Culture propagated through Giant freshwater prawn (*Macrobrachium rosenbergii*) culture. Farmers in villages have grown Giant freshwater prawn for commercial gains, along with regular culture of Khaki Campbell Duck production and sale of its eggs to make additional income for their families

National Bioresource Development Board

Honorable Finance Minister had, in his Budget Speech 1999, announced the setting up of a **National Bioresource Development Board** (NBDB) under the Chairmanship of the Honorable Minister of Science & Technology. In pursuance of this, the Department of Biotechnology had sought the approval of the Government for establishment of the same. The competent authority has approved

The terms of reference of the Board will be as given below:

- To decide the broad policy framework for effective application of biotechnological and related scientific approaches for research & development and sustainable utilization of bioresources especially for the development of new products and processes.
- To develop a scientific plan of action for contributing to the economic prosperity of the nation through accelerated research & development using the modern tools of biosciences. The scientific programmes to be undertaken under the guidance of the Board would be inter-disciplinary, inter-institutional, and time bound with clear-cut milestones. Some illustrative areas include:
- To evolve effective *ex-situ* conservation strategies for bioresources of potential scientific and economic value,

- To develop predictive groupings of biological resources through well-established molecular lineages,
- To construct gene maps of bioresources that can be used for locating useful genes,
- To promote the use of biological software in the management of agricultural pests and pathogens,
- To promote value addition to bioresources,
- To train human resources for the achievement of above objectives,

4. DISCUSSION

Digital inventorisation:

Preparation of digitized inventories of all our important bioresources has been undertaken covering: medicinal plants, other economically important plants, animal, marine and microbial resources. Work on digitization of medicinal plants and other economically important plant resources is progressing very well. In the medicinal plant inventory data for more than 700 plants have been put into the digitized format.

Natural dyes:

An All-India Coordinated Research Project on prospecting for food grade natural dyes from bioresources has been initiated, with six participating institutions. Temperate ranges of NW Himalayas and tropical areas of northern portion of Western Ghats were surveyed for collection of plant species having dye-yielding potential. As many as 106 plant species belonging to 88 genera distributed among 46 families from NW Himalaya (7000-9500 ft above m.s.l.) and 46 plant species from Northern-Western Ghats (1200 ft above m.s.l.) were collected and screened for colouring matters by chemical spot tests, chromatographic and spectroscopic methods. Using standard color index developed by the Royal Horticulture Society of Kew (London) as many as 46 colour shades were observed. Different shades of yellow, orange and green were the dominating colours. The root was found to be the major source of yellow and orange colour and green colours was mainly obtained from leaves and stems.

Colouring matter was reported for the first time from 92 plant species. Twenty five Himalayan plant species have been identified as potential sources for colouring matters that are in high demand in food processing. These include members of Lamiaceae, Rubiaceae, Polygonaceae, Ranunculaceae and Pinaceae. The colouring matters isolated from *Thalictrum javanicum*, *Meriandra strobilifera* and *Rumex hastatus* are suspected to be new and novel ones. Thirteen colour extracts with high tinctorial value obtained from six targeted plant species from Kerala, were also evaluated using cotton, nylon, silk, curd, cheese and butter as substrate. Some of these have potential application in textile and food processing industries.

Thelepaepala ixiocephala (Karva), a unique species of Western Ghats that flowers once in seven years, was also examined for the colouring matter. A novel yellow coloured compound was identified and purified. A number of optical isomers have been isolated from air-dried roots of *Arnebia nobilis*, and these may also be of therapeutic value. Culture protocols for large-scale production of *Dunaliella salina* and *D. bardawil* have been developed. Methods have been standardized for isolation of stable and high quality b-carotene. Information on distribution, habit and natural colouring matter present in 600 dye-yielding plant species from India has also been documented.

Botanical pesticides:

An All-India coordinated research project on development of environment friendly and plant-based pesticides has also been initiated during the year, till date 172 plant/plant part samples have been collected, extracted and screened against the above-mentioned insects. Out of them 62 samples are showing positive results. The screening is done for pesticidal, larvicidal, Insect Growth Regulator (IGR), oviposition, attractant, deterrent, antifeedant and repellent activities, wherever applicable. The plant extracts indicating significant pesticidal activity will be evaluated through field-testing. A suitable eco-friendly formulation will then be developed.

Sugarcane Biotechnology:

Establishment of sugarcane cDNA bank; full-length sequencing and expression profiling of selected genes and transforming sugarcane with identification genes of economic importance.

Gums and Resins:

More projects on Biotechnology related to gums and resins have been invited.

Butterfly park:

A unique project entitled Butterfly Park - A Center for Research, Education and Rural Livelihood using Butterfly Resources has been launched by NBDB during the year. The project would give a tremendous boost to ecotourism as well.

Live butterflies would be bred as per seasonal availability, and displayed here in large numbers for viewing by people. In order to facilitate the breeding, there will be butterfly rearing as well as plant-rearing houses.

Marine and coastal bioresources

In the integrated programme on conservation, inventorization and enhancement of coastal bioresources, status report of all the sites has been compiled and will be published soon. Several interactive meetings have been carried out with different stakeholders and involving several government departments as well as NGOs to develop an action plan for bioresource-based sustainable enhancement and livelihood generation for dependent communities.

The main purpose of using of bio-resources and eco-friendly activities by public and entrepreneurs with environmental friendly awareness in their daily activities and business activities is, to save energy protection of human health, natural resources and emit less harmful substances to the atmosphere, thereby, reduction of pollution to save our mother earth.

5. CONCLUSION

The individuals and the Government both at Center and at the States are making untiring and constructive efforts to utilize Bio- resources in order to make the earth planet a Green Society. The Great personalities like Baba Amte, Rajender Singh, Sunderlal Bahuguna, Medha Patkar, Arundhati Roy have been striving hard to protect environment from being polluted and nature from being destroyed while building projects like Narmada Project and to maintain ecological balance so that society and humankind at large can live in peace and tranquility.

REFERENCES

- Daly, H. E. and J. Farley. 2003. *Ecological Economics: Principles and Applications*. Washington, DC: Island Press
- Etsy, Daniel C. and Maria Ivanova. 2005. "Globalisation and Environmental Protection: A Global Governance Perspective" In *A Handbook of Globalisation and Environmental Policy: National Government Interventions in a Global Arena* ed. Frank Wijen et al. Cheltenham, UK: Edward Elgar.
- Perrings, C., 1987. *Economy and Environment: A Theoretical Essay on the Interdependence of Economic and Environmental Systems*. Cambridge University Press, Cambridge.
- Sassen, Saskia. 2005. "The Ecology of Global Economic Power: Changing Investment Practices to Promote Environmental Sustainability." *Journal of International Affairs*, vol. 58 (spring), nr. 2: 11-33.