NATURALISATION TECHNOLOGY

Technology – Naturalization Process:

Human beings are tool-using animals, a characteristic that distinguishes them from the rest of the world's creatures. Such distinction or effort right through, known as 'technology' has made people living more comfortably by increasing quantities of material products and services. The saga of journey from axes to chain-saws, dibble sticks to 200 HP tractors, gathering wild food to creation of desired plants through biotechnology and from bows and arrows to nuclear weapons is acclaimed by the west as development or "Ascent of Man". But by deviating from the natural cycles every aspect proved ultimately to be unsustainable at different time lengths.

Food, as a metabolic need for healthy and / or survival living conditions take up the ultimate priority of humans. The question here is, "what can be the efficient system that would provide food sustainably today?" The transformative technology through "Green Revolution" (GR) could save lives of millions at the right juncture. Incidentally such technology, in India, could not benefit the inhabitants of forests and forest fringed areas, where the poorest of poor lives. Their demographic growth with reduction trend of forests as well as obsolete of major NTFPs have cumulatively made them to depend on wood economy, govt. incentives and relief philosophy. Nobody knew the real consequence of life in absence of non-renewable genes at the behest of contours of Climate Change. But more or less the results are in addition seen in the agricultural productivity in the areas, although traditional practices are followed. Nearly everywhere in the tropics, users of forest products and services face decline in size/or quality of forest resources in the Globe.

To what extent a nation would be able to feed such a large scale hungry community increasingly underproductive? Some economists have argued that the conservation of tropical forests will be difficult unless people who use these forests are secured with their livelihoods. With the advancement of science and management skills, the traditional wisdom can be capitalized with the basic principle of natural cycles and zero wastes linking / creating market of trendy natural / real organic surplus without pressurizing nature. In convergence of the above determinants, livelihoods (primarily agriculture as food security) can be secured for a higher time length to protect forests. "Naturalization Process" within the framework of oneness of human and environmental society, a new meaning of "wealth" would come up.

I. Traditional Wisdom:

Traditional wisdom in agriculture is the expressions of natural practices developed thousands of years earlier and are the empirical study through permutations and combinations with failures. This is not a universal package of practices and has developed its own practices. Basically it is a way of living with the nature. It is rather emphasized on the aspects like efficient / appropriate use of available renewable resources, innovative and improvement nutrient cycles. All inputs used efficiently without wastage and the products finally return back to nature. Broadly, this is categorized to three determinants.

Such as:

A. Production Base,
B. Protection Base,
C. Knowledge Base.

A. Production Base:

a. Soil:

Soil is taken up as a living entity. It is cared through conservation and compensation means to produce healthy crops sustainably. Practices on crop rotation, cropping pattern, natural nutrient and protection management etc. to upkeep the health of the soil to a favorable living condition for its creatures naturally break down the organic matter relentlessly. These practices cause control of pH, temperature, aeration, water holding capacity, conductivity and host of other important factors of physical and chemical properties of soils. Terraced lands are the indicator on conservation care of the past. Besides, covering the land with crops supported with live hedges, close spaced shrubs, allowing forest erosion to the crop fields are the bright examples of soil knowledge.

b. Nutrient Cycle:

It was perhaps early discovered that manures, composts, dead animals / plant bodies etc. increase the fertility of the soil and this was the basis of ancient saying that “corruption is the mother of vegetation”. On the whole, limited external but renewable resources are practiced. Farmers obtain their inputs from their own farmland (husks, stalks, leaves, roots, crop residues etc.) or neighboring commons and the domesticated animals under their control. The following basic practices take place in nutrient cycles.

i) **Residue Management**: The non-economic plant parts are left in the fields for the food chain of soil biota or herbivores as subsequent plant nutrient.

ii) **Green Manures**: Diverse legumes and non-legumes plants apart from certain shrubs were used as in-situ and instant nutrient source used before taking up principal crop.

iii) **Fallowing**: The practice of fallowing fill up the nutrient of soil organic matter in balanced composition for the biota.

iv) **Other external nutrients**: Management of forest litters and humic substances to the crop field, different composts based on local biomass, FYM (Cow dung base), vermin composts are developed externally to apply in the fields as major nutrients.

b) **Crop Cycles**: Diversity, seasonality and compatibility of designated crops are the key factors to obtain optimum output through the practices of crop rotation and cropping pattern. Barest minimum diseases and pests are witnessed that managed naturally.

c) **Genetic Heritage**: Genetic resources are renewable in the sense that they live and die and recycled or regenerated. But when the species / plant are not recycled due to human intervention / climate threats, the nonrenewable genes are lost forever. In fine, on-farm conservation and evolution are the practices where a gene is restored properly. Farmers, being the primary custodian utilize and conserve on the basis of their needs and situation demand. Farmers even take up rare crop without financial benefit to restore / create newer genes by mutations. Constant trials for newer genes / agro diversity in natural backgrounds are common.

d) **Animal Resources**: Ruminants and other domesticated animals were of use for drought, milch, meat and valuable excreta. Further, piscic-ulture, poultry, goatery etc. provide and take up nutrients symbiotically for a sustainable cycle. These cultures possess various direct and indirect effects on ecology and support to sustainable livelihoods.

e) **Forestry**: Imbibed by the benefit of natural forests, the communities have traditions to maintain forests at home. The culture prevails in the form of community orchards and village forests and alike. Besides, open space kept for hedges, diverse weeds naturally to meet the needs of animals in the cycles as well as various direct requirements of humans are in the cards of tradition of Indian farmers.

f) **Weed Management**: Yesterday's weeds are today's prime food. Rice & wheat are the examples. Weeds provide fiber, fodder, medicines and most importantly accumulation of micro nutrients. This prevents erosion of top soil and manages soil temperature and the unforeseen threats are yet to be understood. These were managed through crop rotations, crop covers, water management and manual efforts without being hostile to them.

B. Protection Base:

a) Disease and Pests: Excessive Nitrogen creates foliage with large thin walled cells containing excess palatable nitrates that get neutralized by pests and insects. In traditional practice, excess nitrates are rare since organic inputs are practiced. In the absence of external support, that of now, plants in natural state used to search and accumulate vital molecules to enrich their immunity, defensive mechanism, and vitality. Such natural defensive chemicals in the food chain transmitted to humans and immunize them naturally. Furthermore, the plants have electrical signals or responses to transmit the rest when attacked to defend them by excreting toxins. Such incidences are normal in natural conditions only.

In addition to organic support, farmers used to take up diverse / compatible and appropriate resistant crops to combat drought, rains / water, winds, diseases, pests and insects, and even in lesser nutrients areas in degraded lands. Additionally, farmers used to protect crops through appropriate crop rotations and use organic repellants / pesticides and manage natural predator following their tradition.

C. Knowledge and Skill base:

During analysis it is seen that the traditional knowledge and skills developed through practical trials and confirmations contain the real issues of sustainability. Starting from diversity of crop to suit the soils, agro climatic conditions, topography and biological factors (including diseases) there have been always provision of nutrient to all living components in the chain or cycle. On the whole there is no wastage in the process.

The farmers with their memories backdrop understand better about their farm conditions than the scientists at the laboratory. But the farmers are categorized as ignorant under the guise of ethno-science whereas no scientists have solutions to produce in confidence where the traditional practitioners take up live challenges. Modern scientists have less/no depths on heterogenous conditions since traditional culture are diverse, natural and complex. The alternative agriculture today in the US is guided by the farmers not the scientists.

The ‘O’ tillage technology of the Vedic era is practiced now by modern farming which is certainly a free fall to early oblivion. Should we say the farmers are ignorant?

II. Scientific Input:

a) **Biotechnology**: With the advent of molecular / micro biology, transformative shifts in the biological science have taken place. Scientists researching the reasons at molecular level could solve problems or design remedy or improvement to the need within shortest time span. Agriculture, rare vegetations (medicinal / forestry) avail some of the best benefits from the technology to encounter the growing population and the ever decreasing species. Only the devils behind the scene are the MNCs which misguide constantly for their financial benefit objective without thinking of the carnage ahead. Besides, R&D in the scientific arena has the greatest contribution in agriculture sector.

b) **Communication**: Science has virtually shrunk the globe by creating wide and fastest mechanism in communication sector. Desired information and queries provided at fingertip anywhere any time through IT system. The facilities can edit / compile and express any global data base, economical and ecological issues and impacts apart from forward trend. Forecasts, market information, diverse solutions are easy for a Rural Knowledge Centre demonstrated by M.S. Swaminathan Research Foundation at Pondicherry.

c) **Irrigation**: Water enables the plant to take up nutrient and make possible for the transport of chemical substances within the plants. This also serves as essential medium for chemical reaction in addition to structural forms and pressure factors. Such vital issues rely on the rain-god earlier. There are also limitations in terms of costs of labour or impossible job to draw water from the ground manually to make the water available everywhere and any time. The invention / creation of big dams, deep bore wells and distribution through gravity canals or pressure pipes for flow, sprinkle; drip or fog irrigation etc. even miles away from source, brought the breakthrough to intensify cropping round the year. This has enabled the chemical, ready to be taken up nutrient by plants to produce through modern technology for the ever growing population and economy.

d) **R & D:** Research and Development is the foundation & core area of an economic development. Expert says in the 1920s, the situation of USA was not much different from that of India today. Despite the late entrance, in comparison to Germany / Britain, she could be able to be the most developed one due to the provision on advances through R & D sectors. The contribution of R & D in agriculture, agro-industry and various related sectors have given the inertia to pronounce security, culture and civilization of advanced alphabets.

e) **Infrastructures**:

i) **Roadways**: Transports by rail and motorways, water and airways etc. have grown with the creation and improvements of respective carrier to deliver goods of any quantity and quality to desired destinations on time. These networks became the important aspect of production system and also the medium of distribution of finished products.

ii) **Storage**: Extended shelf life storage technologies for food commodities (dry grains and perishables) have made possible to store to deliver / distribute to requirement on necessity that were not possible earlier.

iii) **Outlets**: Openness in sales through direct and spread over markets has created opportunity to the producer which was highly limited earlier.

iv) **Industry**: Industries evolved after agriculture. An industry is the largest organized sector consumer of agricultural products; in bulk of any quantity and quality to store, value add, and distribute.

v) **Energy**: The invention and development of electricity and series of alternative energy inventories have solved or fasten the process of agriculture production. Without such designed energy inputs, directly or indirectly, the modern agriculture would not be possible.

vi) **Social**: Social security, empowerment of women and lower stratum, democracies in all sectors; individual to family to community to the state / country are profoundly essential in inclusive development mechanism.

III. Management Domain:

It is indeed a fact that the earlier institutional mechanisms at the community level were much more sustainable than of now. The basic reason is that in earlier days it was confined to local levels with abundant resources back drop. But presently, the problems and solutions have become global. One can suffer for another living thousand miles away. Besides, the suppressed vested interests of exploiters, in the name of MNCs or advanced country, put serious impacts on sustainability issues.

But with the advancement of management studies, every aspects of life are resolved to have simple solutions. Since the micro level problems have global links, the services from management studies have became imperative. In the event of globalization and single market economies concurrent information

on competitors, newer or parallel producers, appropriate technologies, budgeting, cost of production and deliveries to various consumers, global stocks, alternative markets, demand with trends, investments and finance and macro & micro-economies are analyzed critically and edited timely for information and forecast modules for every venture. This enables a farmer to forecast, plan and secure his living. Such organized and essential works ultimately help everyone in value chain.