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Editor

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THE COMING ORGANIC REVOLUTION

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Foreword

The current issue of the Journal of Ecological Society, in a way, probes the future. The challenge it tries to meet is the future cessation of the supply of fossil fuels, an issue which today nobody wants to discuss! Though the developed countries realize the dangers in excessive economic growth, the less developed countries ignore the excesses in the name of eradication of poverty through economic growth. This issue examines the debate that took place between the North and the South since the Stockholm Conference in 1972. The main issue of contention appeared to be how to limit the high consumerism of the North to allow the South to enhance the standard of living of their people.

The concepts of environmental space and sustainable development and sustainable living are examined as also the role of technology in promoting real incomes and human welfare. The conclusion seems to be that the model of sustainability put forth by the North and which is currently being discussed is inadequate for a country like India.

A more viable, alternative path is put forth and is compared with the contemporary economic system. An attempt is made, therefore, to indicate an alternative path of future development for India.

Editor

The Coming Organic Revolution

Introduction

The coming organic revolution (COR) is not about producing organic food. It aims at establishing an alternative economic system, an alternative to capitalism and communism-socialism alike. These two systems have, as their basis, a productive apparatus which was geared to minerals and mineral wealth – both products of millions of years of evolution. Their vision was short-term gain through exploitation of non-renewable resources. They hardly know what will happen when this bounty of evolution is finished.

The basis of the coming organic revolution is the greatest asset of the world; moreover a renewable asset. The COR's vision is long-term as it involves nurturing the biological productivity of the world. Its basis, its engine that powers the system, is human labor power and brain power, so far the strongest and the most dynamic power of the earth.

The labour power is mainly concentrated in the poor of the world. The call of new revolution is unite all ye poor of the world, not to fight the rich but to nurture the earth, the mother of all life on this planet.

How will this economic system be established? How will it function? All over the world, the poor, the subsistence farmers still own land, may be in small pieces, may be greatly variable in quality. The basis of the system is how to utilize, to nurture this land so that it will provide all the basic necessities of life for not only today but for the coming millennia. This does not mean all the land will be utilized for agriculture – far from it. The uses

may be varied – grassland, different practices of plantations, of forest etc. Broadly speaking farmers in temperate lands will produce grains, not to feed the animals who produce edible flesh, but to be exchanged with farmers from tropical countries where the main produce is based on biodiversity – forest food, grassland food, timber, medicinal plants etc.

Land Use as the Basis

But agricultural land is in short supply. Among the poor there are more people who are landless than the number of small land holders. Many state governments have followed the policy of distributing land to the landless. Before the 1980 Forest Act even forest lands were also distributed. In the total land area of the country almost 50% of the land area is termed as unfit for agriculture. There were attempts to bring such land under irrigation. But the result was either salinity or water logging.

That the land termed as wasteland is unfit for agriculture should be considered as a boon and not a disadvantage. The country has a number of vegetation types which can grow on lands which we call unproductive. According to climate and rainfall, these so called vegetation types need to be developed in a way that provide livelihood support for the landholder. The priority should be satisfaction of basic needs and not produce to be delivered to markets. The example of the Bishnoi community in Rajasthan will be of relevance here. This community is not a tribe or of Scheduled Caste. They are educated and some of them do practice as lawyers, doctors etc. but traditionally they have raised, nurtured and protected the Khejadi tree (*Prosopis cineraria*) which provides for many of their basic needs. And this tree grows on poor soil in a region quite deficient in rainfall. Such local conservation practices can be found in other regions of the country.

What is of importance here is to understand that such traditions based on conservation of nature frees the poor from either migration to urban areas or to work as unskilled labourers in construction and other industries, in cities. NGOs can play a critical role here. For village upliftment they need not undertake engineering works but conduct research in traditional community practices which promote varied use of land and water.

Some communities have gone even further. They are self-sufficient and self-reliant as far as resources and their administra-

tion are concerned. Here, I may refer to you the village Lekha Mendha in the Vidarbha region of Maharashtra. The villagers appear to have utilized their own, sustainable pattern of resource use and their management which is democratic. They do not want to be a part of the present economic system and they have declared their independence from the prevalent state apparatus.

It is this model that needs to be propagated if we have to establish an alternative economic system. Lekha Mendha model is based on use of local resources to satisfy local wants. If each village follows this example and by protecting and nurturing their own resources, becomes self-sufficient and self-reliant, the support from countryside that the present inequitous and unjust economy gets, will be over and the ever-growing cities will have to be disbanded. This will not happen overnight but will involve considerable time. For the villagers need to become aware of the advantages of self-sufficiency achieved through wise management of resources.

Use of Energy

The supply of energy may pose a major problem. Though Gujarat has succeeded in taking electric power to almost every home in the countryside, Maharashtra state seems to have made no progress in this direction. Power supply remains highly inequitous and cities are always preferred over mofussil area. The commercial establishments in cities including shops, restaurants, malls and entertainment multiplexes show extreme profligacy in power use. The profligacy seems to be unabating and leads to the false propaganda and misleading picture of an overall power shortage in the state.

The new economy is based on wise and economical use of energy for not only does it recognize that fossil fuels need to be used sparingly to prolong their supply life but also because it appreciates that the greater the energy use, the higher are the losses that an economy incurs. This follows from the operation of the laws of thermodynamics. The 2nd Law of Thermodynamics makes it clear that as energy is applied to convert matter into a finished product, the waste created in the process, is always greater in volume than the finished product. As the waste is left to absorb by the environment, and is not valued and the cost of its proper disposal is not internalized, the productive process shows

a gain or profit which will be immeasurably small if all costs are internalized.

Inadequacy of Industrial mode

The industrial mode of production conceals this stark reality and in the process inflicts unbelievable harm and damage on the environment. The industrial mode of production will continue to show profit as long as the absorptive and assimilative capacity of the environment is not exceeded. This has already happened in many an industrialized country and they are turning away from manufacturing processes that use high energy.

It is a pity that developing countries like India have failed to notice and understand this change. Their educational system and the production apparatus they want to create are still geared to the industrial mode of production based on intensive use of fossil fuels. In the process they are losing their real resource base, their life supporting systems, i.e., their varied environment and its manifestation, the biodiversity.

These countries must understand that economies based on industrial mode are basically loss-making and will never increase the real income of people as expenditure which needs to go to production of basic food, to education and health is diverted to subsidize industry so that it can show a profit. The present picture of chaotic growth, of dirt and filth, of polluted soil and atmosphere and water and incapacity to handle any problem is the direct result of preferring loss-making industry to real foundation of life – environment and biodiversity.

The state has always represented and supported the dominant form of production and producers. When the form was agriculture, the state supported and represented landed interests. When it was industry the state supported the rich and the capitalists. Even under Socialism when the rich and the capitalists were absent, the state assumed their role and supported and represented the industrial mode. The organic revolution is not manifest in a dominant mode of production, simply because it is not interested in realizing a surplus by concentrating energy in a particular direction and in a particular form of conversion.

The surplus is not quantitative but qualitative and based on diversity. Therefore, Sun's energy is not concentrated in a single direction and is not denied to others. When energy use is diffuse,

the production is small scale and is distributed among a number of producers. This can preclude the emergence of a dominant class in society which controls the means and wherewithals of production. The democratic basis and structure of society is organic and is not based on the right to vote.

As yet the Organic Revolution is in a nascent state and it can hardly be called "Revolution". Neither is it a distinct economic system; though certain communities like the Amish in USA and groups in Canada and Europe have voluntarily adopted a lifestyle which calls for reduced consumption and abstinence from fossil fuels. But all of a sudden the revolution may flare up as petrol and diesel prices continue to rise as in India forcing a spiraling inflation leading to a general uprising of the population.

Finite Fossil Fuels

A sudden flare up seems imminent as the present economics and social and political order all over the world appear to be completely oblivious and insensitive to the devastating change in every dimension of life that would follow the cessation of supply of fossil fuels. The scenario without fossil fuels is still not a topic of serious debate, neither is it figuring in any of the workshops and seminars. We seem to be blithely assuming that fossil fuels will always be there for all time to come.

Research in the so-called alternate sources of energy is desultory. Solar panels are as yet not a priority in any government programme. Installation of solar panels on all constructions – from huts in villages to huge housing complexes, towers and all types of houses – is still not compulsory. Development and spread of wind and tidal energy are left to the private sector. Solar powered private and public transport still belongs to the realm of fantasy. Even a subject as vital as defence, seems to be neglected and its future in the face of fossil fuel absence does not seem to be a major topic of research. What will power those engines of destruction? How will they cover large distances? It may be shrouded in official secrecy. But one can easily assume that everyone in the country is deeply concerned about the country's defense and has a right to know what steps are being taken to protect the country's independence and freedom.

Internationally the subject that comes closer to find an alternative life-style is the discussion about sustainability and sustain-

able living. A number of leading economists in the west has discussed this concept.

Sustainable Living

The Brundtland Commission defines sustainable development as one which while providing for the needs and aspirations of present generations, leaves enough (does not compromise the ability of future generations to meet their own needs) resources for future generations to fulfill their aspirations. Distinction is made between weak sustainability and strong sustainability. Distinction is also made between natural capital, i.e. services provided by nature free of charge such as ozone layer, atmospheric balance, hydrological cycle, watershed and forest services etc. Human made capital is the product of technology and includes all the artefacts, gadgets and services provided by manmade manufacture and organization. Weak sustainability assumes that in most of the cases human made capital can be substituted for natural capital; while strong sustainability denies this and advocates that natural capital should not be sacrificed to make way for man-made capital as they are not substitutable.

The Environmentalists criticized present technology-based development as intensively exploitative of nature and wasteful putting great stress on the regenerative, absorptive and assimilative capacities of the environment. John Muir, M. Marsh, Aldo Leopold, Meadows, Rachel Carson, etc. attacked the technological development as destructive of nature and advocated a life style based on caring for nature and natural resources. In the 1950s it was brought to the notice of humanity that this small planet is the only place in the universe where humanity can survive and therefore needs to be saved. Economists like Kenneth Boulding, Herman Daly etc. pointed out that the scale of human activity has become so gigantic that growth will become unsustainable in future if the present rates of growth continue. To sustain the present economic growth in future it was said we need resources from 10 planets like earth! The calculation of GNP was criticized as it failed to take account of the costs of this growth in the forms of damage to the environment, the so-called externalities.

The growth in population has been the subject of anxiety since Malthus in the 19th century. This concern was resurrected

by Paul and Anne Ehrlich in the book *Population Bomb*. They remarked that the exponential growth of population in developing countries such as India is such that it will inevitably lead to destruction of life supporting systems and natural resources and famines, starvation and ultimate suicide of the nation are inevitable. Therefore, no aid should be given to India for economic development as it will all be eaten up by growing population. On the other hand there were writers like Beckerman and John Maddox who said that there were no ecological limits, earth's capacity is infinite and therefore economic growth can continue infinitely.

The Necessity of Economic Growth

Meadows report "Limits to Growth" based on a computer model, a result of their experiences in India, said that exponential growth will be terminated because of the finite capacity of the environment to absorb and assimilate pollution. The pessimism of the report was criticized as it did not take into account new inventions, resource substitution and human capacity to bring about changes in life style.

Herman Daly for the first time connected human activity to the irreversible laws of Physics or thermodynamics. He pointed out that according to the law of entropy, when any human activity reduces entropy in one place, more entropy is created elsewhere. Any human activity will create more pollution and waste than beneficial things. Therefore, entropy puts a limit to the scale of human activity.

Global 2000 a report commissioned by US President Carter pointed out that habitat destruction due to human activities was likely to lead to extinction of 500,000 to 2 million species mostly in tropical forests. This brought about the concern for biodiversity to the top of the environmental agenda.

Developing countries were, or many still are, quite critical and skeptical about environmental concerns and the environmental agenda. Indira Gandhi's famous statement during the UN conference on human development in 1972 at Stockholm, that "poverty is the greatest polluter" aptly sums up the attitude in developing countries. But that conference established UNEP which promoted the idea that economic development can be reconciled with environmental protection. Since then the concepts of soft

technology, appropriate technology and the idea of eco-development gained currency and F. Schumacher's book "Small is beautiful" advocated rural development. This again, was unacceptable to developing countries who wanted to imitate the western model of development and achieve living standards comparable to those in the west.

But the Brundtland Commission commissioned by the UN, in its report supported the idea of a sustainable society first put forward by the World Council of Churches. This idea includes equitable distribution, democratic participation and wise (balanced) consumption. The IUCN said that the concept of sustainable development means integration of conservation and development to ensure that modification to the planet to secure the survival and well-being of all people. The World Conservation strategy however, did not discuss political and economic changes and thus lacked political credibility.

Limits to Consumption

For sustainable development the Brundtland Report introduced the idea of limits to consumption. It recommended that those who are more affluent adopt life-styles within the planet's ecological means. Further population size and growth should be in harmony with the changing productive potential of the ecosystem. It further acknowledged that "We have in the more recent past been forced to face up to a sharp increase in economic independence among nations. We are now forced to accustom ourselves to an accelerating ecological interdependence among nations. The commission bemoaned the fact that economic planning and environmental protection are not integrated. As environmental costs are ignored, environmental degradation is the result which affects the poor most. Extreme poverty also forces the people to adopt environmentally destructive activities. Thus it indirectly supported what Indira Gandhi had said. The commission also emphasized that sustainable development was a matter of equity both between and within generations.

While the commission supported economic growth it also accepted the reality of ecological limits and said that "long before these are reached, the world must ensure equitable access to the constrained resource and reorient technological efforts to relieve the pressure". But the report seems to be sitting on the horns of

a dilemma; while it stressed that the calculation of national income should take into account the depletion of natural capital, it accepted the present practice of calculating GNP as the measure of economic growth. It said that the South requires growth in GNP per capita of at least 3 p.c. and also for enough capital to be available, the economies of the North should also grow at a minimum rate of 3-4 percent. The commission seems not to realize that the gap between rich and poor nations will only widen and will never be bridged if such growth rates are there and goes on to say that the world economy should grow by a factor of 5 to 10; but realizes that energy consumption on that scale with current technologies would be ecological impossibility. Their solution was increased technological efficiency. This ambivalence was due to the unwillingness of some members of the commission who belonged to North to discuss more explicitly the limits to consumption issue. This was revealed by a member of the commission who belonged to the South.

The Environmental Agenda

In 1985 a large hole in the ozone layer over Antarctica was discovered. Evidence was found that it was the result of overuse of chloro-fluoro carbons. Chernobyl nuclear accident came in 1986 which shook almost the entire world and put environmental concerns at the forefront. Even the developing countries realized that the environmental concern is not the luxury of the North.

All these events brought out a salient feature of the environmental concern or the environmental agenda as visualized by the governments of the North. The governments showed far more concern about pollution than about destruction of biodiversity. This was substantiated by the Earth Summit, UN conference on Environment and Development held in 1992 in Rio de Janeiro and attended by over 100 heads of the government, often also called the Rio Conference or the Rio Summit. Its agenda drawn up by Maurice Strong, the Secretary General of the conference, included conventions on climate, biodiversity and forests; an Earth Charter, Agenda 21, a global action plan outlining sustainable development priorities, an agreement on financial resources to implement agenda 21, transfer of environmentally sound technologies from North to South; strengthening of UN institutions, including an Earth Council.

The climate convention was inspired by the success of the Montreal Protocol which reduced use of CFCs. But this convention which dealt with limited use of fossil fuels failed to indicate any time-bound target for reduction mainly due to American pressure. Convention on protecting and giving access to biodiversity failed altogether again because of US stand. Forest convention dealt with protection of forests, but was opposed by developing nations which affirmed their sovereign rights over forests which they wanted to be exploited for development. The Rio Declaration included the precautionary and polluter pays principles but emphasized more the development and national sovereignty.

Agenda 21 however, emphasized NGO involvement and community participation as the bases of international agreements, capacity building and an integrated approach to development and the environment.

But many controversial issues such as consumption pattern, population, international debt and militarism were not considered. Any hint of reduction in consumption was resisted by industrialized countries especially the US. Even for a greatly toned down agenda 21, western countries were not prepared to put forward finances. Only 0.5% of the money asked for were actually allocated.

The North and the South

The southern countries considered the Rio Conference as a failure as funds and technology transfer they expected did not materialize. In 1980s the interest rates on cheap loans were raised involving almost bankruptcy for many southern countries. They had to run to IMF for loans. The IMF made them cut social expenditures and compelled them to increase exports leading to fall in commodity prices. Result was southern countries were worse off than before. Though stronger links were established between North and South groups, the NGOs failed to achieve any significant impact in the Rio Conference.

Conferences after 1992 showed that environmental concern and sustainable development soon sunk down the international agenda. Not much could be achieved by Agenda 21. Western countries even managed to increase their greenhouse gas emissions. While GATT made southern countries lower their tariff

barriers, western countries managed to avoid fulfilling their side of the bargain. GATT and WTO were established to promote free trade but obviously only promoted interest of the developed countries. In 1999 WTO collapsed as no agreement could be reached on the next round of negotiations. Thus US efforts to force GM crops on others and privatize public services failed. President Gorge Bush never agreed to any international controls and ultimately imposed tariffs on steel imports. The Biodiversity convention was signed by President Clinton but never ratified by the US Senate. The Republican Party wanted to abolish much of the environmental legislation of USA.

The Alliance of Small Island States called for a 20% reduction in carbon emissions by 2005. But this was opposed by all western countries. Only UK and Germany had cut their emissions. The Kyoto Protocol committed the industrialized countries to an overall reduction of 5.2% between 2008-12 compared with 1990 levels. The Protocol established joint implementation, clean development mechanisms and emissions trading. Americans finally signed the protocol and the EU promised to ratify it by 2002. But as the US, Australia and Japan withdrew their support, the protocol was not able to enter into force. Actually EU had to agree to lot of concessions, Japan and Russia were given exemptions and the carbon reduction agreed came to be only 1.5 % i.e. only symbolic.

As a result UNEP predicted that CO₂ emissions would rise, deforestation and biodiversity loss would be as fast as ever, free water supplies were reaching their limits, destruction of coastal and marine environments would be intensifying. The bright side was population growth seemed to be leveling off and ozone layer was recovering.

The world summit on Sustainable Development in Johannesburg in 2002 again failed to establish any time-bound targets for energy consumption reduction, biodiversity loss and no new commitments were made to increase aid, relieve debt or tackle the crisis of falling commodity prices.

It is evident therefore, that industrialized countries are interested neither in alternative technologies nor are they prepared to reduce their consumption based on products resulting from fossil fuel based technology.

For the South, while they considered economic growth essential, they wanted to strike a balance between economic growth

and the stance adopted by hard line environmentalists. Sustainable development therefore, was seen in this light. It was generally realized that development meaning industrialization in particular, does not make people happy.

Sustainable Development

Environmental scientists like Tim O'Riordan make a distinction between sustainability and sustainable development. He considers the former term more concerned with environment while the latter gave priority to development. Brundtland Report attempted to redirecting development and growth so that while it meets basic needs of people, environment is given due consideration. But radical environmentalists became deeply suspicious of this exercise. Donella Meadows supported Herman Daly when she said that sustainability denotes stable population, stable throughput and creation of waste below the absorption and assimilation capacity.

Many writers like Michael Jacobs in his book *The Green Economy* agreed that sustainable development is a contestable concept. The Brundtland report considered basic needs of the poor to be circumscribed by the state of technology and social organization and limitations these impose on the environment's ability to meet present and future needs. Even the narrow notion of physical sustainability implies a concern for social equity within and between generations. The crucial question was whether the industrialized countries were prepared to practice what various scientists and writers preached.

Some writers like David Pearce have brought out the fact that it is very difficult to make a distinction between wants and needs. An air conditioning unit may be a need in very hot and humid climates and Heating may be a need to assure a supply of fresh vegetables in winter.

The developing countries considered development as essentially promoting industrialization through state. Some envisaged a mixed economy where private enterprise and ownership had a prominent role while others emphasized state ownership of means of production. Education, health and the environment as such had a low priority. From the global point of view the truth seems to be that the humanity is still in the historical state of the Industrial Mode of livelihood. While the developed want to continue

forever to enjoy the fruits and benefits emanating from this mode, the developing countries are aspiring for the same levels of comfort and consumption. The hopeful sign is that in both these types, a number of people seem to be aware of the disastrous impacts this mode is inflicting on the very basis of life, the so-called life-supporting systems provided by nature. It would be interesting to see what the prominent thinkers of this age consider to be the future of humanity.

Is Industrialization Necessary?

It was assumed that industrialization once started would kick start a wider process of development and become self-sustaining. It was also assumed that inequality of income was necessary to direct investment to increase productivity to enter the 'take off' stage. Once that stage is reached industrialization would reduce inequality in society.

In the 1960s doubts began to set in about this model. More industrialization actually worsened the conditions of the poor. Only where deliberate investment was made in bringing about land reform, mass education and health care, did the condition of the poor began improving. This led to the Basic Needs Approach adopted by some governments, UN agencies and the World Bank. In practice however, the bureaucracy adopted a top down policy providing through state certain public services and did not empower the people. However, this basic needs approach was swept away in 1980s as economic crisis deepened and IMF and World Bank forced debtor countries to reduce expenditure on public services.

In the 1990s Amartya Sen proposed an alternative development model called Human Development. UNDP began to publish its Human Development Report from 1990. Commodity production was seen as something to be valued if they enhance human capabilities such as health, knowledge, self respect and the ability to participate in society. UNDP's Human Development Index is based on life expectancy, literacy and income and ranks the countries of the world accordingly. On this basis Cuba, Costa Rica, Sri Lanka, scored impressively while the Indian state Kerala where life expectancy was 73 years and adult literacy 91 percent and fertility rate 1.7 children per family could easily compete with the most developed countries of the North. The 1980

crisis hit Kerala badly and it had to reduce expenditure on social services though it was not under the tutelage of IMF. Later Kerala increased the expenditure once again. The East Asian Tiger economies are the classic example of countries that started with human development and slow growth but moved into a phase of mutually reinforcing growth and human development in subsequent decades.

The strategy that was followed by the East Asian Countries was to have state intervention and protectionist policies to encourage industrial development, side by side making investment in land reforms, education and health to enhance human capabilities. Their example forced the World Bank to admit that free market is not the only prescription for economic growth. But World Bank and IMF continue to see growth as the primary objective and human development as the means while UNDP has the opposite perspective. In East Asian countries land reforms started rural development and the rural population was not sacrificed to provide cheaper food for the urban population.

As far as their exports were concerned, politics came to their rescue. South Korea and Taiwan were important US allies and received favourable treatment including aid. Hong Kong and Singapore also benefited from trading opportunities. Malaysia and Indonesia which grew later did not possess these advantages. It was soon realized that IMF prescription of increasing exports was invalid. If every country does that there is actually not enough demand for the products. The competition to export only led to the fall in commodity prices.

However, the East Asian development was accompanied by rampant deforestation, loss of habitat and pollution of rivers, air and soil. Even though new cleaner technologies involve lower energy use, their impact downstream and upstream continues to be enormous. Production of electronic products involves use of hazardous chemicals and their movement causes further destruction. For example, the production of a desktop computer involves the movement of 14 tonnes of solid materials almost as much as a car does. This shows that the development path followed by the West and East Asia is environmentally unsustainable.

Is it possible to achieve wealth in a more environmentally sustainable manner? Greens argue that caring for wealth does not lead to happiness. They are backed up by the findings of

social scientists.

Only a Lip Service

Findings of social scientists have shown that richer people in the society tend to report slightly greater levels of happiness than poorer ones as they may possess goods other people cannot afford. But surveys also show that societies with more equal distribution of wealth are happier than those with less equal ones. What it actually means is the so-called development involves joining a rat race of meaningless additional consumption. The addition of commodification brings only temporary happiness. Improving quality of life is not achieving an affluent consumer life style.

The debate about sustainable development actually gave more importance to economic growth while only paying lip service to concern about the development. Even the Brundtland report contributed to this tendency. This made the term sustainable development a euphemism for economic growth.

In calculating GNP the consumption of the Earth's capital was treated as income. It was assumed that technology would make available substitutes for the natural capital. Thus man made capital and natural capital were said to be perfectly substitutable (weak sustainability). The concept of environmental space shows how much human activity ecosystems can support without sustaining irreversible damage. The industrialized countries use a lot of environmental space. They must change their consumption pattern to share environmental space with developing countries. The environmental space concept leads to Ecological Tax Reforms (ETR) where use of energy and natural resources is taxed instead of labour. If western consumption patterns are to change, they must limit their economic growth and allow developing countries to increase their material standard of living.

Very strong sustainability assumes no substitution and will not allow any natural capital depletion. Moderate strong sustainability allows depletion if it is compensated by other means; e.g. oil can be exploited if the revenue can be used to promote solar energy. Believers in technology assume that in future technology will make it possible to have most of the services today provided by nature.

Partha Dasgupta says if sustainable development implies non-

negative changes in the stock of natural resources, it is an impossible goal. He says that reasonable development paths would involve patterns of resource substitution over time, and also substitutions among resources and various types of capital stocks, including knowledge and skills. He accepts that some natural capital would have to be consumed for a minimum level of welfare for the future to be guaranteed. Welfare can be achieved through different paths of development. He adds that risk and irreversibility must also be taken into account, so the option value of conserving environmental goals must also be included in calculations. But Herman Daly commented that it is not possible to do the careful intertemporal optimization calculations using shadow prices.

The Impacts on Nature

Andrew Steer said that requirement should be there that the value of natural capital does not decline below today's levels. This will provide a broad assurance to future generations that the natural capital stock will not be less than what is available to today's generations. He also pointed out that many environmental assets have non-measurable values because of spiritual and cultural beliefs. Correct value should include both measurable and non-measurable value. Economists tend to neglect the latter. The full functioning of the economy is seen to require at least a mixture of the different kinds of capital. Since the boundaries of the critical limits for these kinds of capital are unknown, Steer says it is sensible to err on the side of caution in depleting natural capital. Sustainability is related thus to the Precautionary Principle. Scientific certainty should not be used to postpone measures to prevent environmental degradation when threats of serious or irreversible damage are seen.

Herman Daly and John Cobb point out that there is very little substitutability between funds and flows e.g. labour and capital and natural resources. Strong and weak sustainability ultimately deal with substitution between human-made and natural capital. But this distinction fails to measure ecological limits e.g. how sensible it is to run down stocks of non-renewable resources without explicitly investing in the development of substitutes. How do we know what would be ecologically 'safe' level of natural capital? Weak sustainability might support depletion of a capital,

which, in future, may turn out to be vital in some as yet unknown way.

The Environmental Space

Horst Siebert who propounded the idea of environmental space related it to resource generation function and pollution absorption function a constraint on the economic activity. Here three different dimensions should be represented:

- 1) Pollution of natural systems with xenobiotic substance or natural substances in unnatural concentrations;
- 2) Depletion of natural resources - renewable and non-renewable
- 3) Loss of natural uses (Integrity, diversity, absence of disturbance).

A rather similar concept, The ecological footprint, looks at the area of land a particular life style uses. But this is uni-dimensional. Environmental space concept was taken up by the Netherlands in their report, "Caring for Tomorrow(1980)". It concluded that the Netherlands would have to reduce its resource and energy consumption and its production of wastes to a fifth of the level by 2010. Another report from the same country showed that the rich countries with only 25% of the world population use 75% of the raw materials and energy traded in the world and are responsible for most of the pollution in the world.

This report also concluded that the Netherlands would have to reduce resource consumption and pollution by 80 to 90%. In particular air-travel, use of cars and meat consumption had to be reduced. However, most of the material comforts would still be available. The Netherlands would have to go back to life in the 1960s not in the 1930s.

If you accept Environmental Space then you will have to quantify how much space, i.e. you will have to say how much nature you wish to protect. If you accept the bare minimum structural approach to the environmental utilization space, you are not very far away from weak sustainability. David Pearce says that reducing consumption in the west means increasing savings (possible investment) or reducing incomes generally. The latter cannot be controlled by Governments through taxation. Increase in savings may mean more foreign aid to the developing countries. But reducing incomes is not going to benefit the south.

Reducing incomes will adversely affect the South as it will lose some of its market. Sacrificing economic growth in the North would make both North and South worse off. If North's consumption of a resource falls significantly resource prices will fall. It will affect the South unfavourably if it is an exporter of the resource but will benefit the South if it imports the resource.

According to Pearce the really scarce resources are not materials and energy but the assimilation capacities of the environment. High materials and energy consumption affects this capacity and therefore both North and South suffer as this is a global problem. South suffers more so reduced consumption of materials and energy will reduce impacts on the South.

His solution was to move consumption patterns away from resource intensive products to less intensive products. Eco-taxes will be useful in this respect. He did not say whether and how this will affect South. He is concerned about altering the ratio of resource consumption to GNP but the absolute size of the GNP is also important as influencing the environmental impact a country has.

Is Technological Efficiency the Answer?

Ever since Amory Lovins in 1990s drew attention to the enormous potential for energy saving through energy efficiency and energy saving and using existing technologies, western countries became energy efficient but economic growth swallowed up all the efficiency gains made. Greens shifted their opposition to new technology and economic growth to say that Gandhian simplicity was not the answer but the resource use could be reduced through efficient technologies. Enormous subsidies for energy use makes innovation and new technology use difficult. But there is a danger if energy efficiency results in savings, these could be spent on things which again use energy. To avoid this eco-taxation was proposed.

Carbon taxes were introduced first by the Clinton administration but they failed. Modest taxes were introduced by Sweden and Norway and Netherlands. But they had to face opposition.

Weizsacker proposed that eco-taxes should start at very low levels and be increased at 5 % per year. In forty years energy prices would rise eight fold and renewable energy would be cheaper. Taxing energy and resources makes labour cheaper and

will reduce unemployment. There will be less pollution also. However, energy taxation hits the poorest.

Industry however, remains overwhelmingly opposed. Transport, hotelling and other service industries also opposed. So after a start in Germany, and U.K. the taxes were repealed or cut heavily. Public remained skeptical of their effect on unemployment; but if the funds from ETR were put into increasing energy efficiency and environmental measures, there would be public support.

Industry also feared loss of competitiveness. High ETR may lead to other economic distortions. Japan and Italy continued their economic growth even with high energy taxes. It is true that once all the externalities are internalized, you have the optimum price. But technology will adapt and will make it possible to save energy more cheaply than it is possible today. The long term effect of ETR would be to restructure the whole economy. If governments become too dependent on eco-taxes, they may be tempted to utilize that revenue in other ways. Also technological innovation may lead to decline in revenue from eco-taxes. ETR is better than tradeable emission permits because it is very difficult to set up a market for these permits in each state. A carbon tax i.e. ETR will be better for management.

There is not enough environmental space in the world to enable South to adopt Northern life style. On the other hand the present Northern life style is unsustainable by a factor of ten. The ETR would enable North to bring about a gradual change in their life style.

But if the rich countries continue to grow at 2.5 to 3% per year, materials intensity will have to be reduced by 4 to 7.5% if environment is not to be degraded. Brundtland commission said that the rich countries must continue growth, to provide capital and markets for the poor countries to grow. But the experience between 1960 and 1995 shows that there is no trickledown effect and growth in richer countries make poorer countries still poorer. Herman Daly proposed steady state economy but has not explained how to avoid problems in non-growing capitalist economies. Actually increase in labour productivity is due to labour saving technological innovation. But this increase in productivity also increases energy and resource consumption. Today's economy in the North is such that environmentally burdening activities like industry and agriculture provide most of the national income

though employing only 25% of labour. To counter unemployment Daly proposes a guaranteed minimum income. Once minimum income is guaranteed people will work less, allowing work to be spread over a larger number of people. But this scheme was considered unviable.

GNP is not a measure of welfare. Herman Daly's Index of sustainable economic welfare (ISEW) takes account of depletion of nature capital, costs of pollution and status of unemployment and inequality. According to David Pearce, economic growth as defined by Herman Daly is increased consumption of materials and energy (growth in throughput of energy and materials), increase in productivity of matter-energy flow that satisfies our needs to a greater and greater extent with the same flow. But the sort of growth people want is environmentally burdensome. A steady state economy will require a different set of natural values not a system based on greed and self-interest.

Is Green Economy Feasible?

A Green Economy can be based on workers' co-operation but if it is based on local materials and products, it is likely to be very simple. A market-socialist economy can be commensurate with a steady state economy. Market-socialism means workers' co-operatives function in a market like private firms. Co-operatives can compete in the market and there is no exploitation of labour by management. Management will be democratic. Co-operatives are usually small and decentralized.

The co-operatives may not exploit workers but exploit the environment. Some co-operatives may grow rich and others may go bankrupt. Thus in both these cases state's intervention is necessary. There will be problems with workers' contribution, especially if they borrow money to pay the contribution. There will always be the problem from where the capital is to come, especially if the co-operatives want to expand. Employing more workers or removing workers will create problems.

The most successful co-operative is Mondragon network of Basque county. It combined a group of industrial worker co-operatives with a consumer co-operative bank to provide capital. Its size (30,000 members) enabled Mondragon to form its own social protection system. But it faced little competition in Spain's protected market. Once Spain entered EU, it faced competition

and it had to enter joint ventures with capitalist firms and moved production to non-cooperative factories in low wage economies.

The socialist economy would be less dynamic than a capitalist economy, though in a steady state economy it would not matter much. The priority would be egalitarianism and not profit.

The social democratic approach is high taxation of the rich to break up concentration of wealth. Scandinavia and Britain pursued this policy for some time but greater equality was seen to cost growth.

Cost-benefit and Welfare

The mainstream economist's approach to environmental decision making is based on cost-benefit analysis – what people would pay to preserve a feature of the environment as it is. This has involved the construction of shadow prices based on surveys of what people would be prepared to pay. But many environmentalists argue that nature has an intrinsic value beyond the value people attach to it. Cost-benefit analysis assigns greater value to the interests of the rich than those of the poor.

Welfare economics is based on an individualistic utilization framework with no room for considerations of intra-generational or intergenerational equity. David Pearce was of the opinion that one can put a value on global warming damage. Herman Daly and John Cobb wrote that, even if you assume predictable physical changes from global warming, the economic bases would be subject to wide disagreement and uncertainty. Pearce led a team of economists whose chapter on social costs of climate change for the second report of IPCC was rejected by governments at an IPCC meeting held in Montreal at the end of 1995. It was pointed out that there are currently environmentally damaging perverse subsidies of at least US \$ 1.1 trillion per annum worldwide. About \$150 billion per annum takes the form of perverse subsidies for road development and fossil fuels. The IPCC economists have valued the cost of a lost life in western countries at US \$ 1.5 million and for the rest of the world US \$ 100,000. David Pearce replied that the report only said that people value wishes differently and this valuation is affected by their level of incomes. Even if valuation is based on willingness to accept compensation, estimates may be higher, but they would still differ between regions. The irony is that the responsibility for global warming lies with

the industrial countries, most of the damage will be of countries of the south. Real politics is that the lives of people in the south count for almost nothing. The cost of ending hunger in the world would be a few billion dollars annually. Yet the rich choose instead to spend far more than that on luxuries for themselves. Aubrey Mayer says that "at a global level this kind of economic discrimination is simply suicidal. The power to arrest global warming lies with the North. All that the South can do is to threaten to aggravate it (Greenmail). Northern countries will only take serious action if they believe that they will lose more if they do nothing to prevent it than if they take action. The Kyoto Protocol was a sign that the balance of such pressures had shifted in the direction of taking at least some action.

The practice of discounting future costs and benefits at the current rate of interest may make sense for individuals but it encourages un-sustainability. If a development will cause environmental catastrophe costing US \$ 1 trillion in 100 years' time, it is only worth taking action to prevent the disaster now if it will cost less than US \$ 1 billion. If not, it is considered economically rational to go ahead and accept the future catastrophe! Natural resources have been regarded by economists as free gift. Wilfred Beckerman claims that if we run out of anything, we will always be able to find a substitute because of technical progress.

Value of Natural Capital

David Pearce argued in "Blueprint for Green Economy" that the best way to protect natural capital is by assigning it an economic value. Values will be assigned to environmental services based on what people would be willing to pay for them. We should not improve the welfare of the present generation at the expense of future generations. People would say that certain birds and animals are beyond price. Money is good indicator of strength of preferences between people living at the same time and with similar incomes. It is hard to see how it is a good measuring rod when comparing the preferences of Americans and Bangladeshis; or people today and people 100 years from now. In determining which course of action leads to the greatest total welfare, it is important to consider not just what leads to the largest total wealth for society, but also the distribution of that wealth.

When economists refer to optimality it is a distribution of

wealth that would make one person better off without making another worse off. The potential Pareto optimum is the distribution where the losers are compensated for their losses by the gainers. In practice losses are not compensated.

Cost-benefit analysis of nature preservation relies on contingent valuation surveys. Welfare economists decided in the 1930s that inter personal comparisons of utility were 'ethical' and so 'unscientific'. Contingent valuation assumes that people perceive their environment as a set of discrete objects that could be bought and sold. It also assumes that value is essentially derived just from individual self-interest. It was then discovered that people valued nature as a common good, not in terms of money. Human lives are not saleable commodities. Jacobs argues that irreversible environmental losses (extinction of a species) are regarded by people in a similar way. David Pearce agrees that any project that depletes natural capital, its proceeds should be put into compensatory project to maintain natural capital.

The modified cost-benefit analysis requires maintaining a constant stock of natural assets out of concern for future generations. A 'Conservationist' world view protects nature only on the grounds that human beings can benefit from its existence. Conservation of natural capital would tend to conserve the habitats of non-human life forms. The conservationist world view protects nature only on the grounds that human beings can benefit from its existence. The moderate preservationist world view would allow for some exploitation of eco-systems as long as they remained healthy. Aldo Leopold's land ethic : it gives value to biological diversity, but not to individuals.

Utilitarianism tries to maximize the total of amount of happiness (utility). In English speaking countries utilitarian philosophies developed by Bentham, Mill and Sidgwick were very influential while in Europe Social contract theories by Rousseau and Kant were very influential. Utilitarians said that the morally correct actions would be the one that would lead to the greatest increase in total happiness. This stand seemed to call for an increase in population until the point where the increase in total happiness of each additional person was only slightly greater than zero. This will lead to world of over-crowded but impoverished population. J.S. Mill therefore, called for greatest average, not total utility. Acts which on balance, lead to an increase in

average utility were regarded as moral regardless of the suffering they may cause to individuals. The dignity of individual counts for nothing.

John Rawls revised Kant's tradition. He argued that people would choose an original position based on two principles. First would be most basic liberties should be available for all. The second is social and economic inequalities of outcome, such as inequalities of wealth and authority are just only if they result in compensating benefits for everyone, in particular for the worst off. Institutions that are based on hardships for some are offset by greater good for others, are ruled out. But it is not unjust for some people to be better off than others provided that the situation of less fortunate is improved by the inequality. Rawls pointed out that 'when Society is conceived as a system of co-operation designed to advance the good of its' members, it seems quite incredible that some citizens should be expected, on the basis of political principles, to accept lower prospects of life, for the sake of others. Rawls' assumption that people would not object to inequality per se, provided that everyone is better off in terms of social goods, has been criticized.

Equity between Generations

Rawls considered equity between generations a different problem. Each generation should not only preserve the benefits of culture and civilization it inherited, but also set something aside for critical accumulation. But there is no way for later generations to help or harm earlier generations. He assumed that people do not know to which generation they belong, or the stage of civilization of their society. When people were poor and savings difficult, a low rate of savings would be required; in a wealthier society savings rate will be higher, but people would not feel the burden of it. Once the society had become wealthy and developed all the institutions required, saving rate would fall to zero. He did not see the goal of society as great wealth, but liberty and justice for all. Each generation would save in order to enable the next generation to enjoy a better life. Each generation except the first, would benefit from previous capital accumulation. But Pezzey says that this notion of intergenerational contract is bizarre and can never happen. Enforcement of contract will be still more difficult. If the first generation is poor, it will be difficult for

it to save and then all future generations will share the poverty of the first. Beckerman says if technical progress is possible without capital accumulation, natural capital can be expanded without negative effects on future generations. If you want your predecessors to have chosen the parts of development with the best worst care outcome for your generations, the first rule to fall out of this, would be the precautionary principle. The second rule would be strong sustainability.

People generally care for their children's future. Daly and Cobb argue that the consequence of sexual reproduction is towards community concern and away from individualism. Pezzey showed that even when considering the welfare of the next generation or two, sexual reproduction introduces externalities that can lead to the future being treated in a suboptimal way (let alone unsustainable). Sexual reproduction makes sustainability and welfare of your descendents a public good. Concern for children is not enough, sustainability is a public good which requires public policies to influence behavior. Michael Jacobs has argued that while it is rational to discount the future as a consumer, it is not rational to do so as a citizen.

The choice of rich people who want genetic success would be a rigid class system. People at the bottom of social scale would want a socialist revolution tomorrow to increase their immediate genetic success. The bulk of people between the two extremes would want a social minimum to protect their less fortunate descendents.

Better Dead than Green

The approach mainstream economics takes to environmental issues is to choose the risk of extinction rather than give up the possibility of higher income. Better dead than green was the motto. Nordhaus makes a similar claim in opposing restriction on green house gas emissions. Thus sustainability does not seem to be consistent with utilitarian liberalism. Faced with unlimited individual wants and limited resources, the liberal prefers the tragedy of the commons to state intervention. The conservation of natural capital is a limitation of negative liberty in the present in order to allow future generations greater positive liberty by leaving them more choice. Sustainability is a philosophy that has a lot in common with socialism. But socialism does not say anything

about the obligation to future generations. Marx's denial of nature, natural limits and identification of freedom with the domination of nature had disastrous environmental consequences. Failure of socialism confirmed the belief that there is no alternative to free market. Actually sustainability provides one.

Driving force of modernity is progress. Reason was applied to the material world through science and technology; to the social world by communist philosophy; that there was a historical inevitability to its advance (progress).

What after Collapse of Communism?

But collapse of communism implied several things. Is economic planning impossible? Does it mean that democratic capitalism is the best political and economic system? Does it mark the end of progress, by revealing the limits of both nature and society?

Sustainability means that attempts to control nature are self-defeating; instead attempts should be there to transform society – decentralization of decision making; but there is possibility of free riding and tragedy of commons. Also sustainability requires global coordination. Role of education is important.

Another part of the idea of progress denotes that science and technology would make for a better person. But slaughter and extermination of natives was the result. Nazism was also the result. Nuclear weapons made possible the destruction of civilization. Socialist economics was unable to keep up with western technological innovation. Central planning was crude, the one based on co-operation failed therefore bad co-operatives were subsidized and not allowed to die. On the other hand, bankruptcies of Enron in US and Rail track in Britain showed that deregulation and privatization can be disastrous.

Fukuyama said technology and science give humans tremendous power to conquer as well as use both to feed themselves. He said it was impossible to abandon technology. He does not take ecological issues seriously and implies that capital accumulation would go on indefinitely. He says that market oriented authoritarianism is more effective in bringing about economic development than democracy. But he agrees that democracy has a universal appeal. Democracy balances struggle for recognition based on equality and a struggle for recognition for superiority.

He believed that liberal democracy is the only political system that will appeal to all people around the world. But he has not mentioned that US and other western countries have supported dictators to overthrow democratic regimes.

He believes that people will struggle for democracy and human dignity, but when they succeed, they will create democratic society in which struggle and work in the old sense are made unnecessary and in which the possibility of their ever again being as free and as human as in their revolutionary struggle had been abolished. Fukuyama does not explain why some other alternative to contemporary capitalism is impossible. He assumes economic growth to be endless.

In 'Beyond Left and Right' Anthony Giddens says that left and right have exchanged their roles. Left has lost faith in its vision of progress towards socialism and is trying to defend its past achievements. Old right was suspicious of market and capitalism. The new right wants life to become more market based. But it does not want emancipation of women, as it threatens the traditional family. Giddens says socialism believed that economy should rationally be planned from the centre. But information about Individual preferences can't be gathered by central planners. Since globalization these preferences have become more complex. Giddens sees grave difficulties in the working of worker's co-operatives. Also welfare state now has limited capacity for redistribution in the face of globalization.

The Third Alternative

If both right and left have become irrelevant; we live in a new society. He calls it Reflexive Modernization, based on globalization. We no longer worry about what Nature can do to us but about what we can do to Nature. He rejects the Green idea that separation between humans and nature be restored. He says capitalism destroys morals and values and hence leads to disillusionment about the democratic process. He says people now have points of reference which are cosmopolitan and global. Welfare state's assumption of a full-time job for every male is not justifiable; working hours should be reduced and informal economic activity be encouraged. Problems of ecology cannot be separated from the impact of de-traditionalisation. He criticizes the assumption that those who live close to nature are in harmony with it. He

says nature only becomes friendly when it has come under human control. Global interdependence gives the possibility of a world where common interests and common risks can bring us together. Globalizing trends may lead to cosmopolitan tolerance and a new solidarity between peoples. Giddens treats globalization as something that is unavoidable. Influenced by the Asian crash, he discusses mechanisms to limit the destabilizing influence of uncontrolled global speculation.

In 'The Third Way' Giddens shifts back to social democratic politics. He does not believe in Precautionary Principle but believes that we should be bolder in supporting scientific and technological innovation, e.g. GM crops. We survived the cold war and carbon crisis, because of the aversion to nuclear holocaust. Norgaard sees failure of Soviet Union due to bureaucracy, pollution of soil and water, etc. As J. Poritt says capitalism and communism were forms of industrialization, differing only as how best to divide the proceeds from exploiting the earth. He does not think that sustainability could be achieved through greater emphasis on science and technology. His solution is a co-evolutionary approach. Nature and society co-evolve e.g. Pests and Pesticides. To put sustainable development into practice, we must keep track of material and energy flows. But in regions with complex economies, this will be impossible. But leaving everything to market is no solution.

Decentralization

His co-evolutionary approach would involve smaller political units, flattening of bureaucratic hierarchies and more public participation just like the Greens. There should be greater regional self-sufficiency and less global trade. He says that there need not be a single global definition of sustainability. Now it is very difficult to disentangle different regions. They are brought together by trade. He cites examples of Burma and Tanzania.

A large number of small scale projects with low technology may also lead to environmental degradation. Now population has increased too. Post modernization is committed to pluralism of moral values. But moral values can be dangerous as in Hitler's Germany or communist China.

If everything is decentralized what happens to problems which are of global nature? Giddens believes everything is Glo-

balized and interconnected and therefore, is going to be difficult to manage. If indigenous local cultures are allowed to return and world trade is done away with, the problems it has brought will largely go away. But are local cultures really better in their approach to the environment? Many colonists like those of Easter island destroyed themselves by destroying their environment. Those colonizing Americas and Australia exterminated many animals. Ancient civilizations brought their own downfall by mismanaging their environment. Taliban took away the rights of women but never tackled problems of desertification and population growth. Green movement is searching alternatives by discovering modernity and returning to pre-marxist radical Enlightenment tradition.

Sustainability is an idea which combines post modernist pessimism about domination of nature with almost Enlightenment optimism about the possibility to reform human institutions. With worldwide disillusionment about attempts to engineer better societies after the collapse of socialist ideology, the goal of sustainability sounds increasingly ambitious for the pessimistic times we live in.

Sustainability policies would have to be capable of making long term predictions about the behavior of human societies as well as of the physical environment. Also there is the impossibility of predicting the future course of science. It may have unpredictable social and environmental consequences. Further social evolution is even more unpredictable.

The vision of left is increasingly informed by the green one. In some ways Green ideology returns to the pre-marxist roots of socialism. It lacks the faith in human rationality. It lacks faith in the ability of science or the state to transform society. Capitalism borrowed Christian myth adding that the soul can be saved through work that created wealth. Paradise lies in the rich societies here and now. Greens challenge anthropocentrism.

Welcome Unsustainability!

Today there are powerful vested interests that favour unsustainability. Affluent consumers resist change and poor want wealth quickly irrespective of its consequences. Definition of sustainability depends on how new knowledge and technology will be able to substitute for various natural resources.

Sustainability demands global agreements and action. Free trade and competition will oppose sustainability. If global action is required some kind of division of labour between different scales of decision making will have to be worked out. It is impossible to prevent all potential sources of un-sustainability.

In reality, both markets and planning are imperfect. Soros identified untrammelled capitalism as the greatest threat to human freedom in the post-cold war world. WTO, GATT subordinate environmental considerations and seek to maximize international trade and investment, rapid flow of funds around the world by removing capital controls and increase instability. Too much decentralization ignores global problems. Robyn Eckersley argues that a better arrangement would be a multi-layered federal system of governance from the local to the global based on different scales and capable of meeting different objectives.

Norgaard's solution is not only to attempt to disentangle nature and society, but also to attempt to disentangle different societies in order to free the world from the domination of western modernity. Giddens, by contrast, argues that we cannot disentangle nature and society and that it is only through continuing globalization that we can create communities capable of cultural tolerance and global solidarity. Giddens' reflexive modernization seems too sanguine about manufacturing new risks. Norgaard's co-evolutionary approach runs the danger of allowing narrow parochialisms to compete and create a 'tragedy of commons' scenario.

Sustainability means peoples' desire for riches could be subsumed to the need to maintain a habitable world for future generations. Environmental limits would be accepted and lived within. Extravagant benefits are not worthwhile if they involve the risks of serious or irreversible environmental impacts. Precautionary principle would be followed in practice.

Consumerism!

In a world of competing states, each has an incentive to go for the maximum growth and become dominant. In a world where the environmental limits are already being exceeded, any move to allow improvements in the condition of the poor majority is going to require the rich minority to reduce their consumption of

environmental space still more drastically. Rich show very little sign of being prepared to cut back. People are all in favour of sustainability only so long as economic growth could not keep up with the west's. Superiority of capitalism over socialism rests on the principle of consumerism. As far as capitalism is concerned, consumerism is essential.

People seem to be addicted to consumerism. Concern about sustainability is discussed as a barrier to trade. What is driving globalization is not just economic fashion but new technology. Improved communications technologies lead to ideas and fashions spreading ever faster around the world. Giddens implies that these technologies could undermine any attempt at sustainability in much the same way that he claims they undermined economic planning.

Reform or Get Destroyed!

The pursuit of sustainability requires a global moral and political community. This depends on powerful communications technologies. But these promote rapid social change. This may not be conducive to sustainability because it makes it impossible to predict people's ideas and values.

It is realized that the growth model of capitalism cannot continue indefinitely. Sustainability is about maintaining things, while modernity is about constant change. It is about control of human society to protect nature, while modernity is human control of nature. Sustainability is about conscious regulation of social development. People have to a large extent, failed in this. Greens argue that if it is done in a decentralized fashion, it may succeed. But small scale structures may not co-operate in the long term broader interest but may encourage parochialism and compete for advantage.

There are many ideas that have been discussed here, that could move the world in the direction of sustainability. E.g. reform of world trading system, ETR, development of factor 10 technologies, the Environmental Space concept, contraction and convergence, the precautionary principle and the strong sustainability rule. There will be enormous resistance from many people and vested interests. But there is not much choice. The alternative is to continue along the present path of unsustainability, leading to disaster.

Is the disaster inevitable and unavoidable? It appears inevitable if we continue on the present path of unsustainable living. The present unsustainable life style is possible because its basis is the use of fossil fuels- the cheapest source of energy. It is the cheapest because it is a product of nature's service; over millions of years nature has accomplished the miracle of converting biomass into forms of concentrated energy. If alternative sources of energy are to be used, these will prove far more expensive than fossil fuels. If the true value of nature's services is to be internalized in the prices of fossil fuels, nobody will afford these and the contemporary life-style will crash like a house of cards.

After all dependence on fossil fuels cannot go on indefinitely. Stocks of fossil fuels are finite and as these deplete, alternatives will have to be found. Alternative sources of energy such as solar, wind and tidal power are not versatile enough to support the contemporary life-style. If we at present, start using fossil fuels with utmost care, the life of present stocks can be lengthened. But it can hardly be called a permanent solution. Strengthening the eco-services may be more fruitful path to follow. The present emphasis on science and technology to create more and more man-made capital will have to be replaced by greater investment in the creation and maintenance of natural capital.

How to Avert Disaster?

This goal can perhaps be achieved with greater ease in regions of warm or tropical climate simply because high consumption of energy to keep people and buildings warm, is not required. But life-style change involves a number of other considerations besides energy consumption. These include nature's services like healthy atmosphere, clean drinking water, and man-made capital such as patterns of land use and housing, and provision of basic necessities and intermediate goods, availability of worthwhile education, network of transport and communications, the reach of health care etc. These things can be realized if the economic system gives equal or even greater importance to distribution of wealth than creation of wealth. The present capitalist economic system is based on individual freedom to satisfy competing wants in the face of scarce resources. Market is supposed to allocate scarce resources in such a way as to achieve social welfare by sublimating free choice of individuals. However, it is well known

that free markets (without any regulation from the state) everywhere have failed to achieve this. Some kind of market regulation and restraint of individual freedom of choice are considered necessary. But the present economic and political systems are unable to decide positively how far the state should go on regulating markets and restraining the free choice of individuals.

The solution to this problem may be easier to find if the scarce resources can offer a multiplicity of options or alternatives to individuals to make a free choice. The present emphasis on science and technology leads to standardization of resource use. The best example is perhaps extension of agriculture by clearing natural forests and grasslands. Development of agriculture in the last two hundred years shows that the number of grains, used all over the world as staple food, has been reduced from 45 to just 9. At one time rice was supposed to have 30,000 local varieties; now only about 3000 remain whose germ-plasm is carefully conserved by the Rice Research Institute in Philippines. If standardization makes way for diversity, markets will be small and decentralized and processes will depend on how far these small markets are connected to each other through transport and communications. Such decentralization, on the one hand, check or limit the growth of cities and on the other, will bring about a division of labour in the society based more on individual skills and regional climatic varieties than on requirements of machines and centralized organization implied by the use of machinery.

The present capitalist economic system, which has its origin in the post- Renaissance Europe, respects individual freedom. But it is also realized that the free choice of individuals can be many times irrational. The economic system is more concerned about the quantitative growth in production than its composition and qualitative growth. Rachel Carson (1962) has shown that increasing use of chemical pesticides in agriculture has deleterious effects on social health. Dr Narinder Singh (1978) has shown that over 70% of the products that are offered for sale in markets contain poisonous materials. Moreover, the fossil fuel basis of the economic system makes it prone to the influence of Laws of Thermodynamics as shown by H. Daly. As such the creation of waste is always more than the creation of the product, i.e. wealth. As the system emphasizes quantitative growth, exchange value become more important than use value. On the other hand, an

economic system based on bio-diversity can avoid the above deficiencies.

The Organic Economy

In the present economic system capital is more important than availability of resources. Capital is invested not only in creation of machinery but also on obtaining resources as cheaply as possible from wherever these are available. Formerly colonialism and today globalization are the political means to achieve these ends.

On the other hand economic system which sparingly uses fossil fuels and is based on biodiversity, will emphasize use value more than exchange value, will emphasize barter transactions more than monetary transactions. The differences between these two economic systems can be clearly brought out if put in a tabular form.

Contemporary Economic System	An Organic Economic System
1 Assumes ideal conditions; e.g. optimum distribution of wealth, very little economic inequality, Choice free but with not many alternatives	Character of consumer: free choice but circumscribed by each one's membership of some professional, political economic or religious group.
2 Unitary family system, preferred to a joint family system	Needs of an individual are dependent not only on size of income but also on individual's membership of a group
3 Technology and fossil fuel use necessary	Freedom of choice but some limitations due to membership of a particular group
4 Differences in climate and rainfall between temperate and tropical regions are not considered	Individual ownership accepted but actual use of resources and distribution depend on acceptance by group

and society

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| 5 | It is assumed that life style should be uniform throughout the world | The basis of economic transactions is biology, biomass and biodiversity, not technology. Simple technology used to enhance the quality of natural resources and nature's services, therefore distribution of wealth better |
| 6 | Individual freedom, self-interest and pursuit of profit, trade are of paramount importance, cultural and social controls have less value. | Livelihoods connected to taking better care of nature and natural resources and conserving and enhancing biodiversity. Fossil fuels sparingly used to repair, reuse and restore natural systems. |
| 7 | Therefore, economic growth primarily means quantitative growth in domestic production, in income and in profits | Restoration of nature and nature's services is the primary source of livelihoods. Industry small scale, decentralized and providing for basic necessities, land ownership is private but planning of agriculture production and its distribution on village basis |
| 8 | Commodities included in production and consumption are not judged on their propriety and quality | Production of surplus, e.g. in agriculture, depends on local needs and local usage and not on exports |
| 9 | Unregulated markets necessary for individual choice, self-interest, growth in the economy and in incomes | Fossil fuels are used mainly to satisfy societal needs such as electricity, public transport, production of tools necessary |

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| | to satisfy basic needs and spread of primary and higher education that will impart knowledge in skills to understand in depth nature and its proper, sustainable management |
| 10 Nature and nature's services are ignored and these are believed to possess infinite capacity to bear changes and modification in their structure and functions | It is necessary to avoid consumption of energy which emanates from individual preferences and is wholesale and centralized, thereby avoiding the operation of laws of thermodynamics |
| 11 Management of nature and nature's services anthropocentric, thereby neglecting the welfare of plant and animal kingdoms | Political power based on democratic principles. The role and functions of the government are: provide education that will promote different skills in society; pass legislation that will regulate the working and functions of different professional, social, religious etc. groups; affect distribution so as to avoid hoarding, artificial scarcity, monopoly and monopsony and conduct proper disaster management. |
| 12 Free competition and minimum or no interference in the economy by government necessary; even when it is seen to promote domestic and international inequity, to result in deterioration and decline of nature and nature's | Savings and capital formation to depend on individual skill, intellectual capacity and spirit of enterprise. Investment through professional and other grouping and the government to keep a watch on this. Resources that are indi- |

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| <p>services and to result in imbalances in location of industries and placement of jobs</p> | <p>vidually owned but still unextracted can earn rent which can be taxed and the proceeds used for social welfare</p> |
| <p>13 It is believed that capitalism and socialism/ communism are the only options available for managing social structures and societal functions</p> | <p>Policies should depend on understanding principles of ecology</p> |
| <p>14 Insistence on only these two isms, makes consideration of other structures and systems unnecessary and useless</p> | <p>Exercise control on human population and to see that it does not exceed a certain limit</p> |
| <p>15 Human evolution from hunting-gathering stage to industrial mode is not considered in depth; especially the diversity of livelihoods available in tropical regions and cultural and social restraints emanating from the use of diversity, are not considered in depth.</p> | <p>Economic system to be based on reuse and restoration of nature and natural systems (Services).</p> |
| <p>16 Economic science is essentially based on the Renaissance in Europe and the idealism that it gave rise to. Therefore, life-styles current in Europe and America are taken to be ideal</p> | <p>In this system low tillage agriculture and industry based on hydrogen instead of carbon, are promoted</p> |
| <p>17 Consequently economic science is unable to control irrational and anti-social choices, excessive greed, and individual choices inimical</p> | <p>Industry based on reuse and recycling; increase in production not of cars but bicycles, wind energy to power machines, solar energy used</p> |

to nature, nature's services
and societal welfare.

to heat water, provide
warmth and drying of clothes
etc. and planting local species
to provide fuel, biomass and
attract insects, birds etc. for
pollination and promoting
enterprises and professions
based on these

Iceland and Denmark appear to have already adopted an organic life style and an organic economy. It is necessary to make a thorough study of their system and evolve a system and life-style convenient for Indian conditions.

The present author believes that it is quite possible and necessary to adopt an educational system, an economic system and technology based on Indian conditions- geographical, ecological and economic. In particular education needs to be interdisciplinary and holistic, breaking down the walls artificially created between different disciplines to facilitate analysis and a reductionist approach. Contemporary system gives rise to specialization and specialists who remain blithely oblivious to knowledge beyond their horizon. An integrated and holistic point of view can make these specialists aware of broader realities – social, cultural, economic and technological.

The foregoing discussion will make it clear that the study of environment and ecology, provides the basis for all these broader realities. Investment needs to be directed to the quantitative and qualitative enhancement of natural eco-systems and nature's services.

For a country like India, rich in biodiversity, an organic economy seems to be far more appropriate than the contemporary economy.

Prakash Gole

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इतिहास, अर्थशास्त्र आणि पर्यावरण

पृथ्वीवर माणसाचा प्रवेश होण्यापूर्वी ज्या घटना घडल्या त्यांना उत्क्रांती असे म्हणता येईल आणि मानवाचा उदय झाल्यानंतरच्या घटनांना इतिहास म्हणता येईल. माणसाने त्याच्या आधीच्या काळाबद्दल म्हणजे उत्क्रांतीबद्दल अमाप संशोधन केले आहे. त्याचा निष्कर्ष असा दिसतो की प्रगती, अधोगती या मानवी संकल्पना उत्क्रांतीला लागू पडत नाहीत. पण कोण्या एका अपघाताने पृथ्वीवर जीव (Life) निर्माण झाले आणि मग पृथ्वीवरील वातावरणाशी जमवून घेणे, त्यात जगणे आणि प्रजनन करणे हेच जीवांचे श्रेय ठरले.

पृथ्वीच्या गाभ्यात पाण्याची वाफ होती हा चमत्कार म्हटला पाहिजे कारण पृथ्वीवर पाणी नसते तर जीवांची निर्मिती झालीच नसती. पाण्याचे सुरक्षित कवच सोडून जमिनीवर स्वतंत्रपणे जगण्याची सक्षमता प्राण्यांना गाठता आली कोट्यवधी वर्षांच्या कालावधीनंतर. पृथ्वीभोवती ओझोन थर (लेयर) तयार होणे आणि वातावरणातील प्राणवायूचे प्रमाण वाढणे या गोष्टी जेव्हा प्रत्यक्षात आल्या, तेव्हाच जमिनीवर जीवांची उत्क्रांती झपाट्याने झाली. त्याचबरोबर प्राणवायूशिवाय जगणारे जे जीव होते, ते नष्ट झाले.

उत्क्रांती सांगते की या घटना होण्यास फार कालावधी लागला. बुद्धी कमविण्याआधी जीवांनी शारीरिक शक्ती कमावली आणि बराच काळ राक्षसी शरीरे असणाऱ्या महाकाय प्राण्यांनी पृथ्वीवर अक्षरशः धुडगूस घातला. पण कोणत्याही प्रकारच्या अतिरेकात त्याच्या विनाशाची बीजे दडलेली असतात, हे उत्क्रांतीने दाखवून दिले असे म्हणता येईल. कारण

कालांतराने हे राक्षसी प्राणी नष्ट झाले आणि एका चिमुकल्या प्राण्याने जगण्यात बाजी मारली. या प्राण्याच्या जगण्याबरोबरच पृथ्वीवर एक नवे युग अवतरले असे म्हणावेसे वाटते. शक्तीच्या वर्चस्वाचा जमाना आता संपला आणि सुरू झाला बुद्धीच्या वर्चस्वाचा जमाना. त्याची परिणती झालेली दिसते मानव प्राण्यात. उत्क्रांतीचा इतिहास होतो तो यामुळेच. शक्तीपेक्षा बुद्धी श्रेष्ठ हेच जणू मानवाचे अस्तित्व पृथ्वीवर दाखवून देते आहे. पण हे खरे आहे का?

शक्तीने राक्षसी रूप धारण केल्यावरच तिचे वर्चस्व संपुष्टात आले, हे जर खरे असेल तर बुद्धीने राक्षसी रूप धारण केल्यावर बुद्धीजीवी प्राणीही असेच नष्ट होणार हे ओघाने आले. एवढेच नव्हे तर शक्तीपेक्षा बुद्धीश्रेष्ठ प्राणी फार झपाट्याने विनाशाकडे जाणार, विनाशाप्रत जाण्याची त्यांची क्षमता मोठी असणार, असेही वादू लागते.

मानवी प्रवेशाबरोबर उत्क्रांतीचा इतिहास झाला, तोपर्यंतची उत्क्रांतीची परिमाणे पुष्कळ अंशी संपुष्टात आली, नवी परिमाणे अवतरली. ती कोणती, आणि इतिहासाची वाटचाल पाहता, मला त्यातले नेमके काय भावते आणि काय नाही? हेच आता पहायचे आहे.

मानवाच्या पृथ्वीवरील प्रवेशाबरोबर उत्क्रांतीचा इतिहास झाला खरा, पण ही प्रक्रियाही प्रथमतः फार मंद गतीने सुरू होती. तिला गती प्राप्त झाली जेव्हा माणसाने दूल्स म्हणजे हत्यारे, अवजारे तयार करण्याचे कसब प्राप्त करून घेतले तेव्हा. शक्तीचे वर्चस्व सुरू होण्याची सुरुवात म्हणजे हे कसब आत्मसात करणे.

माणसाचा इतिहास पाहिला तर दिसते की त्यापैकी तीन-चतुर्थांशापेक्षाही अधिक काळ हत्यारे बनविण्याचे कसब वृद्धिंगत करण्यात, तसेच संघशक्तीचा परिणामकारक उपयोग जगण्यासाठी करण्यातच खर्च पडला आहे. याच काळात माणसाचा प्रसार जगातील निरनिराळ्या भागांमध्ये झाला असे मानण्यात येते. काही शास्त्रज्ञांच्या मते मानवी उत्क्रांतीचे केंद्र हे एकच असावे आणि तिथून मानव जगभर पसरला. काही म्हणतात अशी केंद्रे चार किंवा पाच असावीत आणि तेथून मानव जवळच्या प्रदेशांत स्थलांतरीत झाला असावा. माझा कल मानवी उत्क्रांतीची केंद्रे अनेक असावीत याकडे झुकतो. यासंबंधात खूप

उत्खनन, संशोधन झाले आहे, आफ्रिकेत. ते करणाऱ्या शास्त्रज्ञांच्या मते मानवी उत्क्रांती सरोवराकाठी, नदीकाठी, बहुविध वनस्पतींनी नटलेल्या प्रदेशात, समशीतोष्ण तपमानात झाली. पण असा अनुकूल प्रदेश सोडून माणसाला इतर प्रदेशात जाण्याची गरज का निर्माण झाली असावी! हे शास्त्रज्ञ म्हणतात, की या अनुकूल प्रदेशात लोकसंख्या वाढली, अन्न पुरेनासे झाले आणि माणसाला दुसऱ्या प्रदेशांचा शोध घेणे प्राप्त झाले. या उलट मला वाटते की शिकार आणि कंदमुळे जमवून गुजराण करणाऱ्या ज्या टोळ्या असतात, त्यात लोकसंख्या ही कधीच डोईजड होत नाही. लोकसंख्या वाढून उपलब्ध अन्नावर ताण पडू नये म्हणून या टोळ्या दक्ष असतात. एरवी, रोगराई, आपसातील संघर्ष तसेच मांस भक्षक प्राण्यांना तोंड देणे यांमुळे लोकसंख्या कमी होण्याची शक्यताच जास्त. कपी किंवा वानरसदृश्य प्राण्यापासून माणसाची उत्पत्ती झाली, असे समजले तर आज किंवा नजीकच्या भूतकाळात असे प्राणी जिथे जिथे सापडतात, तिथे तिथे मानवी उत्पत्ती होणे संभवते. अगदी अलिकडच्या काळापर्यंत प्रवास ही गोष्ट केवढी खडतर होती, हे पाहिले की आदिमानव स्वखुशीने या मार्गाचा अवलंब करून फार मोठी अंतरे ओलांडील ही गोष्ट अशक्य कोटीतली वाटते.

अलिकडच्या शास्त्रज्ञांनी जनुकांची (DNA) तपासणी करून या प्रश्नाचा निर्णय लावण्याचा प्रयत्न केला आहे पण समाधानकारक असे एक उत्तर त्यांच्याही हाती लागलेले नाही. गेल्या दहा हजार वर्षांत पर्यावरणात कसे बदल झाले हे आता कळून चुकले आहे. एखाद्या कटिबंधात फार प्रतिकूल असे पर्यावरण तयार झाल्यास मानवाला स्थलांतर करणे भाग पडले असणार.

मात्र सुमारे पाच लाख वर्षांपूर्वी आदिमानवाच्या हातात आणखी एक 'हत्यार' आले की ज्याच्यामुळे मानवाचा सर्वत्र प्रसार होण्यास मदत झाली असेल. हे 'हत्यार' म्हणजे 'आग'. आग लागून मोठ्या प्रमाणावर जंगले जाळल्याचे पुरावे आफ्रिकेत मिळतात. या आगी आदिमानवांनी जंगले हटविण्यासाठी लावल्या असाव्यात, असा शास्त्रज्ञांचा होरा आहे. जंगले हटवून मोकळ्या केलेल्या प्रदेशात अन्न शोधणे व मिळविणे आणि त्याला मारण्यास टपलेल्या वन्य प्राण्यांपासून बचाव करणे, आदिमानवाला

कदाचित सोपे गेले असावे. झुडुपे, गवते यांची विविधताही यामुळे वाढली आणि त्यावर गुजराण करणारे तृणभक्षक प्राणी निर्माण झाले, त्यांचीही विविधता वाढली. यांतलेच काही प्राणी पुढे 'माणसाळले' आणि त्यांना माणूस पाळू लागला.

प्राणी माणसाळविण्याची किमया माणसाने बहुधा, तो भटके जीवन जगत असताना, फळे, कंदमुळे आणि थोडी फार शिकार यांवर गुजराण करीत असतानाच साध्य केली असावी. यापुढचा टप्पा म्हणजे वनस्पती माणसाळविणे. त्यासाठी आणखी खूप काळ जावा लागला. वनस्पतींमध्येही फळे देणारी झाडे प्रथम माणसाळली, म्हणजे माणूस त्यांची लागवड करण्यास शिकला आणि त्यानंतर, म्हणजे गेल्या फक्त दहा बारा हजार वर्षांत माणसाळली गवते. शेती आहे या माणसाळलेल्या गवतांवरच आधारीत. आणि हे घडले पृथ्वीच्या आयुष्यात अगदी अलिकडे! शक्तीपेक्षा बुद्धी श्रेष्ठ हे माणसाने पुन्हा एकदा दाखवून दिले आणि माणसांचा इतिहास म्हणजे दिवसेंदिवस बुद्धीचे श्रेष्ठत्व सिद्ध करणाऱ्या घटनांची गर्दी असे म्हणण्यासारखी परिस्थिती निर्माण झाली.

शेतीला इतिहास आहे केवळ १०-१२ हजार वर्षांचा. त्याआधी कित्येक लाख वर्षे माणूस भटके जीवनच जगत होता. या काळात जसे त्याचे हत्यारे अवजारे बनविण्याचे कसब वाढले, तसे आगीशी त्याची जानपहचान वाढत गेली असणार. कच्च्या मांसापेक्षा भाजलेले मांस अधिक रुचकर असते, पचण्यास सोपे असते, हे आगीनेच आदिमानवाला शिकविले असणार. उब देणे, मंदसा प्रकाश देणे, हे आगीचे दैनंदिन उपयोग आहेत, हे त्याने जाणले असणार! रानटी गवतांच्या बियांपासून रुचकर गोष्टी तयार करणे, त्या भाजून पचनयोग्य बनविणे ही कसबे आगीशी जानपहचान वाढल्यानंतरच शक्य आहेत. अन्न शिजविण्याची कला शिकल्याशिवाय शेती करण्याला अर्थ नाही. तेव्हा शेतीवर आधारीत समाजव्यवस्था, स्थिर जीवन या गोष्टी अलिकडच्या काळातील असल्या तरी त्यापूर्वी अनेक आवश्यक अशी कसबे माणसाने आत्मसात केली असणार.

शेतीपूर्वीच्या प्रदीर्घ कालखंडात ही जी 'प्रगती' माणसाने साध्य केली, तिचे योग्य मोजमाप कोणी इतिहासकाराने केलेले दिसत नाही.

शेतीबरोबरच माणूस स्थिर जीवन जगू लागला आणि त्यामुळे त्याची ज्ञानसंपदा वाढण्यास मदत झाली. प्रयोगावर आधारीत शास्त्रे आणि तर्कशास्त्रावर आधारीत वाङ्मय या स्थिर जीवनामुळेच शक्य झाले. पण शेतीचा प्रमुख फायदा म्हणजे शेतीतून माणसाला मिळालेले अतिरिक्त उत्पादन (सरप्लस). या अतिरिक्त उत्पादनामुळेच शक्तीपेक्षा बुद्धी श्रेष्ठ असे निर्विवादपणे म्हणणे आता दुरापास्त झाले! असे का?

तर शेतीमुळे स्थिर झालेल्या मानवी टोळ्यांमध्ये आता शेतकरी आणि इतर असे गट निर्माण झाले. शेतकऱ्याने धान्य पिकवायचे आणि इतरांनी ते पिकविण्यास मदत करायची, आणि त्याच्या मोबदल्यात त्याच्याकडून धान्य मिळवायचे अशी सर्वसाधारण व्यवस्था ठरली असावी. मात्र हे अतिरिक्त उत्पादन समाजातील निरनिराळ्या घटकांना कोणत्या प्रमाणात वाटून द्यायचे, त्यामध्ये अग्रक्रम कोणाला द्यायचा, हे प्रश्न समाधानकारकरीत्या सोडविणे माणसाच्या बुद्धीला त्या वेळेलाच काय पण आजच्या आधुनिक युगातही साध्य झालेले दिसत नाही. यासाठी बुद्धीला शक्तीची जोड देण्याची आवश्यकता त्या काळात जशी भासली असणार, तशीच ती आजही भासत आहे. मानवी समाजात बुद्धीचे श्रेष्ठत्व कधीच निर्विवादपणे सिद्ध झालेले नाही. उलट अतिरिक्त उत्पादनाच्या शक्यतेला जीवनावश्यक वस्तूंच्या टंचाईची जोड दिली की शक्तीचा अयोग्य उपयोग होण्याची शक्यता दुणावू लागते.

माणसाने शेती करून अतिरिक्त उत्पादन मिळविले खरे, पण त्याच वेळी त्याच्या लक्षात आले असणार की असे उत्पन्न देणारी जमीन मर्यादित असते. तसेच या शेतीला लागणारे पाणीही मर्यादित असते आणि जमिनीची सुपीकता टिकवून धरण्यासाठी ज्या गोष्टी आवश्यक असतात, त्याही मर्यादित असतात. अतिरिक्त उत्पादनाबरोबरच ते मिळविण्यासाठी आणि टिकविण्यासाठी लागणाऱ्या साधनांची कमतरता या गोष्टीलाही मानवी समाजांना तेव्हापासून तोंड द्यावे लागले आहे.

यापूर्वी, भटक्या जीवनात माणसाला टंचाई माहीत नव्हती असे नाही. स्थलांतर हा त्यावर उपाय होता. कारण लोकसंख्येच्या मानाने जमिनीचे क्षेत्र अमाप होते. थोडीफार शिकार (माणसाच्या अन्नात वाटा सुमारे वीस टक्के) आणि फळे, कंदमुळे, बिया वगैरे जमविणे हे कोणत्याही प्रकारच्या

जमिनीवर शक्य होते, हे माणूस अनुभवाने शिकलेला होता. शेतीमुळे मात्र माणूस जमिनीच्या एका तुकड्याशी जखडला गेला आणि कोठेही भटकून अन्न मिळविण्याचे त्याचे स्वातंत्र्य संपले. आधुनिक इतिहासकार माणसाच्या भटक्या जीवनकाळास मानवी जीवनातले सुवर्णयुग समजतात. मग हे सुवर्णयुग, हा अत्यंत आनंदाचा व समाधानाचा काळ, ही जीवनशैली सोडून, अतिरिक्त उत्पादनाच्या लोभाने माणसाने एका जमिनीच्या तुकड्याला जखडून घेतले. ही प्रगती का अधोगती, हा मानवी बुद्धीचा विजय का पराजय? कारण मानवी समाजातील सर्व दुःखे, विषमता, जुलुम, संघर्ष आणि हिंसा, अत्याचार यांचा उगम स्थिर जीवनशैलीत दिसतो. अतिरिक्त उत्पादनाबरोबरच अतिरिक्त लोकसंख्या ही डोकेदुखीही तेव्हापासूनच कायमची भेडसावू लागली माणसाला!

शेतीला, काही लेखकांनी मानवाने निसर्गाविरुद्ध केलेला पहिला मोठा गुन्हा, असे म्हटले आहे. पर्यावरणीयदृष्ट्या पाहिले तर ते खरेच आहे. शेतीचे पर्यावरणीय स्वरूप सहसा समाजापुढे सांगितले जात नाही, अभ्यासक्रमात ते समाविष्ट नाही. त्यामुळे शेती आणि शेतकरी यांच्याबाबत अनेक गैरसमज समाजात रुजलेले दिसतात. शेतकरी जेव्हा जमिनीच्या तुकड्यावर पीक लावतो त्या वेळी तो असे ठरवितो की या तुकड्यावर पडणारी सर्व सूर्यशक्ती केवळ याच पिकासाठी वापरली जाईल. इतर वनस्पतींना ती मिळणार नाही. ही गोष्ट निसर्गाच्या विरुद्धच आहे. निसर्गात अशी गोष्ट जेव्हा घडते, तेव्हा त्या वनस्पतीला असंख्य शत्रू निर्माण होतात, की जे त्या वनस्पतीची वाढ रोखतात. शेतकऱ्यालाही या शत्रूंना सतत तोंड द्यावेच लागते. त्यामुळे शेतीत, न भटकता, एकाच जागी स्थिर राहून उत्पन्न मिळत असले तरी ते शाश्वत नसते. मोठ्या प्रमाणात, विस्तृत क्षेत्रावर केलेल्या शेतीला शत्रूही मोठ्या प्रमाणात निर्माण होत असल्याने ती यशस्वी ठरत नाही.

शेतीने मातीवर होणारे परिणाम लक्षात घेतले तर उष्ण कटिबंधात शेती यशस्वी होण्याची शक्यता दुरावते. इथे पाऊस मोसमी असल्याने जमीन उघडी पडली की ती ओल गमावते, कोरडी पडल्याने तिची धूप होते आणि पाण्याच्या कमतरतेमुळे भरघोस उत्पन्न शेतीतून मिळणे दुरापास्त होते. या उलट समशीतोष्ण कटिबंधात बारमाही पाऊस,

सखोल जमीन, तिला दरवर्षी हिवाळ्यात मिळणारी विश्रांती यांमुळे शेतीतून भरघोस उत्पन्न मिळण्याची शक्यता अधिक. भारत शेतीप्रधान देश आहे म्हणजे भारतातील परिस्थिती शेतीला अत्यंत अनुकूल आहे, असे नव्हे तर भारतातली बहुसंख्य जनता शेतीशिवाय दुसरा धंदा करीत नाही, ही सत्यस्थिती आहे, असा होतो.

शेतीचे जैवविविधतेवर होणारे परिणाम प्रथमतः लक्षात येण्याइतके शेतीचे स्वरूप व्यापक झाले नव्हते. तरी शेतीसाठी जंगल तोडून जमीन जिथे मिळवावी लागली, तिथे वन्य प्राणी-पक्षी देशोधडीला लागल्याचे लोकांनी अनुभविले होते. पण यांत्रिक शेतीचा उद्भव होण्याआधी हा प्रश्न एवढा तीव्र नव्हता.

शेतीमुळे संपत्तीचे स्वरूपही बदलले. आतापर्यंत संपत्ती ही सोने, रूपे, रत्ने आणि जवाहीर, दागिने आणि जडावाचे कापड अशा गोष्टीत व्यक्त होत असे. अशी संपत्ती मिळविण्यात स्वकष्टापेक्षा नशीब आणि शक्ती यांचाच वाटा जास्त असे. त्यामुळे समाजातील मातबर लोकच अशा संपत्तीचा साठा करू शकत. आता मात्र स्वकष्टाने शेतीतले अतिरिक्त उत्पादन प्राप्त होते ही जाणीव समाजाला झाली. हे उत्पन्न प्रथमतः समाजातील देवतेला, मंदिराला अर्पण केले जात असावे व तिथून ते मंदिराच्या पुजाऱ्याकडे जात असावे. पुढे राजाने शेतसारा घेण्याची पद्धत पडली आणि या उत्पन्नाचा ठराविक वाटा राजसत्तेकडे जाऊ लागला. उरलेला शेष बाजारपेठेत विक्रीला आला आणि जीवनावश्यक वस्तूंचा बाजारपेठेत प्रथमच प्रवेश झाला. हे अतिरिक्त उत्पादन काही काळ साठत जाऊ शकत असल्याने ते एका ठिकाणाहून दुसऱ्या ठिकाणी पाठविणे शक्य झाले आणि बाजारपेठेची व्याप्ती वाढली.

अतिरिक्त उत्पादनाचे मूळ जमिनीत असल्याने जमीन ताब्यात घेण्यास, तिच्या मालकीहक्कास भलतेच महत्त्व प्राप्त झाले. समाजातल्या विशेष हुशार आणि ताकदवान लोकांनी जास्तीत जास्त जमिनीवर आपला मालकी हक्क प्रस्थापित करण्यात धन्यता मानली. समाजरचना जमिनीच्या मालकीभोवती फिरणारी अशी अस्तित्वात आली. विस्तीर्ण जमिनीवर मालकी सांगणारे सरदार आणि त्यांचा अग्रणी राजा, प्रत्यक्ष जमीन कसणारे म्हणजे कुळे आणि या सर्वांना आवश्यक सुविधा पुरविणारे

कारागीर, अशी समाजव्यवस्था मुख्यतः ठरली. याशिवाय मंदिरे आणि त्यांचे पुजारी, सेनापती, त्यांचे सैन्य हे सुद्धा समाजाचे अविभाज्य घटक ठरले. लोकसंख्या आणि अतिरिक्त उत्पादन यांची सांगड घालणे अवघड आहे. सर्वांच्या प्राथमिक गरजा पुरविण्याचीही कुवत या उत्पादनात नाही, हे उत्पादन बेभावशाचे आणि अशाश्वत आहे, हे सुद्धा समाजाच्या लक्षात आले.

जमिनीची सुपीकता मर्यादित असल्याने केवळ जमिनीवर काम करणाऱ्यांची संख्या वाढवून उत्पादन वाढविता येत नाही, हे लक्षात आले. जमिनीवर काम करणाऱ्यांची संख्या वाढवित राहिले, तर एक बिंदू असा येतो की तिथून पुढे प्रत्येक नवीन कामगार कमी कमी उत्पादन देऊ लागतो. तेव्हा या बिंदूपलिकडे कामगारांची संख्या नव्हे तर इतर गोष्टी वाढविणे योग्य ठरते. या इतर गोष्टी म्हणजे जमिनीचे क्षेत्रफळ वाढविणे, खते, शाश्वत पाणी यांची व्यवस्था करणे, किडीपासून जमीन संरक्षित करणे वगैरे.

निव्वळ कामगार संख्या वाढवून जमिनीतून मिळणारे अतिरिक्त उत्पादन वाढविता येत नाही हे कळणे हीच आधुनिक अर्थशास्त्राची सुरुवात होय. अर्थातच शेतीला पूरक अशा उत्पादक व्यवसायांची समाजाला गरज निर्माण झाली. असे व्यवसाय म्हणजे व्यापार, विशेषतः परदेशांशी व्यापार, नव्या खाणी शोधून मूल्यवान धातूंचा पुरवठा वाढविणे, आणि नौकानयनाद्वारे नवे प्रदेश, नव्या सीमा शोधून काढणे.

पंधराव्या, सोळाव्या शतकात युरोपात बायबल आणि चर्चचा समाजमनावरील पगडा कमी झाला, तसेच भौतिक क्षेत्रात जे व्यापारी, कारागीरांचे संघ होते, त्यांचे सर्वसामान्य व्यक्तीवरील वर्चस्व, नियंत्रण कमी झाले. म्हणजेच वैयक्तिक हुशारी, चौकस बुद्धी, प्रयत्न, महत्वाकांक्षा, विजिगिषु वृत्ती यांना महत्त्व प्राप्त झाले. याच सुमारास समुद्रावर संचार करणाऱ्या बोटी बांधण्याचे तंत्र सुधारले, होकायंत्र प्रचारात आले आणि नौकानयन सुकर झाले. त्यामुळे युरोपातील महत्वाकांक्षी व्यक्तींनी एकत्र येऊन, कंपन्या स्थापन करून नौकानयनाद्वारे नवी खंडे शोधली, नवीन निसर्गसंपत्तीचे स्रोत माहीत करून घेतले, आणि परदेशस्थ व्यापाराद्वारे ग्रीक, अरब अशा संस्कृतींशी

संबंध वाढवून नवीन ज्ञान आत्मसात केले. निसर्गाकडे निराळ्या, चौकस व भेदक दृष्टीने पाहण्यास सुरुवात होऊन निसर्ग निरीक्षणावर आधारीत शास्त्रे उदयास येऊ लागली.

ॲडॅम स्मिथने अर्थशास्त्र लिहिताना जो माणूस त्याच्या केंद्रस्थानी कल्पिला आहे, तो युरोपातील बदलत्या परिस्थितीचे प्रतीक आहे. तो उत्तम शिक्षण घेतलेला आहे. महत्त्वाकांक्षी, स्वतःच्या प्रयत्नांबद्दल आत्मविश्वास असणारा आहे, तो चारित्र्यवान आहे. त्याच्यावरील सामाजिक जबाबदारीची जाणीव असलेला आहे. म्हणजेच तो जेव्हा निरनिराळ्या पर्यायांची तपासणी करून आपली निवड ठरवील आणि मागणी नोंदवील, ती अशी असेल की सामाजिक हितही त्यामुळे साधले जाईल, त्याचा वैयक्तिक स्वार्थही साधला जाईल. पण त्यामुळे सार्वजनिक हितास बाधा येणार नाही.

असे असंख्य, चारित्र्यवान उपभोक्ते (Consumers) बाजारपेठेत आपली मागणी नोंदवितील, त्यावेळी त्या उपभोगाचे स्वरूप समाजहित साधणारेच असेल आणि वैयक्तिक स्वार्थ साधता साधता समाजहितही साधले जाईल. बाजारपेठेत किंमती अशा ठरतील की ज्यामुळे उपभोक्ते आणि पुरवठादार या दोघांचाही फायदा होईल.

अर्थशास्त्राचा उद्भव होण्यास युरोपातील विशिष्ट परिस्थिती कारणीभूत होती, हे यावरून लक्षात येईल. सरंजामशाहीचा अस्त आणि कारखानदारीचा उगम यांमधला संधिकाल यात अर्थशास्त्राचा उदय झाला. भारत-चीन या पूर्वेकडील राष्ट्रांमध्ये परिस्थिती मात्र एकदमच निराळी होती. राजकीय अस्थैर्यामुळे मध्यवर्ती सत्ता जरी बदलती राहिली तरी खेड्यांची व्यवस्था ही स्वतंत्र राहू शकत होती. उत्तर भारतात वतने आणि जमिनदारी यांचा पगडा जास्त होता आणि त्याचे स्वरूप युरोपीय सरंजामशाहीच्या जवळपास पोहोचत होते. पण दक्षिणेत जमिनीची मालकी प्रायः शेतकऱ्याकडे राहिली आणि मध्यवर्ती सत्तेने शेतसारा गोळा करणे हा उत्पन्नाचा प्रमुख मार्ग म्हणून स्वीकारला. उत्तरेत मध्यवर्ती सत्ता कर जमिनदार, सरदार-दरकदार यांच्याकडून गोळा करीत असे आणि ते कर शेतकऱ्याकडून वसूल करीत. असे 'दलाल' दक्षिणेत नव्हते.

मुगल सत्तेपूर्वी उत्तरेत जे मुसलमान सुलतान होऊन गेले, त्यांनी

जिंकलेल्या प्रदेशातून मोठ्या संख्येने गुलाम गोळा केले. काही काळ दिल्लीत गुलामांचे बाजार होते. यांपैकी काही पुढे निरनिराळी कौशल्ये शिकले, कारागीर झाले आणि त्यांनी गुलामीतून मुक्तता करून घेतली. या कारागीरांचेही युरोपप्रमाणे संघ होते; आणि हे संघ आपल्या सदस्यांची वर्तणूक, त्यांचे उद्योग व धंदे नियंत्रित करीत असत.

याशिवाय संपूर्ण हिंदू समाज हा निरनिराळ्या जातींमध्ये विभागला गेला होता. प्रत्येक जातीचे आपल्या सदस्यांविषयी नियम होते, रीती होत्या, बंधने होती. काही जातींमध्ये रोटीबेटी व्यवहार होत असे. काहींमध्ये तो होत नसे. एकूण काय पंधराव्या-सोळाव्या शतकात जसा व्यक्तीकेंद्रीत समाज युरोपात निरनिराळ्या राष्ट्रांत कमी-अधिक प्रमाणात उदयास आला, तसा तो चीन-भारत या पौरात्य देशांत उदयास आला नाही. व्यक्ती ही अनेक समाज बंधनात जखडलेली राहिली.

अर्थशास्त्राच्या दृष्टिकोनातून याकडे पाहिले तर त्याचे फायदे-तोटे लक्षात येतात. अर्थशास्त्राचे एक महत्वाचे गृहीतक म्हणजे मानवाच्या गरजा, मागण्या अनंत असू शकतात पण साधनसंपत्ती मात्र मर्यादित असल्याने कोणत्या गरजा पूर्ण करायच्या आणि कोणत्या नाही, हे सतत माणसाला ठरवावे लागते. अर्थशास्त्राच्या उदयाच्या काळी इंग्लंडमध्ये मानवी उद्योगांचे धुवीकरण झाले होते. एन्क्लोजर मुव्हमेंटमुळे जमिनीचे लहान तुकडे असणारे शेतकरी लयाला गेले आणि शेतीचे बाजारीकरण झाले. कारखानदारीचा उदय होऊन मालक आणि मजूर असे दोन वर्ग निर्माण झाले. संपत्तीचे वाटप बडे शेतकरी (लॉर्डस्) आणि त्यांच्या शेतावर काम करणारे मजूर आणि कारखानदार मालक व त्याचे मजूर या चार वर्गांत मुख्यतः होणार हे ठरून गेले. या चार वर्गांमध्ये संपत्तीच्या वाटपाबाबत संघर्ष राहणार हे दिसत असूनसुद्धा अर्थशास्त्राने गृहीत धरले की या चार वर्गांमध्ये संपत्तीचे वाटप सर्वांना समाधानकारक वाटेल असेच राहील. याचाच अर्थ असा की साधनसंपत्ती मर्यादित असली तरी या चारही वर्गांच्या खिशात आपल्या निदान प्राथमिक गरजा पुरविण्याइतके पैसे असतील आणि त्याद्वारे बाजारपेठ प्रथम समाजाच्या प्राथमिक गरजा पुरवील आणि नंतरच श्रीमंतांच्या गरजा पुरविण्याच्या मागे लागेल. प्रत्यक्षात मात्र सर्वसामान्यांच्या खिशात प्राथमिक गरजा

पुरविण्याइतकाही पैसा न आल्याने बाजारपेठेत फक्त श्रीमंतांच्याच मागण्या व्यक्त होऊ लागल्या आणि पुरविल्या गेल्या. अशा परिस्थितीत सर्वसामान्यांना एक तर सरकारी मदतीवर विसंबावे लागले किंवा परदेशात स्थलांतर तरी करावे लागले. पैशाची उपलब्धता हा इथे निर्णायक घटक ठरला. अर्थशास्त्र त्यामुळेच पैशावर आधारीत अर्थव्यवस्था (Monetary economy) गृहीत धरते.

भारत-चीनसारख्या देशांत मात्र अर्थव्यवस्था पैशाभोवती केंद्रीभूत होण्यास एकोणिसाव्या शतकाचा उत्तरार्ध उजाडावा लागला. त्याआधी या देशांत वस्तूंची देवाणघेवाण (Barter economy) ही महत्त्वाची होती. मानवी उपक्रमांचे ध्रुवीकरण झालेले नव्हते. सर्व सामान्य जनतेचा शेती हा जरी मुख्य उपक्रम असला तरी प्राथमिक गरजा भागविण्यासाठी निरनिराळी जंगले (घनदाट, काष्ठवने), झुडुपी गवताळ प्रदेश, नद्या आणि जलमय भूमी यांचा उपयोग भरपूर केला जात असे. साधनसंपत्तीचे असे अनेक घटक होते. विशिष्ट प्रदेशात यांतला प्रत्येक घटक मर्यादित प्रमाणात उपलब्ध असला तरी सर्वसामान्यांना त्यांतून निवड करण्यास वाव मोठा होता. बाजारातील किंमत ही एखाद्या वस्तूच्या मर्यादित पुरवठ्यावरच अवलंबून नव्हती, तर मर्यादित साठा असलेल्या वस्तूला पर्याय किती उपलब्ध आहेत, त्यांची ग्राहक कोणत्या प्रमाणात निवड करणार यावर अवलंबून असणार हे उघड आहे. म्हणजेच इथे काही ठराविक गोष्टींचा पुरवठा करणारी केंद्रीभूत बाजारपेठ (Centralized market) फक्त नागरी भागात शक्य आहे. अन्यत्र गाव पातळीवर, स्थानिक वस्तूंची देवाणघेवाण करणाऱ्या असंख्य बाजारपेठा उभ्या राहणे अपरिहार्य ठरते. आणि नेमकी अशीच परिस्थिती भारतात ब्रिटिश सत्ता प्रस्थापित होण्यापूर्वी होती आणि आजही काही भागांत अजूनही टिकून आहे. पैशापेक्षा अशा व्यवस्थेत जैवविविधतेला महत्त्व आहे.

गरीब-श्रीमंत, विशेषतः गरिबीचे मूल्यमापन केवळ पैशात अशा व्यवस्थेमध्ये करणे बरोबर नाही. तर माणसाला त्याच्या प्राथमिक गरजा भागविण्यासाठी पर्यायी साधनसंपत्ती (संसाधने, Resources) कितपत उपलब्ध आहेत, माणूस या संसाधनांचा प्रत्यक्षात कितपत उपभोग घेतो, या गोष्टी मूल्यमापनात महत्त्वाच्या आहेत. जैवविविधतेचे वैपुल्य

असलेल्या भारत-चीनसारख्या देशांतील अर्थव्यवस्थेचे योग्य मूल्यमापन युरोपीय अर्थशास्त्राद्वारे होणार नाही. त्याला वेगळेच निकष हवेत.

भारतातील परिस्थितीला योग्य होईल असे अर्थशास्त्र अनंत मागण्या आणि मर्यादित संसाधने यांवर अवलंबून असण्यापेक्षा समाजाने व्यक्तीवर बंधने टाकून त्यातून निर्माण झालेल्या मर्यादित मागण्या आणि मर्यादित पुरवठा पण जैवविविधतेमुळे निरनिराळे पर्याय पुरविणारी संसाधने यांवर अवलंबून असेल. इथे असंख्य लहान बाजारपेठा असतील आणि किंमती ठरतील त्या या असंख्य बाजारपेठांतील दळणवळण, आवक-जावक किती सुलभ आहे, यांवर.

युरोपीय अर्थशास्त्रात व्यक्तिस्वातंत्र्याला महत्त्व आहे. त्याचे सुपरिणाम आहेत, तसे दुष्परिणामही नजरेस आले आहेत. मुख्यतः व्यक्तीची निवड नेहमीच योग्य असेल असे नाही. ती कित्येकदा अवास्तव (Irrational) असू शकते, हे ध्यानात आले आहे. त्याचप्रमाणे युरोपीय अर्थशास्त्रात कोणत्या वस्तूचे उत्पादन केले जाते (Composition of production) याला महत्त्व नाही, त्याची चौकशी केली जात नाही. त्यामुळे व्यक्तिकेंद्रित अर्थव्यवस्थेत पुष्कळदा उत्पादनाचे स्वरूप समाजविघातक असू शकते, हे सुद्धा कळून चुकलेले आहे. डॉ. नरिंदर सिंग यांनी दाखवून दिले आहे की बाजारपेठेत उपलब्ध वस्तूपैकी ७० टक्के वस्तूंत विषारी घटक आहेत (Economics and The Crisis of Ecology 1978). रॅचेल कार्सनने शेतीमध्ये विषारी कीटकनाशके वापरल्यामुळे समाजावर कोणते भयानक परिणाम होतात हे साद्यंत दाखविले आहे (Silent Spring 1962). हरमन डाली, आयर्स, एहरलिच या अर्थवेत्त्यांनी आजची उत्पादने मुख्यतः खनिजतेल, कोळसा यांवर अवलंबून असल्याने भौतिक शास्त्राच्या नियमांनुसार (Laws of Thermodynamics) उत्पादने तयार करण्यासाठी लागणारा खर्च हा नेहमीच उत्पादने विकून मिळणाऱ्या फायद्यापेक्षा जास्त असतो. म्हणजेच आधुनिक उत्पादन हे मुळात तोट्यात जाणारे आहे, हे ही दाखवून दिले आहे. त्यामुळे युरोपीय अर्थशास्त्राला उत्पादन चालू ठेवण्यासाठी कमीत कमी किंमतीत संसाधने मिळतील, तिथून ती ताब्यात घेणे हे अपरिहार्य आहे. त्यामुळे प्रथम वसाहतवादाद्वारे आणि अलिकडे जागतिकीकरणाचा पुरस्कार करून जगभरातून कच्चा

माल मिळविणे अपरिहार्य बनले आहे.

त्यामुळे युरोपीय अर्थशास्त्रात भांडवलाला महत्त्व आहे आणि भांडवल आणि बळ यांचा उपयोग करून संसाधने ताब्यात ठेवण्याचा प्रयत्न तिथे नेहमीच केला जातो. या उलट भारतीय अर्थशास्त्रात भांडवली गुंतवणूक ही संसाधनांचा दर्जा वाढविण्याकडे खर्च होऊन उत्पादन वाढ किंवा जैवविविधतेची उपलब्धता वाढविली जाते. एकीकडे उत्पादनातील वाढ ही संख्यात्मक आहे, तर दुसरीकडे ती गुणात्मक आहे.

अर्थव्यवस्था जर खरंच जैवविविधतेवर आधारीत असेल तर संसाधनांच्या देवाणघेवाणीला महत्त्व येईल. म्हणजेच ती बार्टर इकॉनॉमी असेल. विकेंद्रित, लहान बाजारपेठा असे तिचे आणखी एक वैशिष्ट्य असेल. पैशाला, भांडवलाला फार महत्त्व नसेल.

संख्यात्मक वाढ काय किंवा गुणात्मक वाढ काय, ती साधण्यासाठी तंत्रज्ञान या हत्याराचा (Tool) उपयोग करावा लागेल. संख्यात्मक वाढ करण्यासाठी जे तंत्रज्ञान अवलंबविले जाते त्याचा पाया भौतिकशास्त्र, अभियांत्रिकी आणि खनिज ऊर्जा यांचा आहे. जैवविविधतेवर आधारलेल्या अर्थव्यवस्थेत संसाधनांचा दर्जा व संख्या वाढवायची झाल्यास भौतिकशास्त्रांबरोबर जैवशास्त्रे, जनुकशास्त्र यांचा उपयोग करावा लागेल आणि तंत्रज्ञानही पर्यावरण, सजीवांचे निरीक्षण वगैरेवर आधारीत होईल.

चालू अर्थव्यवस्था (युरोपीय) आणि भारतासाठी योग्य असणारी व्यवस्था यांतील फरक खालील तक्त्यावरून स्पष्ट होईल.

चालू (युरोपीय अर्थव्यवस्था)

भारतास योग्य अर्थव्यवस्था

१ आदर्श परिस्थिती गृहीत धरते.

उदा. आदर्श संपत्ती वाटप,
सामाजिक विषमता नाही.

वैयक्तिक निवड पुष्कळशी
एकसारखी

२ अपरिहार्यपणे संयुक्त कुटुंब-
पद्धतीपेक्षा नवरा-बायकोची

१ उपभोक्त्याची वैशिष्ट्ये :

निवडीचे स्वातंत्र्य, मात्र व्यक्ती
ही कोणत्यातरी - धंदेवाईक,
सामाजिक, आर्थिक, धार्मिक
समूहाची सदस्य. तिची निवड
त्या सदस्यत्वावर अवलंबून

२ व्यक्तीच्या गरजा त्याच्या

उत्पन्नावर, तसेच त्याच्या समूह

- कुटुंबपद्धती योग्य समजते
३ तंत्रज्ञान आणि खनिज ऊर्जा
आवश्यक. पुरवठा सतत
वाढता हवा. भौतिकशास्त्रांच्या
नियमांकडे दुर्लक्ष
- ४ समशीतोष्ण आणि उष्ण
कटिबंधातील वातावरणाच्या
फरकाकडे दुर्लक्ष
- ५ एकच प्रकारची जीवनशैली
जागतिक पातळीवर असावी
असा प्रयत्न. तंत्रज्ञान, खनिज
ऊर्जेचा वापर आणि अतिरिक्त
वस्तूंचे उत्पादन त्यासाठी
आवश्यक
- ६ वैयक्तिक स्वातंत्र्य, स्वार्थ,
नफ्याचा हव्यास यांस
अवास्तव महत्त्व. सांस्कृतिक
आणि सामाजिक बंधनांना
कमी लेखणे
- ७ त्यामुळे आर्थिक वाढ म्हणजे
अंतर्गत उत्पादन सतत वाढणे,
उत्पन्ने आणि नफा सतत
वाढणे या गोष्टी आवश्यक
- सदस्यत्वावर अवलंबून
३ आवड आणि निवड यांचे
स्वातंत्र्य पण सदस्यत्वामुळे
त्यावर मर्यादा
- ४ वैयक्तिक मालकी मान्य. पण
संसाधनांचा प्रत्यक्ष वापर आणि
विनियोग समाजाच्या आणि
समूहाच्या मान्यतेने
- ५ आर्थिक व्यवहाराचा पाया
म्हणजे जैवविज्ञान, जैवभार
आणि जैवविविधता, तंत्रज्ञान
नव्हे. संसाधने व नैसर्गिक
यंत्रणा यांचा दर्जा वृद्धिंगत
करण्यासाठी साध्या तंत्राचा
वापर. त्यामुळे वितरण योग्य
- ६ उपजीविका मुख्यतः निसर्ग
आणि संसाधने यांची काळजी
घेणे, जैवविविधतेची राखण व
वृद्धी करणे यांवर अवलंबून.
खनिज ऊर्जेचा माफक वापर
फक्त निसर्गसंस्थांची दुरुस्ती,
पुनर्वापर, पुनरुज्जीवन
यासाठीच
- ७ उपजीविकेचे निर्माण, निसर्ग व
निसर्गाच्या सुविधा यांचे
पुनरुज्जीवन करून, उद्योग
छोटे आणि विकेंद्रित मुख्यतः
प्राथमिक गरजा पुरविणारे.
शेतजमिनीची मालकी वैयक्तिक

- पण शेती उत्पादनांचे नियोजन गावपातळीवर आणि विनियोग सहकारी संस्थांमार्फत
- ८ उत्पादन आणि उपभोग या दोन्हीमध्ये ज्या वस्तू, माल अंतर्भूत होतो त्यांची योग्यता आणि दर्जा यांकडे दुर्लक्ष
- ९ वैयक्तिक आवड-निवड स्वार्थ, आर्थिक वाढ आणि उत्पन्नातील वाढ यासाठी अनियंत्रित बाजारपेठ आवश्यक
- ८ अतिरिक्त उत्पादनाचा आकार स्थानिक गरजा व स्थानिक वापर यांवर अवलंबून, निर्यातीवर नव्हे
- ९ खनिज ऊर्जेचा उपयोग मुख्यतः समाजाच्या गरजा भागविण्यासाठी. उदा. विद्युत निर्मिती, सार्वजनिक वाहतूक, प्राथमिक गरजा भागविण्यासाठी लागणारी अवजारे (Tools) आणि प्राथमिक ते उच्च शिक्षणास चालना की जे शिक्षण लोकांना निसर्गविषयक कसबे देईल आणि निसर्गाचे सखोल ज्ञान होण्यास मदत करील
- १० निसर्ग आणि त्यापासून मिळणाऱ्या सुविधांकडे दुर्लक्ष आणि त्यांची बदल सहन करण्याची क्षमता अमर्यादित असा विश्वास
- १० वैयक्तिक आवडी-निवडीवर आधारीत, केंद्रीभूत असा खनिज ऊर्जेचा वापर टाळणे आणि त्याद्वारे भौतिकशास्त्राच्या नियमांच्या कचाट्यात न सापडणे
- ११ निसर्ग म्हणजेच वनस्पती व प्राणीसृष्टी आणि निसर्ग मोफत पुरवित असलेल्या सुविधा यांमध्ये माणसाला अनुकूल असे बदल घडवून आणण्याची तंत्रज्ञानाची क्षमता अमर्याद
- ११ राजकीय सत्तेचा वापर लोकशाही मार्गाने. सरकारची भूमिका व कार्य म्हणजे समाजात निरनिराळी कसबे निर्माण होतील असे शिक्षण देणे. योग्य कायद्यान्वये समाजातील

आहे, हे गृहीतक

निरनिराळ्या समूहांच्या कार्यावर नियंत्रण ठेवणे. उत्पादन आणि वितरण यांमधून साठेबाजी, टंचाई, मक्तेदारी या गोष्टी तयार होत नाहीत हे पाहणे आणि नैसर्गिक आपत्तींचे निवारण करणे

१२ मुक्त स्पर्धा, सरकारी नियंत्रण नसलेली अर्थ-व्यवस्था, देशांतर्गत आणि आंतरराष्ट्रीय विषमता चालूच रहात असली, त्यामुळे निसर्ग आणि नैसर्गिक सुविधा यांचा नाश होत असला आणि उद्योग कुठे उभे करायचे आणि नोकऱ्या कशा निर्माण होणार यांतील संतुलन बिघडत राहिले तरी सरकारने त्यात हस्तक्षेप करू नये असा आग्रह

१२ बचत आणि भांडवल संचय या गोष्टी वैयक्तिक कसब, बौद्धिक क्षमता आणि धडाडी यांवर अवलंबून. गुंतवणूक शेअर बाजाराद्वारे नाही तर व्यावसायिक व इतर समूहाद्वारे संचालित आणि त्यावर सरकारचे लक्ष. वैयक्तिक मालकीखाली असणारी पण अजूनपर्यंत वापरात न आलेली संसाधने यांपासून भाडे (Rent) प्राप्त होत असेल तर त्यावर कर आणि त्यापासून मिळणारे उत्पन्न सामाजिक उन्नतीसाठी वापरणे

१३ समाजाची रचना आणि कार्ये चालू राहण्यासाठी भांडवल-शाही किंवा साम्यवाद हे दोनच पर्याय उपलब्ध आहेत, हे गृहीत धरणे

१३ निसर्गव्यवस्थेची मूलतत्त्वे व त्यावर धोरणे आवश्यक

१४ या आग्रहामुळे इतर रचनांचा विचार अनावश्यक आणि निषिद्ध

१४ लोकसंख्या वाढ रोखून धरणे व एका विशिष्ट मर्यादितपलिकडे वाढ होणार नाही हे पाहणे

- १५ कंदमुळे, शिकार यांपासून कारखानदारीपर्यंत जी मानवाची उत्क्रांती झाली आहे तिचा सखोल विचार न करणे, विशेषतः उष्ण कटिबंधात ज्या असंख्य प्रकारच्या उपजीविका, त्यातून निर्माण होणारी सांस्कृतिक व सामाजिक नियंत्रणे यांचा फार विचार न करणे
- १६ अर्थशास्त्र हे युरोपातील पुनरुत्थान (Rennissance) आणि त्यातून निर्माण झालेला आदर्शवाद यांवर आधारीत असल्याने युरोप, अमेरिकेतील जीवनशैली पुरस्कृत करणे
- १७ त्यामुळे वैयक्तिक पातळीवरच्या अवास्तव व पुष्कळदा समाजविघातक गरजा, स्वार्थाचा अतिरेक आणि इतर समाज, निसर्ग व नैसर्गिक सुविधा यांना घातक ठरणार्या आवडी-निवडी या कशा नियंत्रित केल्या जाव्या यासाठी अर्थशास्त्र कोणताच तोडगा सुचवू शकत नाही
- १५ नैसर्गिक संसाधनांचा पुनर्वापर यांवर अर्थव्यवस्थेची उभारणी करणे
- १६ यांमध्ये शेतीमध्ये कमीत कमी नांगरट, उद्योग हे कार्बनपेक्षा हायड्रोजनवर आधारीत. यांचा पुरस्कार केला जातो
- १७ उद्योगांची उभारणी पुनर्वापरावर. मोटारीपेक्षा सायकलींचे उत्पादन वाढविणे, पवनऊर्जेपासून यांत्रिक ऊर्जा वापर, सौर ऊर्जेचा उष्णता, वाळविणे-सारख्या प्रक्रिया, गरम पाणी मिळविण्यासाठी असा मर्यादित वापर, तसेच सरपणासाठी, आरोग्यासाठी, जैवभार मिळविण्यासाठी, कीटक, प्राणी, पक्षी येण्यासाठी स्थानिक प्रजातींचे वृक्षारोपण आणि त्यादृष्टीने आवश्यक सुविधा पुरविणारे व्यवसाय व धंदे यांना

उत्तेजन

१८ डेन्मार्क आणि आइसलॅंड यांनी
या दिशेने जी प्रगती केली आहे
ती अभ्यासणे व स्थानिक
परिस्थितीला आवश्यक असे
त्यात बदल करून तशा
प्रकारची जीवनशैली स्वीकारणे

भारताची भौगोलिक, नैसर्गिक परिस्थिती पाहता एक निराळे तंत्रज्ञान, निराळी अभियांत्रिकी, निराळी अर्थव्यवस्था आणि या सर्वांस अनुसरून निराळी शिक्षणपद्धती शक्य आहे, हे विशद करावे म्हणून हे सर्व लिहिले. या सर्व बदलाचा गाभा आहे योग्य शिक्षण, अगदी प्राथमिपासून उच्च पातळीपर्यंत. माझ्या मते ते आंतरशास्त्रीय असावे. त्यामधून एक सर्वंकष दृष्टीकोन तयार होतो असे मला वाटते. यांमधून त्या त्या विषयातील तज्ज्ञ तयार होणार नाहीत असे नाही. पण या तज्ज्ञांनाही इतर विषय, इतर क्षेत्रे यांचे भान असेल. त्यातून समाजातील मतभेदांचे निवारण, सामाजिक आरोग्य आणि समता या सर्वांचीच आपण सर्वजण वाट पहात असतो, नाही का?

भारतास अनुकूल अशा अर्थव्यवस्थेचा पाया पर्यावरण हा आहे हे यांवरून दिसून येईल. संपत्तीचे योग्य वितरण समाजात केवळ पर्यावरणाची कास धरल्याने होऊ शकेल. भांडवली गुंतवणूक ही निसर्ग, निसर्गातील परिसंस्था आणि निसर्ग मोफत पुरवित असलेल्या सुविधा, या सुदृढ व सक्षम राखण्यासाठी मुख्यतः झाली पाहिजे.

प्रकाश गोळे



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