

GREENING THE ECONOMY-MEASURING GREEN GROWTH AND SUSTAINABLE CONSUMPTION

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Introduction and Objective:

There are two most important dimensions of environmental sustainability. The first is to find out an appropriate technique of its measurement and second to identify the fundamental human behaviour responsible for its sustainability. The present paper makes an attempt to discuss these two objectives. Under first objective various methods of measurement of sustainability will be reviewed. The problems relating to one single index of measurement will be analysed. As far as second objective is concerned, the fundamental cause of environmental degradation is the basic human greed of accumulation and excess consumption. How this behaviour can be controlled will be discussed. Ethical behaviour of mankind towards natural resources and future generations will go a long way in preventing degradation.

Measuring Green Growth

The **Brundtland** Report published in 1987, defined “sustainable development that meets the needs of the present without compromising the ability of future generations to meet their own needs”. In the process of economic development these two opposite activities are in operation simultaneously. On one hand, there are destructive activities which harm environment and on the other hand, there are constructive activities which restore and enhance environment. Sustainable development should emphasize more the constructive activities. For example, women education, wide spread health services and awareness education etc., are some of the policies which will help in containing increase in population and judicious policies implementation to protect environment.

Robert Solow the eminent development economist has further refined the Brundtland approach. Robert Solow’s formulation sees sustainability as the requirement that the next generation must be left with whatever it takes to achieve a standard of living at least as good as our own and to look after their next generation similarly.

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Amartya Sen has further refined Solow's formulation by adding two more variables in standard of living. These are people's capabilities and freedom. In the absence of opportunities to enhance capabilities and freedom, increase in standard of living does not make people happy. Happiness and well-being are the two basic requirements of a developmental process.

Thus a complete definition of sustainable development will include all the three formulations given by Brundtland, Solow and Amartya Sen. In other words, sustainable development and the environment should include, (1) development that meets the needs of the present without compromising the ability of future generations to meet their own needs, (2) sustainability of the requirements that the next generations must be left with whatever it takes to achieve a standard of living at least as good as our own to look after their next generation similarly and (3) in the development process vis-à-vis environment the concept of standard of living should include the opportunities to enhance one's capabilities and enjoy freedom.

Measurement of Sustainability:

Researchers and Research Organisations world over have been busy to evolve the techniques of measuring the sustainability. A number of methodologies and techniques have been evolved. But The Report by the Commission on the Measurement has identified the following four important and authentic techniques which are being discussed in the following analysis.

1. Large and eclectic dashboards
2. Composite Indices
3. Indices that consist of correcting GDP in more or less extensive way and
4. Indices that essentially focus on measuring how far we currently "overconsume" our resources

Large and eclectic dashboards:

This involves gathering and ordering a series of indicators that bear a direct or indirect relationship to socio-economic progress and its durability. These dashboards have two distinct advantages. First, they are an initial step in any analysis of

sustainability. Two, it is also related to the distinction between “weak” and strong sustainability. The “weak” approach considers that good performance in some dimensions can compensate for low performance in others. The “strong” approach argues that sustainability requires separately maintaining the quantity or quality of many different environmental items.

Dashboards suffer because of their heterogeneity and most lack of implications about their causal links, relationship to sustainability. They also lack what has made GDP a success which is the most powerful single indicator of the progress of socio-economic performance.

During the last decade under the influence of the United Nations and the 1992 Rio Summit a number of dashboards have been prepared by the different nations of the world. The OECD and Eurostat have prepared dashboards to measure sustainability which have become famous. The current version of this dashboard includes 9 indicators for level 1, 33 indicators for level 2, and 78 indicators for level 3 with level 2 and 3 indicators covering 29 sub-themes. The level I indicators are shown below in the following Table:

Revised list of European Sustainable Development indicators level (1)

Theme	Level (I) Indicators
1. Socio-Economic development	Growth rate of GDP per capita
2. Sustainable consumption and production	Resource productivity
3. Social inclusion	At-risk-of-poverty rate after social transfers
4. Demographic changes	Employment rate of older workers
5. Public health	Healthy life years and life expectancy at birth
6. Sustainable development	Total greenhouse gas emissions
7. Sustainable transport	Energy consumption of transport
8. Natural resources	Common bird index
9. Global partnership	Official development Assistance (ODA)

Composite Indices

Composite indices synthesize the relevant information into a single number. Some of the composite indices can be cited such as Osberg and Sharpe’s Index of Economic Well-

Being, Environmental Sustainability Index (ESI), Environmental Performance Index (EPI) etc. The major drawback of these indices is that their messages are ambiguous. They are unable to distinguish between a rich and a poor country in respect of some indicators. Again they are not so popular as GDP indicator.

Composite indexes have the benefit of synthesising dashboard relevant information into one single number. These indexes have generally been prepared by academics and non-government organisations. The important index is formulated by **Osberg and Sharpe** which is known as Index of Economic Well-Being (IEWB). In this index environmental issues are addressed by considering the costs of CO₂ emissions per capita. Consumption flows and wealth accumulation are evaluated according to National Accounts methodology.

Yale and Columbia Universities developed “Environmental Sustainability Index” (ESI) and “Environmental Performance Index” (EPI). The ESI covers (i) 5 domains i.e. air, land, water, biodiversity, (ii) environmental stresses reductions such as air pollution, waste pressure, natural resource management, (iii) human vulnerability i.e. exposure of inhabitants to environmental disturbances (iv) social and institutional capacity and (v) Global Steward i.e. cooperation with other countries in the management of environmental problems. Many other indexes are also currently available.

Indices that consist of correcting GDP in more or less extensive way

Adjusted GDPs: Under this measure necessary adjustments are made in traditional GDP accounting to measure sustainability. Two indicators are provided. **First**, is a Measure of Economic Welfare (MEW) obtained by subtracting from total private consumption a number of components that do not contribute positively to welfare and by adding monetary estimates of activities that do contribute positively to welfare. **Second**, converting the MEW into the SMEW by taking into account changes in total wealth. The SMEW measures the level of MEW that is compatible with prevailing capital stock.

Two strands developed from this contribution. (i) Genuine Progress Index (GPI) (ii) System of Environmental Economic Accounting (SEEA), a satellite account of Standard National Accounts (SNA). These are useful concepts with far-reaching implications.

Adjusted GDP: Greening the National Accounts

The most important index in this regard has been developed by **Nordhaus and Tobin** known as Sustainable Measure of Economic Welfare (SMEW). They included estimate of total public and private wealth, educational capital and health capital. **Daly and Cobb** refined sustainability of Economic Welfare in order to incorporate natural resources and the Genuine Progress Indicator (GPI). Those indicators deduct the costs of water, air, and noise from consumption and accounts mainly for losses of wetlands, farmland, primary forests and Co₂ damages.

Indicators Focusing on over-consumption or under-investment

Under this heading all kinds of indicators of sustainability in terms of over consumption, under investment or excessive pressure on resources are undertaken. This includes the two concepts: (1) Adjusted Net Saving (ANS) and (2) Footprints.

1. Adjusted Net Saving (ANS)

Adjusted Net Savings is also known as genuine savings or genuine investment. This is a sustainability indicator that builds on the concepts of green national accounts but reformulates these concepts in terms of stock or wealth rather than flows of income on consumption. Empirically, adjusted net savings are derived from standard national accounting measures of gross national savings making four types of adjustments.

- I. Estimates of the capital consumption of produced assets are deducted to obtain net national savings.
- II. Current expenditure on education are added to net domestic savings as an appropriate value for investment in human capital.
- III. Estimates of the depletion of a variety of natural resources are deducted to reflect the decline in asset values associated with their extraction and harvest.
- IV. Global pollution damages from carbon dioxide emissions are deducted. Negative adjusted savings rate imply that “extended wealth” is in decline and as such provide a warning of non-sustainability.

The adjusted national saving concept has a number limitations:

- I. Estimates of adjusted savings adjusted for environmental degradation is only limited to a restricted set of pollutants i.e. carbon dioxide emissions.
- II. The pricing techniques remain the major issue. Prices for these pollutants fluctuate violently.
- III. By computing ANS per country we miss the global nature of sustainability because some countries import the natural resources while some export them.

1. **Foot Prints**

The Ecological Footprints (EF) measure how much of the regenerative capacity of the biosphere is used up by human activities or consumption. A country's Footprint is the total area required to produce the food, fibre and timber that it consumes, absorb the waste that it generates, and provide space for its infrastructure. On the supply side, bio-capacity is the productive capacity of the biosphere and its ability to provide flux of biological resources and services useful to mankind. At present humanity's footprint has been larger than the planet's carrying capacity. It implies non-sustainability of world environment.

The Ecology Footprint was initially proposed by **Wackernagel and Rees**. Now it has gained popularity among green NGOs and public opinion. The methodology of calculating Footprints has many limitations. **Vanden Bergh and Verbruggen** have pointed out that there is strong anti-trade bias in it. It leads to some contradictory results. Some densely populated countries come as ecologically sustainable whereas sparsely populated turn into unsustainable economies. On this result, resource-abundant countries become importers and resource-scare countries become exporters. The Ecological Footprint methodology provides interesting elements for a full carbon account of consumption, as the carbon footprint at the country level takes into account not only direct Co₂ emissions, but also indirect emissions embodied in imported goods.

Single Index approaches to sustainability: Where are the obstacles?

Empirically data shows that the relationship between these measures is very weak and even in some cases opposite to each other. When data was plotted against each other it was found that the ESI and the ANS display small positive correlation due to the fact that they both have a bias in favour of more developed countries. The correlation is also of the same sign for the ANS and EF. Countries sustainable from the point of view of the ANS have

higher EF and are therefore less sustainable or, more precisely, contribute more to global unsustainability than countries with low ANS.

GDP content is present in all the approaches. Some time dependence on GDP gives fallacious results. For example, when extensive damages are caused to the economy due to some catastrophe. Buildings and other non-manmade and natural resources are damaged. This should be a decline in GDP. Activities to repair these damages will show increase in investment activities and hence increase in GDP. What is actually being missed is that the investment activities are compensating the losses to resources. There is not net addition to the normal assets and resources.

Difficulties in Quantifying a Consensual Approach of sustainability

Some methods of quantifying the sustainability have been reviewed above. These methods give different messages and interpretation regarding environmental sustainability. Two important questions remain puzzling to the statisticians and the policy makers. These questions are:

1. What do we want to measure?
2. What are the difficulties in summarising sustainability in one number as such. Is it number realistic?

An attempt is made to answer these questions.

What do we want to Measure?

The concept of sustainability includes many dimensions of present and future economic, social and environmental well-being. Once present well-being is determined, the question is whether this well-being can be continued even in future or not. The answer is that a unidimensional view of sustainability cannot be reached. We have to evolve at least a “micro” dashboard to the sustainability issue to know the exact motion of sustainability. This motion will have to be related to conventional GDP turned into green GDP.

Summarising Sustainability in one Number: Is it Feasible?

The above mentioned methods of measuring environmental sustainability have many weaknesses. Some suggest that an index is feasible if the factors are measured in monetary terms. Products and services marketed have prices and can easily be measured

in monetary terms. However, there are many factors which are not marketed cannot be brought under monetary measures. These non-monetary factors have to be brought under monetary measures by some methodological procedures of accounting prices. Combining both types of factors will result in an sustainability index. This procedure is also not universally agreed upon because of a number of difficulties encountered in measuring non-tradable factors.

Technological Uncertainties

Measuring sustainability has two problems. One, future eco-environmental developments cannot be predicted perfectly and two, how these developments will affect well-being. Some solutions can be estimated by working on scenarios or provide confidence intervals. Some kind of sensitivity analysis has to be done for different parameters with different scenarios. To work out this, both monetary indices and physical indices will have to be prepared. Monetary index will include tradable items and physical index will measure the quality and quantify of the physical products.

Uncertainty is also Normative

In tradable items normative questions are reflected in their prices but in non-tradable items many normative questions have to be answered. In such cases there is no method of measuring people's preferences. Inequalities in income and wealth make sharp differences in normative preferences. Distributional issues will have to be addressed before answering any normative question. Only then are index of sustainability can be prepared.

Global Dimension Creates Complexity

There are two types of countries one who export natural resources and second those who import these resources. The importing countries use "clean" technologies which do not create the problem of environmental pollution. On the other hand, resources-exporting countries are less developed countries which use 'dirty' technologies and create environmental problems. The former case is that of environmental sustainability whereas the later case is that of environmental un-sustainability. Combining these two cases in one single index creates many problems both of physical and normative nature. Measuring sustainability for each country will not be sufficient because environmental degradation is of

global nature and has global repercussions for all countries. This index prepared for each country separately will give the wrong message to statisticians and policy makers. Each country will have to formulate its index taking global dimension into consideration. Only then the sustainability index will be of some relevance.

Recommendations

There is an environmental crisis associated with global warming. The economic performance is distorted by two factors. One, market prices are distorted by the fact that there is no charge imposed on carbon emissions and two, no account is made of the cost of these emissions in standard national income accounts.

Measuring sustainability involves how to maintain its present well-being and how it can be maintained for future generations. This calls for many assumptions and normative choices. This issue is further complicated because environmental sustainability is affected by the interactions between the socio-economic and environmental models followed by different countries.

A number of recommendations have been made by the Commission in this regard given below:

1. "Sustainability assessment requires a well-defined dashboard of indicators. The distinctive feature of components of this dashboard should be some underlying "stocks". A monetary index of sustainability has its place in such a dashboard but, under the current state of art, it should remain essentially focussed on economic aspects of sustainability".

Sustainability and current well-being are complementary to each other. However, the two have to be treated separately to avoid confusion. Many existing approaches fail to adopt this principle. Sustainability requires the simultaneous preservation or increase in several "stocks": quantities and qualities of natural resources and of human, social and physical capital.

The stock approach to sustainability has two versions one, to assess the change in stock and keep it above critical level. Second, convert all the assets into monetary equivalents so that substitutability among assets is made possible. Any fall or increase in one capital asset can be compensated by another capital asset. The

imputations of the value of assets involve many problems for the present well-being and future sustainability.

2. Regarding physical indicators for environmental pressures it has been recommended that “the environmental aspects of sustainability deserve a separate follow up based on a well-chosen set of physical indicators. In particular there is a need for a clear indicator of our proximity to dangerous levels of environmental damages (such as associated with climate change on the depletion of fishing stocks).

In practice placing a monetary value to the natural environment is difficult. Therefore, separate physical indicators will be needed to monitor the state of the environment. The Scientific community is capable enough to develop physical indicators of increases in atmospheric concentrations of green house gases and climate change due to increases in atmospheric concentrations of green house gases which are nearing dangerous levels.

Conclusion

Main Messages and Tentative Conclusions

The Commission on the Measurement of Economic Performance and Social Progress in its report has given three messages and four recommendations relating to Sustainable Development and Environment. These are reproduced below:

Message 1 – Measuring sustainability differs from standard statistical practice in a fundamental way to do it adequately. We need projections not only observations.

Message 2- Measuring sustainability also entails poor responses to normative questions. In this respect too, it strongly differs from standard statistical activity.

Message 3- Measuring sustainability raises an additional difficulty in an international context. The question is not exclusively to assess relative sustainabilities of each country taken separately. The problem is global, at least in this environmental dimension. In that case, what is at stake is rather the contribution of each country to global sustainability or unsustainability.

Recommendation 1 – Sustainability assessment requires a well-identified sub-dashboard of the global dashboard to be recommended by the Commission.

Recommendation 2- The distinctive feature of all components of this sub-dashboard should be interpretable as variations of some “stocks”.

Recommendation 3- A monetary index of sustainability has its place in a sustainability dashboard, but under the current state of the art, it should remain essentially focussed on economic aspects of sustainability.

Recommendation 4- The environmental aspects of sustainability deserve a separate follow-up on well chosen set of physical indicators.

Sustainable Consumption

The World watch Institute in its year 2000 report has identified some well-established trends which will shape the future of civilization in 21st century. These trends include population growth, rising temperature, falling water tables, shrinking cropland, shrinking forests, loss of plant and animal species and collapse of fisheries. This environmental degradation raises a number of ethical questions. The major questions are:

1. What values of society need to be changed to slow down or stop the process of environmental degradation?
2. What are the obligations of the present generation towards future generations for sustainable development?
3. Which sections of society will be most affected and who will compensate them?
4. Who will protect the life of plants and animal species which will get extinct?

All these question are interrelated and separate answers for each question are not possible. There are some broad topics under which these interrelated question can be answered. The same are being discussed here.

Ecological Ethics

The various parts of ecological system are interrelated. Any change in the activities of one part will affect the entire system. Survival of one part will support the survival of other parts. Partial solution will not work. The system will have to be dealt with as a whole. This truth has to be made amply clear to all policy makers and consumers and producers who produce and consume products. The ecological ethics involved in that environment should be protected not only for human beings but for non-human beings also. Both are

interdependent for their survival at large. At present, human interference with the non-human world is excessive, and the situation is rapidly worsening. Policies must, therefore, be changed. The changes in policies affect basic economic, technological and ideological structures. The whole scenario will have to be different from the present one.

The ecological ethics demands that the welfare of the non-humans is intrinsically valuable and therefore, we humans have a respect and preserve them. Utilitarian viewpoints that pain is an evil whether it is inflicted on humans or non-humans, has great merit as far as ecological ethics is concerned. The cruelty towards animals in any form is unethical. Extending it further, it is also argued that not only living beings but even natural species-a lake, a wild river, a mountain and even the entire biotic community- has a right to have its integrity, stability and beauty preserved.

Ethics of Environmental Rights

We have a right to a livable environment and our right imposes on others their duty of not interfering in our exercise of that right. In many countries this right has been incorporated in their legal system. It is also argued that this environmental right should override many other rights. It is so because advancement in technology has enabled us to manipulate environment. This manipulation has greatly endangered other rights of decent living, right to property and right to liberty and equality.

The Utilitarians also defend this line of thinking. Environmental pollution conceals the real cost of producing commodities. This leads to inefficient distribution of resources. This, ultimately harms the welfare of the society as a whole. Therefore, the utilitarians argue that individuals should avoid pollution because it adversely affects the welfare of the society.

The Ethics of Conserving Depletable Resources

The depletion of resources will be primarily felt by posterity. The future generations have equal rights to the resources for their welfare. The problems will be more with regard to finite and non-renewable resources. Conservation of the finite and non-renewable resources is the main ethical issue which needs serious thinking by the present generation.

There are thinkers who claim that it is a mistake to think for the rights of future generations. Three main arguments have been given by them. **First**, future generations do

not exist and may never exist. They exist only in imagination. **Two**, conserving resources for future generations, as a matter of their rights, will lead to absurd position. The questions raised will be for how many generations the resources are to be conserved? How to divide these finite and non renewable resources among these generations? **Third**, the issue of rights is directly involved with the interests of those whose rights are being violated. Nobody knows what will be the interest of future generations. Rapid advances in science and technology is capable of changing the genetical structure of species. In such a situation what type of persons will exist and what will be their interests? Further, these generations will be capable to evolve the substitutes of these resources and the substitutes may be cheaper and more efficient.

John Rawls, the famous philosopher, has come out in defence of future generation. In his theory of justice he said that it is unjust for present generation to leave nothing for future generations. To determine a just way of distributing resources between generations, he has come out with a suggestion. He suggested that the members of each generation should put themselves in the “Original position” and, without knowing that what generation they belong to Justice, then, requires that we hand over to our immediate successors a world that is not in worse condition than the one we received from our ancestors.

The alternative model is given in the wisdom of ancient Indian thinking. This valuable wisdom is contained in the **Vedas**, the **Epics**, the **Puranas**, the **Bhagwat Geeta**, **Kautilya Arthshastra**, **Manusmriti**, the **Buddhist** and **Jain** canonical literature and so on. In modern times Mahatma Gandhi and many other reformers and saints uphold the ancient values the only way to enhance happiness.

The basic under current running in all these literary works has remarkable similarity. The common points emphasized by all are that a balance has to be worked out in human values, economic development and environment. Further, a balance has to be struck between spiritual and materialistic values, between greed and compassion, between self-restraint and self-indulgence and between violence and peace. In the Gandhian parlance, “On this earth there is enough for everyone need but not for their greed” A harmonious relationship has to be established between economic development, environment and spiritual values. A holistic approach to life is needed and not the fragmented one between economic and non-economic activities. Earth and its resources have to be worshipped, conserved and protected. The resources of the earth have to be shared by all beings

whether human or non-human. All plants and animals are equal partners in sharing the resources of the earth. The specific contributions of the ancient literary works are cited below.

The Vedas

In The Atharva Veda, in its Prithvi Sukta, the Rishi prays to the mother earth, “On whom rest the ocean, the rivers, the water of wells, the tanks and the lakes, on whom we grow grains and other agricultural products, on whom exist all that breaths and moves- let the earth place us also in the hands of the Lord who has already granted protection to those who deserve it, even before they are born”. Considering the earth as the mother, the Rishi prays, “ Oh earth thou are my mother, I am they son”.

The Ishavashya Upanishad in its first Mantra’ says that, “ By one supreme ruler is this universe pervaded. Whatever there is in this moving world is His. Hence, consume the resources of this earth with restrain and renunciation. Do not covet and pounce-upon these resources as vultures fall on dead body. After all, who is the owner of the earth?” The message is loud and clear that resources belong to all human and non-human beings alike, It is unethical to recklessly consume these resources for the greed of a few persons.

The Epics

The Ramayana and the Mahabharata are the two ancient epics which have been influencing the life of the Indians for centuries together. Lord Rama in the Ramayana, spent 14 years in the forests. His utterings regarding the animals, birds, the trees, the mountains, the lakes, the rivers and the ocean on various occasions show his reverence to all these animal species, plants and other natural resources of nature. What Lord Rama said has become an article of faith for all Indians and especially the Hindus.

Similarly, in the Mahabharata also the Pandvas spent 12 years in forest and showed the same respects to all that belongs to nature. The Shanti Parvan of the Mahabharata gives beautiful analogies between the trees and animals on the one side and the human beings on the other side. In a dialogue Bheeshm Pitamh is advising the new king Udhishsthir as how to run the administration. He advises that the earth is like a cow. It has to be ensured that it is not over-milked. If the milk is shared properly between the calf and the milkman, the calf becomes healthy and strong to carry the load. On the contrary, the over-milked cow’s calf

becomes weak and cannot work efficiently. In the same way, by over-exploitation of the earth by the king, the kingdom becomes poor and cannot perform well. The same point is emphasized further by an analogy which says that “just as honey bee sucks flowers and trees and does not destroy them, just as a skilled dairyman milks the cow in such a manner that the calf ,is not affected and its udder is not affected, in the same way the king should milk the earth of his empire.

The Puranas

The Puranas which are 18 in number are a valuable treasure of knowledge of the Indian civilization. They have carried forward the message of the Vedas and the Upanishads that the destruction of environment occurs due to greed and selfishness of man on the one hand and weak and inefficient rulers on the other. These Puranas also emphasize a harmonious relationship between man and nature. There is a story in the Shrimad Bhagwat Purana which says that a severe famine and drought occurred during the reign of king Prithu who otherwise was a pious and just king. The Lord asked the king to milk the earth who had turned into a cow. In the dialogue between the king and the cow the king asked the cow the reasons of famine and droughts. The cow replied, “ My dear king, not only are the grains and herbs being used by non-devotees but as far as I am concerned, I am not being properly maintained. Indeed I am being neglected by the kings who are not punishing those rascals who have turned into thieves by using grains for self gratification. Consequently, I have hidden all these seeds which are meant for the performance of sacrifice.”

The moral of the story is that if the resources of the earth are consumed for personal interest and there is no compassion for other living entities, such evil people should be severely punished. The story further says that the earth turned into cow, put the conditions of its milking only by Rishis and other spiritual people who are devoted to God and public welfare only. Then, the earth was milked and the famine and drought ended. The lesson of the story is that natural resources should be under the ownership and guidance of pious-hearted people and rulers and not in the hands of those selfish and greedy people and rulers who are interested in using the public property for their selfish gains.

The Bhagwat Geeta

The Bhagwat Geeta has given a number of practical suggestions for co-operating between man and his surroundings. It exhorts that if man helps in protecting nature then nature in return, will also protect man. According to the Geeta, in the beginning of the universe, the Lord created man and exhorted that so long one harmonises with nature then nature will bestow upon him the desired fruits. When man and nature make efforts for one another's prosperity, in this process both get prospered. Further, those selfish people who consume the fruits of nature alone without offering it to others, such a person is a thief and he is only consuming sins and not the fruits. All living and non-living objects of the universe and the cosmos are integrated with each other. The pin pricks in one part sends the vibration to the whole mechanism. Therefore, every part of the cosmos has to be nurtured. This is in the interest both of man and nature.

Buddhism and Jainism

In Buddhism and Jainism, Ahimsa or non-violence is the basic creed. There is much sufferings in the world. There is violence of man against man and of man against plants and other species. Unless we emphasize self-restraint and control in our life the problem of violence and ecological destruction cannot be solved. Therefore, Ahimsa or non-violence is the only solution to protect and conserve nature.

Kautilya's Arthshastra

According to the Arthshastra, economics is a science which says that earth is the only source of livelihood of all beings. Therefore, conservation and protection of mother earth is the subject matter of the science of Arthshastra. As a policy implication, it is the duty of the king and the subject to nurture and protect earth. Earth includes all free gifts of nature on the ground, under the ground and above the ground. The duty of the king, according to Kautilya, is to engage in various kinds of activities such as settlement of virgin land, building of dams, tanks and other irrigational works, providing pastures for cattle grazing, a safety of mines etc. Encroachment on pastures and crop land should not be tolerated. Elaborate steps are suggested to protect forests, animal parks, elephant forests and so on. Details of town, planning are given by way of royal highways, construction of residential houses, healthy and clean environment. Disaster management has been an important part of the

Arthshastra. Fire, floods, famine, epidemics, rodents and wild animal's attack on crop land and pastures have been declared as natural disasters. They are to be met on war footing.

Manusmriti

The Manusmriti is the most important book of Hindu religion which has influenced the Hindu view of life for centuries together through its code of conduct. According to Manusmriti, earth, water, air, fire and sky are the five elements of which the entire material world is composed. The heavenly bodies, the earth, birds, animal species, plants, human beings and all that exists on the ground, above the ground and under the ground work in a harmonious and well-coordinated mechanism. This harmony and co-ordination maintains ecological balance. Man's encroachment on nature disturbs this equilibrium causing environmental hazards. These hazards are reflected in floods, earthquakes, famines, epidemics, etc. Therefore, the only way of development is to maintain this harmony among the various elements of life and bring about an equilibrium among both human and non-human beings. It is our Dharama to protect nature. If Dharama is protected, it will protect us and if Dharma is destroyed it will destroy us. This is the famous advice to humanity by the Manusmriti.

The Bishnois

The Bishnoi community settled in Haryana and Rajasthan is famous for its article of faith in the protection of trees and wildlife Unless the protection of trees and wildlife is made an article of faith and an integral part of our religious rituals, there is little hope for environmental protection, How this can be practiced, should be learnt from the Bishnoi community. A Bishnoi knows that by protecting the green trees, he is not doing any favour to any body. By doing that he is only protecting his life and securing the future of his own children. The sacrifices of this community to protect trees is unparalleled in the history of mankind. As many as 363 Bishnois were killed by the forces of the king of Jodhpur at one time when they resisted the cutting of the trees in Khazarali village of district Jodhpur in Rajasthan. It is a pleasant sight to watch frolicking blackbucks, chinkaras and other deers around the areas where Bishnois are settled.

Mahatma Gandhi

The life and work of Mahatma Gandhi has considerably influenced the contemporary environmental movements in India. The Chipko Andolan, The Narmada Bachao Andolan and many other environmental activities launched by the activist to save the earth owe their origin to Gandhian ideology. Gandhiji emphasized the value of Ashimsa or non-violence. Compassion for plants and animals was the thrust of his philosophy. Gandhi was against the present strategy of development based on wholesale industrialization and reckless mechanization because this strategy involves the destruction of nature and human values. The present strategy is catering to the needs of corporate houses, rich people and other influential politicians at the cost of vast majority of deprived masses. All the resources like forests, water resources, killing of animals and so on are primarily being used to meet the luxuries of rich countries and affluent sections of Indian society. Gandhi was for the development of villages and other neglected sections of our society. He emphasized self-restraint as against self-indulgence. His famous aphorism is that, the world has enough for every body's needs but not enough for everybody's greeds.

Conclusion

The main conclusion of the above discussion is that development based on ethical values will alone ensure sustainable development. There is need of a paradigm shift in our attitude towards nature and development strategy. The ancient Indian wisdom had already realized this truth. It is for us to translate this wisdom in our future strategy of sustainable development.

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