CHAPTER I
INTRODUCTION

Conservation and management of natural resources is very vital for the existence of life on planet earth because natural resources are life supporting systems without which no human activity could be imagined. The terms conservation and management of natural resources are used interchangeably. However, the conservation of natural resources means the wise use, protection, preservation, or restoration of natural environments and the ecological communities that dwell in them\(^1\) and natural resource management refers to the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations. It brings together land use planning, water management, biodiversity conservation, and the future sustainability of industries like agriculture, mining, tourism, fisheries and forestry\(^2\). For successful conservation and management of any resource, accurate knowledge about the resource available, its uses, the demand for the resource, and the measures of evaluating the significance of competing demands are required.

**Defining Natural Resources**

Natural resources are indispensable and include biotic and abiotic resources available in the environment. These are of cosmic origin and are not man made but can be utilized by man to his advantage. The natural resources occur in all the three divisions of biosphere i.e. lithosphere, atmosphere and hydrosphere. The materials such as land, water, air, natural gas, coal, oil, petroleum, minerals, wood, topsoil, fauna, flora, forests and wildlife are natural resources\(^3\). Natural resources are of two types: renewable and non-renewable resources. Renewable resources are the resources which are inexhaustible and can be regenerated within a given span of time such as forests, wild life, wind energy, biomass energy, tidal energy, hydro power etc. Solar energy is also a renewable form of energy as it is in inexhaustible source of energy. And non-renewable resources are those which cannot be regenerated. Soil, water, air, fossil fuels like coal, petroleum, and minerals are non-renewable resources\(^4\). Once we
exhaust these resources, the same cannot be replenished. These resources whether
renewable or non-renewable have many advantages for human beings.

Land or soil is a non-renewable resource. It is most fundamental and basic
resource that provides food, feed, fuel and fibre. All activities of man whether it is
agriculture, transport, industry, housing or mining are not possible without soil. It also
provides a large number of minerals like coal, petroleum, iron, copper, gold, mica.
Essentiality of soil to human wellbeing is often not realized until the production of
food drops or is jeopardized when the soil is seriously eroded or degraded to the level
that it loses inherent resilience. Traditionally the soil has been medium of plants
growth only but now with the increasing concerns of food security, soil has multi
functionality including environmental quality, global climate change and repository
for urban/ industrial waste. World soils are now managed to meet the ever increasing
food demand, filter air, purify water, and store carbon to offset the anthropogenic
emission of CO2\(^5\).

Likewise, water is an indispensable natural resource on this earth on which all
life depends. About 97 percent of the earth's surface is covered by water and most of
the animals and plants have 60 to 65 percent water in their body. Although water is in
abundance on this earth yet it is very precious natural resource. Out of the total water
reserves of the world about 97 percent is salty water and only three percent is fresh
water. Even this small fraction of fresh water is not available to us as most of it is
locked up in polar ice caps and just 0.003 percent is readily available to us in the form
of ground water and surface water. It is used for household purposes, irrigation,
transport, for producing tidal energy and electricity. Besides, it is also used in many
industries like textiles, iron and steel and paper. The planet's ecosystems are linked
and maintained by water, and it drives plant growth, provides a permanent habitat for
many species, and is a breeding ground or temporary home for many others. Water is
also a universal solvent and provides the major pathway for the flow of sediment,
nutrients and pollutants. Through erosion, transportation and deposition by rivers,
glaciers, and ice sheets, water shapes the landscape and through evaporation it drives
the energy exchange between land and the atmosphere, thus controlling the earth's
climate. Water is also non renewable resource. Due to unprecedented rise in human
populations and rapid developments in the 20th century, this very essential resource
has been exploited by mankind to meet the ever increasing demand of water for sanitation, drinking, manufacturing, leisure and agriculture. Overuse of ground and surface water for drinking, irrigation and domestic purposes has resulted in rapid depletion of ground and surface water in various regions leading of lowering of water table and drying of wells.

Similarly, air is an integral component of environment. It is because of air that earth can sustain life. In addition to sustaining life, air plays many other important functions that are best performed when air quality is high. The most important aspect of air for humans and other animals is its oxygen content as it is required for breathing. The carbon dioxide that results as a byproduct of animal respiration process keeps plants alive, which convert the carbon dioxide back into oxygen through plant respiration. Air is also helpful in hearing as the sound waves travel in air. Air is also source of wind energy and it can be harnessed from moving air called wind.

Forests are also imperative for life on earth. They are not just the green cover that is needed to make the earth look beautiful; they have many functions integral for our survival and sustenance. They function as water shed protection by reducing the rate of surface run-off of water and by preventing and checking the flash floods and are a safe guard against draughts. Forests help in absorption of heat during evaporation and transpiration, help in maintaining carbon dioxide level and hence give a boost to plant growth and by maintaining the local climatic conditions forests regulate the atmosphere. Besides, forests control soil erosion and hold soil by preventing rain from washing and taking it away directly. They also help maintain the soil nutrients and structures. This way, they keep the local nature of soil intact and help in marinating their fertility naturally. They help preserving the wild life also.

Therefore, it is the duty of the present generations to conserve and manage the natural resources in such a way that future generations are able to enjoy the fruits of nature. Among all the existing natural resources, air, soil and water are of greater significance as air and water form the basic constitution for the survival of any organism whereas soil lends support to the growth and evolution of that organism. But in past few decades, there has been lot of degradation of natural resources particularly of air, soil and water resources. This degradation is evident from declining water table, depleting soil fertility, increasing air pollution, ozone layer depletion, global
warming and extinction of species. There are several factors such as urbanization and industrialization, population explosion, unethical use of chemicals and pesticides by farming community, unplanned economic activities, faulty government policies and systems of management that have been responsible for the problem of degradation of natural resources.

If we do not protect our natural resources, it would be disastrous for the mankind. This was well conceived by the US President Theodore Roosevelt in 1907 when he said, “the conservation of natural resources is the fundamental problem. Unless we solve that problem, it will avail us little to solve all others”\(^9\). Since then scattered efforts are being made here and there all over the world for the conservation and proper management of natural resources. Legislations have also been made by the national and international bodies and governments of various countries to promote natural resource conservation and management.

**International Initiatives for the conservation and management of natural resources**

One of the earliest attempts for the protection of the environment began with the establishment of Committee on Natural Resources in 1970. The committee developed guidelines for advisory services to governments, reviewed arrangements to coordinate UN activities in natural resources development, and evaluated trends and issues concerning natural resources exploration and development, as well as prospects for selected energy, water, and mineral resources. Another major development in the area was United Nations Conference on the Human Environment also known as the Stockholm Conference held in Sweden from June 5–16, 1972. This international conference was the UN's major conference on international environmental issues, which marked a turning point in the development of international environmental politics\(^8\). This was the first attempt when international dialogue on global environmental and climate change issues was started. The decision to have this conference was based on the recommendations of the United Nation's Economic and Social Council whose members saw a vital connection between the environment and social development. In the Stockholm conference sixty nine recommendations were made that paved the way to view the environmental issues as a byproduct of socioeconomic problems. The main recommendations of the conference were:
patterns of rural and urban development needed to be better managed by governments (largely in the third world) and that it was the responsibility of all international development agencies to improve their assistance to governments in planning human settlements.

- stated that bilateral or multilateral consultation should be standard on any problem that affected the environment outside of a single country’s borders (i.e. emissions from one country blowing into a neighboring country).

- asked that the World Health Organization (WHO) improve its support to countries on issues of water supply and sewage handling.

- Called on the future 1974 UN World Population Conference to address on population issues related to the environment.

- Suggested the creation of a body within the UN responsible for creating international standards and measurements for the problem of noise pollution.

- Called on international organizations to address the need to reduce harmful effects of pesticides and agro-chemical farming worldwide.

- Suggested the UN to develop wide ranging utilities for monitoring forest management issues.

- Stated the need for future conferences on protecting wildlife inhabiting, international waters or migration across state boundaries.

- Declared the Secretary-General should support analysis of the environmental effects from energy use and energy production\textsuperscript{10}.

Thus, the Stockholm Conference focused international attention on environmental issues, especially those relating to environmental degradation and transboundary pollution. The concept of transboundary was particularly important, as it highlighted the fact that pollution does not recognize political or geographical boundaries, but affects countries, regions and people beyond its point of origin. In the coming years, it was recognized that regional or local environmental problems, such as extensive urbanization, deforestation, desertification, and general natural resource scarcity could have spread to pose serious repercussions for international broader security. They undermine the economic base and social fabric of weak and poor
countries, generate or exacerbate social tensions and conflicts and stimulate greater flows of refugees. Environmental degradation in diverse parts of the developing as well as the developed world would affect the political, economic and social interests of the world as a whole.

Further in 1977, due to the efforts of the Committee on Natural Resources, the United Nations convened Water Conference in Mar del Plata, Argentina. The conference adopted an action plan to guide international efforts to effectively manage, develop, and use water resources. This conference, the first ever of its kind, was attended by 116 governments at the highest decision-making level in the area of water as well as by numerous international and non-governmental organizations. It approved an action plan. The conference recommended for assessment of water resources, water use and efficiency, developing instruments to improve water efficiency and efficacy in regulation and distribution of water resources, community water supply and water disposal, agriculture water use, and measurements and projections of water demand.

To give impetus to the Mar del Plata Action Plan, the General Assembly of United Nations launched the International Drinking Water Supply and Sanitation Decade (1981–90) in the year 1980. Following were the recommendations of the UN General Assembly:

- Strengthening national capabilities for policy formulation and for the preparation, implementation and monitoring of water supply and sanitation programmes and projects;
- Preparing and implementing national strategies to meet and develop both present and longer-term needs for skilled human resources;
- Intensifying efforts to improve the mobilization and utilization of national financial resources;
- Increasing the attention devoted to health education and community participation and to the need for close operational linkages between health and water supply agencies;
Formulating and implementing the strategies that would enhance the participation of women in the planning, operation and assessment of water and sanitation programmes and projects;

Calling upon organs, organizations and bodies of the United Nations system, as well as other multilateral, bilateral and non-governmental organizations, to continue and, where possible, increase their assistance to Governments in support of national plans and programmes for the Decade.

Urging the international community to take note of the need to enhance co-ordination of technical co-operation activities at the global and national levels and, in this regard, supports the role of the resident representatives of the United Nations Development Programme as focal points for the Decade at the country level;

Focusing efforts and resources on the least developed countries where requirements for drinking water and sanitation are the greatest.

The idea of integrating environmental protection and natural resources management with socio-economic issues of poverty and underdevelopment was highlighted in the Stockholm Conference. This thought got impetus when in 1987 World Commission on environment and development popularly known as Brundtland Commission defined 'sustainable development' as the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. The commission stated that environment protection and economic development go hand in hand. This international recognition of the fact of integrating socioeconomic development with environment protection was culminated in United Nations' Conference on Environment and Development (UNCED) held in 1992 in Rio de Janeiro, Brazil, popularly known as ‘Earth Summit’. History was created during the Earth Summit when global attention was focused on the novice perceptive that the planet’s environmental problems were intimately linked to economic conditions and problems of social justice. It showed that social, environmental and economic needs must be met in balance with each other for sustainable outcomes in the long term. It suggested that if on one side people are poor and national economies are weak, the environment suffers; and on the other side when the environment is abused and resources are over consumed, then people suffer and economies decline. Thus, the Rio
de Janeiro gathering highlighted the interdependence of various social, economic and environmental factors.

This global conference on Environment and Development (UNCED) held in 1992 on the 20th anniversary of the first international Conference on the Human Environment, (Stockholm, 1972), brought together policy makers, diplomats, scientists, media personnel and non-governmental organization (NGO) representatives from 179 countries in a massive effort to reconcile the impact of human socio-economic activities on the environment and vice versa. A simultaneous Global NGO Forum was also held in Rio de Janeiro, which was attended by an unprecedented number of representatives from NGOs outlining their own vision of the future environmental and socio-economic/developmental state of the world.

United Nations Conference on Environment and Development 1992 proclaimed the concept of sustainable development as a workable objective for everyone around the world, whether at the local, national, regional or international level. It recognized that integrating and balancing economic, social and environmental concerns in meeting our needs is vital to continue human life on the planet, and that such an integrated approach is achievable if we put our heads and hands together. It further recognized that achieving this kind of integration and balance between economic, social and environmental dimensions would require new ways of looking at how we produce and consume, how we live, how we work, how we get along with each other, and how we make decisions. The concept was revolutionary and like all original ideas, it started a lively debate among governments, and between governments and their citizens on how to achieve sustainability.

The Summit's primary aim was to produce an extended agenda and a new plan for international action on environmental and developmental issues that would help guide international cooperation and policy development into the next century. As a result, 'Agenda 21' for sustainable development was prepared. 'Agenda 21' is a comprehensive blueprint of action to be taken globally, nationally and locally by organizations of the UN, governments of member countries and major groups in every area in which humans directly affect the environment. The Agenda 21 on environment focuses on integrating environment and development at the policy, planning and management levels; and adopting integrated approaches to sustainable development at
the regional level, including trans boundary areas\textsuperscript{12}. Its recommendations ranged from new ways to educate, to new ways to care for natural resources, and new ways to participate in designing a sustainable economy. The overall ambition of Agenda 21 was breathtaking, for its goal was nothing less than to make a safe and just world in which all life has dignity and is celebrated. Main highlights of Agenda 21 are:

1. The Rio Declaration: This declaration is a set of 27 universally-applicable Principles to help guide international action on the basis of environmental and economic responsibility.

2. The Framework Convention on Climate Change: This convention provides a legally-binding agreement, signed by 154 governments at the Summit in Rio, its ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (man-made) interference with the climate system."

3. The Convention on Biological Diversity (CBD): This is also a legally-binding agreement, that has been signed so far by 168 countries. It represents a dramatic step forward in the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of benefit sharing from the use of genetic resources.

4. The Statement of Forest Principles: It is a set of 15 non-legally binding principles governing national and international policy-making for the protection and a more sustainable management and use of global forest resources. These Principles are extremely significant since they represent the first major international consensus on better use and conservation of all kinds of forests\textsuperscript{13}.

The appraisal of Agenda 21 by the General Assembly of the United Nations was done and for this a special session was held in 1997 to assess the progress of five years on the implementation of Agenda 21. It was felt in the Assembly that the progress on the implementation of Agenda 21 has been 'uneven' because of increasing globalization, widening inequalities in income and a continued deterioration of the global environment. As a result a new General Assembly Resolution (S-19/2) was passed to take effective measures to achieve the recommendations of Agenda 21.
Thus, we can say that during the 1990s, the focus of the Committee on Natural Resources was on implementation of the recommendations of Agenda 21, particularly on the measures to promote the more rational and sustainable use of natural resources. It was stated that mineral and water resources had to be seen as finite and valuable resources, and that their production and consumption affected other constituents of the environment. The committee emphasized the need to consider natural resources as a whole, rather than by individual sectors, such as agriculture and industry. Therefore, a need for holistic approach for planning and management of natural resources within the geographical boundaries of each country was felt and the issue of evolving integrated approach particularly for the management of water and land resources has been raised from time to time at the various platforms.

In 1998 the Committee on Natural Resources was merged with the Committee on New and Renewable Sources of Energy and Committee on Energy for Development and a new Committee on Energy and Natural Resources for Development was established\textsuperscript{14}. The committee comprised of two sub- groups, one dealing with issues of energy and dealing with issues related to water resources. Main objectives of Committee on Energy and Natural Resources for Development was to effectively deal with the present problems related to sustainability of natural resources and to take necessary action for the future.

In April 1999, the reconstituted committee on Energy and Natural Resources for Development prepared a draft paper for the next session of the Commission on Sustainable Development. Draft paper highlighted the need to increase efficiency of fossil energy use, improve environmental compatibility of fossil technologies, and shift to fossil fuels with lower environmental impacts, such as natural gas. Apart from reports on renewable sources of energy, rural energy policies, energy and transportation, the draft paper focused on the report on spatial planning of land and water resources, which identified emerging issues and highlighted the finite nature of the earth's resources\textsuperscript{15}.

In the year 2000, when Millennium Development Goals were set, the issues of environmental sustainability and reducing the losses of biodiversity at large were also discussed. Seventh Millennium Development Goal deals with environment and has the following targets:
to integrate the principles of sustainable development into country policies and programs; and to reverse the loss of environmental resources

- to reduce the loss of biodiversity loss, by increasing land area covered by forest, by reducing CO₂ emissions, by reducing consumption of ozone-depleting substances, by keeping appropriate proportion of fish stocks within safe biological limits and by reducing total water resources usage, and by protecting the terrestrial and marine areas and species threatened with extinction.

- to halve the proportion of the population without sustainable access to safe drinking water and basic sanitation by 2015\(^{16}\).

Again in 2002, when World Summit on Sustainable Development was organized at Johannesburg, it was felt that the member countries should work with conviction at the affirmed UN commitment of 'full implementation' of Agenda 21, along with the achievement of the Millennium Development Goals and other international agreements. International cooperation for the sustainable use of natural resources has emerged as an important issue in the aftermath of the World Summit on Sustainable Development. It was realized that such cooperation would be fruitful for sustainable utilization of natural resources in the long run.

Efforts are going on at the global level to protect the environment and natural resources. On 20-22 June 2012, the United Nations Conference on Sustainable Development (UNCSD) is going to be organized in Brazil to mark the 20th anniversary of the 1992 United Nations Conference on Environment and Development (UNCED), in Rio de Janeiro, and the 10th anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg. It is envisaged as a Conference at the highest possible level, including Heads of State and Government or other representatives. The Conference would result in a focused political document on environment and natural resources.

**Efforts Made in India**

Though efforts for the protection of environment started even before Independence with the passing of India Forest Act in 1927, yet the serious attempts towards the issue began only after independence. It was in the mid-1970s that India
started showing interest in the protection of environment after the Stockholm Conference on Human Environment in 1972. After participating in the Stockholm conference provisions related to the protection of environment were incorporated under 42nd amendment in the Constitution of India in 1976. These amendments were made in the Directive Principles of the State Policy as Article 48-A and in fundamental duties as Article 51-A (g). Article 48-A obligates the state and states that "the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife in the country" to protect and improve the environment whereas Article 51-A (g) imposes duty on the citizens to protect and improve the environment and states that to protect and improve the natural environment including forests, lakes and rivers and wildlife, and to have compassion for the living creatures". The first formal legislation related to the environment came in form of the Water (Prevention and Control of Pollution) Act, 1974, followed by the Air (Prevention and Control) of Pollution Act, 1981.

In the same vein, Environmental Protection Act of 1986 was enacted. The act aimed at protection and improvement of the environment. This act empowers the Central Government to establish authorities under section 3(3) of the act for preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991. There is a major shift in the Indian approach towards environment after the enactment of this legislation. This act lays down the provisions of prosecution of the offender under Indian environmental laws by the government. From here onwards the act of damaging the environment in any form became a criminal offence. Under the act, Central Government shall have the power to take all such measures for the purpose of protecting and improving the quality of the environment and preventing controlling and abating environmental pollution. The provisions of the Environment Protection Act are

(i) co-ordination of actions by the State Governments, officers and other authorities,

(ii) planning and execution of a nation-wide programme for the prevention, control and abatement of environmental pollution;

(iii) laying down standards for the quality of environment in its various aspects;
(iv) laying down standards for emission or discharge of environmental pollutants from various sources whatsoever:

(v) restriction of areas in which any industries, operations or processes or class of industries, operations or processes shall not be carried out or shall be carried out subject to certain safeguards;

(vi) laying down procedures and safeguards for the prevention of accidents which may cause environmental pollution and remedial measures for such accidents;

(vii) laying down procedures and safeguards for the handling of hazardous substances;

(viii) examination of such manufacturing processes, materials and substances as are likely to cause environmental pollution;

(ix) carrying out and sponsoring investigations and research relating to problems of environmental pollution;

(x) inspection of any premises, plant, equipment, machinery, manufacturing or other processes, materials or substances and giving, by order, of such directions to such authorities, officers or persons as it may consider necessary to take steps for the prevention, control and abatement of environmental pollution;

(xi) establishment or recognition of environmental laboratories and institutes to carry out the functions entrusted to such environmental laboratories and institutes under this Act;

(xii) collection and dissemination of information in respect of matters relating to environmental pollution; 

Besides, similar provisions allowing the citizens to participate in the enforcement of pollution laws are now found in Section 43(1) of the Air (Prevention and Control of Pollution) Act, 1981 as amended in 1987 and in Section 49(1) of the Water (Prevention and Control of Pollution) Act, 1974 as amended in 1988. Both these amendments also require the Pollution Control Board to disclose internal reports to citizens seeking to prosecute a polluter. The Right to Information Act, 2005 has further enabled the citizens to work for the protection of environment. Some recent
judgments by the courts on providing information and involving NGOs in development planning have encouraged people to seek information on projects and policies\textsuperscript{19}.

In 1992 at Earth Summit when international fora realised that environment protection and socio economic development are interdependent, the Ministry of Environment and Forests the Government of India also prepared National Conservation Strategy and Policy Statement on Environment and Development. It states that an integrated land and water management approach is extremely important to sustain the food production, animal husbandry and other activities; amelioration of water-logged and salt affected lands, command area development, protection of good agricultural land against diversion to urban and other uses, prevention of land fragmentation, maintenance of sustained productivity of soil and conservation of lands with forests and vegetal cover are the integral components of sustainable management. Policy highlights the importance of water as a finite resource, though a renewable resource must be clearly recognized. Land and water use are to be considered together, particularly in the context of recurring droughts and floods. Water conservation measures; discipline on use of water; economizing the consumption of water in households, agriculture and industry; and appropriate recycling would be essential. The main provisions of the policy particularly for sustainable use of land and water include:

- Classification, zoning and apportionment of land for designated uses such as, agriculture, forestry, grassland, green areas, industrial activities, catchment areas and watersheds and human settlements based on assessment of their capabilities and environmental considerations;
- Enactment of laws for appropriate land uses to protect the soil from erosion, pollution and degradation;
- Protection of land near water bodies and prevention of construction there upon;
- Measures to ensure equitable access to and responsibility for sustainable use of land and water resources;
Micro-level planning to develop appropriate methodology and implementation of action plan by involving the people at the village level in social forestry programmes, land use planning, afforestation etc.;

Building up a network for assessment and monitoring of soil and water (surface and ground water) quality throughout, the country which should be on a permanent basis as in the case of meteorological stations;

Measures for water conservation, recycling and optimal conjunctive use of surface and ground water for specific uses;

Legislative measures to check over-exploitation of surface and ground water for various uses;

Conservation of wetlands for ensuring sustainable ecological and economic benefits;

Encouragement to and improvement in traditional methods of rain water harvesting and storage.

Stringent measures for prevention and control of pollution due to indiscriminate disposal of solid wastes, effluents and hazardous substances in land and water courses;

Control of pollution of water bodies from municipal and industrial wastes generated from urban habitats by intercepting and diverting such wastes away from water bodies;

Classification, zoning and regulations for maintaining the quality of the water bodies to protect and enhance their capabilities to support the various designated uses; and,

Adoption of low cost sanitation technology for prevention and control of pollution in water sources.

Thus we can say that National Conservation Strategy and Policy Statement on Environment and Development proposes to address the problems of environment and development holistically and takes into consideration various cross-sectoral issues having a direct bearing on conservation and sustainable uses of natural resources including forestry and wildlife.
Likewise realising the significance of water for human survival and water being the finite source, Ministry of Water Resources, Govt. of India launched National Water Policy in 2002 to address the water related issues. Water policy states that:

- Water resources available to the country should be brought within the category of utilizable resources to the maximum possible extent.

- Non-conventional methods for utilization of water such as through inter-basin transfers, artificial recharge of ground water and desalination of brackish or sea water as well as traditional water conservation practices like rainwater harvesting, including roof-top rainwater harvesting, need to be practiced to further increase the utilizable water resources. Promotion of frontier research and development, in a focused manner, for these techniques is necessary.

- Water resources development and management will have to be planned for a hydrological unit such as drainage basin as a whole or for a sub-basin, multi-sectorally, taking into account surface and groundwater for sustainable use incorporating quantity and quality aspects as well as environmental considerations.

- All individual developmental projects and proposals should be formulated and considered within the framework of such an overall plan keeping in view the existing agreements / awards for a basin or a sub basin so that the best possible combination of options can be selected and sustained.

- Watershed management through extensive soil conservation, catchment-area treatment, preservation of forests and increasing the forest cover and the construction of check-dams should be promoted. Efforts shall be to conserve the water in the catchment.

- Water should be made available to water short areas by transfer from other areas including transfers from one river basin to another, based on a national perspective, after taking into account the requirements of the areas / basins.

Among the points addressed in the policy are development of standardized national information system containing data on water availability and use is essential for appropriate planning; Resource planning should be conducted using a catchment
or a watershed as the basic unit; Water development projects should be multi-purpose and should address various priorities such as drinking water, provision and flood-mitigation; Environmental impact of new projects should be assessed and minimized wherever possible. But these measures do not seem to be bringing any substantive change at the ground level because of lack of awareness among people in India about their right to enjoy clean and healthy environment and also about their duty to protect and improve the environment. Apart from this, effective implementation of environmental protection laws is a weak link and it has further aggravated the problem. Therefore there is need to make people aware about their rights and duties to protect and conserve the environment. For this GO-NGO partnership can play a very significant role.

**Role of Voluntary Organisation in Conserving and Managing the Natural Resources**

Voluntary Organisations play a vital role in implementation of various development programmes in participatory mode. Voluntary Organisations provide innovative and alternative cost effective models for development. They mobilize people for constructive community work and often reach the most marginalised and vulnerable sections of society and contribute to the socio-economic development of the country, with much wider outreach. The voluntary sector has a significant presence in almost all regions of the country and its role as an important partner of the Government in development is being increasingly recognized. Voluntarism is a long cherished tradition which has been encouraged by the Government of India since independence. The Government has launched a number of schemes to implement various developmental projects, wherein concerned departments / ministries provide grant-in-aid to voluntary organisations to carry out welfare and development activities.

After independence, the voluntary sector has been given due importance right from the beginning of five year plans. The major recognition was given in the third five year plan. The third five year plan emphasized that “the concept of public cooperation is related to the much larger sphere of voluntary action in which the initiative and organizational responsibility rest completely with the people and their leaders, and does not rely on legal sanctions or the power of the state for achieving its
aims. In the fourth and fifth five year plan, voluntary sector was not given much attention. But again in the sixth five year plan, the idea of participation of people’s organizations was recognized. Success of voluntary organisations under various projects like the Jamkhed Project on child and health care in Maharashtra, Bharat Agro Industries Foundation’s work in animal husbandry and social forestry and Self-Employed Women’s Association (SEWA) were quoted and it was stated that the country is dotted with numerous examples of highly successful voluntary action of this nature.

Role of voluntary organizations in development got a further fillip in the seventh five year plan where it was declared that serious efforts would be made to involve voluntary organisations in various development programmes to supplement the government efforts. In the eighth plan document, due emphasis was given on building up people’s institutions. It was admitted that developmental activities undertaken with people’s active participation have a greater chance of success and can also be more cost-effective as compared to the development activities undertaken by the Government where people become passive observers. It was admitted that a lot in the area of education (especially literacy), health, family planning, land improvement, efficient land use, minor irrigation, watershed management, recovery of wastelands, a forestation, animal husbandry, dairy, fisheries and sericulture etc. could be achieved by creating people’s institutions accountable to the community.

In October 2000 during the mid-term review of the ninth five year plan some successful and sustainable projects undertaken by voluntary organizations were documented and problems in the performance of central and state plans were also identified. Some of these maladies faced by the country can be mitigated by the emerging voluntary sector as a compliment and supplement to the State efforts. It was suggested that “Initiatives by local bodies, NGOs and women need to be encouraged”. In the approach paper of the tenth plan it has been mentioned that in many states there are hospitals / dispensaries but absence of personnel and school buildings are there but teachers remain absent. To rectify these anomalies and to achieve most of the targets set up for the tenth plan, the need to promote voluntary sector has been recognized. It has suggested greater decentralization to PRIs and other people’s organisations as one of the items in the tenth plan.\footnote{23}
During the year 2000, the government of India took a number of steps to create an enabling environment for the voluntary sector so that the voluntary organisations could collaborate with government in the development process. The most significant step taken by the Government of India, in March 2000, was to declare the planning commission as the nodal agency for the GO-NGOs interface. This has helped in transition in the social service sector by changing the voluntary culture into a more professional NGO culture and volunteerism turned into development monitoring and management. In the process of transition, the NGOs are becoming more specialized. The voluntary movement is taking shape of a social change and the development work is being done with a professional touch. Therefore, we can say that the contribution of NGOs is well recognized for ensuring sustainable development of the communities, be it in the area of education, health, housing, family welfare, agriculture, environment or natural resources. The voluntary organisations namely Centre for Science and Environment (CSE), Green Peace, Navdanya, Centre for Indian Knowledge System, Eco Science Research foundation, M.S. Swaminathan Research foundation and The Himalayan Environmental Studies and Conservation Organisation (HESCO) are few worth mentioning which are playing an important part at policy level and at the grassroots level as well for conservation and management of natural resources.

**Current Scenario of Soil and Water Resources in India**

Despite government's concerns and efforts by the voluntary organisations for conservation and management of natural resources, the situation is not very appreciable. It is worsening day by day. The issue of conservation and management of natural resources particularly of soil and water is gaining more and more impetus because soil and water are the basic life supporting systems on earth and are getting depleted at an alarming rate. The state of Environment Report (2009) of Ministry of Environment and Forests, states that at least 45 percent of India’s land is environmentally degraded due to erosion, soil acidity, alkalinity and salinity, water logging and wind erosion. The main reasons for this degradation originate from unstable land use and inappropriate land management practices. Other important factors for large scale degradation are deforestation beyond the permissible limits, unsustainable fuel-wood and fodder extraction, shifting cultivation, encroachment into
forest lands, extension of cultivation to lands of low potential or high natural hazards, non-adoption of adequate soil conservation measures, improper crop rotation, indiscriminate use of agro-chemicals such as fertilizers and pesticides, improper planning and management of irrigation systems and extraction of groundwater in excess of their recharge capacity.

Non-adoption of soil conservation measures has resulted in to poor quality of soils in India. There is increase in deficiency of various important nutrients like NPK, calcium, magnesium, sulphur and micro nutrients like zinc in soils of India. It is due to indiscriminate and continuous use of high analysis chemical fertilizers over the years and neglect of organic manures. The large scale application of chemical fertilizers for having high yields also has negative impact on the environment and leads to contamination of soil, air and water resources. Many of the chemical fertilizers used in agriculture are persistent soil contaminants whose impact may endure for decades and adversely affect soil conservation. Not only the local biodiversity is neglected and marginalized but has resulted into soil infertility declining water table, and health hazards of serious nature. There are various studies worldwide which indicate that use of chemicals and pesticides in agriculture cause degradation of soil, decrease biodiversity in soils, affect its water holding capacity and result into depletion of water resources. Agricultural practices have now been identified as the leading contributor of nonpoint source pollution to the nation's waters even in United States of America. It is stated that much of the environmental damage caused by agriculture is irreversible and results in a multibillion dollar drain on the nation's economy.

Similarly, the State of Environment Report (2009) warns a potential water crisis in the country stating that rain fall has become more erratic, ground water supplies are becoming more depleted and surface water is becoming more polluted. The report paints a grim picture stating that India will face big challenges in the future related to scarcity of water and lower crop yields. The NASA’s Gravity Recovery and Climate Experiment (2009) states that more than 26 cubic miles of ground water disappeared from aquifers in areas of Haryana, Punjab, Rajasthan and Union Territory of Delhi between 2002 and 2008. Ground water levels in northern India have been declining as much as one foot per year over the past decade. Its data relating to 2006
shows that more than 20 percent of monitoring wells of Punjab, Haryana, Chandigarh, Bihar, West Bengal, east Madhya Pradesh and east Rajasthan registered a decline of more than 2 metres\textsuperscript{30}.

The country faces another major problem of water resources i.e. groundwater contamination - a problem which has affected as many as 19 states in India. In 1995, the Central Pollution Control Board identified severely polluted stretches on 18 major rivers in India\textsuperscript{31}. Almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic and inorganic pollutants. In many cases, these sources have been rendered unsafe for human consumption as well as for other activities such as irrigation and industrial needs. This illustrates that degraded water quality can contribute to water scarcity as it limits its availability for both human use and the ecosystem\textsuperscript{32}. One of the important reasons for contamination of both surface and groundwater resources has been rapid increase in agro-chemical use in the past five decades along with industrial waste disposal as the pesticide consumption increased from less than one million tonne (technical grade) in 1948 to a maximum of 75 million tonnes in 1990 and per hectare consumption of fertilizers has increased from 69.8 kg in 1991-92 to 113.3 kg in 2006-07 at an average rate of 3.3 percent (Centre for Science and Environment, 1999)\textsuperscript{33}.

**Current Scenario of Soil and Water Resources in Punjab and Haryana**

There are various studies which indicate the status and condition of soil and water resources in Punjab and Haryana. In a study conducted by R.B. Singh on Environmental consequences of agricultural development in the state of Haryana, it is stated that green revolution has resulted in continuous environmental degradation, particularly of soil, vegetation and water resources. Soil organic matter levels are declining and the use of chemical inputs is intensifying. Newly introduced crop varieties have been responsive to inputs but this has necessitated both increased fertiliser application and use of irrigation resulting in water contamination by nitrate and phosphate and changes in the ground water table. About 60 percent of the geographical area faces soil degradation in the form of water logging, salinity and alkalinity which threatens the region’s food security in the future. Since 1985, the water table has risen more than 1 meter annually, and patches of salinity have started to appear at the farm level\textsuperscript{35}. In Punjab also the condition of soil and water is almost
similar to that of Haryana. As stated by Vandana Shiva in her book Green Revolution in Punjab, out of total 8706 soil samples from the Punjab, over half of the samples exhibited zinc deficiency, reducing yields of rice, wheat and maize by up to 3.9 tonnes per hectare. It further states that the water table is declining at an estimated rate of one-third to half a meter per year. A recent survey by the Punjab Directorate of water resources has shown that 60 out of the 118 development blocks in the state cannot sustain any further increase in the number of tube wells. In another study conducted by National Aeronautics Space Authority (NASA's) Gravity Recovery and Climate Experiment (2009) reveals that out of 138 blocks in Punjab, 103 have over exploited ground water, five have reached critical levels and another four are nearing red zone. Thus, declining water table is a major concern in the states of Punjab and Haryana. Declining water table in these agriculturally dominated states is mainly because of the over exploitation of ground water for irrigation. The Central Ground Water Board report (2007) mentions that 75 percent in Punjab, 49 percent in Haryana, and 59 percent in Rajasthan are "over-exploited". The estimates of ground water availability for irrigation in 2025 shows negative figures for Haryana, Punjab and Rajasthan.

Water resources in the states of Punjab and Haryana are not only declining but are contaminated to the extent that it has stated causing health problems for the people. In a study conducted by post-graduate Institute of Medical Education in Chandigarh commissioned by the Punjab Water Pollution Control Board, found that Ground water in Punjab has been contaminated to such an extent that it is now causing mutation of DNA of the people who drink it. It was found in the study that poisonous pesticides and heavy metals have entered the food chain, and this is now making congenital deformities, cancer and kidney damage exceedingly common. According to the study, 80 percent of ground water samples that were collected in the state had mercury that was far beyond the permissible level. 70 percent of the samples of effluents, half the samples of tap water and 57.7 percent samples of ground water were also found to contain arsenic. Pesticides, in a high degree, were also found to have contaminated water in drains in the various parts of the state. Another study conducted by Greenpeace (2009) reveals that most of the farms in Punjab, had well water contaminated with nitrates, while 20 percent of all sampled wells had nitrate
levels above the safety limit of 50 mg per litre, as established by the World Health Organisation\(^{40}\).

It is evident from above data that there has been over exploitation of soil and water resources in the states of Punjab and Haryana, the forerunner states in green revolution and that these resources are under threat. This added significance and urgency to the project. Moreover there are many voluntary organisations in these states that are working for the conservation and management of soil and water resources. This prompted the researcher to assess the role of voluntary organisations in conservation and management of soil and water resources in agriculturally vibrant states of Punjab and Haryana.

**The Problem**

The present study is entitled "Role of Voluntary Organisations in Conservation and Management of Natural Resources: A Comparative Study of Punjab and Haryana". As stated in the title of the study, it is a comparative study of role of voluntary organisations in conservation and management of natural resources particularly of soil and water in the states of Punjab and Haryana. The study is focussed on assessing the role played by voluntary organisations in conservation and management of soil and water resources in these two states. For the purpose of present study two districts i.e. Patiala and Ropar of Punjab and Karnal and Kurukshetra of Haryana have been selected for making the comparison as per objectives of the study. The variables for comparison of role of voluntary organisations are awareness generation about depletion of soil and water resources, awareness generation about the conservation and management of these resources, various programmes implemented by voluntary organisations in the area of soil and water conservation and management , their success rate and the impact of these programmes on beneficiaries, and identification of methodologies used by voluntary organisations under study to conserve and manage the soil and water resources. Apart from this an attempt has been made to suggest a holistic functional model for designing and implementing various programmes on soil and water conservation and management through voluntary organisations. Thus through present study, the researcher has made a modest attempt to study the problems related to soil and water conservation and management in the states of Punjab and Haryana and has tried to
assess the role of voluntary organization with respect to their professional approach and quality of manpower and work they are rendering to the society.

The researcher has selected the voluntary organisations who have minimum three years of experience of working in the voluntary sector and who have implemented some programmes on soil and water conservation and management in Punjab and Haryana. The data has been collected both from the chief functionaries of voluntary organisations through Questionnaire and also from the direct beneficiaries in the villages through interview schedule, where the organisations have implemented the various programmes on natural resources.

**Scope of the Study**

The universe chosen for the study is district Patiala and district Ropar of Punjab State and district Kurukshetra and district Karnal of Haryana State. These districts have been chosen by keeping two facts in mind. One, a large number of projects and programmes have been financially sponsored by the various National and International funding agencies and are implemented in rural areas by the voluntary organisations on conservation and management of soil and water resources in these four districts of the states of Punjab and Haryana. Two, a large number of voluntary organisations with long standing exist in these areas and there is adequate number of beneficiaries available that are availing the services of these voluntary organisations.

**Objectives**

1. To study the profile of voluntary organizations and beneficiaries.
2. To study the causes of depleting soil and water resources.
3. To study the implications of depleting soil and water resources and role of voluntary organizations in generating awareness about it.
4. To assess the role of voluntary organizations regarding conservation and management of soil and water resources.
5. To identify the programmes run by various voluntary organizations for conservation and management of soil and water resources.
6. To identify the methodologies used by various voluntary organisations in imparting the knowledge of conserving and managing the soil and water resources to the beneficiaries.
7. To suggest a holistic functional model for designing and implementation of various programmes on soil and water conservation and management through voluntary organizations.

**Delimitations of the Study**

1. Keeping in view the complexity and diversity involved in natural resources, the researcher has narrowed the focus of the present study on two basic natural resources i.e. soil and water.

2. Only four districts i.e. Rupnagar and Patiala of Punjab and Kurukshetra and Karnal of Haryana are covered under the study.

**Definitions of the Important Terms Used**

**Natural Resources**

The natural resources are naturally occurring substances that are considered valuable in their relatively unmodified natural form. Natural resources include soil, air, water, sunshine, indigenous animals, or vegetation including plants, herbs, shrubs. All these are of cosmic origin and are not created by man and therefore, are called natural resources. Natural resources are classified on the basis of their origin, and their stage of development. On the basis of their origin, natural resources are of two types such as biotic and abiotic and on the basis of their stage of development natural resources are divided into potential resources and actual resources. Thus, natural resources constitute very important part of the ecosystem. These resources are considered life supporting systems on the planet earth without which no human activity can be imagined. For the purpose of the present study, natural resources of soil and water have been taken in to consideration.

**Voluntary Organisation**

Voluntary organisation means a group of people working together voluntarily to help the needy persons with their available needs and resources. According to Prabhakaran “Voluntary organisation is an agency(organised or unorganised, structured or unstructured) which works for the welfare of community in any given area of its own volition. It may be just an individual or collection of individuals or it
may have a more formal structure. It is actually a group of well trained, committed persons living in an area of activity and dealing and interacting with villagers.42

The voluntary sector or community sector also known as non-profit sector is the sphere of social activity undertaken by organizations that are for non-profit and non-governmental.

Since ancient times, voluntary sector in India has played a vital role in promotion of the participatory democracy by implementing need based, area specific, innovative, integrated, environment friendly and people friendly interventions, focused on the welfare and development of the under privileged masses. Voluntary organizations work as eye and ear of the people and they have capacity and capability to feel the pulse of the people for providing appropriate services for the welfare and betterment of the poor, downtrodden and marginalised section of the society. They are well aware about the ground realities at the grassroots level and give realistic picture of the causes and solutions of various social problems. Their approach with the target group is direct, friendly, empathetic and need based. Because of their strong linkages with the community, they are able to develop and implement more contextualized, people oriented plan of action, focusing on self-reliance and sustainable development. Their credibility lies in the responsible and constructive role they play for the betterment of the state and society. The vision, mission and people centered approach and implementation of developmental intervention in close coordination with the community signifies their pivotal role in sustainable development. Voluntary organizations work directly with the people on various social issues such as environment, natural resources, education, health, rural development, water, sanitation and many more. Under the present study the term voluntary organisations has been used in a broader perspective which includes the non-governmental organisations, civil services organisations, self-help groups, community based organisations and institutions, youth clubs and mahila mandals who are engaged in sustainable management of natural resources specially the soil and water resources in rural as well as urban areas.

Soil Conservation

Soil conservation is a set of management strategies for prevention of soil being eroded from the earth’s surface or becoming chemically altered by overuse,
acidification, salinization or other chemical soil contamination. It is a component of environmental soil science. Soil conservation focuses on maintaining of soil health and protecting it from soil erosion, acidification and salinization. It refers to various management strategies that are put in place for protecting soil from various factors. For instance, soil conservation helps to avoid soil erosion or damage to soil by salinization, acidification or overuse. By conserving soil, we can promote soil organisms, maintain soil PH and prevents soil erosion. Soil conservation might be beneficial for the environment but most farmers find that undertaking the commended conservation practices is a very expensive affair.

**Soil Degradation**

Soil degradation is defined as a decrease in soil quality as measured by changes in soil properties and processes and the consequent decline in productivity. Food and Agriculture Organisation (1977) has defined soil degradation as a process which lowers the current and/or potential capability of soil to produce quantitatively and/or qualitatively (goods or services). Soil degradation affects the flow or renewable characteristics of soils by reducing the potential biotic productivity of the resource. Thus a land is set to be degraded when its productivity declines. The degradation of land is either by natural agencies or its over exploitation by man. Soil degradation occurs through erosion of top soil, loss of organic matter, depletion of nutrients through repeated harvest, water logging and salinization, acidification, compaction, pollution of ground water and both decline and rise of ground water. There are six processes of soil degradation such as soil erosion, wind erosion, access of salts(salinization), chemical degradation, physical degradation and biological degradation.

**Soil Erosion**

Soil erosion is when the top soil is washed or blown away by water or wind. It is major factor responsible for the degradation of soil resources. The loss of top soil resulting in reduced productivity is the major degradation problem in the Indian sub-continent. Soil erosion is one of the main processes of degradation and consists of physical detachment of soil particles by wind and water and their transport elsewhere in the landscape, to rivers and water storage or to the sea. It has been estimated that out of total 329 million hectares geographical area of the country, 141.15 million
hectares is subject water and wing erosion and about 34 million hectares is affected by special land to degradation problem\textsuperscript{46}.

**Conservation of Water Resources**

Conservation and management of both surface and ground water resources are of utmost important, without which survival of human beings, livestock, flora and fauna cannot be thought of. Surface Water resources includes rivers, lakes or fresh water wetlands. Precipitation is the natural recharging source for the surface water resources and it also maintain the hydrological cycle. Rivers are the major source of water in India. The utilizable annual surface water in rivers of the country is 690 km\textsuperscript{3}. Human activities like artificial dams, reservoirs are also included in the same category and have capacity to increase utilization of the water. Similarly, subsurface water or water within aquifers are known as ground water resources. Ground water resource recharge from the precipitation mostly in the monsoon season. Canal irrigation and other form of irrigation systems also contribute to the recharging of the ground water. The annual potential of natural groundwater recharge from rainfall in India is about 342.43 km\textsuperscript{3}, which is 8.56 percent of total annual rainfall of the country. The annual potential groundwater recharge augmentation from canal irrigation system is about 89.46 km\textsuperscript{3}\textsuperscript{47}.

Water conservation refers to the preservation, control and development of water resources both surface and groundwater, and prevention of pollution. It aims at reducing the wastage and usage of water and recycling of waste water for different purposes such as cleaning, manufacturing, agricultural and irrigation. A water conservation measure is an action, behavioural change, device, technology, or improved design or process implemented to reduce water loss, waste, or use. Water efficiency is a tool of water conservation that results in more efficient water use and thus reduces water demand. The value and cost-effectiveness of a water efficiency measure must be evaluated in relation to its effects on the use and cost of other natural resources (e.g. energy or chemicals)\textsuperscript{48}.

**Management of Water Resources**

Water resources management or integrated water resource management is a process which promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare
in an equitable manner without compromising the sustainability of vital ecosystems. Integrated Water Resources Management is necessary to combat increasing water scarcity and pollution. Methods include water conservation and reuse, water harvesting, and waste management. An appropriate mix of legislation, pricing policies and enforcement measures is essential to optimize water conservation and protection. It embodies integration across sectors, integration of use, integration of demand, integration with the environment as well as integration with the people

**Holistic Functional Model**

A holistic functional model refers to a model set of practices essential to carry out and properly implement the developmental interventions particularly on soil and water management in rural areas with involvement of the stakeholders/beneficiaries community. The model will highlight the basic essential steps to carry out the intervention on soil and water management starting from the entry point activities, programme planning, implementation, follow up and withdrawal strategies by the voluntary organisations in order to achieve the end objectives under the programme. It would be an effort of the researcher to prepare a holistic functional model on the basis of the feedback obtained from the respondents under the present study.

**Methodologies Used by Voluntary Organizations**

Methodology is generally a guideline for solving a problem, with specific components such as phases, tasks, methods, techniques and tools. It can be defined also as the analysis of the principles of methods, rules, and postulates employed by a discipline, the systematic study of methods that are, can be, or have been applied within a discipline; the study or description of methods. Methodologies under the present study refers to a description of generic processes followed by the voluntary organisations. It is the methods of implementation of the developmental interventions on soil and water management by the voluntary organisations in their target areas. It includes entry point activities to start the project, peoples' participation and involvement strategies adopted by the voluntary organisations for programme implementation, capacity building and information, education and communication activities, monitoring and evaluation methods, and withdrawal strategy etc. under a particular project.
Limitations of the Study

1. As the present study is based mainly on the primary data obtained from the 100 chief functionaries of the voluntary organisations and 300 beneficiaries from two districts of Roopnagar and Patiala of Punjab and Karnal and Kurukshetra of Haryana, the objectivity of the research shall be dependent upon the extent of spontaneity and readiness of the respondents to provide true and authentic information. A bigger universe as the area of study was not possible and viable because of the time and economic resources.

2. Since the present study is confined to the four districts of Punjab and Haryana, therefore it may not bring out the results which could be generalized for the entire country. The findings of the study may be relevant for other districts of Punjab and Haryana with slight variations.
References:


