

LAWS TO CONTROL DESERTIFICATION : A STUDY WITH SPECIAL REFERENCE TO WEST BENGAL

**Thesis Submitted for the Degree of Doctor of
Philosophy in Law**

The University Of Burdwan

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This is also to certify that no research work has, to the best of my knowledge, been done on this topic in such format in any Indian or foreign University and that the work has been done by the candidate himself.

Prof. (Dr.) Shiv Sahai Singh

PREFACE

Desertification constitutes one of the global international problems the world is facing. Each year millions of acres of farmland, rangeland and forests are becoming too arid. Climatic variations have significant impacts on dryland soils because they are inherently vulnerable to desertification processes. The direct human-induced caused of desertification includes so many things, out of which degradation of forest is one of the primary cause.

Forest eco-systems contain a large part of terrestrial biodiversity. The forests also witnessed the birth of humans and with motherly care it nurtured human beings from a cave dwellers to this present generation. Today, the futures of forest biodiversity are at the mercy of humans, and it is being reduced due to rapid deforestation and degradation of land. Although efforts at afforestation continue worldwide, still forests are being destroyed at an alarming rate. Considering the facts, the United Nations declaring 2006 as the International Year of Deserts and Desertification, only just to create awareness on this very fundamental problem to initiate concrete measures to combat desertification. Similarly year 2011 was declared as the International year of Forests by the United Nations. The theme of “Forests for People” celebrating the central role of people in the sustainable management, conservation and sustainable development of our world’s Forests.

Desertification is related to land degradation and it affects so many parts of India as well as our State. The problem is more severe in western parts of Rajasthan and Kutch. Some parts of State of West Bengal is facing this problem very silently.

Soil erodes rapidly where the forests have been felled down, as it provides a protective shield over the land and prevents the loss of topsoil. Deforestation, overgrazing and unsustainable agricultural practices are the main human activities resulting desertification.

This present thesis has focused on such a problem of the environment, which has not received much light as the other environmental problem got. Through different chapters the researcher has tried to highlight the entire subject matter. The thesis contains the position of forests from ancient to the modern period and social aspects of the forests. The researcher also highlighted the main cause of the problem of desertification and discussed about the problem region-wise and socio-economic conditions of the local inhabitants. The thesis contains a large number of local problems, international conventions, national laws and up to date judgments.

The National Forest Policy of 1988 aimed to increase the forest and tree cover to 33 per cent of the country's geographical area by 2012. It is still about 23 per cent. Most of the forests are being degraded and the mean annual increment in the growing stock is minimal. In the first phase of civilization humans are being dominated by nature, in the second phase humans managed the nature. But in this present generation nature is dominated by humans. Menace of desertification is slowly progressing in this state. This research, highlights serious attention of this problem.

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I am deeply indebted to my parents for their encouragement to see me in the higher education and success. I feel myself always blessed by the inspiration of my late father Narayan Chandra Mondal. This present work was started with his inspiration. I remain deeply appreciative of the persistent encouragement and cooperation of my family members. Anjali Mondal, my mother's continuous care and deep positive approach are influential in making me what I am today. Contribution of my wife Mousumi Mondal, M.A. and daughter Abantika Mondal in this work is irreplaceable and deserve special gratitude, as the work stands on their precious time which I have encroached upon.

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ABBREVIATIONS

AIR	All India Reporter
ADDA	Asansol Durgapur Development Authority
APPCB	Andhra Pradesh Pollution Control Board
BNR	Bengal Nagpur Railway
BTR	Buxa Tiger Reserve
CEC	Central Empowered Committee
CAZRI	Central Arid Zone Research Institute
CRZ	Coastal Regulation Zone
DFO	Divisional Forest Officer
DVC	Damodar Valley Corporation
FAO	Food and Agriculture Organisation
FPC	Forest Protection Committee
GFA	Government Forest Act, 1865
Guj.	Gujarat
HPC	High Power Committee
IFA	Indian Forest Act, 1927
J & K	Jammu and Kashmir
JFM	Joint Forest Management
Kant	Karnatak
Ker	Kerala
LPG	Liquidified Petroleum Gases
MFP	Minor Forest Produce
MGNREGA	The Mahatma Gandhi National Rural Employment Guarantee Act, 2005
NCA	National Commission on Agriculture

NGO	Non Governmental Organisation
NTPC	National Thermal Power Corporation
PACD	Plan of Action to Combat Desertification
PESA	Panchayat (Extension to the Scheduled Areas) Act, 1996
PF	Protected Forest
POSCO	Pohang Iron and Steel Company
PS	Police Station
PWD	Public Works Department
RF	Reserved Forest
Sec.	Section
Sq. Km.	Square Kilometer
SAIL	Steel Authority of India Limited
SC	Supreme Court
SCC	Supreme Court Cases
STKK	Saptagram Tribeni Kalna Katwa
SWFA	South West Frontier Agency
UN	United Nations
UP	Uttar Pradesh
US	United States
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Economic and Social Council
UNSF	United Nations Special Fund
WB	West Bengal
WSSD	World Summit on Sustainable Development

LIST OF TABLES

	Page
2.1 Using of forest in different ages	35
2.2 Forest types and distribution in India	48
2.3 Legal status of forests in W.B. since 1901	56
2.4 District wise area under forests by legal status in W.B.	57
2.5 District wise distribution of geographical and recorded forest land in W.B.	59
2.6 Forest area under major forest type in W.B.	60
2.7 Principal species under major forest types in W.B.	60
4.1 Root Causes of Global Desertification	112
4.2 Soils under limiting erosion classes	138
4.3 Soils under limiting salinity classes	138
4.4 Three Major Forest Areas in Bengal	140
4.5 Wildlife conservation and protected areas of W.B. Through National Parks and Sanctuaries	179
4.6 Wildlife conservation and protected areas of W.B. through Reserves and Biosphere	180

Table of Cases

	Page
1. Ambica Quarry Works etc. vs. State of Gujarat & Ors A.I.R. 1987 S.C. 1072.	252
2. Animal and Environment Legal Defence Fund vs. Union of India A.I.R. 1997 S.C. 1071.	249
3. Banwasi Seva Ashram vs. State of U.P. A.I.R. 1987 S.C. 374	246
4. Fatesang Gimba Vasava & Ors. Vs. State of Gujarat & Ors. A.I.R. 1987 Guj. 9.	247
5. Mulla Mohmadali vs. State of Gujarat A.I.R. 1987 S.C. 335	250
6. M.C. Mehta vs. Kamalnath (1997) I S.C.C. 388	255
7. Nagarahole Budakatta Hakku Sthapara Samithi vs. State of Karnataka A.I.R. 1997 Kant. 288	254
8. Niyamavedi vs State of Kerala A.I.R. 1993 Ker. 262	254
9. Pradeep Krishan vs. Union of India A.I.R. 1997 S.C. 2040	249
10. Rural Litigation and Entitlement Kendra, Dehradun vs. State of U.P. A.I.R. 1988 S.C. 2187	251
11. Samatha vs. State of Andhra Pradesh A.I.R. 1997 S.C. 3297	253
12. Second Banwasi Seva Ashram vs. State of U.P. (1992) & S.C.C 202	248
13. Supreme Court Monitoring Committee vs. Mussoorie – Dehradun Development Authority & ors. (1997) II S.C.C. 605	256
14. Suresh Lohiya vs. State of Maharashtra & Ors. A.I.R. 1987 S.C. 103	248
15. State of Orissa vs. Duti Sahu A.I.R. 1997 S.C. 1040	248

	Page
16. Tarun Bharat Sangh, Alwar vs. Union of India A.I.R. 1992 S.C. 514	253
17. T.N. Godavarman Thirumulpad vs. Union of India A.I.R. 1997 S.C. 1228	257
18. Union of India vs. Kamath Holiday Resorts Pvt. Ltd. A.I.R. 1996 S.C. 1940	255

CONTENTS

	Page
<i>Supervisors Certificate</i>	
<i>Preface</i>	I
<i>Acknowledgement</i>	III
<i>Abbreviation</i>	V
<i>List of Tables</i>	VII
<i>Table of Cases</i>	VIII

1. INTRODUCTION

(1 – 7)

1.1 Object of the Study	2
1.2 Research Methodology	4
1.3 Chapterisation	5

2. FOREST IN ANCIENT AND MODERN PERIOD

(8 – 63)

2.1 The Changing Earth	9
2.2 History of Environment	11
2.3 Definition of Forest and its development in Various ages	12
2.4 Historical Forest Jurisprudence in India	15
2.4.1 In Geological Ages	15
2.4.2 Ancient Thoughts	15
2.4.3 The Maurya Dynasty	19
2.4.4 The Mughals Period	24
2.4.5 Early British Period	26
2.4.6 Destruction of wild life	30
2.4.7 The First World War	32
2.4.8 The Second World War	33
2.4.9 Major Use of Forest in Different Ages	34
2.4.10 Policy and Conservation during Colonial Govt.	36
2.4.11 Post – Independence Period	36

	Page
2.4.12 National Forest Policy, 1952	38
2.5 Forest Types and their Distribution in India	39
2.5.1 Tropical Wet Evergreen Forest	40
2.5.2 Tropical Semi-Evergreen Forest	41
2.5.3 Tropical Moist Deciduous Forest	42
2.5.4 Littoral and Swamp Forest	42
2.5.5 Tropical Dry Deciduous Forest	43
2.5.6 Tropical Thorn Forest	43
2.5.7 Tropical Dry Evergreen Forest	44
2.5.8 Sub-Tropical Broad-Leaved Hill Forest	44
2.5.9 Sub-Tropical Pine Forest	45
2.5.10 Sub-Tropical Dry Evergreen Forest	45
2.5.11 Montane Wet Temperate Forest	45
2.5.12 Himalayan Moist Temperate Forest	46
2.5.13 Himalayan Dry Temperate Forest	46
2.5.14 Sub-Alpine Forest	46
2.5.15 Moist Alpine Forest	47
2.5.16 Dry Alpine Scrub	47
2.6 Forest and Forestry in Bengal	48
2.7 Forest Land Forest Cover and Vegetation in W.B.	55
2.7.1 Classification of Recorded Forest Land	58
2.8 W.B.F.D.C	61
2.8.1 Objective of the Corporation	61
2.8.2 Activities of the Corporation	64

3. SOCIAL ASPECTS OF FORESTS

(64 – 104)

3.1 Forests and Civilisation	65
3.2 Forestry for Socio – Economic Development	66
3.2.1 Forest as a Source of Human and Animal Food	71
3.2.2 As Source of Providing Cheap Fuel	71
3.2.3 Forestry is the Main Supplier of Raw Material for making paper	72
3.2.4 Forestry provide Employments to the Rural Populations often at their door steps	72
3.2.5 Forestry Plays an Important Role in Regional Development	72
3.2.6 Forests Right, Concessions and Privileges Enjoyed by the Local Villagers Amount to a Big Subsidy	73

	Page
3.2.7 Forest Based Industries Provide Diverse Products, Employment and Income	73
3.2.8 Forestry Provides Material for Diverse Uses	73
3.3 Main Forest Products and Industries	74
3.3.1 Packaging	75
3.3.2 Railway Sleepers	75
3.3.3 Building Construction	76
3.3.4 Matchwood	77
3.3.5 Mine Pit Props	77
3.4 Minor Forest Produce	77
3.4.1 Fibres and Flosses	78
3.4.2 Grasses, Bamboos and Canes	79
3.4.3 Essential Oils	80
3.4.4 Tans and Dyes	82
3.4.5 Gums, Resins and Oleoresins	83
3.4.6 Drugs, Spices, Poisons and Insecticides	83
3.4.7 Edible Products	86
3.4.8 Leaves	87
3.4.9 Animal, Mineral and Misc. Products	87
3.5 Forest Industries	88
3.5.1 Composite Wood Industries	88
3.5.2 Match Industry	89
3.5.3 Paper Industry	90
3.5.3.1 Newsprint	90
3.5.4 Furniture and Other Timber – Utilizing Industries	91
3.5.5 Industries Utilizing Forest Products Other Than Timber	91
3.5.6 Resin Trapping and Manufacture of Turpentine and Rosin	91
3.5.7 Lac and Shellac	92
3.5.8 Tendu Leaves	93
3.6 Wild Life and the Forests	93
3.6.1 The Mammals	94
3.6.2 The Avifauna	95
3.6.3 The Reptiles	95
3.7 Tribal People and Forests	96
3.7.1 Forests and Tribal Civilization	98
3.7.2 Some MFP and Tribals	100

	Page
4. EMERGING ISSUES FOR DESERTIFICATION (105 – 192)	
4.1 Descritification : Meaning and Definition	106
4.2 Problem of Desertification	107
4.3 Root Causes of Global Desertification	110
4.3.1 Climatic Variations	112
4.3.1.1 Wind Erosion	112
4.3.1.2 Water Erosion	113
4.3.1.3 Salinization	114
4.3.1.4 Shortage in Rainfall	115
4.3.1.5 Changes in Water Courses	116
4.3.2 Human Activities	116
4.3.2.1 Indiscriminate Cutting of Trees	116
4.3.2.2 Uncontrolled Grazing	119
4.3.2.3 Irrational Land Use	120
4.3.2.4 Over Exploitation of Water Resources	121
4.3.2.5 Mines and Industrilization	122
4.3.2.6 Highway and Dams	125
4.3.2.7 Unplanned Tourism and Urban Growth	128
4.3.2.8 Raising Demand of Fuelwood and Timber	131
4.3.2.9 Shifting Cultivation	133
4.3.2.10 Tribal Dependency on Forests	134
4.4 Landuse And Soil In West Bengal	135
4.5 Soil Problems Leads to Desertification In W.B.	137
4.6 Classification of Forest cover In West Bengal	139
4.6.1 Himalayan Terai And Dooars	140
4.6.1.1 History of Dooars and Buxa	141
4.6.1.2 Neora Valley National Park	143
4.6.1.3 Singalila National Park	144
4.6.1.4 Gorumara National Park	144
4.6.1.5 Jaldapara National Park	145
4.6.1.6 Problem of Desertification in Himalayan Terai & Doars	146
4.6.2 Mangrove Forest	150
4.6.2.1 Soils and Salinity of Mangrove	151
4.6.2.2 Biotic Resources of Sundarban	152
4.6.2.3 Socio-Economic condition of the Forest Dwellers of Sundarban	153

	Page
4.6.2.4 The Man Animal War For Food and Space	154
4.6.2.5 Hostility of Nature In Mangrove Forest	155
4.6.2.6 Problem of Desertification In Mangrove Forest	157
4.6.3 South-Western Junglemahal	159
4.6.3.1 Midnapore West And Its Forests.	160
4.6.3.2 Bankura And Its Jungle Mahal	164
4.6.3.3 Purulia And Its Jungle Mahal	168
4.6.3.4 Parts of Birbhum and Burdwan Districts	171
4.6.3.5 Problem of Desertification in Junglemahal	176
4.6.4 Wildlife Conservation And Protected Areas in W.B.	178
4.7 Field Survey	181
4.7.1 Analysis of Field Survey	189

5. REGULATORY MEASURES TO COMBAT DESERTIFICATION

(193 – 244)

5.1 Ancient thoughts for combating desertification	193
5.2 Combating desertification in the Medieval Period	195
5.3 Forest Conservancy during the British Period	196
5.3.1 Beginning of the Organised forest management	197
5.3.2 Beginning of forest Conservancy in Bengal	198
5.3.3 Forest Legislations by the Britishers	198
5.3.3.1 Government Forest Act, 1865 and its drawbacks	199
5.3.3.2 Indian Forest Act, 1878	201
5.3.3.3 Indian Forest Act, 1927	202
5.4 Forestry in Independent India	204
5.4.1 The Constitution of India for wholesome environment	205
5.4.2 National Forest Policy 1952	207
5.4.3 The Wildlife (Protection) Act, 1972	208
5.4.4 The National Forest Policy 1988	209
5.4.5 Forest (Conservation) Act, 1980	211
5.4.6 Five Years Development Plans	212
5.4.7 Joint Forest Management	215
5.4.8 Panchayat (Extension to the Scheduled Areas) Act, 1996	217
5.4.9 The Forest Rights Act, 2006	217
5.5 Forest Legislations in West Bengal	219
5.5.1 The Bengal Public Parks Act, 1904	219
5.5.2 The West Bengal Private Forest Act, 1948	220

	Page
5.5.3 West Bengal Town and Country (Planning and Development) Act, 1979	220
5.5.4 The West Bengal Trees (Protection And Conservation in Non-Forest Areas) Act, 2006	221
5.6 Some Forest Movements	222
5.7 Recent Desertification Control Technologies in India	228
5.8 International Environmental Law	228
5.8.1 Stockholm Conference of 1972 on the Human Environment	229
5.8.2 Earth Summit of 1992 at Rio de Janeiro	229
5.8.3 Earth Summit of 2002 at Johannesburg	230
5.8.4 United Nations Conference on Desertification, 1977	231
5.8.5 International Tropical Timber Agreement, 1994	232
5.8.6 U. N. Convention to Combat Desertification in Those Countries Experiencing Serious Drought and / or Desertification, Particularly in Africa, 1994	234
5.9 Foreign Countries view towards controlling of desertification	235
5.9.1 Forests and their management in Canada	235
5.9.2 Principles for Combating Desertification in China	236
5.9.3 Controlling of Desertification in the United States	238
5.9.4 Forest Policies of Some South and South-East Asian Countries	239

6. ROLE OF THE JUDICIARY TOWARDS PROTECTION OF FORESTS

(245 – 269)

6.1 Role of the Court on Rights of Forest Dwellers	246
6.2 Forest Protection : Some Judicial Perspectives in Mining Cases	251
6.3 Eco – Tourism and the role of Judiciary towards Forest Protection	254
6.4 <i>Godavarman</i> Case : A Highwater Mark in Forest Protection	257
6.4.1 <i>Godavarman</i> Case towards Saw Mills and Wood based Industries	259
6.4.2 High Power Committee and Central Empowered Committee	264
6.4.3 <i>Godavarman</i> Case towards Felling of Trees and Compensatory Afforestation	265
6.4.4 <i>Godavarman</i> Case towards Protection of National Parks and Sanctuaries	266

7. CONCLUSION AND SUGGESTIONS

(270 – 287)

<i>Appendices</i>	288
<i>Bibliography</i>	292

INTRODUCTION

Desertification constitutes one of the global international environmental problems whose global importance has been recognised by the international community. Desertification is not new to humankind. In the ancient Middle – East, for instance, the destruction of forests, overgrazing and poor agricultural practices caused a deterioration of the water-absorbing capacity of the land and reduced the amount of rainfall. At the first instance desertification can be understood as degradation of soil. Soil is a complex mixture of organic and inorganic material with changeable amounts of air and water. The organic component consists of leaves, roots, and a multitude of living organisms such as bacteria, insects, and earthworms. The inorganic material includes clay, silt, sand, gravel, and rocks. These components and other features combine to form many different soil types throughout the world. Soil is vital to the success of a nation as the civilisation itself rests upon the soil. Degradation of soil is one of the most critical problems in the developed as well as the developing nations. Throughout the world, grassland, pasture and forests are becoming too dry to use because of natural climate change and poor land management practices such as overgrazing, industrialization and indiscriminate tree felling.

Removing of vegetation and degradation of forest is one of the main causes of global desertification. Vegetated surfaces tend to hold moisture. In denuded areas, water tends to run off the surface of the land; so less is available for replenishing ground water and for nourishing plants. Plants that need more moisture cannot

survive. So, extensive deforestation and indiscriminate felling of trees causing this menace of desertification worldwide.

1.1 Object of the Study :

India is the second most populous and seventh largest country in the world having a population of over one billion with 1.8 per cent of world's forest cover. The Country has 88 national parks, 490 wildlife sanctuaries and 12 biosphere reserves to set up different types of ecosystems. Out of these the country has other tree coverage also. Although efforts of afforestation continued, still forests are being destroyed at an alarming rate.

Only about a century ago the earth's land surface comprised 42 per cent forest, 34 per cent desert and 24 percent grass and agricultural land.¹ Today the situation has totally changed. The forest coverage has decreased while the proportions of desert, agricultural land and urban areas have increased. This kind of progress of mankind is heading towards an 'ecocides'. Forestry plays an essential role in protecting the soil, especially trees and bushes that due to their long life and powerful root systems assure strong protection against soil degradation. Due to climatic variations and human activities, regions of fertile land have degraded to dry land areas rapidly.

The problem is very vulnerable and affects a number of regions of the world in developed and developing countries, whose global importance has been recognised by the international community. The UN Conference on Desertification, which took place in 1977 was the first major international meeting addressing specifically land

¹ Lal J.B. : India's Forests : Myth & Reality (Natraj Pub. 1989) p – 220

degradation. The importance is clearly visible in the massive endorsement that States have given to the United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and / or Desertification, particularly in Africa in 1994. The **Year 2006 – 07 declared as International Year of Deserts and Desertification**, not only just to create awareness on this very fundamental problem, which has roots, rights from local to global level, but also to initiate policies to combat desertification and land degradation. The United Nations declared the **Year 2010** as the **International Year of Biodiversity** considering the role played by the world's flora and fauna in the well-being of humans. Considering destruction and exploitation of green wealth with a horrifying speed the United Nations declared the **Year 2011** as the **International Year of Forests**. The United Nations considered the forests as protector of watershed and conservator of soil. Considering 'water' as most precious resources the United Nations has declared **Year 2013 as International Year of Water Cooperation**. So, it can be understood that the International Communities significantly taking environmental issues in their working framework.

India as well as the State of West Bengal is not far away from this problem. Desertification is a major problem in the dry lands of north-western part of India, especially in the desert tracts of Rajasthan and Rann of Kutch in Gujarat. Although the problem is severe in arid and semi arid part of the country, the other part of the country like West Bengal is not much more away from the problem. With the increasing population and other socio-economic problems, desertification or land degradation posing threat to some parts of the State. Bengal is the state with variety of soil, forest types and inhabitants. Present problem of the state is not alike with the problem of north-western part of the country, but here the problem is different.

Although international community has taken certain steps to eradicate this problem, but neither India nor State of West Bengal has initiated legal framework to eradicate land degradation. The country and its parliament passed several laws to eradicate so many environmental problems; judiciary also passed series of judgments which have enriched the environmental jurisprudence. But neither the legislation nor the judiciary is thinking about the problem of desertification or land degradation.

The main object of this project is to highlight the problem in different parts of the state according to its soil, forests and local inhabitants. Land degradation is *genus* and deforestation is one of its *species* is the main theme of this project. The researcher divided the state in three main geographic areas — Terai – Dooars, Sundarban – Mangrove and South-Western Junglemahal. This present project has discussed in detail about the problems region wise with its historical backdrops to the present condition. It has found that every region has its own characteristics and different types of problems. During successive five year plans and under social forestry scheme, forest department has planted some commercially valued trees which have no outcome in the life of local forest dwellers. So, this research project tried to find out the socio-legal causes of the problem and its impact upon the society.

1.2 Research Methodology :

To pursue this research work I have followed the doctrinal method mainly. I have collected the materials from the libraries of different institutions and Universities. Mainly the relevant statutes and text books, different journals, news papers, magazines help me to find out the situation of this work. I have collected a good number of related case references of the Supreme Court and different High

Courts from the law reporters. I have made an extensive field study to visit different regions of the State, where through questionnaire method (list of questionnaire given to Appendices) collected views of several persons regarding the work. The local inhabitants of different regions responded to my queries and co-operated me to explain the actual position. The study aims at a critical analysis of the impact of development efforts made so far in the research area on bringing about welfare of the population and well-being of the eco-system. It seeks to examine in particular the role of the villagers living in and around the forest in ensuring sustainable development of the area which means meeting the need of the present without compromising the needs and aspiration of the future.

1.3 Chapterisation :

This work is a small effort in building my thesis on the topic “**Laws To Control Desertification : A Study With Special Reference To West Bengal**”. For giving it a gradual shape in a comprehensive manner and for making my study and collection of materials convenient, I have categorized the entire subject matter into the following chapters :

1. Introduction
2. Forest in ancient and modern period
3. Social aspects of forests
4. Emerging issues for desertification
5. Regulatory measures to combat Desertification
6. Role of the judiciary towards protection of forests
7. conclusion and suggestions

In the first chapter, an idea has given by the author about the problem of desertification and its impact upon the society and also discuss about the methodology of the research work.

In the second chapter position of forests and its conservation explained in ancient, medieval and British period. It covers post independence period also. This chapter also explained the types of forests and their distribution in India as well as in West Bengal.

Third chapter covers social aspects of forests, which includes forests and civilisation, forest industries and minor forest produces which plays an important role in the socio-economic development of mankind. Forests are not only meant for trees, it includes wildlife and the people living in and around the forests. This chapter throws some lights about the symbiotic relationship of tribal with forest.

Fourth chapter is the key chapter of this work, which explained about the emerging issues for desertification. It discusses about the global as well as local problems of desertification and causes of desertification region-wise in the first part. In second part of the chapter includes field survey in three major classified areas of the state. The chapter in detail discuss about the national parks, sanctuaries and tree coverage of the State.

Fifth chapter highlights about the regulatory measures to combat desertification which includes forest management system from ancient thoughts to the modern era. Forest conservation has discussed in detail in ancient, medieval, colonial

and in independent India. International mechanism and municipal laws of some foreign countries also added few words in it. Some forest related movements indicate the close relationship of man with forest.

Role of the judiciary towards protection of forest is the sixth chapter, which given an idea about the interpretation of existing forest related laws by the Supreme Court of India. The chapter includes the landmark cases decide by the Supreme Court and various High Courts regarding the rights of the forest dwellers, dams, saw mills, tourism, mining and so many different matters. Godavarman case is the second wave of environmental litigation in the sense that Supreme Court addresses such a range of policy as well as enforcement issues on a continuing basis.

FOREST IN ANCIENT AND MODERN PERIOD

From the creation of the planet earth, forests are the part and parcel of living creatures. India is such a country that has vast forest land from ancient time. In different religious books and epics forests have been described as one of the main features of the land. Indian socio cultural history provides excellent examples of the preservation of forest resources from the ancient thoughts of religious injunctions. The Indian sub-continent ruled and governed by different religions and rulers from so many parts of the world. The forests of the country have seen the princely statehood of native kings as well as the emperor of British Government. During the Islamic invention forest was used for hunting and pleasure. The colonial Government used the forest resources as supply of wood to the railways and navy. Although they have shaped the forest area in a systematic management. After two world wars the forest area of the country has decreased with the loss of other resources. After independence the Government of India had taken so many steps and policies to manage the green vegetation of the country. Forest of Bengal is spread over the whole state from the hill top of Himalayas to the Mangrove of Sundarban. The Forest of the state has changed by the different periods from ancient time to this present generation.

2.1 The Changing Earth :

If we consider the relationship of trees and living creatures, then we see that from the early period of this planet both are living with harmony. The earth formed from a cloud of dust and gas drifting through space about 4,600 million years ago. Dense minerals sank to the centre while lighter ones formed a rocky crust. However, the first known life-forms-bacteria and blue green algae and it was only 700 million years ago that more complex plants and animals began to develop. The earth itself is continually changing. Although continents neared their present locations about 50 million years ago, they are still drifting slowly over the planet's surface, and mountain ranges such as the Himalayas- which began to form 40 million years ago only.

When the earth formed about 4,600 million years ago, its atmosphere consisted of volcanic gases with little Oxygen, making it hostile to most forms of life. The first primitive life-forms emerged around 3,400 million years ago in shallow, warm seas. The build up of Oxygen began to form a shield of Ozone around the earth, protecting living organisms from the sun's harmful rays and helping to establish an atmosphere in which life could sustain itself. The first land plants appeared around 400 million years ago during the Devonian period (409 – 363 million years ago) and the first land animals about 30 million years later.

The carboniferous period (363 – 290 million years ago) takes its name from the thick, carbon rich layers, now coal, that were produced during this period as swampy tropical forests were repeatedly drowned by shallow seas. The humid climate across northern and equatorial continents throughout carboniferous times produced the first dense plant cover on earth.

The Triassic Period (245 – 208 million years ago) marked the beginning of what is known as the Age of Dinosaurs (the Mesozoic era). During this period, the present-day continents were massed together, forming one huge continent known as Pangaea. This land-mass experienced extremes of climate, with lush green areas around the coast or by lakes and rivers, and arid deserts in the interior. The only forms of plant life were non-flowering plants, such as conifers, ferns, cycads, and ginkgos; flowering plants had not yet evolved.

The Jurassic Period, the middle part of the Mesozoic era, lasted from 208 to 146 million years ago. During Jurassic times, the land-mass of Pangaea broke up into the continents of Gondwanaland and Laurasia, and sea-levels rose, flooding areas of lower land. The Jurassic climate was warm and moist. Plants such as ginkgos, horsetails, and conifers thrived, and giant redwood trees appeared, and did the first flowering plants.

The Mesozoic Era ended with the Cretaceous period, which lasted from 146 to 65 million years ago. During this period, Gondwanaland and Laurasia were breaking up into smaller Land-masses that more closely resembled those of the modern continents. The climate remained mild and moist but the seasons become more marked. Flowering plants, including deciduous trees, replaced many cycads, seed ferns, and conifers. Animal species became more varied, with the evolution of new mammals, insects, fish, crustaceans, and turtles.

Following the demise of the Dinosaurs at the end of the Cretaceous period, the Tertiary period (65-1.6 million years age) was characterized by a huge expansion of mammal life. India's collision with Asia led to the formation of the Himalayas. During the middle part of the Tertiary period, the forest-dwelling and browsing mammals were replaced by mammals such as the horse, better suited to grazing the open savannahs that began to dominate.

In present time there are more than 3,00,000 species of plants. They show a wide diversity of forms and Life-styles, ranging, for example, from delicate liverworts, adapted for life in a damp habitat, to cacti, capable of surviving in the desert, and from herbaceous plants, such as corn, which completes its life-cycle in one year, to the giant redwood tree, which can live for thousands of years¹.

2.2 History of the Environment :

The conception of the environment changes in the course of this evolution. Ecological conditions which may appear hostile to man at one stage of this evolution may prove to be attractive and inviting at another stage. The hunter and food gatherer armed only with stone tools preferred to live on the edge of forests near the plains or in open river valley by cutting the trees and developed it into fertile soil. With the rainfall or by irrigation man started to produce the food grains. In this way man become civilized and such civilizations and empires were very much dependent on their agrarian base.

¹ Ultimate visual Dictionary, (Plant variety) – (Dorling Kindersley, 2005) p – 112

Indian history provides excellent examples of this evolution. The cultivation of grain started around 7000 BC in southern Asia, according to recent archaeological research. This was a time of increasing rainfall in the region which has allays depended on the monsoon².

The resurgence of old traditions throughout Indian history prevents the ready transfer of the Western periodisation of history to India. Ancient, medieval and modern history cannot be easily identified in India. For this reason many historians adopted another division for Indian history : Hindu, Islamic and British periods. Hindu historians tended to glorify the golden age of the Hindu period and considered Islamic and British rule as two successive periods of foreign rule. Islamic historians accepted this clear cut division though they may have had their own ideas about the Hindu period. British historians were equally comfortable with this division as it implied that British rule made such a mark on Indian history that one could very well forget about everything else³.

2.3 Definition of Forest and its development in various ages :

The word Forest is derived from the Latin word ‘foris’, meaning outside, the reference being to a village boundary or fence, and it must have included all uncultivated and uninhabited land. The Indian word ‘jungle’ has been adopted in the English language to describe a collection of trees, shrubs etc., that are not grown in a regular manner, as contrasted with ‘forest’, which is any vegetation under a systematic management. Technically forest has been defined as :

² Kulke Hermann and Rothermund Dietmer : A History of India (Routledge 1999) p – 2

³ ibid P-6

- a. (In general) An area set aside for the production of timber and other forest produce, or maintained under woody vegetation for certain indirect benefits which it provides, e.g. climatic or protective;
- b. (In ecology) A plant community predominantly of trees and other woody vegetation, usually with a closed canopy; and
- c. (In law) An area of land proclaimed to be a forest under a forest law⁴.

According to Oxford English Dictionary forest means, a large tract of land covered with trees and undergrowth sometimes mixed with pastures (in proper names also a district formerly forest but now cultivated); the trees growing in such a tract.

According to Britannica Ready Reference Encyclopedia forest is nature's most efficient ecosystem, with a high rate of PHOTOSYNTHESIS affecting both plant and animal systems in complex organic relationships.

According to United Nations Convention on combating Desertification forest means dense canopy with multi-layered structure including large trees in the upper storey.

UN-FAO defined that, land under forestry or no land use, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds in situ.

United Nations Framework Convention and climate change stated that, young natural stands and all plantations which have yet to reach a crown density of 10 – 30 percent or tree height of 2 – 5 meters are included under forest.

⁴ Sagreiya. K. P. : Forests and Forestry (NBT 2000) p-2

In *T. N. Godavarman Thirumalpad vs. Union of India*, an ongoing case under whose umbrella all forest cases are today sheltered. For, in a December 12, 1996 order, the Supreme Court provided the definition of ‘forest’ by bringing all areas into the ambit areas of forests not under the forest department, but under tree cover⁵.

So, apart from all the views it can be said that forest is a unique blend of botanical and Zoological units with a vast social organization of living creatures of this planet. To this systematic organization belong not only the trees but also animals and minerals.

To this special organization belong not only the trees but also innumerable other living organism from the plant world viz. shrubs, herbs, mosses, lichens, algae, fungus and bacteria, and from animal kingdoms mammals, birds, reptiles, insects and protozoa. The mineral has its place in the soil and is the bedrock of the forests. Time does not stand still in a forest as is popularly imagined and there is continual action and reaction amongst the members of these communities belonging to one or more of natural kingdoms involving both cooperation and conflict and producing change. Nature resolves such conflicts, if any, in her own inexorable way by weeding out the weak and the inefficient and producing an ‘equilibrium’ which we call as “Nature’s balance”⁶.

⁵ Down to Earth, June 15, 2007 p – 37

⁶ Tewari. D. N : Forestry in National Development (Jugal Kishore & Co. 1986) p – 1

2.4 Historical Forest Jurisprudence in India :

From the ancient time forests have been admired and feared by the aboriginal Indians, as they worshiped the trees as their god. There are so many sacred groves throughout the country which are worship by the tribal peoples. The country and its peoples witnessed so many rulers, mainly from abroad, some of them have restored the greenery and some have destroyed the same.

2.4.1 In Geological Ages :

Palaeo-botanical evidence testifies to the fact that there were dense forests in India in the Permian period, 250 million years ago. A fossilized trunk of a tree found in the Raniganj coal-field is nearly 30m long and 75 cm in diameter at the butt end and 35cm at the top end and is now kept in the Indian Museum in Kolkata. Fossil wood is found in several places in Madhya Pradesh and in the Siwalik hills along the Himalayas.

Man was evolved in the beginning of the Pleistocene Age, only about a million years ago. At this time India had thick forests except in Rajasthan and parts of Punjab which lay buried under a swamp, the remnant of the receding Tethys Sea.⁷

2.4.2 Ancient Thoughts :

Since time immemorial forests have been admired and feared. According to *Agni Purana* there is a 4000 years old injunction to protect trees to earn religious merit, and to ensure material prosperity of the family.

⁷ Sagareiya. K. P : Forests and Forestry (NBT 2000) p – 7

Portions of forests have been regarded as Dev-aranya (God's Abode) and strict prohibition was placed on cutting living trees and large number of leaves generally. Still there is an religious injunction to cutting flowering or fruits bearing trees in their season. In the *Vishnu Purana* there is a reference to *vanas* (forest) existing across the length and breadth of the country. The *Brihad Aranyaka Upanisad* compares man to a tree. His hair is leaves and his skin is its outer bark. The banyan tree occupies a special position in the *Bhagwad Gita* itself. It is said that there is an imperishable banyan tree that has its roots upwords and its branches down and whose leaves are the *vedic* hymns, One who knows this tree is the knower of the Vedas⁸.

In ancient India, protection and cleaning up of environment and conservation of forest was the essence of vedic culture. The *Vedas* and the *Upanishads* named God 'Brahma', from awareness that this cosmos in every part of it is animated by the spirit. In ancient culture concept of *tapovana* or study within the vicinity of forest grows. On the ecological front, the *tapovana* concept and the basic agrarian culture posed humanity in a friendly posture towards the flora and fauna of the world. Man loved to live in the proximity of Nature.

In present India in some parts particularly in Himalayan forest forests and water body are spiritually considered. Because there is scarcity of water in hill area. In Buxa Forest of north Bengal there is one lake, Pokhri, 700 foot above the Jayanti range, water of the lake is being believed to be God from the time immemorial by the local forest dwellers. Similarly Tanakpur of Champabat district of Uttranchal is busy

⁸ Upadhyay Sanjay & Videh : Handbook on Environmental Law vol.-I (Lexis Nexix 2002) p – 78

town with so much population and traffic, within its 10 – 20 k.m., there is Purnagiri, a beautiful hill forest. But none had damaged its green. Only there is some religious sense that if anyone falling its trees, he will die.

So, since ancient time, religious beliefs and verdicts are regarded as the best way for conservation. The traditional Deo-Bani in Rajasthan, the sacred groves of the north-east are few of the other indicators of the modern times that reflect the immense spiritual attachment of the Indian psyche to the forest.

Literature of Hindu religion gives a detailed description of trees, plants and wildlife and their importance to the community. The *Rigveda* highlights the potentialities of nature in controlling the climate, increasing fertility and improvement of human life emphasising for intimate kinship with nature. *Atharva Veda* considers trees abode of various Gods and Goddesses. *Yajur Veda* emphasises that relationship with nature and animals should not be that of dominion and subjugation but of mutual respect and kindness⁹.

Kailash Thakur in his Environmental Protection Law and Policy in India discussed about the trees in ancient Indian beliefs.¹⁰ He pointed out that in *Narsimha Puran* trees have been personified as God (Brahma) Himself. In *Skandpuran* Peepal is considered supreme to all other trees. *Varahapuram* advocates regular plantations as a means to achieve heaven. In *Matsyapuram* plantation of a tree has been equated with progeny of the sons. *Vishnu Dharmasutra* says that if you plant a tree it will be your son in the next generation. In *Skand Puran* a long list of trees is given the cutting of

⁹ Thakur Kailash : Environmental Protection Law and policy in India (Deep & Deep 1999) p – 102

¹⁰ *ibid* P – 102

which is prohibited. In *Yagyavalkay Smriti*, cutting of trees and forests was a punishable offence and penalty of twenty to eighty *pana* (old coin) was prescribed. Even in Ramayana and Mahabharata where in we find reference of beautiful forests of *Dhandakaranya*, *Nandovana* and *Khandavana*. In Hindu Vedic society destruction of vegetation and forests was considered to be great sin.

In ancient time there were some beliefs of planting and worshipping of sacred herbs and trees, is still a part of the country's religious philosophy. The bar (*Ficus bengalensis*), peepal (*Ficus religiosa*), bilva (*Aegle marmelos*), neem (*Azadirachta indica*) and sami (*Acacia ferruginea*, *prosopis cineraria*) continued to be planted and mentioned in present times.¹¹

The history of forests in India, as any where else in the world, is related to the history of civilisation. The civilisation began in India much before the migration of the Aryans which took place between 2500 and 2000 B.C. The civilisation of Mohenjodaro, Harappa and Channudaro in Sindh, Punjab and Rajputana back to between 4000 and 5000 BC. There is also evidence of a thriving Dravidian civilisation existing deep in the south about 2000 BC. There is however, no record to indicate if the Indus valley civilisation in the north perished because of wars with the foreign invaders or internal conflicts, or because of the break-down of the eco-systems they subsisted upon. Whatever may be the reasons for the destruction of the Indus valley civilization, there is evidence to show that the people in that period of civilisation used wood for obtaining energy and for producing bricks, and at the same time they venerated trees. The supreme God of the Indus valley was supposed to live

¹¹ Das Veena (Ed.) Hand book of Indian Sociology (Oxford 1995) p – 94

in Peepal trees. Peepal and babul were plants considered to have descended on earth from heaven. The Dravidian civilisation, however, appears to have lived in consonance with its eco-system and forests. The consonance was not the result of any design on the part of the people. It just happened that forests produced more than what people needed. The people were few, and their requirements did not exceed the growth in forests in a period.

The relics of the Dravidian civilisation still exist. They are the tribal communities of central and south India. Their requirement was less or about the same order as the annual growth in forests till a few decades ago.¹²

2.4.3 The Maurya Dynasty :

Before Chandra Gupta Maurya established a relatively big empire about 300 BC, the territory in the country was divided among various rulers whose kingdoms extended to small geographical units. The ancient period was marked by destruction rather than any attempt on conservation of forests.

Chanakya, the Prime Minister to Chandra Gupta Maurya, did realise the need to establish a forest administration. He not only appointed a superintendent of Forest, but also classified the forests on a functional basis.

Chanakya and his *Arthashastra* considered for ages as the source and spirit of econo-political frame work, which could be referred to at any moment of time of crisis or otherwise. His managerial acumen had been too significantly expressed for the maintenance of a stable flora and prosperous eco-system. He had made viable

¹² Lal. J. B. : India's Forests : Myth & Reality (Natraj pub 1989) p – 15

reforms in flora management as well as in Economies and Politics. Probably, he was aware and convinced of the importance of the flora as the major and unique component of eco-system that provides everything to rest of the biotic world. Chanakya's knowledge of various categories of plants, their products, socio-religious uses, economical benefits and medicinal properties is well reflected in *Arthasastra*.

It is found that during the Maurya period with the Prime Minister ship of Chanakya forest administration was classified as :

- i. Forests set apart for the study of religion,
- ii. Forests reserved for the supply of forest produce,
- iii. Forests set apart for the grazing of royal elephants,
- iv. Forests reserved for hunting by the royalty,
- v. Forests open to public for hunting

So, from that very time concept of reserved forest for various purposes created. In that time there was also special conservation of elephants. Because the elephants was domesticated by the Hourappan times, but it was only later that it began to be put in wider use. It was at the same time used as medium of transportation, as military war craft, as a sign of status and a mobile platform to hunt in tall grass country. But the war elephants on which imperial Magadha based its military strength were ideal supporters of power monopoly. The eastern environment of Magadha provided an ample supply of wild elephants, but maintenance was of greater importance than supply. The entrance of elephants into Indian Military history around 500 BC when Chandragupta Maurya gifted 500 elephants to Seleuks Nikator was one of the most important military aid transactions of the ancient world.

According to Mahesh Rangarajan in India's wildlife History, "The protection of elephants became serious business by the time of Mauryan rulers such as Ashoka. The *Arthashastra*, containing maxims of ancient statecraft, lays down the duties of the protector of the Elephant Forests. Even the tusks of animals dying from natural causes in the forest were to be handed over to the government".¹³ The same rule of custom is still established in the wildlife protection Act. It is therefore, no surprise that in the Maurya period, the punishment was very high for unauthorised killing of an elephant.

So in my observation for feeding the elephants forest was reserved. Because the elephants can win or lose a war for an emperor. In other way for game entertainment and for supply of fuel wood the forests were protected.

In Mauryan time forests were a state property, its proper maintenance and use had been undertaken by the state officials. This was a separate department controlled by a head Samaharta similar to collector. There were several subordinated persons appointed under a superintendent of forest to look after every related matter of the forest. The officials were divided with their duties, responsibilities and accountabilities. The superintendent was entitled to collect the forest produce like timber, fruits, fibers, medicines etc., process it, store it, fix the price and sell it at proper time in the market. He too was responsible to provide water or irrigation facility to the forest plants during drought or other seasons. The superintendent of forest was empowered to impose penalty or fine for misuse of forest products or destruction of vegetation.

¹³ Rangarajan Mahesh : Indians Wildlife History (Permanent Black 2001) p – 7

The collector-general of revenue was assigned to collect the revenue from forest trades and increase the economy finance of the state. *Aksatapal* (controller of accounts and audits) was to maintain the record of income and expenditure of the forest department. The entire system was integrated in such a way that each one was as a check for another. The result was luxurious growth of the forests all over the sub-continent during Chanakya's time.¹⁴

The importance of forest wealth is recognised in the *Arthashastra*. Chanakya states that no one is permitted to cut any part of the forest without the permission of the state. This was to ensure a control over revenue both from the produce of the forest and from the land cleared and brought under cultivation. Chanakya is also very precise in describing how the state should clear wasteland and settle families of agriculturists on it as part of the process of extending agriculture and enhancing revenue. Emperor Ashoka took pride in the roads which were constructed by his administration and these he states were lined with shade-giving trees and with wells.¹⁵

Buddhism and Jainism then began to play a role in once again designing social conventions which promoted the prudent use of resources. In part, such conservation practices would have been founded on earlier ones, inherited from food-gathering societies. The best-known ancient State-sponsored conservation campaign was undertaken by the Mauryan emperor Ashoka, following his conversion to Buddhism. The Ashoka advocated for both restraint in the killing of animals and the planting and

¹⁴ Jha. V. N. (Ed.) Kautilya's Arthasastras and social welfare (Sahitya Akademi 2006) p – 280

¹⁵ Mahesh Rangarajan : (Ed.) Environmental Issues in India (Pearson Longmen 2007) p – 38

protection of trees. One such edict, from the third century BC, in Dhauli (in present-day Orissa), goes in translation as follows :

The king with charming appearance, the beloved of the gods, in his conquered territories and in the neighboring countries, thus enjoins that: medical attendance should be made available to both man and animal; the medicinal herbs, the fruit trees, the roots and tubers, are to be transplanted in those places where they are not presently available, after being collected from those places where they usually grow; wells should be dug and shadowy trees should be planted by the roadside for enjoyment both by man and animal.¹⁶

The Gupta Empire ended in 673 AD, and the country reverted back to the situation which prevailed prior to the establishment of the Maurya kingdom. The country was again divided into small states which perpetually fought among themselves. The loser in wars, in their flights from the victors, took refuge in previously undisturbed forests and cleared them to create new abodes for them. Virtually every war took a toll of a new forest. The political instability caused by the local conflicts was aggravated by repeated Muslim invasions from the west. Internal battles and foreign invasions both led to the uprooting of people from their original settlements, and their seeking refuge in remote, undisturbed forests. Every battle, every invasion caused not only human suffering, but also destruction of forests. People made fresh clearing, for their habitation, and for agriculture. The Indian peninsula lost substantial forests on account of political instability that prevailed in the country for over nine centuries, that elapsed between the fall of the Gupta dynasty

¹⁶ Gadgil & Guha : This Fissured Land (OUP 2008) Pp 88 – 89

in the later years of the seventh century and the consolidation of the Moghul Empire by Akbar about close of the sixteenth century. While in most times the loss of forests is related to population rise and growth of civilisation, this was a singular period in the history of India when forests were destroyed on account of political instability.¹⁷

2.4.4 The Mughal Period :

The Mughals made no attempts on forest conservation. They did not ever realise the need. Perhaps the reason that, they came from dry arid lands, where there are no concept of forestry or forest conservation. To Mughals rulers themselves, forests meant no more than wooded lands where they could hunt and collect some revenue. There was restriction on cutting of trees other than some specific royal trees.

Only during the time of Shershah Suri plantation of trees along the Delhi-Patna Highway was done. The Mughals were not forest-minded as such, but they created exquisite gardens. Emperor Jahangir introduced the famous *Chinar* tree in the valley of Kashmir which has now become synonymous with Kashmir. In that time the Marathas and the Gonds planted mangoes and other useful trees along their marching routes and halting places, some of which are still surviving. Soon after, under a somewhat more stable government, the population rapidly increased and indiscriminate destruction of forests began, particularly in the basins of important rivers such as the Ganga, Yamuna, the Chambal and the Narmada.¹⁸

¹⁷ Lal. J. B : India's Forests : Myth & Reality (Natraj Pub 1989) p – 17

¹⁸ Sagreiya. K. P : Forests and Forestry (NBT 2000). P – 9

From environment conservation point of view, a significant contribution of Mughal emperors has the establishment of magnificent gardens, fruit orchards and green parks, round about their palaces, central and provincial headquarters, public places, on the banks of the rivers and in the valley and dales which they used as holiday resorts or places of retreat or temporary headquarters during the summer season.¹⁹ Shalimar garden and Nishat Bagh in Srinagar and Nur-i-Afsan in Agra are some such types of cultural heritage of the imperial Mughals.

It is found in those times excepting royals gardens and plantations other tree covers were not under protection. Particularly in vast natural forest areas there were no such rules or regulations for protecting flora and fauna. But regarding the position of forest economy local communities have some rules and regulations regarding use and abuse of forest products.

Through the Mughal emperorship established first in India by Babur, a disinherited central Asian prince, the Mughal Empire was really set on a firm footing by his grandson Akbar who ruled for nearly half a century, ending in 1605. His biographer, Abul Fazl, claimed that the hunt was means of gathering intelligence about the state of the realm. At a different level, the Mughals developed hunting into a ritualised activity, Laden with political meaning Arrangements were overseen by a Hunt Master or Mir Shikaran.²⁰

So, from various writings and paintings of Mughal times it is found that from Babar to Aurangzeb the Mughals presided over an empire of great diversity, both

¹⁹ Thakur Kailash : Environmental Protection Laws and Policy In India (Deep & Deep 1997) p – 107

²⁰ Rangarajan Mahesh : India's wildlife History (Permanent Black 2001) p – 12

ecological and cultural. The forests and grassland were many things at the same time : Sites of hunts, great and small, potential revenue-yielding arable land or simply and impediment to military operations. Certain lands had to be set aside to ensure the success of royal hunts. Unlike the elephant forests of the Mauryas, the Mughals selected different areas of imperial hunting grounds in different provinces. Under Mughal rule, no killing was permitted at sacred sites of the Jains like the Shetrunjaya hill, Saurashtra or Parashnath in Chhotanagpur.

It is found that in the first twelve years of his reign alone, Jahangir killed over 17,000 animals. These included as many as 889 nilgai, 86 tigers and lions and 1,670 gazelle and antelope. Elephants were caught later in the sixteenth century from parts of central India like Hoshangabad, Raisen and Chanderi. At one stage there were over 12,000 elephant in the possession of Emperor Jahangir.²¹

So, the Gupta period (200 – 600 AD) witnessed a distribution of forests whereas the Mughal period (1526 – 1700) was characterised by the continuous destruction of both flora and fauna in the subcontinent for timber and clearance of green cover for cultivation.

2.4.5 Early British Period :

If the Mughal rulers took no steps to conserve forests, the early British administrators did worse. The tremendously diverse tree growth of India's forests was liquidated to build British ships and lay extensive railway lines. Mixed forests were replaced by single species commercially valued trees, such as teak, sal and deodar.

²¹ Rangarajan Mahesh : India's wildlife History (Permanent Black 2001) p – 14

The British wanted to retain India as a supplier of cheap raw materials and a market for higher priced manufactured goods.

The British who conquered and unified India were at that time the world's premier omnivores, drawing resources of the entire biosphere to their tiny island kingdom. The man presiding over the British Empire perched on chairs of Burma teak at tables of African mahogany, consuming Australian beef washed down with French and Italian wines. Their women were decked in Canadian furs and clothes of Egyptian cotton, dyed with Indian indigo, glittering with diamonds from South Africa and gold from Peru.²²

The Mughals were only indifferent to forests; the British administrators were predators. The only concern of the early British administrators in the Indian forests was to secure big supplies of teak and other timber for the Royal Navy. They did not consider even regulating felling in forests, let alone make any efforts to conserve the resource. Till about the middle of the nineteenth century, the attitude of the British administrators, with some notable exceptions was :

- to obtain and export large quantities of Indian timber for use by British Navy;
- to obtain timber for local constructions;
- to fell and export the scented sandalwood to various European countries;
- to allow free development of agriculture by clearing forests.

²² Gadgil & Guha : Ecology and Equity (OUP 2008) p – 9

It is, indeed, ironical that the first officer, Captain Watson of the Police, appointed a conservator of Forest in November, 1806, was assigned the duties of procuring maximum quantities of Indian timber for building the ships of the British Navy. Watson plundered rather than conserved the forests in Travancore and Malabar. It was some justice that this post of so-called conservator of Forest was abolished in 1823.²³

Thus, under the imperial considerations and in the absence of any conservation policy, the Indian forests were used for the supply of wood for export; for British Navy; for local construction (such as roads and railways) and development of agriculture and had to suffer a great deal of brunt till about the middle of the nineteenth century. Private Contractors, Indian and European, were chiefly responsible for the devastation of forests.

The first action to improve the forests in the country came in 1842, when Conolly, the then collector of Malabar, assisted by an Indian, Chatter Menon, a sub-conservator of Forests, raised the pioneer teak plantations of Nilumbur. The plantations were highly successful, and over the years became world famous. Conolly's efforts made the British rulers (the Directors of the East India Company) recognise the need to improve the forests of South India. Gibson was appointed the Conservator of Forest in the Bombay Presidency in 1847, and Cleghorn, a medical surgeon, the conservator of Forest in Madras in 1856, who followed Conolly's example and made regular, though limited, efforts in raising teak plantations. No steps were, however, taken either to regulate felling or to improve forests in central and

²³ Lal J. B : India's Forests : Myth & Reality (Natraj Pub 1989) p – 18

north India till a few years after the sovereignty of Queen Victoria as Empress of India was declared by a Royal proclamation in 1858, and in the densely populated region of Avadh clearance of forests for agriculture continued to be rapid and extensive. The years that immediately passed after the Royal proclamation were marked by massive felling in forests nearly all over the country, to obtain timber for railway sleepers. If the needs of the Royal Navy destroyed the forests in the early years of the British administration, the requirement for the local railways ruined the forests in the middle years of the foreign rule.

By around 1860, Britain had emerged as the world leader in deforestation, devastating its own woods and the forests of Ireland, South Africa and north-eastern United States to draw timber for shipbuilding, iron-smelting and farming. Upon occasion, the destruction of forests was used by the British to symbolize political victory. Their early treatment of the Indian forests also reinforces the claim that the destructive energy of the British race all over the world was rapidly converting forests into deserts. With oak forests vanishing in England, a permanent supply of durable timber was required for the Royal Navy as the safety of the empire depended on its wooden walls. In a period of fierce competition between the colonial powers, Indian teak, the most durable of shipbuilding timbers, saved England during the war with Napoleon and the later maritime expansion, ships were built in dockyards in Surat and on the Malabar coast, as well as from teak imported into England. An indication of the escalating demand is provided by the increase in tonnage of British merchant ships (i.e. excluding the Royal Navy) from 12, 78,000 tones in 1778 to 49,37,000 tones in 1860. A large proportion of the wood required came from Britain's newly-

required colonies. As late as the 1880s, the Indian forest department was entertaining repeated requests from the British admiralty for the supply of Madras and Burma teak.

This process greatly intensified in the early years of the building of the railway network after about 1853. Before the coal mines of Raniganj became fully operative, the railway companies drew upon the forests for fuel as well. Thus the progress of the railway produced marvelous changes on the face of the country as regards tree vegetation. In the Madras presidency over 2,50,000 sleepers (or 35,000 trees) were required annually from indigenous sources. The pace of railway expansion—from 1349 kms of track in 1860 to 51, 658 kms in 1910 – and the trail of destruction left in its wake brought home forcefully the fact that India's forests were not inexhaustible.

The crisis had assumed major proportions as only three Indian timbers – teak, sal, and deodar – were strong enough in their natural state to be utilized as railway sleepers. Sal and teak, being available near railway lines in peninsular India, were very heavily worked in the early years, necessitating expeditions to the north-western Himalaya in search of deodar forests. The deodar of the Sutlej and Yamuna valleys was rapidly exhausted in the years following the inception of the forest department – over 65,00,000 deodar sleepers were supplied from the Yamuna forests alone between 1869 and 1885.²⁴

2.4.6. Destruction of wild life :

In the same time of British period with destroying of woodland they have fought war against wild species. They were a scourge to be wiped out. Such practices

²⁴ Gadgil & Guha : The use and abuse of Nature (OUP 2000) Pp 118 – 122

were new to India; no previous ruler had ever attempted to exterminate any species. District level administration went out of its way and facilitated hunts, local landed gentry lent their elephants. Officers and soldiers in cantonments were encouraged to spend their vacations acquiring more trophies. The Rhino and wild buffalo, major prey items, vanished from the North Bengal plains by the 1850s; in the drier regions the Nilgai became scarce. In fact, the numbers of animals killed for rewards were often a good index of the land deforested for agricultural expansion. Over 80,000 tigers, more than 1,50,000 leopards and 2,00,000 wolves were slaughtered in the fifty years from 1875 to 1925.²⁵

The primary aim of Britishers was to utilize the resources of the colony to meet the industrial requirements in their home country and the administrative expenditure in the colony. In their policy, there were two benefits in a single event : clearing the woodland means selling of timbers and side by side it would create new farmland in the cleared forestland. For this reason they have appointed a certain number of paid tiger-killers or snake-destroyers. Fewer tigers mean more cultivation and more revenue. Unprecedentedly, larger rewards were given out for killing of tigresses, and special prizes for finishing off cubs. A continuum of tree forest, savannah and abandoned farmland was giving way to a countryside divided into two landscapes, of cultivated space or of forest.

The 1850s were a time of political turmoil : the rebellion of the Santhals in the east was followed by the Great Rebellion or *Sepoy* Mutiny of 1857. One immediate consequence was the crackdown on anything that could lead to disorder colonial

²⁵ Rangarajan Mahesh : Indias Wildlife History (Permanent Black 2001) Pp 26 – 32

strictures against the annual hunts of the Santhal tribals removed a major check on wild animal populations with pressure mounting on the British Government to meet the revenue requirements of the colony, especially the expenditure on the army which had increased from 41.9 percent of India's budget to 51.9 percent in 1904 – 05, the colonial government was forced to fall back on forests. Many tribals and other forest dwellers opposed this violent confiscation of the long cherished rights of the people.

2.4.7 The First World War :

The World War I not only interrupted but reversed the march of the country towards scientific forestry. Large quantities of timber, fire wood and other produce (for example, hay for the ponies) were required for the War which was being fought, not on India, but foreign soils. Silviculture was ignored, the principle of sustained yield forgotten and the forestry in India was oriented to one single purpose; meet the timber and other requirements of the fighting forces under the British command in full measure, and well on time. The War took a heavy toll of the Indian forests.

Attention was also given to wild life conservation and a few pioneer sanctuaries (for instance, Milroy in Assam) were set up. The twenties of the century also marked some important legislative and administrative developments. In 1921, the subject of forest administration was transferred to the Provincial governments, and in 1927, the Indian Forest Act revised once again. The revised Act made provisions for regulations of fellings in forests under private ownership.

The criterion fixed for the good management of a forest was not the saving of forests from injuries, not even securing good regeneration, but obtaining maximum earnings to the State exchequer.²⁶

2.4.8 The Second World War :

The World War II was fought nearer home, and made much bigger demands on the forests of the country than did the earlier War. Quantities of timber far in excess of the prescribed sivicultural limits were felled in nearly every part of the country from high up in the Himalayas to deep in the south to meet the requirements of the War. It would be no exaggeration to say that the War depleted all utilizable stock of standing timber in the country.

The few years that made the gap between the end of the second World War and the Independence of India were marked by relatively large efforts to raise plantations, to improve communication and to introduce planned working in the forests which had been worked on an *ad hoc* basis before. However, these efforts were little compensation for the ravages done to the forests during the War.

The British had given the country a tradition and a system of regular forest working. Though the East India Company plundered and used the forests for their

²⁶ Lal. J. B. : India's Forests : Myth & Reality (Natraj Pub. 1989) Pp 21 – 22

own benefit, the ninety years form the declaration of the British Sovereignty to the Transfer of Power made a sea change in the notion of the forest.²⁷

2.4.9 Major Use of Forest in Different Ages :

Forestry is a relatively new science. But forests are older than man. Man has made different uses of forests in different periods. In ancient times forest were being used for religious purpose, hunting and shelter of war victims. Thereafter the forests are being used for revenue earning by the different rulers. Forest was the last resort of cave dwellers to the present generation who are economically depending upon the wealth of the forest. Forests have nourished the human beings with motherly care in the time of war and natural calamities. We could trace the major uses of forests from ancient India to the end of the British rule in the following steps :

²⁷ ibid Pp 22 – 23

Table 2.1

Using of Forest in Different Ages

Period	Major use of forest
1	2
2000 BC – 300 BC	i. Meditation ii. Religious studies iii. Hunting
300 BC – 650 A.D.	i. Hunting ii. Procuring of elephants iii. Grazing by domesticated elephants
650 A.D. – 1700 A.D.	i. Hunting ii. Shelter to victims of internal wars and foreign invasions iii. Revenue to local rulers from sale of timber of selected species (Royal trees)
1700 A.D. – 1850 A.D.	i. Production of timber for building of fighting ships of the British Navy ii. Reserves for expansion of cultivation
1850 A.D. – 1900 A.D.	i. Production of timber for railway sleepers and firewood for steam engines ii. Reserves for expansion of cultivation iii. Available lands for tea and coffee plantations iv. Hunting
1900 A.D. – 1914 A.D.	i. Regulated production of timber for commercial and social needs ii. Revenue of Government iii. Hunting
1914 A.D. – 1918 A.D.	i. Production of timber and hay for war supplies
1918 A.D. – 1940 A.D.	i. Regulated production of timber to meet commercial and social needs ii. Revenue to government
1940 A.D. – 1944 A.D.	i. Production of timber in very large quantities for war supplies
1944 A. D. – 1947 A.D.	i. Revenue to government ii. Regulated fellings to meet social and industrial demand iii. Grazing by cattle

Source : Lal. J. B. – India's Forests : Myth & Reality (Natraj Pub. 1989) p – 25

2.4.10 Policy and Conservation during Colonial Government :

In 1855, the Government of India issued a memorandum outlining the rules for the conservation of forests for the whole country. A qualified forester, **Dr. Dietrich Brandis**, was appointed as the first Inspector General of Forests in 1864. The first Indian Forest Act was drafted in 1865. A revised Indian Forest Act came into existence in 1878 and it was made operational in most of the provinces. For the first time, the forests were classified into Reserved and protected forests. In 1927, the Act of 1878 was consolidated to regulate the law relating to forests and forest produce. The first Forest school was opened in Dehradun In 1878. The provincial Forest Service was inaugurated in 1891. Thereafter, technical education and training were organised. The imperial Forest Research Institute was established in 1906 in Dehradun.

In 1910, the Board of Forestry was created at the national level under the chairmanship of the Inspector-General of Forests. The national character in forest administration was considerably diluted with political changes in 1921 when forests became a provincial subject and their administration came to rest in the Government of the concerned provinces.²⁸

2.4.11 Post-Independence Period :

After independence in 1947, almost all the British officers of the erstwhile Imperial Forest Service left India and Indian officers assumed charge. With the integration of princely States with the rest of country, the task of consolidation of forests, unification of forest laws and extension of scientific management on a

²⁸ Dr. Desai Vasant : Forest Management in India – Issues and Problems (Himalaya Pub. 1991) p – 3

reasonably uniform basis became the most important pre-occupation of the forest administration at the national and provincial levels.

Through some of the relatively large princely States like Travancore, Mysore, Hyderabad and Jammu & Kashmir had organised forest departments and introduced fair measures of regularity in their forest working, and some like Bhopal and the States in Central and Eastern India States Agency had engaged trained foresters from the neighbouring provinces of British India and brought their forests under a reasonable state of working, by and large, the ex-princely forests had been managed on an adhoc basis either to serve as a source of revenue, or to provide game for hunting.

In 1946-47, that is immediately before Independence, the recorded area of the forests in the Provinces of British India (excluding the area that was transferred to Pakistan as a result of partition) was 39.94 million hectare. With the addition of ex-princely and ex-proprietary forests, the recorded area of forests increased to 68.02 million hectare in 1950-51.²⁹

In the early 1950s, most of the States enacted new legislations affecting land tenure systems and large areas of privately-owned forest came to rest with the Forest Departments of the States. In the same time the country adopted a national festival of tree planting, Vanamahotsava, wildlife conservation, soil conservation etc. in 1950, and resolved a new forest policy in 1952.

²⁹ Lal. J. B. – India's Forests : Myth & Reality (Natraj Pub. 1989) Pp 25 – 26

Amidst all these changes the National Plan of Development commenced in 1951. Under the Five Year plan, artificial man made forests were began to be created on an unprecedented scale. Thus forestry's development found an important place in the National Plans.

2.4.12 National Forest Policy, 1952 :

The forest policy resolution of 1894 had four major draw-backs, first it allowed forests no intrinsic right to space, and in land use subordinated forestry to agriculture; secondly, it did not give adequate emphasis to protective and regulative services produced by forests; thirdly, while it advocated the meeting of people's need in full measure it did not stipulate the management of forests on the principle of sustained yield; lastly, it did not suggest protection of forests from harmful practices of shifting cultivation and excessive grazing.

The new Forest Policy enunciated in 1952 made good the inadequacies of the old policy substantially. The new Policy recognised the protective functions of forests, and specifically stated that the notion that forestry has no intrinsic right to land but may be permitted on the residual land not required for any other purposes, should be discarded. It stipulated that the country as a whole should aim at maintaining one third of its total land area under forests. It suggested that while in the plains where erosion is not a serious problem, a proportion of 20 per cent be attained, in mountainous regions liable to erosion the percentage of the land under forests should be much higher, about 60 per cent. The Policy advocated scrupulous regard for sustained yield in the management of all classes of forests. On the controversial

question of grazing, the Policy left no ambiguity in its enunciations. Continuous and cheap grazing should not be allowed in forests, grazing by goats should be totally excluded, and grazing by sheep should be restricted, the policy stated.

To facilitate fixing of priorities in management, the Policy indicated a functional classification of forests. The classification suggested was :

- (a) **Protection forests**, i.e., those forests which must be preserved or created for physical and climatic considerations.
- (b) **National forests**, i.e., those which have to be maintained and managed to meet the needs of defence, communications, industry, and other general purposes of public importance.
- (c) **Village forests**, i.e., those which have to be maintained to provide firewood to release cow-dung for manure, and to yield small timber for agricultural implements and other forest produce for local requirements and to provide grazing for cattle.
- (d) **Tree-lands**, i.e., those areas which though outside the scope of the ordinary forest management are essential for the amelioration of the physical conditions of the country.³⁰

2.5 Forest Types and their Distribution in India :

They are distinguished in forestry mainly for the purpose of management and, therefore, the degree of subdivision depends on the intensity of treatment a particular type has to receive for purposes of its regeneration and tending. In delimiting types emphasis is laid on the most emergent vegetation, namely, the main tree layers and

³⁰ Lal. J. B. : India's Forests : Myth & Reality (Natraj Pub. 1989) Pp 28 – 29

their important constituents from the economic view-point. Thus the most complex and variable wet tropical evergreen forest with its luxuriant vegetation of big and small trees, shrubs, herbs, climbers, parasites, etc., of numerous species, which is not valuable, is referred to as a single type. On the other hand, the tropical deciduous forests, though comparatively open and with but a few species, have been categorized into moist, semi-moist, dry, arid, and other types because the methods of regeneration and tending differ for each of these types of valuable forests. The main factors which define forest types are climatic, edaphic and biotic. Of climatic factors the most important are temperature and moisture and in particular their combination and seasonal variation. Provided adequate moisture is available, temperature shows itself in the luxuriant growth of the forest, in its height, density, variety of species and rate of growth. The conifers reach their best development in temperate climate in which they surpass their broad-leaved associates which grow best in a tropical climate. At higher elevations with cold increasing, winter deciduous species become more prevalent. Further higher up vegetation degenerates into scrub and only evergreen broad leaved species such as *Rhododendrons* are left. If moisture conditions are less favourable in areas of higher temperature, the vegetation gets stunted, sparse and is reduced to a few species most of which are summer deciduous and have other xerophytic adaptations such as small leaves, thick bark, etc.³¹

2.5.1 Tropical Wet Evergreen Forest :

Lofty, very dense, multilayered forest with mesophytic evergreens, 45m or more high, with a large number of species, numerous epiphytes, few climbers. Found

³¹ Sagreiya, K. P. : Forests And Forestry (NBT 2000) Pp 61 – 62

along the western face of the Western Ghats and in a strip running south-west from upper Assam through Cachar, and in Andamans.

Example : (i) *Ranni, Kerala, 1000 m.*

Important species : Mesua, white Cedar, *Calophyllum*, Toon, Dhup, *Palaquium*, *Hopea*, Jamun, Canes, etc.

(ii) *Cachar, Assam*

Important species : Gurjan, Chaplasha, Jamun, Mesua, Agar, Muli, Bamboo etc.³²

2.5.2 Tropical semi-Evergreen Forest :

A closed high forest with large trees dominate, sometimes deciduous, with tendency to gregariousness, many species, buttressed trunks frequent, bark thicker and rougher and canopy less dense than in previous type, climbers heavy, bamboos less prevalent, epiphytes abundant. Occurs on the western coast, Assam, lower slopes of the Eastern Himalayas, Orissa and in Andamans.

Example : (i) *Palghat, Kerala*

Important species : Aini, Semul, Gutel, Mundani, *Hopea*, Benteak, Kadam, Irul, Laurel, Rosewood, Mesua, Haldu, Kanju, Bijasal, Kusum, thorny bamboo etc.

(ii) *Kalimpong, West Bengal*

Important species : Bonsum, white Cedar, Indian Chestnut, *Litsea*, Hollock, Champa, Mango, etc.³³

³² ibid p – 62

³³ ibid p – 63

2.5.3 Tropical Moist Deciduous forest :

Irregular top storey of predominantly deciduous species, 40 m or more high, heavily buttressed trees, definite second storey of many species with some evergreens, fairly complete shrubby undergrowth with patches of bamboos, climbers heavy including canes. Occurs throughout Andamans, moisture parts of Uttar Pradesh, Madhya Pradesh, Gujarat, Maharashtra, Karnataka and Kerala.

Example : (i) *Andamans*

Important species : Padauk, White Chuglam, Badam, Dhup, Chikrasi, Kokko.

(ii) *Allapalli, Maharashtra*

Important species : Teak, Laurel, Haldu, Rosewood, Mahua, Bijasal, Lendi, Semul, Irul, Dhaman, Garari, Amla, Kusum, Common bamboo etc.

(iii) *Dehra Dun, Uttaranchal*

Important species : Sal, Lendi, Haldu, Paula, *Litsea*, Jamun, Mahua etc.³⁴

2.5.4 Littoral and Swamp Forest :

Mainly evergreen species of varying density and height, always associated with wetness. Littoral forests are found all along the coast and swamp forests in the deltas of bigger rivers.

Example : *Sunderbans, West Bengal*

Important species : Sundari, *Bruguiera*, *sonneratia*, Agar, Bhendi, Keora, *Nipa*, etc.³⁵

³⁴ ibid

³⁵ ibid

2.5.5 Tropical Dry Deciduous Forest :

Upper canopy closed though rather uneven, composed of a mixture of a few species practically all deciduous during the dry season, some for several months; upto 20 m high, some species tend to predominate over selected areas but most non-gregarious, lower canopy almost entirely deciduous, shrub present but enough light reaches the forest floor to permit growth of grass; bamboos present unless exterminated by over cutting but not luxuriant, climbers few but some large and woody, epiphytes and ferns inconspicuous. Occurs in an irregular wide strip running north-south from the foot of the Himalayas to Kanyakumari except in Rajasthan, Western Ghats and Bengal.

Example: (i) Betul, Madhya Pradesh

Important species : Teak, Axlewood, Tendu, Bijasal, Rosewood, Amaltas, Palas, Haldu, Kasi, Bel, Lendi, common bamboo, etc.

(ii) Cuddapah, Andhra Pradesh

Important species : Red Sanders, Axlewood, Bhilama, Achar, Khair, Ghont, Bel, etc.

(iii) Ramnagar, Uttar Pradesh

Important species : Sal, Laurel, Axlewood, Bhilama, Achar, Khair, Ghont, Bel, etc.³⁶

2.5.6 Tropical Thorn Forest :

Open, low, pronouncedly xerophytic forest, thorny leguminous species predominate, trees with short boles and low branches, an ill-defined lower storey of smaller trees and shrubs, spiny and with xerophytic characteristics, climbers few. This

³⁶ ibid p – 64

type grows in a large strip in South Punjab, Rajasthan, upper Gangetic Plains, the Deccan plateau and the lower peninsular India.

Example : (i) *Sholapur, Maharashtra*

Important species : Khair, Reunjha, Axlewood, Neem, Sandalwood, Nirmali, Dhaman, etc.

(ii) *Jaipur, Rajasthan*

Important species : *Acacia Senegal, Reunjha, Khejra, Kanju, Neem, Palas, Ak, etc.*³⁷

2.5.7 Tropical Dry Evergreen Forest :

A low forest, upto 12 m high with complete canopy, mostly of coriaceous leaved evergreen trees of short boles, no canopy layer differentiation, bamboos rare or absent, grass not conspicuous. Restricted to a small area of Karnataka coast which receives some summer rain also.

Example : *Sriharikota, Andhra Pradesh*

Important species : Khirni, Jamun, Kokko, Ritha, Tamarind, Neem, Machkund, Toddypalm, Gamari, Canes, etc.³⁸

2.5.8 Sub-Tropical Broad-Leaved Hill Forest :

Luxuriant forest evergreen species predominating limited to the lower slopes of the Himalayas in Bengal and Assam and other hill ranges such as Khasi, Nilgiri and Mahabaleshwar.

Exemple : Trivandrum, Kerala

Important species : Jamun, *Machilus, Meliosma, Elaeocarpus, Celtis, etc.*³⁹

³⁷ ibid

³⁸ ibid p – 65

2.5.9 Sub-Tropical Pine Forest :

Practically pure association of Chir pine, considerably influenced by periodical fires, no underwood, few shrubs. Found throughout the whole length of the north-west Himalayas between 1000 – 1800 m. Absent in Kashmir due to weakened south-west monsoon. In Khasi, Manipur and Naga Hills, Khasi pine occurs at similar altitudes.⁴⁰

2.5.10 Sub-tropical Dry Evergreen Forest :

Low, practically scrub forest, small evergreen stunted trees and shrubs including thorny species, herbs and grasses appear in monsoon. Met with in the Bhabar, the Siwaliks and the western Himalayas upto about 1000 m.

Important species : Olive, *Acacia modesta*, *Pistacia*, etc.⁴¹

2.5.11 Montane Wet Temperate Forest :

A closed evergreen forest. Trees mostly short-boled and branchy attaining large girth, height rarely 6 m, crowns dense and rounded leaves coriaceous, red when young, branches clothed with mosses, ferns and other epiphytes, woody climbers common. Found in the higher hills of Tamil Nadu and Kerala from 150 m upwards and in eastern Himalayas on the higher hills of Bengal, Assam, Sikkim and Nagaland from 1800 to 3000m.

Example : Kalimpong, West Bengal

Important species : *Machilus*, *Cinnamomum*, *Litsea*, *Magnolia*, Chilauni, Indian Chestnut, Birch, Plum.⁴²

³⁹ ibid

⁴⁰ ibid

⁴¹ ibid

⁴² ibid p – 66

2.5.12. Himalayan Moist Temperate Forest :

Coniferous forest, mostly pure, 30 to 50 m high with varying, underwood mostly evergreen, mosses and ferns grow freely on trees. Extends along the entire length of the Himalayas between the pine and the sub-alpine forest in Kashmir, Himachal Pradesh, Punjab, U.P., Darjeeling and Sikkim between 1,500 and 3,300 m.

Example : (i) *Chakrata, Uttar Pradesh*

Important species : Oak, Fir, Spruce, Deodar, *Celtis*, Chestnut, Maple, etc.

(ii) *Sutlej Valley, Himachal Pradesh*

Important species : Spruce, Deodar, Fir, Kail, Oak, Yew, Maple, Birch, etc.⁴³

2.5.13. Himalayan Dry Temperate Forest :

Predominantly coniferous forest with xerophytic shrubs, hardly any epiphytes and climber. Found in the inner dry ranges of the Himalayas where south-west monsoon is very feeble, precipitation below 100 mm, mostly snow; in Ladakh, Lahaul, Chamba, Kinnaur, Garhwal and Sikkim.

Example : *Kinnaur, Himachal Pradesh*

Important species : Chilgoza, Deodar, Oak, Maple, Ash, *Celtis*, *Parrotia*, Olive, etc.⁴⁴

2.5.14. Sub-Alpine Forest :

Dense growth of small crooked trees or large shrubs with coniferous overwood, mostly Fir and Birch. Conifers 30 m high, broad-leaved trees 10 m high.

⁴³ ibid

⁴⁴ ibid

Occurs at the upper limit of tree forest in the Himalayas adjoining alpine scrub and grasslands.

Example : Kulu, Himachal Pradesh

*Important species : Fir, Kail, Spruce, Rhododendron, Plum, Yew, etc.*⁴⁵

2.5.15. Moist Alpine Forest :

Low evergreen dense growth of Rhododendron and Birch. Mosses and ferns on the ground with alpine shrubs and flowering herbs. Occurs along the entire length of the Himalayas above 3000 metres and extends to the snowline.

Example : Kumaun, Uttar Pradesh 3,800 m.

*Important species : Birch, Rhododendron, Berberis, Honeysuckle, etc.*⁴⁶

2.5.16. Dry Alpine Scrub :

The uppermost limit of scrub xerophytic, dwarf shrubs, over about 3,500 meters found in the dry zone.

Example : High Himalayas over 4,000 m.

*Important species : Juniper, Honeysuckle, Artemesia, Potentilla, etc.*⁴⁷

⁴⁵ ibid

⁴⁶ ibid p – 67

⁴⁷ ibid

The extent of forests of different groups of the country as a whole, is as under-

Table 2.2

Forest Types and distribution in India

Sl No	Forest Group	Area (Mha)	% of total
1	Tropical Wet Evergreen	5.12	8.0
2	Tropical Semi-evergreen	2.624	4.1
3	Tropical Moist Deciduous	23.68	37.0
4	Littoral and Swamp	0.384	0.6
5	Tropical Dry Deciduous	18.304	28.6
6	Tropical Thorn	1.664	2.6
7	Tropical Dry Evergreen	0.128	0.2
8	Sub-tropical Broad-leaved	0.256	0.4
9	Sub-tropical Pine	4.224	6.6
10	Sub-tropical Dry Evergreen	1.6	2.5
11	Montane Wet Temperate	2.304	3.6
12	Himalayan Moist Temperate	2.176	3.4
13	Himalayan Dry Temperate	0.192	0.3
14	Sub-alpine	-	-
15	Moist alpine Scrub	1.344	2.1
16	Dry Alpine Scrub	-	-
	Total -	64.0	100.0

Source : Indian Forester, July 1971 p – 436

The most abundant groups are Tropical Moist and Dry Deciduous forests, occupying over 70 per cent of the country's forest area, followed by the Tropical Thorn forest (6.9 per cent), Tropical Wet Evergreen (6 per cent) and Sub-tropical Pine forest (5 per cent)⁴⁸

2.6 Forest and Forestry in Bengal :

Keeping in view of the present research project it is highly indispensable to highlight on the woodlands of Bengal. The history of Bengal has some special characteristics. The downfall of the Gupta Empire was followed by the rise of

⁴⁸ ibid p – 68

independent states in different parts of Northern India. Gouda and Vanga, previously included in the Gupta empire, gradually acquired independent status in the second half of the sixth century A.D. Karnasuvarna, capital of Gauda, occupied a prominent place in the history of Bengal when Kanauj has already been recognised as the chief metropolis of Northern India. The origin of the Gauda and the city was most probably on the bank of the river Ganga, not very far from the point where its course enters into West Bengal and extended upto the coast of Bay of Bengal in South.

So, apart from various studies, Gauda, the ancient Bengal was under various ruler of Hindu Kings and Muslim Nawabs. The alluvial river valley was very fertile and there is also evidence of large woodlands. Finally the East India Company won the battle of Plassey and spread their political supremacy over the people, land as well as woodland of Bengal.

Within two decades of defeating the rulers of Bengal in the historic Battle of Plassey in 1757, the British decreed special rewards for any tiger killed. The idea was to help push back the jungle. It was part of the constant tug of war between axe and plough on the one hand and the incredible ability of natural vegetation to spring back.

On the 29th of March 1787, the British Government undertook the direct administration of the two great frontier principalities of Lower Bengal. Situated on the extreme verge of unwieldy jurisdictions, and separated from headquarters by rivers and swamps, and almost impassable jungle. In the northern district vir-bhumi, literally Hero Land, or as it commonly written in English documents, Beerbhoom and in the

southern district, anciently called Mala-bhumi, the lord of Wrestlers, but now known as Bishenpore.⁴⁹

W.W. Hunter in his “The Annals of Rural Bengal” described the Bengal in that time as : “On the frontier of lower Bengal, fifty miles west from the field of plassy, are to be traced the landmarks of two ancient kingdoms. They lie along the intermediate country between the lofty plateau of central India and the valley of the Ganges....over the uplands the jungle still holds its primitive reign, affording covert to wild beasts and cool glades for herds of cattle. In general the plains undulate gently east ward, dotted with fruit-bearing groves, enameled with bright green rice fields, and studded with prosperous villages. The soil, although less fertile than the swamps of Eastern Bengal, returns in low-lying grounds two crops each year; and the bracing atmosphere makes ample amends to the cultivator for the additional labour demanded by his fields. The forest yields a spontaneous wealth of timber, gums and brilliant lac-dye; the valleys produce the finest indigo, cotton, jute, sugar-cane, oil-seeds, and cereals grow abundantly and the country has long been famous for its iron and coal”.⁵⁰

So, it is clear that the Britishers attracted to the rich soil of Bengal which has crops and vegetation in one hand and coal and timber in other hand. Just after ten years of the battle of Plassey the Britishers started to manage the jungle mahal of Bengal.

⁴⁹ Hunter. W. W. : The Annals of Rural Bengal (Cosmo Pub. 1975) p – 9

⁵⁰ ibid Pp 1 – 2

In January 1767 the emerging company raj took its first steps to settle the jungle zamindars. After receiving charge of revenue collection in Midnapore, the East India Company had been preoccupied with the eastern part of the district, where settled agriculture, an accessible country side, and its apparently well established zamindaris were quickly controlled. In 1773, Edward Baber, the collector of Midnapore, provided the first detailed description of the jungle Mahals as Western jungle is an extent of country of about 80 miles in length and 60 miles in breadth. On the east it is bounded by Midnapore, on the West by Singhbhoom, on the north by Panchete, and the South by Mayurbhanj. He described that the soil is very rocky and mountainous and overspread with thick woods. The area was thinly populated compared to the alluvial plains of eastern Midnapore and the inhabitants were mostly paiks who were negligent of cultivation. These *paiks* had a hierarchy of *sardars* (headman), *khandaits* (swordsmen) and *churs*. The *chuars*, who were mostly Bhumij people, lived mainly in the hills between Ghatsila and Barabhum and were probably the original inhabitants of the jungle mahals.⁵¹

Besides the South Western jungle mahals there is Sundarban Delta situated in West Bengal, the world famous largest delta in the world formed by the Ganga-Brahmaputra river system. Sundarban particularly famous for mangroves forests and home of Royal Bengal tigers is consisting of 54 small islands separated from each other by a network of tidal channels, rivers and creeks.

In fact, the Portuguese occupied Takdaha on the river Bidyadhari a century before the foundation of Calcutta by Job Charnock. Lower Sundarban was dominated

⁵¹ Sivaramakrishnan. K. : Modern Forests, Statemaking and Environmental Changes in Colonial Eastern India (Oxford 1999) Pp 43 – 48

by the Portuguese for quite sometime. After the battle of Plassey, Mir Jafar, the Nawab of Bengal assigned to the East India Company on the 20th December, 1757, the Zamindari of Calcutta or 24 Parganas which included Sundarban. The grant did not confer a full proprietary status till 1759 when such right was assigned to Robert Clive by a 'Sanad'. In the revised deed of 1765, the company received the right from 1775 permanently and unconditionally.⁵²

Another woodland of Bengal situated in the great Himalaya. The great Himalayan ranges, 2400 km long and 240-400 km wide, the most striking feature in the geography of the world.

The Himalayan forests are diverse and comprise tropical, sub-tropical, mountain temperate, temperate and dry and moist alpine forests and scrubland. The Eastern Himalayas have, however, valuable broad leaved forests. All these forests are also very rich in fungi, lichen, moss and liverwort flora.⁵³

So anywhere in the soils of Bengal, the Britishers day by day establishing their supremacy. There are certain selective plantation schemes were visualized and implemented in the jungles surrounding civil or military stations and landed estates. Soon after their establishment in 1788, the Calcutta Botanical Garden became a source of seed, advice and encouragement for tree planting programmes in Bengal and beyond. From 1794 teak seed and seedlings were distributed from there to every part of the country and plantation were taken up in different parts of Bengal. In Midnapore, Burdwan, and Bihar, the scheme was taken up through several Zamindars

⁵² Sharma, B. C. : Lower Sundarban :Role of fisheries in its Sustainable Development (The Asiatic Society 1994) p – 7

⁵³ Chaudhury. A. B. : Forests Environment and Man (Daya Pub. 2007) p – 107

who did plant teak in their jungly wastes. In the next two decades Britishers distributed several thousands trees of teak, mahogany, sissoo and other timber species all over India. So, this plantation is a type of colonial forestry under the company raj for supplying timber to the British Crown. I have no hesitation to say from this company time commercial forestry was established; the legacy of which are still existing after 60 years of removing the colonial power from our country. So, in this way the natural woodland and its habitats were destroyed and replaced by commercial colonial plantation.

During the period of 1795 to 1850, the company raj chiefly viewed forests as limiting agriculture. In Bengal, forested lands, classified as wastelands, had been included in landlord estates. Dr. T. Anderson, superintendent of the Royal Botanical Gardens, Calcutta, was appointed as the first conservator of Forests in Bengal in August 1864. Under his direction, operations for fellings, conversion for logs into sleepers and the establishment of plantations began in British Sikkim, Jellapahar hills and the Darjeeling terai. A timber slide was installed near Kurseong. Probably the law makers also took inspiration from the prevalent forest laws in Europe, such as the French Forest code of 1827, the Austrian Law (Forestgesetz) of 1852 and the Bavarian Law of 1852. Be as it may, the first forest law titled “The Government Forests Act, 1865 came into force on 1st May 1865 in many parts of the British India including Bengal.”⁵⁴

In 1871, as the Bengal Forest Rules came into force, the province remained a major importer of wood. The Darjeeling terai was found well stocked with sal and

⁵⁴ ‘Banabithi’ Forest week edition 2009

some sissoo on river banks. A good part of what was estimated to be an area in excess of 50,000 acres had been leased to one Wardroper in 1854 to extend cultivation. In Jalpaiguri 25 per cent of the area leased out for cultivation was held by European tea planters. In Bankura, Birbhum, and Midnapore, the sal jungles were extensive, entirely owned by Zamindars and only occasionally of timber quality. The jungle mahals of Midnapore were about 1,200 square miles in extent, of which 700 square miles were forested. The proprietors were already engaged in timber trade, while also giving annual licences for collecting *dhuna*, cocoons of silkworms and making charcoal. Subarnarekha and Kangasabati (Kansai) rivers were important to the timber trade. In the dry season timber also went by carts along tracks running parallel to the rivers. Midnapore town was a major centre for firewood.⁵⁵

Since 1925 there were rapid deterioration of sal jungles in Midnapore. Except for the Raja of Jhargram whose forests were in better shape than most surrounding areas, all other small landlords and *patnidars* had been incapable of resisting of forest destruction. Some trees were cut at one to one-half feet above ground so that the stump could be dressed down and burned to make charcoal. Live sal stools were preferred for charcoal by blacksmiths in Bankura and Midnapore. The Bengal-Nagpur Railway (BNR) opened in Jhargram forests in 1898, and the Kharagpur-Adra branch opened in 1903 and destroyed the sal jungles of Bankura.⁵⁶

⁵⁵ Sivaramakrishnan, K. : Modern Forests, Statemaking and Environmental Changes in Colonial Eastern India (Oxford 1999) p – 135

⁵⁶ Jeffery & Sundar : A new Moral Economy For India's Forests? (Sage 1999) p – 3

2.7 Forest Land, Forest cover and Vegetation in West Bengal :

The state of West Bengal extends from the Himalayas in the North to the Bay of Bengal in the South. It lies between 20° 31' North and 27° 12' North latitude and 85° 50' East and 89° 52' East longitude covering a geographic area of 88,752 sq. km. Five States (Sikkim, Assam, Bihar, Jharkhand and Orissa) and three countries (Bhutan, Nepal and Bangladesh) surround West Bengal-Sikkim to the North, Bhutan to the North-East, Assam and Bangladesh to the East, Nepal, Bihar and Jharkhand to the West and Jharkhand and Orissa to the South-West. The extreme south end into the Bay of Bengal.⁵⁷

Total recorded forest land in the state is 11,879 sq. km. of which 7,054 sq. km. is Reserved Forest, 3,772 sq. km. is Protected Forest and 1,053 sq. km. is Unclassed State Forest, thus constituting 13.38% of the geographical area of the state.⁵⁸ Forest land in this State mainly spread over in the Terai Dooars region, Sundarban Mangrove and in South Western Junglemahal. Other than these three areas there are so many green plantation by the Government and by the villagers. Apart from the village forest there are so many sacred groves covering green vegetation in the State.

⁵⁷ State Forest Report, West Bengal (2006 – 2007) p – 16

⁵⁸ *ibid*

Table 2.3

Legal Status of Forests in West Bengal Since 1901

Area in Sq. Km.

Year	Reserved Forests	Protected Forests	Unclassed State Forests	Private Protected Forests	Tea Garden Forests	Other Private Forests	Total Forest Area
1901	2,401	4,856	115	0	398	5,271	13,491
1911	2,471	4,431	78	0	398	5,654	13,032
1921	2,530	4,408	78	0	325	5,950	13,291
1931	5,209	1,661	31	0	263	5,133	12,297
1941	5,199	1,645	31	0	258	4,995	12,128
1951	6,845	17	128	0	258	5,007	12,255
1961	6,979	3,451	483	598	257	204	11,972
1964	7,000	3,512	520	593	244	118	11,987
1971	7,054	3,772	1,053	0	0	0	11,879
1981	7,054	3,772	1,053	0	0	0	11,879
1991	7,054	3,772	1,053	0	0	0	11,879
2001	7,054	3,772	1,053	0	0	0	11,879
2002	7,054	3,772	1,053	0	0	0	11,879
2003	7,054	3,772	1,053	0	0	0	11,879
2004	7,054	3,772	1,053	0	0	0	11,879
2005	7,054	3,772	1,053	0	0	0	11,879
2006	7,054	3,772	1,053	0	0	0	11,879
2007	7,054	3,772	1,053	0	0	0	11,879

Source upto 1964 : West Bengal Forests, Centenary Commemoration Volume, 1964

Source upto 2007 : State Forest Report, West Bengal (2006 – 2007) p – 17

Table 2.4

District wise Area under Forests by Legal Status in West Bengal

(in Sq. Km.)

Sl. No	District	Reserved Forests	Protected Forests	Unclassified State Forest & others	Total Area
1	Darjeeling	1,115	0	89	1,204
2	Jalpaiguri	1,483	217	90	1,790
3	Cooch Behar	0	42	15	57
4	Bankura	80	1,311	91	1,482
5	Purba Medinipur	8	1,166	535	1,709
6	Paschim Medinipur				
7	Burdwan	3	192	82	277
8	Purulia	112	729	35	876
9	Birbhum	8	54	97	159
10	Hooghly	3	0	0	3
11	Nadia	5	3	5	13
12	Murshidabad	1	7	0	8
13	Malda	8	5	7	20
14	Uttar Dinajpur	8	4	6	18
15	Dakshin Dinajpur				
16	24-Parganas (N)	43	0	0	43
17	24-Parganas (S)	4,177	42	1	4220
18	Howrah	0	0	0	0
19	Calcutta	0	0	0	0
Total		7,054 (59.38%)	3,772 (31.75%)	1,053 (8.87%)	11,879 (100%)
All India		4,23,311	2,17,245	1,27,881	7,68,437

Source : State Forest Report West Bengal 2006 – 2007 p – 18

2.7.1 Classification of Recorded Forest Land (Legal status) :

According to Indian Forest Act, 1927 forest areas of the state classified in three major categories. Estuarine water bodies like rivers and creeks in mangrove forest and river flowing through the recorded forest land in Jalpaiguri and other districts have been included while computing the forest cover: Similarly large portions of farm forestry plantations, raised outside forest land, having forest like micro-ecosystem, have been enumerated as forest cover. The main forest cover of West Bengal mainly spread over three parts of the state : The Terai – Dooars, the Mangroves and South Western Jungle Mahal. The legal status of the forestry can be classified as follows :-

Reserved Forest : An area notified under the provisions of Indian Forest Act, 1927 having full degree of protection. In Reserved Forests all activities are prohibited unless specifically permitted (Sec. 20 of IFA, 1927).

Protected Forest : An area notified under the provisions of the Indian Forest Act having limited degree of protection. In Protected Forest all activities are permitted unless prohibited (Sec. 29 of IFA, 1927).

Unclassed Forest : An area recorded as forest but not included in Reserved or Protected forest category. Ownership status of such forests varies from state to state.

Table 2.5

**District wise Distribution of Geographical and Recorded
Forest Land in West Bengal**

District	Geographical Area (Sq. Km.)	Recorded Forest Area (Sq. Km.)	% age of Recorded Forest Area
Darjeeling	3,149	1,204	38.23%
Jalpaiguri	6,227	1,790	28.75%
Cooch Behar	3,387	57	1.68%
Bankura	6,882	1,482	21.53%
Medinipur	14,081	1,709	12.14%
Burdwan	7,024	277	3.94%
Purulia	6,259	876	14.00%
Birbhum	4,545	159	3.50%
Hooghly	3,149	3	0.10%
Nadia	3,927	12	0.30%
Murshidabad	5,324	8	0.15%
Malda	3,733	20	0.54%
Uttar Dinajpur	3,140	10	0.32%
Dakshin Dinajpur	2,219	8	0.36%
Calcutta	104	0	0.00%
Howrah	1,467	0	0.00%
24-Parganas (S)	10,159	4,221	41.54%
24-Parganas (N)	3,977	43	1.08%
Total	88,752	11,879	13.38%

Source : State Forest Report, West Bengal, 2006 – 2007 p – 19

Table 2.6**Forest Area under Major Forest Type in West Bengal**

Sl No.	Forest Type	Area (in million hectares)	
		West Bengal	All India
1	Tropical Moist Deciduous Forests	0.459	23.245
2	Tropical Dry Deciduous Forests	0.430	29.149
3	Sub-tropical Broadleaved Hill Forests	0.005	0.287
4	Montane Wet Temperate Forests	0.005	1.613
5	Littoral and Swamp Forests	0.279	0.671
6	Alpine Forest	0.005	1.790
	Total	1.183	56.755

Source : State Forest Report, West Bengal, 2006 – 2007 p – 20

Table 2.7**Principal species under Major Forest Types in West Bengal**

Sl No.	Forest Type	Principal Species
1	Tropical Moist Deciduous forests	Shorea robusta, Michelia champaca, Lagerstroemia parviflora, Terminalia belerica, Chukrasia velutina.
2	Tropical Dry Deciduous forests	Shorea robusta, Anogeissus latifolia, Boswellia serrata, Terminalia belerica, T.tomentosa etc.
3	Sub-tropical Broadleaved hill forests	Schima wallichii, Castanopsis indica, Phoebe attenuate, Castanopsis tribuloides etc.
4	Montane Wet Temperate forests	Quercus spp., Acer spp., Michelia spp. etc.
5	Littoral and Swamp forests	Ceriops spp., Avicennia spp., Rhizophora candelaria etc.
6	Alpine forests	Tsuga brunoniana, Picea spp., Abies densa, Quercus spp., Juniperus spp., Rhododendron spp and Betula utilis.

Source : State Forest Report, West Bengal, 2006 – 2007 p – 21

2.8 West Bengal Forest Development Corporation Limited :

West Bengal Forest Development Corporation Limited came into existence in 1974 on the recommendations of National Commission of Agriculture in their interim report in 1972 on 'Production Forestry – man-made forests'. Having been registered as a Company and incorporated under the Companies Act, 1956, the Corporation started functioning on 19th November, 1974.

2.8.1 Objectives of the Corporation :

- To help conserve fragile eco-system of Darjeeling Himalayas in areas in operates.
- To promote Joint Forest Management (JFM) with people's participation in South West Bengal and North Bengal.
- To offer timber, non-timber forest produce and value-added products at reasonable prices.
- To help develop awareness for conservation of nature through eco-tourism.
- To help develop and promote wood-based industries.
- To generate rural employment through forestry and related activities.
- To promote and market filtered honey of the Sundarbans.

2.8.2 Activities of the Corporation :

The corporation holds lease of 440 Sq. Km. of forest areas primarily in the Kalimpong Forest Division. Entrusted by the Govt. of West Bengal, the Corporation undertakes the management of such leased out areas in terms of prescriptions of the approved Working Plan and the relevant orders. Every year it takes up afforestation of degraded forest areas. As part of a shift in the afforestation plan in the hills, the

plantations are now being enriched, to the extent possible through planting out of varieties of board-leaved indigenous species instead of raising mono-culture of conifers.

The Corporation has been entrusted by the State Govt. with the harvesting and marketing of timber, poles, pulpwood and firewood on agency basis from all territorial Divisions under the territory of the Forest Directorate. Earlier, such harvesting activities were confined to territorial Divisions of the northern part of the state. However, in 1990's the Corporation extended its harvesting operation of Sal coppice forests of South West Bengal. Much later, from 1998 – 99 onwards, such Sal coppice areas in South West Bengal as well as plantations as are being harvested from the areas leased out to Corporation on a progressive basis as part of a MOU between West Bengal Forest Development Corporation Limited and the Forest Directorate in terms of the Project on Consolidation of JFM and Enhancement of Forest Productivity.

Besides taking up the afforestation work of degraded forest areas in the hills, the Corporation had undertaken afforestation with Cashew in Midnapore District over an area of 1,870 ha., of which about 1,480 ha. Has a reasonably good crop of Cashew. The balance areas which have been rendered blank or degraded because of biotic interference are being replanted with Eucalyptus clones. The Corporation has promoted high-tech plantation under the Project on Consolidation of JFM and Enhancement of Forest Productivity. Such high-tech plantations included clonal plantations and experimental plantations.

It has seen that from the ancient time human beings are sheltered, nourished and helped by the resources of forests. The religious injunctions protect the forest from the hands of human civilization by various thoughts and beliefs. From the dawn human civilization, particularly after the industrial revolution the forest and its resources are being destructed in the name of development. The welfare government made certain policies and laws to save the forest eco-system, but still there is need for protecting the forests and the living creatures around the forests.

SOCIAL ASPECTS OF FORESTS

Forests play a crucial economic, social and cultural role in India. Many river systems originate in forests and produce rich biodiversity. Forests provide timber, industrial wood, fuel wood and non-timber products to the local communities and the national economy.

Most segments of Indian society – peasants, adivasis, pastoralists, city dwellers and industry – have a heavy dependence on the produce of the forests, as the source of fuel, fodder, construction timber or industrial raw material. Some of the most basic needs and livelihood sources of the masses of India's ecosystem people revolve round natural resources : small timber for fuel wood and thatch; bamboo for huts and basket weaving; plant material for tools and implements used in agriculture, hunting and fishing. Their livestock graze extensively in the forest and in some parts tree fodder lopped by hand has several important uses ranging from medicinal to livelihood sources.¹

In India nearly 2,00,000 villages are located inside or on the fringes of forests. According to some estimates, nearly 200 million people depend on forests for their livelihood, with more than 30 million people directly involved in gathering and treading non-timber forests products such as fruits, seeds, flowers, leaves, honey and gum. Around 70 million tribals largely depend on forests for their livelihood. Thus,

¹ Kothari & Patel : Environment and Human Rights (N.H.R.C – 2006) p-33.

any impact on forest vegetation and biodiversity will have adverse implications for the livelihoods of forest-dependent communities.²

3.1 Forests and Civilisation :

Forests have a vital role in maintaining balanced ecological systems. The forests have preserved the soil, and their heavy humus acted as a reservoir for retaining water and gradually releasing it in a sustained flow over a long period of time to feed the agricultural areas.

Shri K. M. Munshi summarised the role of forests in his own inimitable way, “There is a balance on earth between air, water, soil and plant. Forests have a great place in the economy of nature. They hold up the mountains, cushion the rain and storms. They discipline the rivers and control the floods. They maintain the springs, they break the winds, they foster the birds, they keep the air cool and clean. They are the guardians of perennial springs of water. They are the natural defenders of dust storms. They prevent erosion by wind and water and preserve the fertility of soil”.

Experts recognise the following three different stages in the march of man from the dawn of civilisation to modern times with regard to the extent of impact of forests on civilisation –

- i. Civilisation dominated by forests;**
- ii. Civilisation over-coming forests;**
- iii. Civilisation dominating forests.**

² Ravindranath. N. H. : Forests in India in Survey of the Environment 2007(The Hindu, Chennai) p-14.

Experts are of the view, “our country is now passing through an acute phase of the third stage wherein civilisation is dominating forests to the point of destroying them and destroying itself in the process. This was the fate of Mayan, Babylonian and Mesopotamian civilisation in the past.”³

The Mayans dominated Central America for more than 1,500 years, from well before the birth of Christ to late in the first millennium. They built large cities with palaces and pyramids throughout Central America. In their zeal to build new temples Mayans began ripping away forests they had preserved for centuries. These led to their downfall and destruction.⁴

Forests constitute a powerful ecological unit having vital environmental significance. They influence local and regional climates by moderating the same, maintaining the soil mantle, purifying the air and helping in ensuring a continuous flow of clean water.

3.2. Forestry for Socio-Economic Development :

From the earliest times trees have been venerated, used in religious symbolism and for aesthetic purposes. Trees and groves were sacred to the Greeks, often being associated with particular deities : The Oak with Zeus, the Olive with Athena, the Laurel with Apollo. Transplantation of trees is known to have been practiced as early as 1500 B.C. in Egypt. The regard the society has had for trees is reflected in the

³ Tewari, D. N. : Forestry in National Development (Jugal Kishore & Co. 1986) p-2.

⁴ Down to Earth (Sept 1 - 15) 2009 p – 48.

countless place names which owe their origin to the trees which grew in the vicinity, while in poetry, prose and song, tree imagery is to be found in every language.⁵

The benefits conferred by the forests to the various sections of ancient Indian society cannot be minimised. They provided shelter and subsistence to a number of indigenous tribes, who mainly earned their livelihood by hunting and used the leaves and twigs of the trees and the skins of the wild beasts as their clothing. Moreover, timber forest having abundant produce and a river on its border provided food and shelter to people in times of calamities due to drought or inundation.

Some of the forests also served as the natural defensive barriers for the protection and security of the economic life of the people.⁶ In ancient time city of Rajagriha, which was a flourishing centre of mercantile activity was covered by five hills with tall trees. But the real wealth of the country lay in the variety and abundance of produce yielded by forests. The Arthasastra, the Buddhist literature and the Epics, introduce us to the remarkable forest products of both major and minor categories. They consisted of a large variety of trees of strong timber, bamboos, roots, herbs and fruits for medicines, poisonous drugs, grains, pulses etc. Apart from the conservational value on climatic and physical grounds, there were numerous direct benefits from ancient Indian forests. They provided grazing and forage facilities for the livestock of the people, and also used as a fencing to demarcate the villages. Timber was used for construction of cottages, houses, palaces and forts, chariots,

⁵ Hora Bayard : The Oxford Encyclopedia of TREES of the world (Oxford 1981)
p - 45

⁶ Kher. N. N. : Agrarian and Fiscal Economy – In the Mauryan and Post Mauryan Age (Motilal Banarsidas – 1996) p – 185

vehicles, cart, boat and ships. So, from the dawn of the urban human civilization, wood considered as a prime forest product as part and parcel of human life.

In the time of Kautilya for the socio-economic development of a country can considered to be related to the agricultural product, forest product and land management. Kautilya had emphasised agriculture and forestry based export-import business during his time. He had made several schemes and laid down certain basic principles for their practice. In order to increase the productivity of the country, he had divided the available land into agricultural land, medicinal land, forest land, pasture land and waste land etc.⁷

The area under forests is unevenly distributed over different regions in the country. More than 75 per cent of total forest area is located in peninsular India, including the Eastern and Western Ghats, while the Himalayas account for 20 per cent. The plains of the Ganga and its tributaries account for less than 5 per cent of forests. Forests are mainly concentrated in the States of Madhya Pradesh, Maharashtra, Arunachal Pradesh, Assam, Andhra Pradesh, Karnataka, Chattishgarh, Jharkhand and Orissa. There are variations in the percentage of area under forests among the different States of the country. It varies from nil in Pondichery to 80.43 per cent in Arunachal Pradesh. The area under forest is more than the all-India average (21.02 per cent), in Kerala (44.58 per cent), Madhya Pradesh (25.21 per cent), Orissa (31.38 per cent), Assam (35.30 per cent), Tripura (76.99 per cent), Himachal Pradesh (26.35 per cent), Sikkim (47.31 per cent), Meghalaya (77.23 per cent), Manipur (77.40 per cent), Dadra and Nagar Haveli (42.97 per cent), Goa (58.10 per cent), and

⁷ Rath Saraju in V.N. Jha edited Kautilya's Arthasastha and Social Welfare (Sahitya Akademi – 2006) Pp – 276 – 280

Andaman and Nicobar Islands (80.76 per cent). The forest area in other States is relatively low with 4.69 per cent in Rajasthan, 7.46 per cent in Gujarat, 3.61 per cent in Haryana and 3.30 per cent in Punjab⁸. It is said that a country should have a minimum of 25 to 30 per cent of the total geographical area under forests.

The importance of forests in the developmental activities of rural India may be summarized as follows :

1. Forests are powerful ecological unit affecting environment and are among the most natural and renewable resources. They render the climate more equitable. The forests help to prevent soil erosion and facilitate rainfall. This emphasises the importance of preserving an adequate proportion of the land area under forests in the interests of agricultural development.
2. Forests in India provide fodder for more than 300 million livestock.
3. It is estimated that 3.1 million workers or about 0.2 per cent of the total work force in the country are working in the forestry sector. Forests provide full-time employment for some and part-time work for many.
4. Forests are also the homes of tribal people, who lives in various geographical regions of the country.
5. Forests provide raw material for industries like saw mills, match, plywood, paper, pencil-making, etc.
6. They provide major and minor products, the major products being fiber, timber, firewood, charcoal, and minor products being bamboos, canes, drugs, spices, fodder, gums, rubber, lady fruits, honey, etc.

⁸ Forests Cover in States / U.Ts. in India in 2007 : Annual Report 2009 – 2010 MOEF (Official Web site)

7. Forests are an important source of revenue to the government. It is estimated that annually an amount of huge revenue is derived from the sale of forest products.
8. Forests have an employment generation potential through (a) production forestry, (b) social forestry, (c) minor forest produce, (d) forest industries and (e) forest department.⁹

India lives in her villages. The most important fact about life in villages is the crucial role played by the forest cover in the life of the villagers. Forests' not only provide the villagers daily requirements, but support in addition, the two most important occupations of the people – agriculture, by protecting the fertility of the soil and animal husbandry, by providing fodder. Fetching of fuel and fodder has almost become a whole day's work in several villages.

The total area of land under forests in India is about 75 million hectares. Out of this, an estimated 61million hectares are productive forests, and 14 million hectares unproductive forests comprising scrub and fallow land. A huge portion of forest were lost through release of forest areas for setting up of dams, industrial units, construction of roads, agricultural purposes and other developmental activities. On the other land, the average annual increment of productive forests in the country is still below the average for Asia as well as for the world.

The forester as a resource manager of lands, timber, wildlife, and water resources located in forest areas should manage these resources in the long term interest of the community. The forestry sector is potently capable of making a special contribution towards a country's economic development. The significance of forests

⁹ Desai Vasant : Forest Management in India (Himalaya Pub. 1991) p – 91

as a life sustaining resources and an asset for the well being of the people, both rural and urban, scarcely calls for emphasis. Among others, the following aspects of forestry hold a significant impact on India's socio-economic condition. :

3.2.1 Forests as a Source of Human and Animal Food :

Forests play a vital role in the human food cycle. The tribal and forest dwellers in many areas subsists mainly on wild leaves, roots, fruits, flowers, seeds, etc. To many in Madhya Pradesh, Sikkim and Assam the grass of *Coix lechryma* (Joli) suppliers and staple item of diet. Some 450 different species of edible plants were listed and exploited from Himalayan region, and another 200 from all over the country.

The forage from forests including grazing, cycled through animals, provides milk products, meat, hyde, etc. Forests contribute substantially to overcome the current oilseed crisis in India. Among the trees of forest origin known for their oil bearing seeds are : Sal (*Shorea robusta*), Mahua (*Madhuca longifolia*), Neem (*Azadirachta indica*), Karanj (*Pongomia pinnata*), Khakan (*Duabanga grandiflora*), Khokam (*Garcinia indica*), Kusum (*Schleichera oleosa*), Nahor (*Mesua farrea*) and Undi (*Calophyllum inophyllum*).

3.2.2 As Source of Providing Cheap Fuel :

Forests providing cheap fuel to the peasants thereby enabling them to divert the cow dung and agricultural waste (organic manure) to agriculture for improving agricultural productivity which form an essential ingredient for a people's economic development. Cow dung thus utilized means saving of chemical fertilizers.

3.2.3 Forestry is the Main Supplier of Raw Material (wood) for Making Paper :

The most important item in the implementation of literacy and educational programmes is papers. In fact its use is a must in every economic development plan. Alternative sources of cellulose, such as, agricultural residues, sugarcane baggase, jute sticks, etc., entail too expensive processes for pulping and are not as economic as wood. Export of Indian furniture, carved articles, plywood, veneer, and minor forest products could earn valuable foreign exchange.

3.2.4 Forestry Provides Employment to the rural Population often at Their Door Step :

Forestry works do not involve any sophisticated technology and equipment. Even unskilled labour can be trained on various works within a few days. During 1975, forestry provided productive employment for 12.6377 million man-years. Forestry, in fact, can diffuse to a considerable extent the industrial skill in rural areas and also absorb the rural under-employed.¹⁰

3.2.5 Forestry Plays an Important Role in Regional Development :

This particularly significant since every region today is development conscious. Whereas, unfortunately, the resources available are inadequate, to satisfy all. Evidently, the role of forests is more national then regional. As such, there can be

¹⁰ Pant. M.M. : Forestry for Economic Development (Natraj Pub. 1986) p – 10

no ban in utilizing the forest capital of one region for the development of another, if such a measure is considered of greater national interest.

3.2.6 Forest Right, Concessions and Privileges Enjoyed by the Local Villagers Amount to a Big Subsidy :

This subsidy goes a long way towards economic equity and redistribution of income in villages. By the means of social forestry they have collect firewood from forest area.

3.2.7 Forest Based Industries Provide Diverse Products, Employment and Income :

The contribution can be measured in terms of employment, salaries, wags, value-added, volume of sales, import substitution, exports, volume of taxes (state and central), etc. Their contribution to the regional economy can also be similarly measured.

3.2.8 Forestry Provides Material for Diverse Uses :

Some of the trees planted today for getting veneer fifty years hence, can be harvested even earlier, depending on the economic forces, for timber, transmission/fence posts, pulpwood for firewood, etc. This characteristic: multi-stage utilization of forests, also minimizes the degree of uncertainty involved in a long term enterprise and benefits an economy in consonance with the rapidly changing technology.¹¹

¹¹ Pant. M.M. : Forestry for Economic Development (Natraj Pub. 1986) Pp 8 - 12

3.3 Main Forest Products and Industries :

The important forest products are wood and a number of minor forest products (MFP) which include fibers and flosses, grasses and bamboo, essential oils, oilseed, tans and dyes, gums and resins, drugs, spices and insecticides, leaves, edible products, lac and its products and so on. The important industries based on forest produce include those connected with paper and pulp, panel products safety matches, textiles paints, varnishes, oils and soaps, pharmaceuticals, plastics, electricals, adhesives, chemicals etc.

Forest resources need to be developed with the help of modern science and technology. The efforts in this direction are scanty up till now which need to be strengthened so that the optimum exploration of the forest resources is possible resulting in benefit to the people and earning of valuable foreign exchange. Forest resources need to be properly linked with industries for their effective utilization.

The total consumption of non-commercial fuel of 179.41 million tones of coal replacement was made up of fuel wood 116.62 million tones (65%), cowdung 26.91 million tones (15%) and vegetable wastes 35.58 million tones (20%). Fuel wood accounted for 65 per cent of the total consumption of non-commercial fuel.¹²

There are serious shortages of wood for both industrial and fuelwood purposes in the country. In a developing country like India, the demand for forest products is growing at a rapid pace. The gap between availability and demand for wood is ever widening. The question of substitution of wood in fact necessitates an indepth study

¹² Desai Vasant : Forest Management in India (Himalaya Pub. 1991) p – 93

which has not been carried out so far. In view of the urgency of the situation, the following palliatives are proposed to relieve the pressure on our forests:

3.3.1 Packaging :

As much as 2 million cu. mts. of wood is consumed in the packaging industry such as crates for fruit, textiles, tobacco and machinery and plywood chests for tea. The quantity of wood consumed for packaging of apples alone is an alarming revelation of the problem. This industry, on an average, consumes as much as one million cubic mts, of timber annually. The report drawn up by the sub group on 'Packaging of apples in India' shows that as many as 10 hectares of forests are required to be sacrificed for packaging of apples derived from one hectare of its orchard.¹³

3.3.2 Railway Sleepers :

The railway track sleepers are another item where wood could be substantially replaced. At present the railways consume 1.3 million cubic mts. of timber annually for track sleepers. The slipper Pricing Sub-Group of the Central Board of Forestry has, since 1983, been advising the Railways to switch over to concrete and mild steel sleepers. While the Railways have accepted this recommendation, the progress achieved so far needs to be stepped up. The Railways propose to change over to substitution in a phased manner through their own plants.¹⁴ One of the most important uses of wood is as railway sleepers. The standard railway slipper sizes are :

¹³ Desai Vasant : Forest Management in India (Himalaya Pub. 1991) p – 98

¹⁴ ibid

<u>Gauge</u>	<u>Standard sleeper size</u>	<u>volume (c ft)</u>
Broad gauge 5'6"	9' x 10" x 5"	3.125
Metre gauge 3' 3 ³ / ₈ "	6' x 8" x 4.5"	1.500
Narrow gauge 2'6"	5' x 7" x 4.5"	1.094
Light narrow gauge 2"	4' x 6" x 4"	0.833

The number of sleepers laid on the track is $N + 3$ where N is length of the rail in yards. The specifications for passing are very rigid regarding species, pre-treatment, tolerance on size, splits, cracks, shape, knots, insect attack, etc. The annual requirements are much more than the number available from the forests and in consequence iron, steel and concrete sleepers are also being used. The percentages of wooden sleepers used are : Board gauge 19, Metre gauge 17, and Narrow gauge 72.¹⁵

3.3.3 Building Construction :

The National Building Organisation has estimated the housing requirement in 1985 to be of the order of 5.6 million urban and 18 million rural units. While the urban sector would take to substitute materials like metal door and window frames, the rural areas would continue to depend upon timber for quite some time. The present annual requirement of 25 lakhs cu. mts. for building construction would be substantially minimized if the urban housing sector is prevailed upon to use metal door and window frames and hollow panel doors by linking the financial facility to this stipulation. This may help to reduce consumption of timber by nearly 50 per cent in the urban sector.

¹⁵ Sagereiya. K. P. : Forest & Forestry (NBT – 2000) Pp 267 – 278

3.3.4 Matchwood :

This industry consumes about 14 lakh cu. mts. of wood annually. The western India Match Company which is a major unit in this country, is compelled to take recourse to propagation of poplars on an extensive scale under the Farm Forestry Programme, faced as it is with scarcity of raw material. The first attempt to manufacture safety matches in India began in 1894, and the credit for it goes to Amrit Match Factory, Bilaspur and Gujrat Islamia Match Manufacturing Factory. Almost all the factories in India depend on the forests for their supplies of match woods. Of the several species found suitable only a few, e.g., maharukh (*Albizia triphylla*) white dhup, kambli geon (*Excoecaria agallocha*), poplar (*Populus ciliate*), willow (*Salix spp.*), gutel, vellapine (*Vateria indica*), etc., are available in commercial quantities.¹⁶

3.3.5 Mine Pit Props :

The forests around coal mines in the country are generally denuded of tree cover in the process of meeting their requirement of pit props which is of the order of one million cubic metres a year. Substitution of wooden props by iron or concrete props could go a long way in minimizing consumption of good quality timber for this item.¹⁷

3.4 Minor Forest Produce :

By definition, minor forest produce includes all products obtainable from forests other than wood and thus comprise products of vegetable, animal and mineral

¹⁶ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) p – 66

¹⁷ Desai Vasant : Forest Management in India (Himalaya Pub. 1991) Pp 92 – 99

origin except minerals that are under the control of the Mining Department. Right to collect and sale Minor Forest Produce (MFP) conferred under the Forest Rights Act, 2006 which includes tendu leaves and bamboo that have high commercial value and were under the forest department's control. Now MFP is understood as "all non-timber forest produce of plant origin".

For convenience the products may be classified as under :

1. Fibres and Flosses;
2. Grasses (other than oil-producing), Bamboos and Canes;
3. Essential Oils including those from grasses;
4. Tans and Dyes;
5. Gums, Resins and Oleoresins;
6. Drugs, Spices, Poisons and Insecticides;
7. Edible Products;
8. Leaves; and
9. Animal, Mineral and miscellaneous products.

Some of these are very useful to the local population while others are of considerable commercial importance. Some earn substantial foreign exchange, while others give employment to the persons engaged in cottage industries utilizing them.

3.4.1 Fibres and Flosses :

Fibres are obtained from the best tissues of certain woody species. Mostly they are coarse and used for ropemaking. The shrub Ak (*Calotropis spp.*) however, gives a fine, silky and very strong fibre used for making fishing nets.

Flosses are obtained from certain fruits and used for stuffing pillows, mattresses, etc. The commonest is that from Semal. The floss from the fruits of Kapok

(*Eriodendron anfractuosum*) is very elastic, extremely buoyant and resistant to water-logging. It is therefore used for making life-belts.¹⁸

3.4.2 Grasses, Bamboos and Canes :

Beside being utilized as fodder or for thatching, some grasses are fibrous and therefore used for cordage, matting and even for making paper. The most important for the latter purpose is Sabai (*Eulaiopsis binata*). It is a perennial grass found on the bare slopes of forest blanks of the sub-Himalayan tract and in Bihar, Orissa, W. Bengal, M.P. and western parts of Himachal Pradesh.

Bamboos are tall, perennial, arborescent grasses. More than 100 species of them are found in the Indian forests. The most common, valuable and universally used is *Dendrocalamus strictus* which is found in almost all tropical deciduous forests except where it has been exterminated by over-cutting. The thorny *Bambusa arundinacea* takes next place in occurrence and utility. It is found mainly in Orissa, Assam and in the southern and western Indian forests.

Bamboos are even more important from the industrial point of view. They are the only indigenous plant of wide occurrence in the Indian forests which has a comparatively long fibre suitable for making paper, just as coniferous woods are used in other countries.¹⁹ In South East Asia, because of its use as a structural material for buildings in the form of poles, trusses, rafters and purlins, for ladders and scaffoldings, bamboo is known as the 'poor man's timber'. In Chinese culture it symbolise 'Serenity and Sophistication'; in Vietnam 'a brother', and in India, 'green

¹⁸ Sagreiya. K.P. : Forests And Forestry (NBT 2000) p – 83

¹⁹ Sagreiya. K.P. : Forests And Forestry (NBT 2000) p – 84

gold'. These tender sentiments attributable to bamboo signify how deep its concept has permeated the peoples' cultural thoughts.²⁰ Realising the massive utility of bamboos, 18th September was declared as International Bamboo Day in World Bamboo Congress in 2009 at Bangkok. Forest Rights Act, 2006 also included Bamboo as MFP considering it as grass.

Canes occur in the forests of Andaman and Nicobar, Assam, W. Bengal, Kerala and to some extent in Tamil Nadu, Maharashtra, Bihar, Orissa and U.P. They are used as plaiting material, as ropes and cables of suspension bridges in the forests, for furniture, walking sticks, umbrella handles, sports goods, wicker works, etc.²¹

3.4.3 Essential Oils :

A variety of forest plants contain essential oils. These are used in the manufacture of soaps, cosmetics, pharmaceutical preparations, confectionery, tobacco flavouring, incense, etc. Important from the commercial point of view are the oils of *Eucalyptus globules*, used in medicine, Rusa grass, Khus and the most valuable Sandalwood.

Sandal is a small evergreen tree growing wild (also cultivated) over a area of 15,000 sq km of which 85 per cent lies in the State of Karnataka and the remainder in the adjoining districts of Tamil Nadu and parts of M.P.

²⁰ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) p – 102

²¹ Sagreiya. K.P. : Forests And Forestry (NBT 2000) p – 85

Sandalwood itself is extensively used for carving pieces of art. The chips of heartwood and the roots as also the wood that is unsuitable for carving are used for distilling the oil. There is a government factory at Bangalore with up-to-date equipment for the purpose. The oil is used in Indian medicine and mostly in perfumery and manufacture of toilet soaps, locally.

Lemon grass oil is obtained from *Cymbopogon flexuosus* and *C. citrates*. Kerala is the chief producer having about 25,000 hectares of plantations at the foot of the Ghats.

Rosa or palmrosa oil is obtained from the grass *Cymbopogon martini*, var. *motia* which grows mostly in western M.P. and adjoining tracts of Maharashtra. It contains about 90 per cent geraniol and is thus a cheaper source of it than the geranium oil from *Pelargonium*. The oil is widely used in perfumery and cosmetics, particularly in the manufacture of soaps to which it imparts a lasting rose scent, also for flavouring tobacco.

Khus oil is distilled from the scented roots of the grass *Vetiveria zizanioides* which grows wild in Rajasthan, M.P., Punjab, Orissa, and Kerala. It is widely used in the perfumery trade particularly for making Itra of Khus.²² *Madhuca butyracca* (Indian butter tree) seeds yield an oil known as Phulwara butter. It is used as an adulterant of ghee, for soap candle and chocolate making. Collection and processing

²² Sagreya, K.P. : Forests And Forestry (NBT 2000) Pp 86 – 87

of seeds generates valuable income and employment for the villagers. The oil is used mainly by the soap and detergent industry, paints and varnishes industries.²³

3.4.4 Tans and Dyes :

Tannins are secretion products of plant tissues. The important tanning materials obtained from forests are :

Harra of chebulic myrobalan nuts from *Terminalia chebula*, a large deciduous tree. The largest supplies come from M.P. and smaller quantities from Bihar, Orissa, Andhra Pradesh, Tamil Nadu and Maharashtra. Babul (*Acacia nilotica*) bark is an important tanning material used in northern India, the main centre being Kanpur. The tree occurs on wastelands and is also cultivated.

Avaram (*Cassia auriculata*) bark is obtained from a shrub growing wild in Deccan and south India. It is chiefly used in Madras tannery. Wattle (*Acacia decurrens* and *A. mollissima*) bark is obtained from the plantation of these species on the Nilgiri plateau and Palni Hills.²⁴

Tans from Mangrove trees includes *Rhizophora mucronata*, *Embllica officinalis*, *Ziziphus glaberima*, *Lannea coromandelica*, *Terminalia tomentosa*, *Syzygium cuminil*, *Lagerstroemia parviflora*, *Careya arborea*, *Xylia xylocarpa* and *Anacardium occidentale*.²⁵

²³ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) Pp 105 – 106

²⁴ Sagreiya. K.P. : Forests And Forestry (NBT 2000) Pp 89 – 90

²⁵ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) p – 106

3.4.5 Gums, Resins and Oleoresins :

Gums and resins are exuded by plants, partly as a natural phenomenon and partly as the result of disease or injury to the bark or wood, chiefly from the stems and sometimes even from roots, leaves or other parts. Resins are sometimes mixed with a high percentage of essential oil when they are termed oleoresins. Categories of gums are : true-gum pseudo-gum and astringent gum. These are used mainly as adhesives, paste, in textile in calico-printing, mucilage, sizing of paper, paint, polish, candy and confectionery and also in medicine. True gums are extracted from babul (*Acacia nilotica*) (babul gum), *A. Senegal*, (true gum Arabic). *A. modesta*, *A. catechu* (khair), *Macaranga peltata*, *Lannea coromandelica*, *Azadirachta indica*, *Acacia catechu*, *Anogeissus latifolia*, *Aegle marmelas*, *Anacardium occidentale*, and *Feronia limonia*. *Pseudo gums* are derived from *Astragalus heratensis* (gum-tragacanth), *Sterculia urens* (gum karayas), *Bombax ceiba* (Semal) etc. *Astringent gums* used in medicine come from (bijasal) *Pterocarpus marsupium* (Gum kino) and (palas) *Butea monosperma* (Bengal kino).²⁶ The most important Indian gum is Karaya obtained from *Sterculia urens* or *S. villosa* trees of the dry deciduous forests. Tapping of *S. urens* has been properly organized in M.P. The gum is a very important article both for internal consumption and more so for export.²⁷

3.4.6 Drugs, Spices, Poisons and Insecticides :

The number of these products obtained from forests runs into hundreds. Therefore a brief mention of some of the conspicuous ones is made here. They are derived from trees, shrubs, climbers, herbs and even from the primitive types of plants

²⁶ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) p – 108

²⁷ Sagreiya. K.P. : Forests And Forestry (NBT 2000) p – 90

and consist of fruits, flowers, leaves, stems or roots. They are administered as solids, liquids, infusions or dust. Other important drugs are :

Root and underground parts : Ipecac from *Cephaelis ipecacuanha* is a native of Brazil now being cultivated in Darjeeling, Shillong and the Nilgiris. The production is about 1,000 kg annually, giving sufficient emetine to treat 37,000 cases of amoebic dysentery.

Liquorice from *Glycyrrhiza glabra* is being cultivated on an experimental scale in Himachal Pradesh, Delhi and Jammu and Kashmir. It has tonic, expectorant, demulcent and mildly laxative properties.

Sarpagandha are the roots of *Rauwolfia serpentina*, a plant growing sporadically in the sub-Himalayan tract and in the plains near the foothills, also in the Western Ghats and elsewhere. Kuth or costus are the roots of *Saussaria lappa*, a perennial herb practically confined to the moist slopes of the mountains around the valley of Kashmir at elevations of 3,000 to 5000 m. In Lahaul and Spiti the villagers cultivate the herb. In medicine it is used as a tonic, stomachic, stimulant and spasmodic.

Bark Drugs : Quinine is by far the most important of all Indian vegetable drugs. It is obtained from *Cinchona ledgeriana* and *C. hybrida*. The former is cultivated in W. Bengal and Tamil Nadu 1,700 ha plantations in Tamil Nadu and W. Bengal respectively (not under the Forest Department.)

Kurchi is the bark of *Holarrhena antedysenterica*, a shrub or small tree common in tropical forests. As the scientific name implies, it is a remedy against dysentery.

Wood Drugs : Ephedra species are small exrophytic plants found in dry places on rocks in the Himalayas over 2,400m. The alkaloid ephedrine is used in the treatment of bronchial diseases.

Leaf Drugs : Senna pods and leaves obtained from *Cassia angustifolia*, a small plant of southern India. It is a mild laxative.

Drugs from Fruits and Seeds : Kala-zira is the seed of *Carumearvi*, a much valued spice because of its strong agreeable flavour.

Chaulmogra is derived from *Hydnocarpus kurzii* a tree common in Western Ghats. The seed is expressed to get the oil which is considered a specific for leprosy.

Spices : Spices are aromatic vegetable products used in cooking to add aroma or pungency to food and to flavour certain dishes to make them agreeable to the taste, not unlike ginger, pepper and chillies, which are cultivated. The important spices obtained from forests are :

- (a) Galangal from *Alpinia galangal* a plant found in the Eastern Himalayas and in the Western Ghats. It has perennial rhizomes

which are aromatic and pungent. It is also used as medicine for rheumatism and catarrhal infections.

- (b) Cinnamon or *Dalchini* is the bark *Cinnamomum zeylanicum*, a tree of the Western Ghats, from Konkan southwards upto 1,800 m elevation. It is astringent stimulant and carminative, also used in candy, gums, incense, dentrifice and perfumes.
- (c) *Ilaychi* (Chhoti) or lesser cardamom are the dried capsules of *Elettaria cardamomum*, a small plant growing wild in the evergreen forests of south India. The seeds are used as a masticatory, as a flavouring for sweet dishes and as a carminative.
- (d) *Ilaychi* (badi) or greater cardamom is the seed of *Ammomum subulatum* growing in the east Himalayan forests. It is an inferior substitute for the former.

3.4.7 Edible Products :

Several forest fruits, flowers and even leaves and tuberous roots are eaten.

Species of which the fruit is eaten with relish are : *Aam* or mango (*Mangifera indica*); *Bel* (*Aegle marmelos*); *Ber* (*Ziziphus mauritiana*); *Jamun* (*Syzygium cumini*); *Kathal* (*Artocarpus heterophylla*); *Khirni* (*Manilkara hexandra*); *Phalsa* (*Grewia asiatica*); *Sitaphal* (*Annona squamosa*); *Tendu* (*Diospyros melanoxylon*); etc.

Species of which the kernels are eaten :

Achar (*Buchanania lanzan*); *Akhrot* or *Walnut* (*Juglans regia*); *Cashewnut* (*Anacardium occidentale*); *Chilgoza* (*Pinus gerardiana*); *Kamal* (*Nelumbo nucifera*); *Singhara* (*Trapa bispinosa*); etc.

3.4.8 Leaves :

The most important from the commercial viewpoint are the leaves of *Tendu* (*Diospyros melanoxylan*) used as wrappers of tobacco to give *bidis*. It is a medium-sized tree found throughout the dry forests of the plains, chiefly in M.P., and Orissa and to a lesser extent in Andhra Pradesh, Bihar, W. Bengal, Maharashtra, Tamil Nadu, Gujarat, Rajasthan and southern U.P. The annual leaf production is estimated at more than 6 lakh tones 2,00,000 in Madhya Pradesh; 1,20,000 in Orissa; 1,80,000 in Maharashtra; 90,000 in Andhra Pradesh, and smaller quantities in other States. Besides internal consumption bidis and leaves are exported to Bangladesh, Pakistan, Sri Lanka, Nepal and other Asian and African countries.

3.4.9 Animal, Mineral and Miscellaneous Products :

Lac is the most important animal product obtained from forests. It is resinous secretion, formed as a protective covering on the bodies of larvae of a hemipterous, minute insect *Laccifer lacca*, living parasitically on the juicy twigs of certain plants and sucking their juice. From the forest point of view the important host plants are Kusum (*Schleichera oleosa*), Palas (*Butea monosperma*), Ber (*Zizyphus jujuba*, and Ghont (*Z. xylopyra*). India produces about 18486 tonnes of stick lac annually (nearly 85 per cent of the world production, the only main rival being Thailand), mostly in Bihar (40 per cent), M.P. (30 per cent), W. Bengal (15 per cent), Maharashtra (5 per cent), and smaller quantities in Gujarat, U.P., Orissa and Assam.²⁸ The two common wild-honey making bees in India are : *Apis dorsata* and *A. indica*. Bees wax : is used for making candles, polishing wooden-floors, manufacture of sealing-wax, sizing

²⁸ Sagreiya. K. P. : Forest & Forestry (NBT 2000) Pp 82 – 95

paper and for the manufacture of Carbon-paper. The wild Tussar silk is obtained from the silk worm of genus *Antheroea species* feeding chiefly on *Terminalia tomentosa*, *Bombax ceiba*, *Shorea robusta*, *Syzygium cuminil* and *Ficus* species.²⁹ Other miscellaneous products includes Tendu fruit, which is popular season fruit in jangal mahals of Bankura and West Midnapore in West Bengal. Lush green sal forests of Bengal provides different types of Mashrooms just after the rainy seasons. Mashrooms are very popular food among the local forest dwellers.

3.5 Forest Industries :

Wood products worth Rs. 4420 million were imported, mostly coniferous softwood, and wood for special purposes, pencil slats and cork products; and products worth Rs. 2167 million were exported, chiefly Resewood and some Laurel, Sandalwood, Andaman-padauk, Red Sanders, teak and Walnut.

3.5.1 Composite Wood Industries :

These include plywood particle boards, improved-wood and adhesives.

Plywood is a thin board made from 3 or more odd numbers of very thin (5 to 60 mm) layers or sheets of wood-peeled, sawn or sliced from a log-cemented together under pressure so that the adjacent plies have their grains at right angles. The origin of the industry dates back to the early twenties when the tea industry in Assam took initiative to make tea-chests. Today it stands as a highly developed industry. There are at present over 150 factories producing 17 different types of products such as flush

²⁹ Pant. M. M. : Forestry for Economic Development (Natraj Pub. 1986) p – 119

door, block board, shuttering plywood, etc., valued at more than Rs. 1000 million. In 1985, 70 square metres of plywood were produced.

Fiber Board : As the name implies this is made from components of fibre dimension, and is formed from an interfelting of fibres which produces a mat, with a characteristically natural bond of the fibre itself. This is the main difference between fibre board and particle board. The industry is of a very recent origin in the country.

Improved Wood includes compregnated wood for electrical parts, railway fish-plates, etc., and some compressed wood for shuttles, bobbins, insulating chair sheets, and laminated picking sticks for the textile industry. This industry is of a very recent origin. Adhesives are produced into plants with a total capacity of 18,000 tonnes annually.

3.5.2 Match Industry :

The demand for safety matches is steadily increasing. The industry was started in 1922 prior to which all matches were imported either from Sweden or Japan. The industry was divided into two sectors : *Mechanical* sector producing nearly 60 per cent of the output, and *Cottage industry* sector, mainly concentrated in and around Sivkasi in Tamil Nadu. Under the former two factories were built in 1924, one at Ambarnath near Bombay and the other at Arambagh near Calcutta. Later two more factories were built, one near Madras and the other in Port Blair in the Andamans, the latter making only undipped splints. There was another factory at Bareilly in U.P. The entire complex was known as the Western India Match Co. (WIMCO) with an associate company called Assam Match Co. (AMCO) started in 1925 at Dhubri.

3.5.3 Paper Industry :

Trends and Prospects from the forest point of view, paper industry is the most important as it is a major consumer of bamboos and hard-woods. Paper is one of the necessities of civilization and it is impossible to imagine its continuance without printed books and newspapers. In fact the per capita consumption of paper (writing, printing, newsprint, wrapping and packing) is considered a good index of the stage of progress of a nation.

In India, the first commercial paper machine was installed in 1867. The raw material used was mainly imported pulp. The suitability of bamboo for making paper was established by the extensive investigations of W. Raitt at the Forest Research Institute, Dehra Dun from 1909 to 1925. The Institute recently established that it is possible to make acceptable paper from short-fibred hardwoods by mixing some long-fibred pulp and suitably modifying the process.

3.5.3.1 Newsprint :

Till a few decades back there was only one newsprint mill in the country which the writer put up. It went into production in 1955, utilizing the locally available forest raw material, namely 40 per cent furnish of chemical pulp of bamboos and 60 per cent groundwood pulp of Salai wood (*Boswellia serrate*). Attempts were made to increase its production to 50,000 and later to 75,000 tonnes per year. Even so the mill met only a fraction of the country's demand and that too of somewhat inferior quality as the groundwood pulp does not stand strong bleaching.

3.5.4 Furniture and other Timber-Utilizing Industries :

Furniture industry is dispersed throughout the country and flourishes especially at places where good timber such as Teak, Sissoo, Deodar, etc. are available. The annual requirements of wood have been estimated at about 0.55 million cubic metres. Textile industry consumes about 0.8 million cubic meters of which 50 per cent is imported as blanks for bobbins and shutters.³⁰

3.5.5. Industries Utilizing Forest Products Other Than Timber:

Sandalwood is used for carving, and because of the fragrant oil its heartwood contains, it has been known the world over from ancient times. The total annual production of its oil is 1,00,000 kg valued at one crore rupees, and it earns a considerable foreign exchange. It is a small evergreen tree thriving on well-drained loamy lateritic soils of the highlands of southern India, particularly in the scrub forest of Karnataka and Tamil Nadu. The tree lives parasitically on other plants by sending haustoria which attach to their roots.

3.5.6 Resin Tapping and Manufacture of Turpentine and Rosin :

Chir pine is the only species regularly tapped in India. The tree is widely distributed in the outer ranges and principal valleys of the Himalayas as also on the Siwalik formations at elevations between 450 and 2,300 m, extending in the west to Kashmir and in the east to Bhutan. The Indian resin-tapping industry is confined to the belt of the Chir pine forests, expanding from Uttar Pradesh, westwards to Jammu,

³⁰ Sagreiya. K. P. : Forest & Forestry (NBT 2000) p – 273

in the Siwaliks and outer Himalayas upto an elevation of 1,200 m, sometimes going up to about 1,500 m.

There are five large government-owned factories at Tilware and Clutterbuckgunj in U.P., Nahan and Bilaspur in H.P. and at Miran Sahib in J and K. Besides these there are 17 other small private factories. The Clutterbuckgunj factory is the largest and is now contemplating making rubber emulsifier from resin. The total yield of turpentine is about 800 kilolitres and that of rosin about 37,000 tonnes. The average rate is about Rs. 5,000 per tonne of rosin and Rs. 4,200 per kilolitre of turpentine.³¹ Rubber is the milky or coloured juice called 'latex' secreted by many plants and is a mixture of resins, gums, hydrocarbons, etc. Two valuable products from latex are 'caoutchouc' and 'guttapercha'.³²

3.5.7 Lac and Shellac :

Lac is the secretion of an insect which lives parasitically on certain forest trees, mainly Palas, Kusum and Ghont and has been known in India since ancient time. It is mentioned in the *Vedas* and the *Mahabharata*. Laksha, the Sanskrit equivalent, means 1,00,000 and obviously refers to the innumerable minute insects seen on the twigs when they are swarming. Formerly attention was confined mainly to the magenta dye produced when the insect bearing twigs were crushed and washed in water. It was used as a medicine, as a dye for colouring silk and also as a cosmetic. Some lac was and is still used for making bangles.³³ There are two strains of lac "Kusumi" and "Rangini" – the former is considered superior. Lac products included : stick-lac, seed-lac, lac-dye, shellac, button-lac, wax, white-lac, etc. Shellac – the most important product – is used for : surface coating of wood, metal leather, finishing for

³¹ Sagreya. K. P. : Forest & Forestry (NBT 2000) p – 276

³² Pant. M. M. : Forestry for Economic Development (Natraj Pub. 1986) p – 109

³³ Sagreya. K. P. : Forest & Forestry (NBT 2000) p – 277

oil-clothes, in electrical goods industry, for the manufacture of Gramophone records and hats.³⁴

3.5.8 Tendu Leaves:

Leaves of Tendu (*diospyros melanoxylon*) trees abound in the forests of M.P. and to a lesser extent in Orissa W.B. and elsewhere, are used as wrappers of tobacco for making *bidis*. The new leaves come out in April-May when they are plucked by local women and children and made into *gaddis* of 50 each dried in the sun, for use later for making *bidis*.³⁵

3.6 Wild life and the Forests :

The matter of wildlife is correlated with the forests since time immemorial wild animals and forests are inseparable from each other. All over the world both are so interlinked that wildlife or broadly speaking biodiversity cannot exist without forests.

Presently there are 521 National Parks and Sanctuaries in India, which covers 4.5 percent of the country's geographical area. This vast area has helped in conservation of a significant part of biodiversity of the country, which includes 13,000 species of flowering plants and 65,000 species of fauna including fish, birds and mammals.

³⁴ Pant. M. M. : Forestry for Economic Development (Natraj Pub. 1986) Pp 118 – 119

³⁵ Sagreiya. K. P. : Forest & Forestry (NBT 2000) p – 277

3.6.1 The Mammals :

Broadly speaking, the distribution of the major mammals in India can be recognised with respect of three zones – the Himalayas, the sub-Himalayan Terai, and the Peninsula.

There are numerous species of bovines in the Western Himalayas. Yak or the Ox of the snows is found in Ladakh. The majestic Kashmir Markhor, the Ibex, and the Himalayan Thar are the Himalayan wild goats. The beautiful Kashmir Stag, and the kastura or the Musk deer are the main deers of the Himalayan mountains. Thamin is a pretty and typical deer found in Manipur. The higher perennial snow-clad area being governed by the Snow Leopard. The Brown Bear and the Himalayan Black Bear are the Bears found in the Himalayan region, and the Red Panda inhabits the lower Himalayas in the eastern region.

The one-horned Rhinoceros, the Hog deer, and the Clouded leopard are the typical animals of the eastern Himalayan foothills. The Sub-Himalayan Terai also home for Tiger and the Panther, the other main carnivores being the Sloth Bear, the Fox, the Wild dog, a number of Feline cats and the Binturong – a Civet Cat. The Chinese Pangolin is also found in Assam. Elephants are numerous in Assam and Sub-Himalayan Bengal. The deer tribe includes the barasinga, the sambar, the chital or the spotted deer and barking deer. Flying squirrels, Indian porcupine, Gaur (Indian bison) and Wild pigs are quite common.

In peninsular India the distinctive species are the Elephant, Gaur, the Chinkara or the Indian gazelle, the Black buck or the Indian antelope, the Nilgai or the blue

bull, the Mouse deer or the Indian chevrotain, the Chowsinga or the four-horned antelope, the Nilgiri thar, the Asiatic lion, and the now extinct Cheetal or the hunting Leopard. All the deer species of the Himalayan foothills except Hog deer are also found. Tiger and Panther are the widely distributed predators. Sloth bear is also found all over. Other carnivores include a number of cats, the wild dog, the fox, the jackal, the hyena, the mongoose, civet cat and the Rattle.

3.6.2 The Avifauna :

The Indian bird life is rich and there are hundreds of species of aquatic, gallinaceous and arboreal birds. A variety of storks, herons, egrets, cormorants, flamingoes and ducks – both resident and migratory – are the chief classes of aquatic birds. Among the waders and shore birds are the snipes, ibises, gulls, and the lapwings. The main ground birds includes the Great Indian Bustard, pea fowl, jungle fowl, partridge and quail. There are innumerable species of perchers, some of them excellent song birds. Babblers, barbets, bulbuls, cuckoos, mynas, doves, parakeets, pigeons, rollers, beaters, flycatchers, hoopoes, drongoes, finches, finchlarks, wagtails, warblers, orioles are but a few. A variety of owls, eagles, kites, falcons are the main birds of prey. The national bird Peacock found in northern and north-western part of the country.

3.6.3 The Reptiles :

The country has a large variety of snakes. Of the poisonous ones the most important are Cobra, Russel viper and krait. Dhamon is a non-poisonous large snake.

Pythons of large size are found amongst rocks along streams. Apart from snakes there are various types of Crocodiles and lizards reside in and around the Indian forests.³⁶

Indian subcontinent alone can proud of its large wildlife – both herbivores and carnivores. The elephant, lions, tigers, rhinoceros, deers and bears are found in many other countries; but all of these mammals are found together only within the Indian forests.

As my present study is specially referred to the state of West Bengal, the State has 6 National Parks covering an area of 1909.76 sq. Km. and 15 wildlife sanctuary covering an area of 1203.28 sq Km. The main inhabitant of the forests of beautiful Bengal are Rhino, Leopard, Elephant, Tiger, Gaur, Sambar, Chital, Hog Deer, Barking Deer, Wild Boar, Goral, Tahr, Screw, Himalayan Black Bear, Python, Crocodile and Turtle.

3.7 Tribal people and Forests :

The largest concentration of tribal people anywhere in the world except perhaps Africa, is in India and there are six hundred and thirteen tribes inhabited all over India, out of them mostly are forest dwellers and depended upon forest resources.

The tribal habitation in India can be demarcated in three tribal zones : North – eastern, Central and Southern. The north – eastern zone consists of Sub-Himalayan region and the mountain ranges of north – eastern India. This zone is inhabited by

³⁶ Sagreiya. K. P. : Forest & Forestry (NBT 2000) Pp 100 – 102

tribes like the Gurung, Limbu, Lepcha, Garo, Khasi, Naga and others. The Central zone consists of the plateaus and mountainous halts between the Indo – Gangetic to the North of Krishna river in the south. The main tribes found in this zone are the Santhal, Munda, Oraon, Ho, Bhil etc. The Sourthern zone consists of the peninsular India, south of the river Krishna. Tribes like Chanchu, kota, Toda, Malayam, etc. inhabit in this zone.³⁷

The tribal communities have traditionally been a great support in the conservation of natural habitats in forest areas.³⁸ The basic needs of the tribal people or forest dwellers awarded to them by nature, justly and properly.

Many tribes, very often, live by hunting, fishing or gathering. But they do not depend upon these exclusively for meeting their needs. The aboriginal inhabitants of the Andaman Islands, however, depend upon these entirely for their livelihood. On the other hand in mainland India, apart from all these functions tribal people or forest dwellers engaged with shifting cultivation for searching of their livelihoods. In the more advanced areas, however many tribal groups have got transformed into agricultural communities. Some tribal communities are depended upon forests on a very limited sense like grazing of their cattle or meeting their fuelwood needs.

The tribals have symbiotic relationship with forests and mainly have three major families of languages viz., The **Austro-Asiatic**, the **Dravidian** and the **Tibeto – Burma**. Nearly 82 per cent of tribal population in India is concentrated in central and western part of the country, about 11 percent in the north – eastern states and

³⁷ Thakur & Thakur : Tribal Life and Forest (vol. I) (Deep & Deep 2009) p – 9

³⁸ Purohit Mona : Introduction of wild life laws and its impact on Tribes (Deep & Deep 2009)

about 7 percent dispersed in small pockets in the southern zone. State-wise distribution in Madhya Pradesh (20.13 percent), Orissa (23.11 percent), Assam (10.99 percent) Andhra Pradesh (3.8 percent), Gujarat (13.99 percent), Arunachal Pradesh (78.85 percent), Mizoram (94.28 percent), Manipur (31.13 percent) and West Bengal (5.72 percent).³⁹

This present study is specified to the State of West Bengal and in this area tribal community belongs to Austro – Asiatic group who are mainly concentrated to the district of Bankura, Burdwan, Birbhum, Purulia and Midnapore (west) and Tibeto – Burma group mainly reside in the northern hill districts of Bengal. In the present day these tribal communities of Bengal apart from hunting, fishing and gathering also engaged with cultivation and tea plantation programme for searching of their livelihood's.

3.7.1 Forests and Tribal Civilization :

Forest have provided the tribals with home since time immemorial. The forests belonged to the tribals, before the creation of the state forestry agencies. Naturally, the tribals have developed intimate relationship with their surroundings and forests which provide livelihood and the very means of existence to them. Forests provide shelter and housing material, food, edible fruits, nuts, tubers, flowers, seeds, wild game, drugs, spices etc. for the tribals and forage for their livestock.⁴⁰ In the process of civilisation two types of human population developed : those who regard the forest as not habitable and whose relationship to the forest is marginal and those

³⁹ Chaudhuri. A. B. : Forests Environment and Man (Daya Pub. 2007) Pp 130 – 131

⁴⁰ Pant. M.M. : Forestry For Economic Development (Natraj 1986) P-184

who live within the forest in a more or less symbiotic relationship subsisting on the use of the forest produce. This second type of people are the tribal people who have lived amidst hills and forests since times immemorial. They are regarded as forest – dwelling people.

Forest and tribes are two sides of a coin. Both are significantly interrelated. Forefathers of these tribals settled within the forest and have been surviving on forests and other available natural resources in the forest. As a result their economic, social and cultural practices closely revolved round the forest life-cycle and they became the foster children of the forest. For centuries, forests have ensured a steady supply of food, fuel, fodder and other requirements of tribals. Besides, traditionally, the people had built a culture and a social system that kept a balance between human needs and the carrying capacity of the forest. The tribal people have always considered the forest a renewable resource. The tribal people in the past maintained a constructive dependence on the forest considering it as a source of many items for their material culture. No doubt a forest obviously caters to the biological, emotional and economic needs of tribal people in many ways.

Tribals are found at four different stages of economic development, viz., food gathering, pastoralism, shifting cultivation and settled cultivation. Though the tribes are classified into four major groups on the basis of their predominant economic system, these categories are not exclusive. The food gathering economy mostly revolves around forest wealth. But some food gatherers here and there practice settled cultivation, while the pastoralists and shifting cultivators resort to settled cultivation.

However, all these categories depend upon the forest. They have evolved a way of life which has been woven around forest ecology and forest resources for centuries.

The tribal people are emotionally attached to the forests. Their deep-rooted sentiments are in association with forests, their religion and folklore revolves around the forest. The forest is closely associated with various life-cycle activities of tribals right from birth to death. The tribals are so attached to the forests that they worship some trees in the forests as gods and goddesses. Their folklore is full of references to the forest and there are several rites and rituals which are performed under trees. Till modernization crept into the tribal areas, a vast majority of tribal populations inhabiting the hilly and forest tracts used to survive on tubers, roots, fruits and leaves or various food varieties available in the forest, supplemented by game. As time passed on, some advanced tribal groups engaged in shifting and settled cultivation to get an assured food supply for their sustenance. Forest produce were used for supplementing the grains from agriculture during the lean seasons as the returns from crops hardly sustained them from a few months in a year.⁴¹

3.7.2 Some Minor Forest Produce and Tribals :

Minor Forest Produce (MFP) provides substantial sustenance to the tribal communities particularly in the backward regions. In some cases they are the main source of their cash incomes. The collection of MFP by the tribal in the earlier days was primarily for meeting their personal requirements.⁴² During the past few decades after independence the tribal areas have been exposed to outside contact with the

⁴¹ Behera Sricharan in Seeland & Schmithusen edited Man In The Forest (D.K. Print 2000) Pp – 292 – 294

⁴² Thakur & Thakur : Tribal Life And Forests (Vol. I) (Deep & Deep 2009) P - 142

rapid implementation of development plans that saw laying of roads connecting the inaccessible terrain and dense forests with the plain areas. Consequently, traders from the plains started migrating into the tribal areas introducing barter economy to the hitherto subsistent tribal societies. They used to supply essential commodities like salt, tobacco, kerosene and dry fish to the tribal people in exchange of agricultural and forest produce. This phenomenon generated a spirit of competition among the tribals to collect more and more forest produce to acquire adequate quantities of essential commodities. Realising the commercial value of various MFP items, the traders have introduced cash in transaction with tribal people. The result is that more and more items of MFP of commercial value have been identified by the tribals in the forests and are collected on a large scale. Initially exchanged on barter basis they were later sold for cash.⁴³

One of the most important MFP's from the view point of tribal development is the resinous substance known as 'Lac' from which shellac is derived. India produces nearly 70-80% of world's total lac. Over 90% of country's production (about 5,00,000 quintals) is exported annually. Lac, the valuable resin is secreted by an insect, *Laccifer lacca*, as a protective covering for itself. The lac insect feeds on the sap of certain host plants common among which are *Butea monosperma* (palas), *Ziglyphus mauratiana* (ber), *Schleichera oleosa* (Kusum), *Zizyphus xylopyrus* (ghout), *Shorea talura* (Jalari), *Cajanus cajan* (arhar) etc. The first three species are commercially most important; lac produced from kusum tree is by far the best quality. Lac cultivation in India is concentrated in the regions of Jharkhand, eastern Madhya Pradesh, parts of West Bengal, eastern Maharastra, northan Orissa, Assam and

⁴³ Behera Sricharan in Seeland & Schmithusen edited Man In The Forest (DK Print 2000) p – 294

Mirzapur district of Uttar Pradesh. Smaller quantities of lac are also produced in Andhra Pradesh, Tamil Nadu, Karnataka and Rajasthan.⁴⁴

Tendu leaves (*Diospyros melanoxylon*) used as wrapper for making *bidis* have gained commercial importance. *Bidi* industry provided sustained employment to millions of people. Besides internal consumption large quantities of *bidi* and tendu leaves were exported to various countries earning huge foreign exchange annually. Gums are used in a wide variety of industries like pharmaceutical, textile, paper, dyeing etc. Nearly half of the produced gums exported to United States of America, United Kingdom, Germany, Japan and Australia. Like oil produced from *Sal*, *Mahua*, *Karanj*, *Neem*, *Kusum* etc. exported to the Soap industries of Europe. Estimated average annual production of grasses, bamboos and canes is reported to be 2 million tones, 3 million tones and 5,000 tones respectively. Sabai grass is supplied mostly to the paper mills and other grasses are being used for making ropes, mats and for feeding the cattle. Bamboo is mainly used for pulping, as a construction material and in cottage industries. Canes are mostly used in cottage industries. Grass-bamboo-cane crafts are widely practiced all over the country by weaker sections of the society particularly women. India produces about 1,600 tones of 30 different types of essential oils derived from various plants. In view of its heavy demand in the world market, and growing domestic consumption, there is a greatly felt need for increasing the production. Out of about 2,000 items of drugs recorded in Indian Materia Medica, over 1,800 are of vegetable origin. Quinine, Reserpine, Ephedrine, etc. once known only to the tribal society are now equally popular in western science. In Indian forests, Sericulture activity extends from cultivation of food plants, rearing of silk worms,

⁴⁴ Pant, M.M. : Forestry For Economic Development (Natraj Pub. 1986) p – 203

collection and reeling of cocoons and weaving. India produces all the four varieties of silk namely, mulberry, tassar, eri and muga.⁴⁵

The most important of all the available trees in the forest area for consumption is Sal tree. Sal leaves are used to make food plates, bowls and local cigars; it logs are used as poles for houses and for a number of agricultural implements. The seeds are used for food and oil is extracted, which is in great demand for making soups, sweets etc., while its resin is collected and sold in the market. In short, a Sal tree has a multiplicity of uses for forest dwellers : economic, ritual and cultural. Similarly, many other trees are also regarded as important resources. Mahua tree (*Madhuca Longifolia*) plays a vital role in the socio-cultural events of tribal life. Liquor from Mahua flowers is very much favoured by the forest dwellers. Irrespective of age and sex, liquor is an important part of their food. When no other food is available, Sal seeds with a few Mahua flowers make a tasty and nutritious food. Oil extracted from Mahua seeds is used for cooking and other purposes. For food, Mango (*Mangifera indica*), Jackfruit (*Artocarpus heterophyllus*), Guava (*Psidium guajava*), Kendu (*Diospyros melanoxylon*) and many other trees are held in high esteem.⁴⁶ Another forest produce Honey is collected from the forest. Forest dwellers of Sundarban in West Bengal collected honey from deep forest; the quality of Honey of Sundarban is one of the finest in the world. Fishing in the creeks and canals within the forest areas is prohibited. But next to agriculture, fisheries, particularly brackishwater aquaculture provide the main source of employment in the region. Tiger Prawn of Sundarban is world famous and it has excellent market value in Japan.⁴⁷

⁴⁵ Tiwari. D.N. : Forestry In National Development (Jugal Kishore & Co. 1986) Pp 99 – 102

⁴⁶ Behera Sricharn : Forests, Tribes and Resources in Seeland & Schmithusen edited Man In The Forest (DK. Printworld 2000) Pp 296 - 297

⁴⁷ Sharma. B. C. : Lower Sundarban (The Asiatic Society 1994) p - 57

But the picture in the other side of the coin is different. In some areas, forest officials are preventing people from taking the produce to the market. Most states have nationalized certain MFP items – *Mahua*, *Sal* seeds and flowers, tendu leaves and certain gums. After the supreme court banned tree felling the forests without working plans, MFP has emerged as the main source of revenue for forest department.⁴⁸ In the forests of Purulia and Bankura districts of West Bengal natural trees are replaced by eucalyptus, aakashmoni plantation. These trees have no MFP value, other than timber value. *Kusum* is the basic tree for cultivation of Lac. But the forest department is not interested to plant natural trees, they are only concerned to commercial forestry.⁴⁹ By these types of activity tribals are losing their basic right to livelihood. There should be a policy to provide social and economic benefits to the tribals and rural populations besides ensuring development of forest areas.

Forest plays an important role in country's economic development and ecological stability. They provide several goods broadly classified as major and minor forest products which serve as raw material for many industries : the focal points of economic growth. Forests provide numerous services such as environmental and ecological stability necessary for human sustenance. Indian rural economy depends basically upon forestry. Overwhelmingly, the dwellings are made of small timber, bamboo and thatching grass. From the ancient time tribals of the country depending upon the forest produces and they have a symbiotic relationship with the forest.

⁴⁸ Mahapatra, Shrivastava, Narayanan & Pallavi : Major battle over minor produce in Down To Earth (Nov. 1 – 15, 2010) p – 29

⁴⁹ Dutta Sangita in “Dainik Statesman Bichitra” (Bengali) Kolkata 7th Oct. 2007

EMERGING ISSUES FOR DESERTIFICATION

Destruction of biotic potential of land leads to desertification. This may result either due to a natural phenomenon like wind and water erosion, salinization, shortage in rainfall or by the human activity. From the very beginning of human civilization, human beings are shaping and moulding the environment, especially after the industrial revolution. Indiscriminate cutting of trees, uncontrolled grazing, patterns of land use, mines, industrialization are the instances of human activities which leads to desertification. With the heavy load of human and livestock population, India stands on the world map of forests resources as belonging to deficit zone. India today is the poorest in the world as per capita land is concerned compared to the other nations. Still our country is loosing its green vegetation each and every day for either myopic profit making demand of human population or for hostility of nature. If this trend continues we may in the near future reach to zero-forest value in the country.

Keeping in view of the present research project it is highly indispensable to highlight on the forest tracts of Bengal. Theoretical analysis reveals many things regarding forest and land use in Bengal. But practically through field survey, the exact position of desertification has seen in right perspective. This chapter examines the root causes of desertification of the first phase. In the second phase it reveals the practical picture in various regions of Bengal.

4.1 Desertification Meaning and Definition :

Desertification process is leading to desert formation. This may result either due to a natural phenomenon linked to climatic change or due to abusive land use. Formation of desert created from the very beginning of the planet earth. From the great sand seas of the Sahara to the foggy coastal plains of Peru, from the broken rock of the cold Gobi to the Indian Thar, the variety of desert environments is greater even than the number of deserts themselves.

Desertification can simply be classified as expansion of desert to the soil or woodland becoming arid zone. If the desert really were expanding, the threat would be critical. They could enlarge if the climate changed or the desert edge were gravely mishandled. In the course of the past 12,000 years, there have been times when climate change has shrouded millions of now vegetated square kilometers with desert. Human activity has also created deserts; In Iraq, salt injected from irrigation has endured in many millions of hectares of soil. Meteorologists now concede, however, that rainfall in the West African Sahel was below the 30 years average in the late 1910s and in the 1930s, and that the period 1970 – 90 was dry by the standards of previous years. The cruel and rampant droughts that occurred in the Sahel and the Horn of Africa during this period are ample evidence. Soil erosion is the second greatest problem in dry lands. Erosion occurs as a result of clearing the soil for cultivation. Erosion is probably worst in highland areas on the desert edge, such as northern Ethiopia.¹

¹ DESERTS The Encroaching Wilderness (General Editors : Tony Allan & Andrew Warren) M. B. International Ltd. (1993) p-97

Desertification is the name given to a complex of interrelated human and natural processes that lead to environmental degradation in drylands. It was first used in 1949 by the French scientist **Aubreville** to explain environmental degradation in sub-humid tropical Africa, caused mainly by human impacts. Since that time, numerous individuals and organizations have produced different definitions of the phenomenon. As defined by the United Nations Environment Programme in 1992, desertification is 'land degradation in arid, semi-arid, and dry sub-humid areas caused by adverse human impact'. Land degradation is the reduction or loss of potential productivity and biological potentiality by adverse changes in soil characteristics and / or soil loss by wind and / or water erosion. These changes are such that natural recovery is not possible or takes so long that in, human terms, it represents a permanent change.²

4.2 Problem Of Desertification :

Desertification is not a new phenomenon, but it has grown to epic proportions in recent years because of the massive size of the human population. Desertification is a problem rooted in over population and unsustainable land use patterns. It afflicts numerous countries and regions, including the United States, Africa, Australia, Brazil, Iran, Afghanistan, China and India. Worldwide, recording to a United Nations Environment Programme (UNEP) estimate, approximately 9 to 11 million hectares of cropland and rangeland become decertified each year.

Desertification is not new to humankind. In the ancient Middle East, for instance, the destruction of forests, overgrazing, and poor agricultural practices

² Hancock Paul. L. & Skinner Brian. J. (Ed.) The Oxford companion to the Earth (O.U.P. 2000) p-239

caused a deterioration of the water-absorbing capacity of the land and reduced the amount of rainfall.

Desertification is especially bad in parts of Africa, especially the sub-saharan region known as the sahel. Beginning in 1968, a long-term drought in the sahel (coupled with overpopulation, overgrazing and poor land management) began the rapid southward migration of the desert in Ethiopia, Mauritania, Mali, Niger, Chad, and Sudan. The Sahara is also spreading northward. An estimated 1,00,000 hectares (2,50,000 acres) of rangeland and cropland are lost in Africa each year.

For combating this type of desertification Eleven North African nations gathered in the Chadian capital on 18th June 2010 to push the proposal of creating a tree belt across North Africa. The Great Green wall project aims to thwart the march of Sahara desert further south. This project has total distance of 7,775 km. with covering of 11,662,500 hectares of land area and includes some North African countries like Senegal, Eritria, Mauritania, Mali, Burkina Faso, Niger, Chad, Sudan, Djibouti and Ethiopia. According to the UN's Intergovernmental panel on climate change, in countries surrounding the Sahara climate change has slowed rainfall, resulting in desertification. If the trend continues two-thirds of Africa's farmland may be swallowed by Saharan sands by 2025.³

Desertification and erosion are taking a huge toll on world production. In Africa, a continent straining under the pressures of 743 million people in 1997, well over 100 million do not have enough food to eat. In Ethiopia, nearly one of every

³ Down To Earth July 1-15 (2010) Vol 19 No. 4 p – 13

three people is undernourished. In Chad, Mozambique, Somalia and Uganda, four of every ten people are undernourished. Food supplies are declining in Latin America as well. The number of undernourished preschool children in Peru now stands at nearly 70%. Infant mortality in Brazil continues to rise.⁴

Desertification is one type of process which is gradually developed with the progress of destruction of rainforest. Recently for farming of livestock, famous Amazonian rain forest is destructed. In another south-east Asian country – Indonesia – the world's fourth most populous country – has the most extensive rainforest cover in Asia, but driven by a global demand for palm oil and timber products, more than 74 million hectares of forest (more than three times the size of Uttar Pradesh) have been logged, degraded, pulped in the last 50 years. Globally, more than one million hectares of tropical rain forests are destroyed every month, an area of forest the size of a football pitch every two seconds.⁵

Amongst the South-east Asian countries maximum reduction in rain forest was seen in India, Burma and Sri Lanka. Thus in developing countries, the picture is alarming. In India nearly 80% of the country was covered with forests around 3000 B.C. Waves of migrants came to India, many from tree-less countries, and changed the whole landscape. It was the growing demand of the cities that also destroyed our forests. Besides this local cattle, goats, sheep etc. not only destroy the vegetation but also pull out the roots of the plants. The process of deforestation started in the Shivalik range. Shivalik Sal forests were over-exploited for industrial use. Thus foot-

⁴ Chiras Environmental Science Wadsworth Pub. Co. (1998) p-169

⁵ Sunday Hindustan Times, Kolkata, Dec. 6, 2009

hills of Shivalik once covered with dense forests, are facing an acute water scarcity and semi-desert conditions.⁶

4.3 Root Causes Of Global Desertification :

Desertification results from many factors, including frontierism, a lack of knowledge of the importance of forests, population growth, poverty, and inadequate and inequitable land ownership. In the United States, colonists cleared eastern deciduous forests to make room for farms and settlements. Often the land eroded under poor management, so settlers picked up and moved into new territory. Seemingly unlimited forests merited little protection in the frontier days.

In developing countries, deforestation is viewed as a natural social response to poverty, unsustainable population growth, and landlessness. Poor people move into the forest to settle for a living. The faster the population grows, the faster the forest falls. Land ownership patterns in developing nations also contribute to the loss of forests. In Zimbabwe, Africa white farmers comprise 1% of the total population but control 39% of all land, much of its prime farmland. In El Salvador, 2% of the landowners have title to 60% of the land. With the good land in the hands of a few, poor rural peasants often enter forests and cut down trees to carve out plots to farm. Many of these people exploit fragile and hilly terrain, semi arid grass lands, or rain forests. Because they are relegated to marginal lands, their farms often fail, and they must move on – often going deeper into the forest to repeat the cycle.

⁶ Sharma P. D. : Ecology and Environment (Rastogi Pub. 1999) p - 327

As a result of gross mismanagement of natural resources including land, certain irreversible changes have triggered the breakdown of nutrient cycles and microclimatic equilibrium in the soil indicating the onset of desertic conditions. The once verdant kumaon hills are on their way of degeneration. The mountain springs have dried up or become seasonal with substantial reduction in the flow of rivers and streams. The deforestation in the Himalayas is linked to population explosion. Strides on revenue earning and resources regeneration for pulp and match industries seems to have accelerated soil erosion. Resin tapping from Chirpine trees has choked the trees to death.

The principal causes have been the population explosion in man and livestock leading to enhanced requirement of timber and fuelwood, and grazing respectively. Increasing number of livestock and migrating graziers contributed to degradation of forest.

Moreover, increase in shifting (jhum) cultivation in north-east and Orissa has also laid large forest tracts bare. There has been shortening of jhum cycle to six years only (in some districts even 2-3 years only) which provides no enough time for natural repair of damaged ecosystem.⁷

Besides from all these causes, the major causes of desertification are construction of highway and roads, building up of industries and pollution therefrom, tourism, unlimited mining etc.

⁷ Sharma P. D. : Ecology and Environment (Rastogi Pub. 1999) p -328

The most recent definition recognises that a variety of factors are at stake and states that desertification is land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

Table 4.1

Root Causes of Global DESERTIFICATION	
A. Climatic variations	B. Human activities
i. Wind erosion ii. Water erosion iii. Salinization iv. Shortage in rainfall v. Changes in water courses	i. Indiscriminate cutting of trees ii. Uncontrolled Grazing iii. Irrational Land use iv. Over exploitation of water resources v. Mines and Industrialization vi. Highways and Dams vii. Unplanned Tourism and urban growth viii. Raising demand of Fuelwood and Timber ix. Shifting cultivation x. Tribal dependency on Forests

So, apart from the above noted causes, a brief discussion on the causes of desertification in India and particularly in West Bengal is highly needed.

4.3.1 CLIMATIC VARIATIONS :

There are so many reasons of desertification caused in the soil. All the reasons are caused by changing variation of the atmosphere and change in the physical relationship of water, air and wind. This study discuss all the causes in bellow :-

4.3.1.1 Wind Erosion : Wind erosion is a major problem in the western drylands of India, which is more severe in the arid and semi arid lands of Haryana and Punjab and especially in the desert tracts of Rajasthan and Gujarat. Wind erosion is a major

problem in the desert tract of Rajasthan where it resulting erosion of top soil containing organic matter, which is useful to fertility of vegetation. It affects the crop plants, burial of good agricultural lands and infrastructures. In West Bengal, the problem of wind erosion is not particularly found but erosion of top soil can found in the treeless red lateritic soil. Districts of Bankura, Purulia, West Midnapore and some parts of Birbhum and Burdwan are facing this problem of top soil erosion due to non vegetation and deforestation. Because, particularly in these areas seasonal rainfall is very low and soils are reddish to yellowish red containing less amount of organic materials and thus not capable of regenerate plantation. So, when there is a destruction of forests, that leads to erosion of top soil and finally that resulting desertification.

4.3.1.2. Water Erosion : This kind of desertification is soil loss through water erosion, which is the most serious land degradation in India. During seasonal heavy rainfall and flood the top soil of surface washed away, and it is possible due to non-coverage of plantation. Recently in August 2010 after a cloudburst and floods destroyed crops and lands in Ladakh district of Jammu & Kashmir. Nearly 1,500 hectares of agricultural land was damaged by flash floods that followed the worst cloudburst in Ladakh on 6th August, 2010.⁸ Due to soil erosion thousands of hectares of agricultural lands situated at the banks of Ganga and Padma rivers in the districts of Malda and Murshidabad vanished every year. Owners of Mango orchard in Malda, out of fear of diluviation of their lands by the river axed their trees only for timber values. But this types of deplantation leads to descrtification. Rivers are considered to be a source of economy in West Bengal since very long. The Total sediment load of

⁸ Article of Tashi Morup in Down to Earth (Oct 16 – 31, 2010) p – 20

the Ganga – Brahmaputra river having known to be much higher than any other river system of the world.⁹ So, there is need for plantation of deep rooted plants through river banks, by which they can hold the soil and sub-soil of river banks and act as a shield to protect water erosion which leads to desertification.

4.3.1.3. Salinization : The rise of water level, seepage, water logging increase salinity problems and related hazards are causing abandonment of rich settlement. The problem is universal. There are about 69,000 square km. of land has been salinized in the arid and semi arid regions of China. Some other coastal nations are facing this problem due to rise in the sea level. In India, Ganganagar, Bikaner, Sikar, Jhunjhunu and Churu districts of Rajasthan are facing fresh deposition of sand due to salinization. Over cultivation on the marginal lands and deserted sandy river beds towards the west and north west of Ajmir and Pushkar have shown slow advance of sandy materials through Luni gap engulfing more fertile lands towards the east of Aravallis.¹⁰ In West Bengal the problem of salinization found in the coastal parts of the State. West Bengal is cyclone prone. Number of severe cyclones may even be occurred once in 3 to 4 year. The wind velocity during cyclones often ranges from 80 – 140 km. per hour; Cyclones also initiate large scale littoral drift and lead to devastating coastal modifications. Wave heights goes much above 2.5 meter in the events of cyclonic storms.¹¹ By this type of climatic variation saline water of Bay of Bengal spreading throughout the agricultural and crop lands of coastal Bengal.

⁹ Bhattacharya. A. K & G. K. Das : Dynamic Geomorphic Environment of Indian Sundarban in Subhashranjan Basu edited “Changing Environmental scenario of the Indian Subcontinent” (acb Pub. 2002) p- 287

¹⁰ Sen, Amal Kumar in “changing Environmental Scenario of the Indian Subcontinent” (acb Pub. 2002) p – 76

¹¹ Bhattacharya. A. K. & G. K. Das in “changing Environmental Scenario of the Indian sub continent (acb Pub. 2002) p – 286

Cyclone ‘**Aila**’ stuck on Monday, 25th May 2009 in and around sunderbans coast line. Over 8,000 people are missing and about a million are homeless in India and Bangladesh. About 300 people were killed by ‘**Aila**’, which struck the Sagar island in sunderbans at a maximum speed of 110 km. per hour 1,25,000 hectares of cropland was affected due to salinization of ‘**Aila**’.¹² Environmental experts predicts that cyclonic storms, along with rising sea water level, would lead to a large number of climate refugees in the Sunderbans.¹³ So, alone salinization can deserted both plant and human beings.

4.3.1.4. Shortage in rainfall : Due to shortage in rainfall and failure of monsoon, causing drought in even well irrigated and rainfed areas. Once greenery area become drier arid zone. India has seen 22 major droughts since 1891, mostly in dry regions like Rajasthan. But in 2009, flood prone Assam was one of the first States to declare drought. High rainfall areas like Bihar and well – irrigated areas like Punjab, Haryana suffered drought. In Andhra Pradesh 25 farmers committed suicide due to drought by August 21.¹⁴ In 2010 with some other parts of the country West Bengal affected by drought. By 15th August, 2010 the State Government declared 11 districts of the state as drought affected, out of which mostly from south Bengal. Districts of Bankura, Prulia, Birbhum and western parts of Burdwan and West Midnapore heavily affected. Because these area’s agriculture is totally depended upon seasonal rainfall. By the end of October 2010 thousands of hectares of agricultural land become dry and abandoned. Great greenery of Bengal become drier arid zone due to shortage in rainfall.

¹² Gupta Alok in Down to Earth (June 16 – 30, 2009) p – 29

¹³ Rakeeb Hossain in Hindusthan Times, Kolkata Nov. 29, 2009

¹⁴ Kaur Ravleen in Down to Earth (Sept. 1 – 15, 2009) Pp 23 - 29

4.3.1.5. Changes in Water Courses : The increase in water flow in the water courses associated with desertification which causes the stream bank erosion, reduction in vegetation cover, surface crusting etc. The river courses in the Luni basin in India are widening up due to the recurring floods. During the period (1958 – 86) 9 flash flood of moderate to severe intensity were recorded in the Luni basin and about 3720 hectare area along the river courses was eroded.¹⁵ In North Bihar, in the past 25 years about 55 villages sandwiched between the Kosi embankments have changed location at least thrice.¹⁶ The Ganga in Haridwar district has shifted 500 metres from its course over the past four decades, shows a study by the Uttarakhand Space Application Centre. The state government agency said erosion of the river banks may be speeding change of course.¹⁷ In Bengal the Ganga and other rivers often changes their courses and when it occurred, the old river course side become abandoned and leads to desertification.

4.3.2 HUMAN ACTIVITIES :

Human beings are also liable for causing desertification. After the rapid growth of industrialisation and population explosion pressure is built upon the earth's surface. Both urban and village peoples are causing damages to the topsoil as well as vegetation of the planet. There are so many reasons for degrading the soil quality.

4.3.2.1. Indiscrimination cutting of trees : Indian subcontinent is full of forest resources, and to match the global industrial pattern, there is increased consumption

¹⁵ Sen. A. K. in "Changing Environmental Scenario of the Indian Sub-continent" (acb Pub. 2002) p – 77

¹⁶ Gupta Alok Kumar in Down To Earth, (April 1 – 15, 2010) p – 23

¹⁷ Shrivastava Kumar Sambhav in Down To Earth (June 1 – 15, 2010) p – 22

of natural resources. Indian Forest is the good supplier of industrial raw materials. It begins with the advancement of the Britishers, and still we are continuing the colonial legacy.

Blaming native communities for misusing the resources which were otherwise meant to be exploited by rulers from distant countries; the British colonists identified the rural poor of Africa and India as the source for deforestation, soil degradation, groundwater depletion and decline of biodiversity. Unfortunately, such a deplorable legacy secured acceptance even among the rulers of modern India.¹⁸ For getting more cultivation land foreign rulers cleared more forests and killed wildlife's. In fact, the numbers of animals killed for rewards were often a good index of the land deforested for agricultural expansion.¹⁹ By around 1860, Britain had emerged as the world leader in deforestation, devastation its own woods and the forests of Ireland, South Africa and north-eastern United States to draw timber for shipbuilding, iron smelting and farming. Their early treatment of the Indian forests also reinforces the claim that 'the destructive energy of the British race all over the world' was rapidly converting forests into deserts.²⁰

After independence as the population grew there was more and more demand for land for agriculture. In various States and Union Territories Governments officially diverted as many as 2.623 million hectares of forest lands to agriculture during the period 1951 to 1980. In addition many hectares of unoccupied (non-forest) government lands were also allocated for agriculture. It is a sad fact that many State Governments, especially Madhya Pradesh, Maharashtra, Karnataka and Gujarat

¹⁸ "Right To Survive", an article by Kisor Chaudhuri in The Statesman, Kolkata 21 March, 2006

¹⁹ Rangarajan Mahesh in India's Wildlife History (Permanent Black 2001) p - 32

²⁰ Gadgil & Guha edited "This Fissured Land" (Oxford 2008) Pp – 118 - 119

repeatedly regularized the unauthorised occupations in government forest lands till the Forest (conservation) Act, 1980 was enforced and they could excise no more forest lands without the prior concurrence of the Central Government.²¹ So, in this way as the population grows, demand for cultivation for food also grows and in a result more woodlands of the country axed and leads to desertification.

In the first phase Colonial Government destructed the woodlands and its habitats mercilessly for encroaching of lands. In the second phase they have settled their mind for plantation. The Colonial Government did not waste their time and money for planting natural woodland. For myopic profit making tendency they settled their mind for commercial plantation.

Soon after their establishment in 1788, the Calcutta Botanical Gardens became a source of seed, advice, and encouragement for tree planting programmes in Bengal and beyond. From 1794 teak seed and seedlings were distributed from there to every part of the country and plantations were taken up in different parts of Bengal considered favourable for the growth of teak.²²

So, by this way India as well as Bengal silently witnessed about destruction of its greenery. After independence of the urgency of creating mixed economy so many heavy and small scale plant and industry settled up by the independent Government as well as by the private enterprises. For the second time the natural woodland faced destruction. Entire region of Durgapur – Asansol area was covered with lush green

²¹ Lal. J. B. , India's Forests : Myth & Reality (Natraj Pub. 1989) p - 99

²² Sivaramakrishnan. K, Modern Forests – State making and Environmental Change in Colonial Eastern India (Oxford 1999) p – 107

natural sal forests. But in the name of settling up of industry, the woodland was destroyed.

But not only in forested area, but also there are some instances of indiscriminating destruction of trees. There was destruction of trees, by cutting down its branches on both sides of Rashbehari Avenue, Kolkata under the supervision and direction of Kolkata Municipal corporation.²³ Again, the greenery along the Ganga at Panihati is on the verge of disappearing for construction under the supervision of civic body.²⁴ So, in this way the colonial government started destruction of trees in the name of collection of timber and still we carrying the colonial legacy in the same way, resulting desertification of the eco-system.

4.3.2.2. Uncontrolled Grazing : The World Watch Institute of UNO, Washington has briefly observed – “the world surface is turning into non-productive desert not just because of lack of rain, but because of modern man’s denuding the land by over grazing his cattle and stripping away the trees for firewood”.

At the present stage of development the importance of livestock in the national economy of India needs no special emphasis, India possesses a livestock population of over 412 million of which 270 million are bovine animals, about one-tenth of which graze in forests. Wherever forest are easily accessible, the livestock depends entirely on grazing on them.²⁵ India accounts for 13 percent of the total live-stock population in the world. Only about 12 million hectares of land in the country are officially recorded as pastures and grazing lands. The officially recording, however,

²³ Rakshit Rajibaksha in Anandabazar Patrika (Bangali Daily Newspaper) 8th Apr. 2006

²⁴ Chatterjee Rajib in The Statesman, Kolkata, 27 June 2006

²⁵ Sagreya. K. P : Forests And Forestry (NBT 2000) p - 228

implies neither management status, nor suitability for the use, but only traditional usage. These lands are not demarcated on the ground, nor does any agency exist for their management. The truth is that excessive and continuous grazing has degraded these lands to an extent that their productivity is negligible.²⁶

India has no separate reserve land for cattle grazing like many European countries and Argentina. Also the country has no policy to check the population of livestock. Fierce and indiscriminate forest grazing is, therefore, leads to cattle breeding. This over grazing, has threatened the existence of forests in the country. It has found that unrestricted grazing of cattle detrimental to tree growth, because they have uprooted the young trees and seedlings. So, by this way then the cattle graze faster than the growth of grass or new trees, then the matter is vulnerable and leads to desertification.

4.3.2.3. Irrational Land Use : Over exploitation of resources and irrational land use practices is one of the main process of desertification that have made the Indian desert more uninhabitable. Due to intensive pressure on land and absence of subsidiary occupations couple the people to cultivate the dunes and marginal lands. This causes the loosening of sand particles which become susceptible to be carried by the winds. These wind borne sand fall on the adjacent fertile lands and ultimately deteriorate them. Hence the system is a menace of soil erosion and desertification hazard.²⁷

²⁶ Lal. J. B. : India's Forests : Myth & Reality (Natraj Pub. 1989) p – 94

²⁷ Sen. Amal Kumar in Changing Environmental Scenario of the Indian Subcontinent (acb Pub. 2002) Pp 74 – 75

This type of cultivation in sand dunes is problem of Western Rajasthan. This type of wind erosion from sand dunes is not common in West Bengal. But alluvial soil of this river based state facing problems from brick-kiln. Most of the brick-kilns are feeded soil from the agricultural fields in off season and from the river bed. Districts of Burdwan, Hooghly, Nadia are facing this problem rapidly. So, in this way degradation of soil and sub soil resulting desertification.

4.3.2.4. Over Exploitation of Water Resources : The report on State of India's Environment says the domestic water demand over the next 20 years will double from 25 billion cubic meter to 50 billion cubic meter. Also the report informed that 80 percent of domestic water supply in rural India comes from ground water.²⁸ With the increase of population demand of food grains also increased. For satisfying the demand the farmers are now engaged in dry summer cultivation, totally depending upon ground water. The urban population also exploiting the water resources by various ways. Deep bores are one of the problem of over exploitation of water resources. There is no clear water policy to regulate the problem.

At the city scale, rainwater can be used to recharge aquifers and fill lakes and tanks. No such plan exists for any urban area in India.²⁹ So, as a result the ground water is by various way exploited. In the summer season the districts of Bankura, Birbhum, Purulia, West Midnapore and Western part of Burdwan district facing the problem severely. This very destructive water exploitation is one of the causes of desertification.

²⁸ Down To Earth (Sept. 1-15, 2009) p-20

²⁹ Vishwanath. S in Survey of The Environment 2009 (The Hindu, Madras) p – 62

4.3.2.5. Mines And Industrialisation : Surface strip mining brings extreme desertification causing permanent waste lands making them irrecoverable. Example can be cited in Jawar mining areas (copper and zinc) near Udaipur, sandstone and lime stone in Jodhpur, Balesar, Jaisalmer and marble mining in Makrana. The mining activity, particularly surface mining lead to the diminution of biological potential of the lands which has turned into wasteland.³⁰

Mining activities is a big and new problem to decertified the virgin forests. In the year 2006 three divisional forest officers (DFO) of Saranda, Kolhan and Porhat divisions are attempting to protect Saranda, home to Asia's largest Sal (*Shorea robusta*) forest and an important elephant habitat, which some companies like the Mittals, Jindals and Essar are eyeing for its large iron ore deposits. The Jharkhand government signed 42 memorandums of understanding (MOU) worth some Rs.1,70,000 crore with these companies. Apart from various plants and elephants Saranda forest is home to the flying squirrel, four horned antelope, sloth bear, leopard and deer. Mining is the largest cause for land alienation in Jharkhand. Between 1951 to 1991, over 34 per cent of land acquired for development projects was for mining.³¹ Apart from existing big domestic names like the Tatas, Birlas and the Jindals 2 host of transnational corporations suddenly arrived on the scene. The iron, coal, bauxite, copper, silver, gold and diamond deposits in the resource-rich states of Chhattisgarh, Jharkhand, Orissa, Madhya Pradesh, Goa and Karnataka were suddenly drawing companies such as POSCO – India, Vedanta Resources, A. C. C. Rio Tinto

³⁰ Sen. A. K. in changing Environmental Scenario of the Indian Subcontinent (acb Pub. 2002) p – 77

³¹ Bose Ruksan in Down To earth, (Jan 15, 2006) Pp 7 – 8

Exploration, De Beers India Prospecting, BHP Minerals India and Arcelor Mittal, and Others.³²

In result these private companies exploring the minerals don't stick to rules as green zones turnes barren and creating threat to the forest land affecting natural habitat and interests of tribals. But the Union Environment Ministry has stepped in to prevent certain mining activities creating danger to the forest lands.

The Union environment ministry has stepped in to prevent mining near the Tadoba – Andhari tiger reserve. It has told the Maharashtra government that the mining leases allotted in the buffer zone of the reserve have to be cancelled.³³ Again in a major blow to the Vedanta group, the Centre refused to grant environmental clearance to its US \$ 1.7 billion bauxite mining project in Orissa's Niyamgiri Hills, citing serious violations of forest and environment laws.³⁴

After the closure of mines, the miners neither refill the toxic craters nor afforest these 'dead' mining sites.³⁵ Again in sensitive news, the Rajasthan government granted 40 new mining leases in the eco-sensitive zone which will pose a threat to an ambitious tiger rehab project of the Aravalli – flanked Sariska Reserve. Earlier the Supreme Court had banned quarrying for stone in the Aravallis of neighbouring Haryana, holding the mining companies guilty of violating zoning laws and not filling up excavated craters.³⁶ In West Bengal, the tribal people of Mahammad Bazar block of Birbhum district do not want more crushing units or stone mines in this district, as those units are harmful for the tribal people. A huge number of tribal

³² Bavadam Lyla in Survey of the Environment 2010, p – 92

³³ Pallavi Aparna in Down to Earth (Nov 16 – 30, 2009) p – 17

³⁴ The Statesman, Kolkata, 25 August 2010

³⁵ Viju. B. in The Times of India, Kolkata, Oct 19, 2010

³⁶ Singh Rachna in The Times of India, Kolkata, Oct. 22, 2010

families have already left their villages following pollution.³⁷ In Western Ghats mining brings with it all those activities that are inimical to wildlife, forest and hydrology. The mining company has dumped mining waste, called ‘tailings’, inside the kudremukh national park submerging 340 hectares of pristine forests and grasslands.³⁸

So, whatever may be the area indiscriminate mining damages the total ecosystem by polluting its river courses, displacing forest dwellers, destructing wildlife and vanishing forests; all leads to desertification.

Industrialisation is lubricating the wheels of human civilization. India is primarily an agriculture oriented country. Through green revolution we have increased our agricultural production remarkably. But agriculture alone cannot provide employment to our entire population. After independence our planners emphasized on growth of core industries – Steel, power etc.³⁹ Hence for establishing these big industrial units forest lands had choosen as free area. With the entire country West Bengal also started its industrialization adventure in the decade of fifties in last century. But for the creation of industry and its townships trees had been axed rapidly.

The Durgapur township itself came into being in the decade of fifties at the cost of forest, once coverage of a lush green Sal forest. Officially, there are forests and green belts to combat the ravages of industrilisation and urbanization, but myriad

³⁷ Chakraborty Snehmay in The Statesman, Kolkata, 31 July 2010 p – 15

³⁸ Gubbi Sanjay in Survey of the Environment, 2010 p – 102

³⁹ Mondal Nabendu in “Industrial Development in India : An Analysis with special Reference to Ecological Balance” – An unpublished dissertation paper submitted for partial fulfillment of LL.M. Degree of Burdwan University. p – 22

roads and newer localities are cutting into its green belts.⁴⁰ In Gangajalghati block of Bankura district one thermal power plant named “Aalok Tirtha” established on the cost of Hanspahari forest. In Balarampur area of Purulia district there is lush green forest in and around panchet hill. But some small scale sponge iron units posing threat to the greenery.

Even the Union environment and forests ministry is approving use of forest land for industrial and other infrastructure projects in violation of its own executive orders and provisions of the Forests Rights Act of 2006. The ministry gave clearance to the POSCO steel plant in Jagatsinghpur district of Orissa.⁴¹

So, in this way from the age of industrial revolution for the cause of industry and urbanization forest covers are vanishing till date. Thus, industrialization is one of the causes of desertification.

4.3.2.6 Highway And Dams : Making of highways in different parts of the country, caused desertification. New highways are constructing after expansion of breadth of old one. For making of a part of four lane golden quadrilateral, trees of the old Grant Trunk Road destroyed. For expansion of highway from Kalna to Katwa town (known as STKK Road) of Burdwan district in Bengal several thousand species of trees have felled down in its 50 k.m. way. Surprisingly these felling areas are not replacing by new trees. Resulting soil erosion and leads to desertification. In another South Asian

⁴⁰ Chatterjee Ardhendu in The Times of India, May 12, 2006

⁴¹ Pallavi Aparna in Down To Earth (July 1 – 15, 2010) p – 22

Country Pakistan also witnessed of desertified of its land for building National Motorway Network Project and Lyari Express way Project.⁴²

India boasts of having the second largest road network in the world, after the United States. According to India's National Economic Survey of 2007 – 08, this is no less than 3.34 million kilometers. No study has yet even catalogued the extent of roads through natural areas, especially forests, across India or the loss of forest cover due to roads. A notable exception, from Garo Hills in Meghalaya, showed that just in this region the 456 hectare of biodiversity-rich forest was lost to roads between 1971 and 1991.⁴³

Fresh waters in India's streams and lakes have long been used for irrigation to enhance agricultural production, and the surplus available to the ruling classes. Evidence of the earliest irrigation works in India dates from the Mauryan Empire two thousand years ago. Under the British too, water began to be used for hydroelectric power generation. In example power generated from the koyna hydroelectric project has primarily fed industrial development in distant Bombay. Some projects have also created access to hilly forested areas till then left untouched, thereby triggering deforestation.⁴⁴

In this way along with the other South Asian Countries, Indian sub-continent is also witnessed about desertification of soil and displacement of its people from various projection of dams. Development-induced displacement has been a

⁴² Sheikh Attaur Rehman in Banerjee, Ray Choudhury & Das edited 'Internal Displacement in South Asia' (Sage 2005) Pp – 75 - 76

⁴³ Shankar Raman T.R. : Death on the highway in Survey of The Environment 2009 (The Hindu – Chennai) p – 116

⁴⁴ Gadgil & Guha edited 'Ecology And Equity' (Oxford 2008) Pp – 19 – 20

widespread phenomenon in northeast India, like elsewhere in the Country. Development projects like dams, oil and gas fields, mines and industrial projects have displaced thousands of people in the north-eastern states.⁴⁵ Among the seven sisters state of northeast, Arunachal Pradesh has wide variety of virgin forest. Large forest areas still remain in Arunachal, in part due to its low human population density of 13 per sq. km. About 82 per cent of the geographical area is actually forested compared to the national average of 21 per cent, although the recorded forest area is 62 per cent of the total area. The state has great biological significance as a result of its position at the confluence of the palaearctic and Indo-Malayan bio-geographical realms.⁴⁶ So, by construction of various dams is not only threatening the vegetation but also the peoples and animals residing in the downstream of the lower states.

Major floods in Assam in June 2008, allegedly due to sudden water releases from the 405 MW Ranganadi Stage – I hydroelectric project in upstream Arunachal Pradesh, brought the ‘downstream impacts of dams’ into central focus in the northeastern region.⁴⁷ Again a mega hydel project is under construction on the Subansiri, a tributary of the Brahmaputra. The 2000 MW Subansiri Lower Project is the biggest of the three dams under construction in Arunachal Pradesh.⁴⁸ First the fear was that people living in the downstream areas of the Brahmaputra might be adversely affected by the dams coming up in neighbouring Arunachal Pradesh. Now the construction of dams has become a new threat to elephant habitats in the northeastern region. According to the Elephant Task Force (ETF), the construction of

⁴⁵ Bhaumik Subir : ‘India’s Northeast in Banerjee, Basu Ray Choudhury edited ‘Internal Displacement in South Asia’ (Sage 2005) p - 166

⁴⁶ Datta Aparajita : Threatened Forests, Forgotten People in Shahabuddin & Rangarajan edited ‘Making conservation work’ (Permanent Black 2007) Pp – 169 - 171

⁴⁷ Vagholikar Neeraj : Damning the downstream in The Survey Of The Environment 2009 (The Hindu – Chennai) p - 127

⁴⁸ Dutta A. P. : Downstream impact in Down To Earth (Oct 1 – 15, 2010) p – 9

lower Subansiri hydro – electric project in Assam-Arunachal Pradesh border has caused much disturbance on the movement of elephants on the northern bank of Brahmaputra. Between 1991 and 1998 over 1,500 sq. k.m. of forest on the northern bank of Brahmaputra was cleared, intensifying the human-elephant conflict particularly in Sonitpur district of Assam. This district alone lost 145.44 sq k.m. of forest between 1999 and 2001. Elephant experts pointed out that ongoing dam construction had led to clearing of forest cover and large-scale digging of earth besides constant disturbances created by the movement of heavy vehicles and humans.⁴⁹

So, it is very clear that, both nature and its habitats are the receivers of bad impact of construction of highways and dams; but the result is one-way traffic, that is desertification. Because for construction, digging of earth has direct impact upon forests land, whereas floods due to releasing from dams, human-animal conflict for shortage of trees, salinity of soil due to flood are the examples of indirect impact.

4.3.2.7 Unplanned Tourism And Urban Growth : The ‘Incredible India’ campaign to promote tourism in India urges people to experience the sea beach, hills, islands and of course forests of this beautiful country. Now a days tourism is a flourishing industry in our country and it spread its business from snow capped mountain to hot deserts with some mindless tourists.

Eco-Tourism is the new buzzword. As the Indian Government goes all out to woo foreign visitors, everyone seems to be latching on to the term, as if the mere

⁴⁹ The Times of India, Kolkata, Nov. 8, 2010

addition of the prefix 'eco' will suddenly transform a highly destructive industry into one that will save the planet.⁵⁰ But every time the planet is not saving. Tourism industry and its visitors extending their greedy hands towards the floral beauty of the land.

Arid regions are ideal for tourism. All the deserts are sites of ancient civilizations. With tourism may come threat of land destruction when too many people congregate in a small area or when excavations are carried out in uncalled for sites like that of old river beds or depressional area like that of Kalibanga which has now been threatened by Ghaggar floods.⁵¹ After the **Tsunami** of December 26, 2004 caused severe damage to people, places and aqqa marine life around the 572 islands that form Andaman and Nicobar, the government handed out attractive packages and discounts to visit the islands. Many new resorts and hotels are being constructed to meet the growing demand. Out of the total area, 86 per cent is under forest cover and also home to 22 per cent of India's mangrove cover. But with the growing number of tourists, vegetation cover started to decrease. There is a possibility of 15 islands being opened and more access being granted to reserved sanctuaries as a part of promoting tourism. This will result in reducing the natural habitat of Jarawa reserve.⁵²

The problem is same in mainland also. Animals are increasingly finding it difficult to move from the Corbett Tiger Reserve to the adjacent Ramnagar Forest Division in Uttarakhand. Reason is unregulated tourism along their route. A study in

⁵⁰ Kothari Ashish : Tourism, Wildlife And Communities in The Survey Of The Environment 2007 (The Hindu, Chennai) p – 121

⁵¹ Sen. A.K. in S. Basu edited changing Environmental Scenario of the Indian Subcontinent (acb Pub. 2002) p – 77

⁵² Pinglay Prachi : Andaman And Nicobar Islands – Dangerous tourism in The Survey Of The Environment 2007 (The Hindu, Chennai) Pp 103 – 107

December 2009 found 49 tourist resorts exist along the route, called the Kosi river corridor, and 12 more are under construction. Over the past five years, resorts have been built on land where mango and lychee trees grew.⁵³

In the same line West Bengal Tourism Department is also planning to upgrade tourism infrastructure in the Dooars to attract more visitors. In this region, only a few hotels are located at Falakata and Madarihat in the Dooars and it is planned to set up more hotels in Alipurduar. Tent accommodation would also be made available in various areas of the Dooars jungle.⁵⁴ As a result once a safe haven for rhinos, elephants, bison and a spectacular range of other animals, Gorumara National Park – which had earned the tag of the country’s best conserved forest – is being slowly smothered by a concrete jungle growing up around it. A number of resorts have come over the few years at Murti, Dakshin Dhupjhora, Neora, Chalsa, Kalipur and Ramsai.⁵⁵ Tourists carried picnic lunches, non-biodegradable materials like polythene, plastic materials and left those, which has a long term impact on the forests ecosystem. The new resorts – with their flashing lights, loud tourists have disrupted the movement of animals.

Population explosion is the epicenter of each problem in our country. To settling the growth of human population so many virgin lands are converting to cities, malls, hotels and place of entertainments. In Kerala the island of Valanthakad in the suburbs of Ernakulam has one of the largest mangroves spread over 644 hectares. Valanthakad is part of the Venbanad backwaters, one of the sites covered by the international treaty for wetland conservation, the Ramsar Conservation. Any

⁵³ Paliwal Ankur : “Trespassers allowed” in Down To Earth (June 16 – 30, 2010) p – 31

⁵⁴ Sengupta Sulagna in The Statesmen, Kolkata, 6 May 2010

⁵⁵ Bhattacharya Pinak Priya in The Times of India, Kolkata, Sept. 23, 2010

development activity will be disastrous for the ecology and violation of the treaty. But, if things go according to the state industries department's plans, the mangrove will give way to a high-tech city. A private developer has acquired 129 hectare from farmers on the island to build a knowledge park, commercial complex and star hotels.⁵⁶ The Kerala Cricket Association's plan to build a stadium designed to international specifications at Edakochi has run foul of environmental laws. The association purchased about 10 hectares for its 300 crore stadium cum-village project, 45 km from the Kochi airport. The state forest department has filed a first information report in a magistrate's court saying the cricket association has destroyed mangrove trees in preparation for the construction work.⁵⁷

Very recently for preparation of XIX Delhi Commonwealth Games 2010 almost 50,000 trees were cut for development of the city. Rugby Stadium on north campus of Delhi University used to be a green and open area but now they have concretized everything.⁵⁸ In Bengal some urban township build just after the independence like Bidhannagar, Kalyani, Durgapur. Particularly in Durgapur township lush green sal forest slaughtered for settling the workers of various plants. Till now the trees are being felled for expansion of urban growth in this area.

4.3.2.8 Raising Demand Of Fuel Wood And Timber : Deforestation and forest degradation resulting in forest cover loss, leading to further land degradation. The major causes of deforestation are over-harvesting of fuel wood, conversion of woodlands for large scale crop and livestock production, illegal logging, and fires set

⁵⁶ Venugopal. P. N. : "644 ha mangrove will be history" in Down To Earth (Nov. 16 – 30, 2009) p – 16

⁵⁷ Suchitra. M. : "Stadium in deepwater" in Down To Earth (Oct. 16 – 31, 2010) p – 19

⁵⁸ Singh Smriti : "Greens need to be protected ..." in The Times of India, Kolkata, 27 Oct., 2010

to clear land or facilitate hunting.⁵⁹ All through the developing world, wood is primarily used as fuel, leading to tremendous annual loss of forest cover. In Himachal Pradesh, 3,000 square km of forest land has been damaged during the past 40 years. The Amazon, which is the world's largest tropical rain forest with an area of 5 million square km, is being felled at the rate of 35,000 square km. every year. In Nepal, firewood is so scarce that it costs more than Kerosene.⁶⁰

Nearly 80 per cent of the population in India is rural based and traditionally uses fuel wood for cooking. The source of fuel wood extends progressively from collecting deadwood to the lopping of live trees, the felling of trees, the total destruction of tree cover and eventually to the uprooting of stumps and removal of shrubs. Subsequent to this there is the diversion of agricultural residues and animal dung to fuel use, to the detriment of soil structure and soil fertility.⁶¹ Nearly three-quarters of the population of developing countries use wood for their staple energy source. Yet fuelwood is already in desperately short supply. More than 1,000 million people in developing countries are short of fuelwood, or are having to cut it faster than it grows to obtain what they need.⁶²

On the basis of inventories made by the Forest Survey of India, there is huge demand of timbers in various sectors other than firewood demand. Pulp and paper, plywood and veneer, Fibre board particles, Match industry, sports goods industry, Furniture, Agricultural implements, bullock carts and Packaging industries have such demand of timber.

⁵⁹ Fanigrahi. Srikanta. K : Combating Desertification in Yojana, June 2006. p – 42

⁶⁰ Bedi Seema : "Bio-Tech to Forest Rescue" in V.S. Mahajan edited Environment Protection, challenges and issues (Deep & Deep 1993 1993) p – 124

⁶¹ Tiwari. D.N. : Forestry in National Development (Jugal Kishore & Co. 1986) p – 50

⁶² Desai Vasant : Forest Management in India – Issues and Problems (Himalaya 1991) p - 153

The report drawn up by the Sub-Group on “Packaging of Apples in India” shows that as many as 10 hectare of forests are required to be sacrificed for packing apples produced from an orchard of 1 hectare. Indeed, the use of wood crates for packing fruits is spelling disaster for the forests, and if substitute for wooden crates are not found quickly, depletion of forests in Himachal Pradesh, Jammu & Kashmir and hill districts of Uttranchal may not be prevented. Nearly 300 pulp and paper production units of the country rely heavily on forests for raw material. The Indian Plywood industry is more dependent on imports from South-Asian Countries than on wood made available from native forests.⁶³

4.3.2.9. Shifting Cultivation : Shifting cultivation is a relic of primitive culture which has persisted in some hilly, forested and relatively inaccessible pockets of India, as in some other parts of the world. When man first took to agriculture some 9000 years ago, it was in the form of shifting cultivation, that is he cleared a forest, burnt the slash, dribbled or broadcast the seeds raised a crop or two, and then shifted to another forest. He returned to cultivate the first forest 20 to 30 years later after the land had enough rest and recuperated. As civilisation progressed, most people took to settled cultivation, but many a tribal communities who stayed as back waters of this evolutionary stream, stuck to shifting cultivation. The Task Force on shifting cultivation in its report estimated that shifting cultivation practiced in 13 States of India and largely confined to the North Eastern Hill States and Orissa.⁶⁴

Over more than 1,00,000 sq Km of forested areas in the states of Orissa, Madhya Pradesh, Andhra Pradesh, Bihar and all states of north eastern India have

⁶³ Lal. J. B. – India’s Forests : Myth & Reality (Natraj 1989) Pp 104 – 105

⁶⁴ Lal. J. B. – India’s Forests : Myth & Reality (Natraj 1989) Pp 97 - 98

suffered from deforestation and land degradation, and depletion of water regime. With the pressure of population shifting cultivation or Jhum rotation has become shorter and shorter and has led to soil deterioration, loss of species diversity, depletion of wildlife and eventually loss of ecological balance. According to Planning Commission (1982) 233 blocks spread over 62 districts in 16 states the Jhum is practiced involving 12 per cent of tribal population.⁶⁵

But shifting cultivation is invariably harmful for forest regeneration. It destroys the ecological balance and results in substantial soil erosion which subsequently leads to flooding of rivers and drying of hill springs. As thousand of families practicing this system, by destroying the ecological balance, although some sociologists have belief that, this system balancing the soil fertility. But in the long term, result of shifting cultivation leads to desertification.

4.3.2.10. Tribal Dependency On Forests : From several thousand of years the tribal peoples are depending upon forests, not only for his economic but also for his social, cultural and emotional needs. From their domestic use of fire wood, timber for construction the list is wide up to various fruit, seed, leaves, gums, resins etc. for their food and medicine. However symbiotic relationship is existing between the Forests and its dwellers or otherwise called the tribal people, who has no other knowledge for earnings.

In India, there are about 260 tribal communities are existing, who constitute about 7.8 per cent of the total population of the country. For these communities,

⁶⁵ Chaudhuri. A. B. : Forests Environment and Man (Daya Pub. 2007) p - 135

forests represent a god, a way of life, a culture, a home, an employer, and a manufacturing industry. Forests continued to be the cherished home for many generations of tribals.⁶⁶ With the increasing pressure on the land and the spread of agriculture, both the forests and the original hunter-gatherer communities, have shared a generally parallel history of evolution. After three thousand years of such an evolution, they have shared a common fate; either they have been subsumed into the more dominant social and economic organization of the relatively more advanced peoples, as in the densely populated, predominantly agricultural tracts of the Indo-Gangetic basin and the plains of peninsular India; or they have found a refuge, increasingly precarious and increasingly threatened, in the forested hills and uplands, as in the North-Eastern States, the great belt of the Central Highlands and the hills of the Western and Eastern Ghats.⁶⁷

So, from the Minor Forest Produce to the Major Forest Produce tribals have a symbiotic relationship with forests. With the increasing economic crisis, day by day tribals are depending solely upon the resources of the forests. Mainly shifting cultivation by some tribals and over exploitation of minor forest produce largely depleting the ecology of forests.

4.4 Land use And Soil In West Bengal :

Owing to the characteristic geographical position along with the attitude varying from sea level to 3,700 meters, West Bengal enjoys a varied types of soil, rainfall, temperature and agro-ecological zones. The overall land use pattern in the

⁶⁶ Shasi Kant in Seelend & Schmithusen edited 'Man In The Forest' (D. K. Print, 2000) p - 249

⁶⁷ Pant. M.M. : Forestry For Economic Development (Natraj Pub. 1986) p - 185

state of West Bengal depends mostly on the physiographic condition of the area. Total geographical area of the state is divided into two major classes – arable land, that includes net sown area and fallow land, and non-arable land, which includes forest, area not available for cultivation and other uncultivable land excluding current fallow. The percentage of arable land is about 66.8% and about 33% land is under non-arable category, which includes forest area to the tune of 13.38% of total geographical area. Agricultural activities are mostly restricted to the Gangetic plains having fertile cultivable land. The percentage of net sown area is higher (above 70%) in Uttar and Dakshin Dinajpur, Nadia, Murshidabad, Cooch Behar, North 24-Parganas, Hooghly, Burdwan and Birbhum districts. High percentage of forest cover exists in the Districts having hills and mountain ranges and also in the coastal areas. Protected forests also cover considerable areas in Purulia, Bankura, Medinipur, Burdwan and Birbhum districts. The maximum area under forest (44.68%) is found in Darjeeling district.⁶⁸

The physiography of West Bengal can be divided into two major regions :

A. Himalayan Region

B. Gangetic Plains

A. Himalayan Region : *This is sub-divided further into two parts :-*

i) Darjeeling Himalayas : This zone consists of Darjeeling district (except the Siliguri Sub-Division). The hills are comparatively of recent origin, generally steep sided and prone to landslides, Soils are brown, loamy in nature, rich in nutrients, organically rich and acidic in reaction. Most of the rivers originate here.

⁶⁸ West Bengal State Forest Report (2006 – 07) p - 5

ii) **Sub-Himalayan** : This zone comprises of the plains districts of Jalpaiguri and Cooch Behar and Siliguri Sub-Division of Darjeeling district. Soils are mostly sandy, highly acidic, heavily leached and poor in base and plant nutrients. Since most of the hilly rivers flow through this region, these areas are flood prone.

B. Gangetic Plains : The Lower Ganga Plain in West Bengal forms a part of the Indo-Gangetic Plains. 14 districts of West Bengal are contained in this physiographic region. This region is further divided into four .micro physiographic zones. Those are:

- i) Barind tract comprising Cooch Behar, Malda, North and South Dinajpur districts.
- ii) Moribund Delta comprising of Murshidabad and Nadia districts.
- iii) Proper Delta consisting of the districts of Burdwan, Kolkata, Hooghly, Howrah, South & North 24 Parganas.
- iv) Rarh plain is spread over East and West Midnapore, Bankura, Birbhum and Purulia districts.⁶⁹

4.5 Soil Problems Leads To Desertification In West Bengal :

As already discussed, soil erosion is one of the natural cause of desertification. There are different types of soils in different parts of the state, and it depends mostly on the physiographic condition of the area. In general, the climate of West Bengal varies from sub humid to per humid with uniformity of temperature. The Himalayan, Gangetic alluvial, Western part and coastal plains are represented by different types of

⁶⁹ West Bengal State Forest Report (2006 – 07) P - 12

soils according to variation in agro-climatic zones. So, depending upon various factors soil erosion by water is a severe problem in West Bengal.

Table 4.2

Soils Under Limiting Erosion Classes

Class	Distribution	Area (.000ha.)
Severe	Parts of Darjeeling, Purulia, Birbhum, Bankura & Midnapore	57.4
Moderate	Whole of West Bengal excepting 24-Parganas (S&N), Nadia, Howrah & Hooghly.	1303.1
Total		1360.5

Source : Soils of West Bengal for Optimising Land use, 1992

Salinization of soil is another natural cause of desertification in West Bengal. Various river system in the state is washed away the top soils by its natural way or by flood.

Table 4.3

Soils Under Limiting Salinity Classes

Class	Distribution	Area (.000ha.)
Very Strong	Parts of South 24-Parganas & East Midnapore	241.0
Strong	Part of South 24-Parganas & East Midnapore	5.7
Moderate	Parts of South 24-Parganas & East Midnapore	131.0
Total		377.7

Source : Soils of West Bengal for Optimising Land Use, 1992.

So, apart from the above discussion it is clear that both water erosion and salinity caused desertification in West Bengal. Although there are other natural and human made reasons are there, which will be discuss later on.

4.6 Classification Of Forest Cover In West Bengal :

The State of West Bengal has a total geographical area of 88,752 Sq. km., which is 2.7% of the total geographical area of the country. After the promulgation of Estates Acquisition Act of 1953, all the recorded forests of the state other than those under lease agreements with tea gardens have been brought under the management of Forest Department, West Bengal. Subsequently the Tea garden forests had been vested with Forest Department as “Resumed Forests”. At present, all the recorded forests of the State are classified as Reserved Forests, Protected Forests and Unclassed State Forests, under the Indian Forest Act, 1927. The recorded forestland of the State (11,879 sq. km.) is 1.54% of the recorded forest land of India (770078 sq. km.)⁷⁰. Early eighties saw the global resurgence of Biodiversity conservation and renewed interest in the preservation of the endangered flora and fauna of the world. In keeping with the international and national trend, West Bengal too shifted its priority in forest management towards conservation of natural flora and fauna in the forests and the wetlands. Large tracts of forest areas, having ecological importance and significance, had been declared as protected areas in the form of National Parks, Sanctuaries and Tiger Reserves.

So, it is clear that forests in Bengal classified as Reserved, Protected, Unclassed etc. for the study of forestry sector. But this present research paper examines not only the trees in forests, but also its inhabitats; and it includes both human beings and wild animals. It stated earlier that in this particular State, peoples and their culture and activities are different from Himalayan foothills to the mangroves of Sundarban. So, the study must related to the forest types and its local problems. Broadly forest of West Bengal has been classified in to three major areas :

⁷⁰ West Bengal State Forest Report (2006 – 07) P - 60

Table 4.4

Three Major Forest Areas in Bengal

Name of Major Areas	Covering Districts
1. Himalayan Terai And Dooars	1. Darjeeling, Jalpaiguri and parts of Cooch Behar.
2. Mangrove	1. Sourth 24-Parganas and parts of North 24-Parganas
3. South-Western Jungle Mahal	1. Bankura, Purulia, West Midnapore and parts of Birbhum and Burdwan

Moreover, since North and South Dinajpur, Malda, Nadia, Murshidabad, Cooch Behar, Howrah, Hooghly, North 24-Parganas and East Midnapore contained very small percentage of recorded forest land, yet all these districts have appreciable tree cover mostly contributed by the village groves and trees around households in the rural areas. Mainly the Central and South Bengal contained alluvial agricultural tracts of Ganga and Damodar river valley. So, for the purpose of this research project, field data has been collected from above noted three major forest areas of the State.

4.6.1 Himalayan Terai And Dooars :

The forest extends from Sandakphu, at an altitude of 13,000 feet, to the Terai plain Sal forests to the moist evergreen miscellaneous forest of Dooars bordering Assam. There are five National parks, namely Singhalila, Neora Valley, Gorumara, Jaldapara and Buxa. The Sanctuaries include Senchal near Darjeeling, Mahananda in the Tarai, Chapramari and Buxa in the Dooars.

The Himalayan forests are diverse and comprise tropical, sub-tropical, mountain temperate, temperate and dry and moist alpine forests and scrub land. There

are many biotopes or life zones from tropical heat to alpine cold abounding in vast assemblages of flora and fauna unrevealed anywhere in the world.⁷¹

4.6.1.1 History of Dooars And Buxa : Most probably the word ‘Dooars’ came from Sanskrit word ‘Dwar’. According to British gazetteers Bengal Dooars situated in between Manas and Tista river. From ancient time Dooars is associated with commercial route towards Bhutan and Chumbi Valley of Tibet. From British time Dooars got its geographical location. Assam is in its east, Tista river is in its west, Bhutan is in north and Coochbehar is in south. In 1206 when Mohammad Bakhtiar Khilji invaded Tibet, from that time, some tribal sect like Garo, Rava, Dukpa, Toto, Limbu, Rai, Dhimal are residing there as aboriginal people. In 11th November, 1865 the British East India Company occupied the Dooars land permanently by a declaration. In 1874 Richard Haughton opened first tea garden at Gajoldoba in Dooars, and within 1901 Europeans opened 235 tea gardens in 76,403 acres of land.⁷²

Similarly, in pre-colonial times, the Buxa area was under the territorial limits of the Bhutanese kingdom, and harbored only sporadic pockets of human habitation in the savannah and hill tracts. The population consisted almost exclusively of semi-nomadic indigeneous ethnic groups like the Rava, Garo, Mech, Limbu and Dukpa, all swidden agriculturists or Jhoomiyas. After 1865, the British annexed this area and started systematic settlement practices in the plains. Tea gardens came up in fresh forest cleanings, large chunks of land were settled to both local and outsider *jotedars* (Land Lords).

⁷¹ Chaudhuri. A. B. : “Environment and Ecology of the Himalayas” in Forests Environment and Man, 2007 (Daya Pub. House, Delhi) p - 107

⁷² Chakraborty Chinmoy : Aranyer Tane (Bengali) 1415 B.S. (Mitra O Ghosh, Kolkata) p - 15

The demographic profile of the area changed rapidly as these developments triggered off mass migration; tribal groups from Chottonagpur and adjoining areas to the tea gardens, and other communities of the land got displaced *en masse*, the newly created forest department declaring remaining forests in the area as 'Reserves' in which these communities were denied all access. From 1894 onwards though, the forest people of the area were re-settled in reserved forests as taungya or plantation workers. The practice of establishing forest villages to create a captive workforce was in vogue till as late as 1974-75. By that time the Buxa Forests had 37 forest villages, in addition to several fixed demand holdings, areas leased to timber marchants to start colonies. The Buxa forests were declared a tiger reserve in 1982 – 83, through the official notifications for wild life sanctuary and National park were issued later. Now out of its total area of 760 sq. kms. the Reserve has about 369 sq. kms. with sanctuary status, 117.10 of which constitute the National park. Prior to formation of the Tiger Reserve, the forests were worked for timber. Timber operations and forestry practices continued since 1875 changed the ecology of the area. By 1982, the big mammals like tiger and gaur had become sparse, their original habitat range severely fragmented. In pockets though, the Buxa forests continued to support biodiversity : 250 species of flowering trees, 200 species of shrubs, 300 species of herbs, 6 species of canes, 10 species of bamboos, 150 species of orchids and 100 species of grasses. The flora have not been adequately researched and inventoried. The flora have not been adequately researched and inventoried. The faunal biodiversity diminished in comparison with early colonial days, but the remoter hill forests and evergreen forests still sheltered wildlife : 390 species of birds, 73 mammals, 36 reptiles.⁷³

⁷³ Plight of The Forest People : Buxa Tiger Reserve (Report of the Public Hearing : April 2005)

Located on the confluence of there major bio-geographic zones : Lower Gangetic plains, Central Himalayas and Brahmaputra valley, the Buxa forests contain 8 major habitat / forest types, ranging from riverine and bhabar sal to moist mixed, evergreen and savannah. Main speeches of trees are *Sal*, *Champ*, *Gamar*, *Simul*, *Chikrasi* etc.

4.6.1.2 Neora Valley National Park : From 1881 Neora valley was declared as protected forest. In 1992 it was declared as National park vide notification no. 9058 – For dated 2.12.92.⁷⁴ It is situated in the Kalimpong sub-division under Darjeeling district and it is one of the richest biological zones in the entire north – east of the country. This national park spread over 8,800 hectares of surface area with height of 180 meter to 3,200 meter above sea level. There are different types of forests for variety of heights in Neora valley.⁷⁵

The forest in Neora Valley has such a luxurious growth that even sunlight finds it difficult to touch the ground. Much of the park is still inaccessible making it a virgin forest. The park reaches upto an elevation of 10,600 feet at Rechela Danda, the highest point of Neora valley National park, which borders Sikkim and Bhutan. The Neora river, major water souuce of Kalimpong town originating from the forest. Due to its altitudinal variation ranging from 600 feet to 10,600 feet, various species of birds make the park a paradise for the bird watchers. Pheasants, Cuckoos, Minivets, Flycatchers, Maynas, Orioles, Owls, Parakeets, Partridges, Sunbirds, Swallows, Swifts and the different types of birds found in Neora valley. This forest is particularly well known for wild orchids. A number of orchids hidden in the deepest

⁷⁴ State Forest Report, West Bengal (2006 – 2007) p - 98

⁷⁵ Chakraborty Chinmoy : Aranyer Tane (Bengali) 1415 B.S. (Mitra O Ghosh, Kolkata) p - 130

parts of the virgin forest are yet to find a place in the records. Kaiser-I-Hind and Krishna peacock are most attractive butterflies found here. The self-sufficient ecosystem of Neora valley harbours a rich plethora of animals, like Red Panda, Himalayan Thar, Tiger, Goral, Himalayan Black Bear, Wild Boar, Wild dog and Clouded Leopard.

4.6.1.3 Singalila National Park : Singalila is the highest National park in West Bengal located at the higher ridges of Darjeeling Himalayas. In 1992 it was declared as National Park vide notification no. 9057 – For dated 02.12.92. The park has an area of 78.60 sq. km.⁷⁶ The park has mixed vegetation of Magnolia, Rhododendron, Oak, Himalayan Hemlock (*Tsuga dumosa*), Silver Fir (*Abies spectabilis*), Juniper, Maling Bamboo, Buk, Kawla, Bhujpatra etc. The Singalia Park also has collection of different species of rare orchids. Some most endangered species of animals like Red Panda and Himalayan Black Bear are the most important mammals found in the park. Among the other major species found in the park are Leopard, Serow, Pangolin, Barking Deer, Boar etc. The park has a variety of birds such as Kaleej Pheasants, Tragopan, Munal, Pigeons, Doves, Sibia, Minivet, Magpie, Cuckoo, Hornbills and a large number of migratory birds. Apart from its rich bio-diversity Singalila National Park is also famous for its stunning natural beauty with spectacular views of Himalayan peaks.

4.6.1.4. Gorumara National Park : This park has an area of 79.45 sq.km. and situated within the district of Jalpaiguri. Gorumara forest declared as National Park is 1998 vide notification no. 1-For dated 1.1.98.⁷⁷ Gorumara National Park situated in

⁷⁶ State Forest Report, West Bengal (2006 – 2007) p - 98

⁷⁷ *ibid.*

between two rivers of Murti and Jaldhaka. Mainly *Sal*, *Simul* and *Chikrasi* are major flora of this park. Gorumara is famous for one horned Rhino. Elephant, Gaur, Wild Boar, Sambar, Leopard and Bear are the major wild life species of the park. There are so many species of birds like Scarlet Minivet, Sunbird, Paradies Flycatcher, Hornbill including Peacocks are found here. There are 50 species of mammals, 193 species of birds, 22 species of reptiles and 27 species of fishes recorded by the wildlife biologists.⁷⁸ Rock python and king Cobra are commonly found here. Rhinos are depended upon the various types of grasses like Chepti (*The meda arundinacea*), Purundi (*Alpina sp*) and Chadda (*Saccharum longistatum*). This national park is situated in Malbazar, 52 km south of Jalpaiguri town and 70 km north of Siliguri. There are so many forest fringe villages in and around the park. Saraswati, Budhram, Bichabhanga, Chatua, Kailipur – Murti are some villages adjacent to the national park. Villagers are economically depended upon the forest of Gorumara.

4.6.1.5 Jaldapara National Park : Previously in the year 1941 it was declared as sanctuaries. But on 10th May, 2012 the Central Government declared it as a National Park. It spread over 216.51 Sq km area in the Alipurduar Sub-division of Jalpaiguri District. Jaldapara National Park famous for its one horned Rhino. Torsha, Malangi, Halang, Chirkhawa, Kalijhora, Sisamara and Buribasra are the main rivers and water courses, which fed the entire grassland of the forest. Moist grassland is the main attraction of the forest and it occupied nearly 30 percent of the area. There are 33 species of mammals, 16 species of reptiles, 8 species of tortoise, 30 species of fishes and 240 species of birds recorded by the local forest department.⁷⁹ One horned Rhino,

⁷⁸ Ghorai Narayan in Tanmoy Choudhury edited 'Banglar Bone Bone' (Bengali) 2010 (Family For Tiger Dot com, Kolkata) p – 13.

⁷⁹ Banglar Bone Bone (Bengali) (Family for Tiger Dot Com 2010 Kolkata) p – 14

Elephants, Leopard, Hog Deer, Gaur, Wild Boar are the main species of Mammals. Openbill Stork, Indian Roller, Hornbill, Large Green Barbet; Black headed Oriole, Racket tailed Drongo, Hill Myna are the main bird species of the forest. Mainly *Sal*, *Shimul*, *Khoer*, *Shisham* are the main flora of the area. *Dendrobium densiflorum*, *Kingidium deliciosa*, *ptocerus suaveolens*, *Dendrobium auduneum*, *Vanda cristata* are the main wild orchids which has decorated the entire eco-system of Jaldapara.

Apart from above noted five National Parks in Himalayan Terai, there are some Wild Life Sanctuaries are situated in this region. Jorepokhri Salamander, Senchal and Mahananda Sanctuaries are in Darjeeling, and Chapramari, and Buxa are in Jalpaiguri. The State Government by notification under Sec. 18 (1) of the Wild Life (Protection) Act, 1972 declared 368.99 sq km. of Buxa forest, as sanctuaries considering the ecological, floral, faunal and natural significance of the area.

4.6.1.6 Problem of Desertification In Himalayan Terai And Dooars : Forest villagers and people in fixed demand holdings depended almost entirely on timber operations, because the area offered little or no livelihood alternatives. Till 1987 – 88, the villagers got regular employment in timber operations and plantation works; the per capita availability of man-days employment ranged from 100 – 120 each year. The post 1988 moratorium on felling in natural forests, and declaration of the Tiger Reserve brought this down to less than 20 days, sometimes and in some areas zero. Besides, employment, the villagers once had agricultural land, and free supply of fuel wood, small timber and non timber forest produce. After 1987, in areas within sanctuary limits these privileges and been completely withdrawn, and in other areas drastically curtailed. The railway that ran through the preserve stopped functioning

around the same time, as several dolomite mines in the area were forced to abandon activities. The protected area management also put a stop to lifting of boulders from the seasonal rivers, choking another major source of livelihood for the local people. Collection of non timber forest produce were either stopped, or severely limited.⁸⁰

There are nearly 40 forest fringe villages are situated in and around the Buxa Tiger Reserve. Lapraguri, Indubasti, Khuntimari, Sankosh, Kumargram, Newlands, Siltong, Panijhora, Garobasti, Bhutiabasti are some villages. Mainly Rava, Bhutia, Nepali, Oraon, the indigenous ethnic people from Tibeto-Burmese tribal group are living in these forest villages. Their economy is totally depended upon tea gardens and forest produce. But most of the tea gardens are in abandoned condition and more than 60 per cent of its forests are in degraded or semi-degraded conditions, most of its mammalian wildlife gone, the Buxa Tiger Reserve took up the ambitious India Eco Development programme, which was to provide alternative livelihoods to the people on the periphery, through strengthening of Joint Forest Management Committees and Eco Development Committees. Unfortunately most of these committees are only on paper. While the traditional livelihood sources of people in the protected area dried up, mafia style illegal timber operations were rise everywhere in the area. Villagers in the fringe, the surplus are unemployed population from the tea gardens as well as migrants from Bangladesh and Assam found employment in this trade – mostly as wage workers. Soon, this would become the commonest vocation in the area, not only for those on the fringe but also for the insiders, the indigenous ethnic people living in forest villages. From the year 2001 onwards, the people in the Buxa area had to cope with a new threat – security personnel combing the forests and the villages in search

⁸⁰ Plight Of The Forest People : Buxa Tiger Reserve (Report of the Public Hearing : April 2005)

of terrorists. In villages on the Indo – Bhutan Border, these anti – terrorist exercises resulted in incidents of gross violation of human rights : false arrests, tortures, atrocities on women and children.

37 Forest villages and 5 hamlets (fixed demand holdings) with a population of more than 20,000 reside in and around the Buxa Tiger Reserve. These forest villages, like that elsewhere in the country, were habitations settled by the British in the late 19th century for ensuring a steady supply of labour for their forestry operations. In lieu of settlement rights and rights over other forest produce the communities had to give their slave labour, also known as ‘begar’. As per agreement “Taungiya system” was incorporated under which forest villagers had to work for 90 days without any remuneration (*Begar*) and up to 275 days on daily wages of meager amount. In the 1970s with the shift from ‘commercial forestry’ to ‘conservation forestry’ the scale and nature of forestry operations changed. But the economy of the forest villages in the area was severely impacted after 1983, when 758.82 sq. km. of forest area were brought under the ‘**Project Tiger**’ and declared as the Buxa Tiger Reserve. For the forest villages of the area this meant a loss of their vital source of income. Apparently the employment generation of 5.9 lakh mandays during the year 1984 has gone down to 2.8 lakh mandays in 1991 and 1.8 lakh mandays in 1996 due to drastic reduction in clear felling and plantation activities. With declaration of the ‘Reserve’ several other income generating activities ranging from dolomite mining, boulder lifting from the river beds, labour at the private saw mills and fuel wood supply to the tea plantations

come to a screeching halt : In absence of any livelihood alternatives these communities face a severe crisis.⁸¹

Another main problem of Terai-Dooars forest is commercial plantation of some economic valued trees like Teak, Eucalyptus, *Aakashmoni* etc. From the early sixties the central government provided financial incentives, in the form of central plan funds, to encourage state governments to take up industrial plantations. Existing natural forest stands was replaced by fast – growing commercial species. In effect, tropical rain forests were converted into man-made forest.⁸² Wild elephants of this forest are completely depended upon the vegetation of the natural forest. The forest between the east bank of Mechi river of Nepal to west bank of Sankosh river of Jalpaiguri is the original residence of wild elephants of Terai and Dooars. But for lack of vegetation and food insecurity they are attacking on the crops and lifes of the forest fringe villages, villagers are cultivating paddy and maize is side of the 164 kms railway lines between New Jalpaiguri and Alipurduar. Attracting by these delicious crops wild elephants are loosing their lives by rail accidents. Recently on 22nd September, 2010 seven wild elephants was killed by a rail accident near Haldibari railway crossing. In last six years 26 Elephants, 5 Gaurs, 3 Leopards, 2 Rock pythons lost their lives by rail accident. Surprisingly, in every incidence Forest department and Railway authorities indicating finger to each other.⁸³

So, from the above noted discussion it can easily determined that, conflict between man and wild is common feature in the forest of Terai and Dooars. Forest

⁸¹ Asher Manshi in Plight Of The Forest People : Buxa Tiger Reserve (Report of the Public Hearing : April 2005)

⁸² Gadgil and Guha : The use and abuse of nature (Oxford, 2000) p – 187.

⁸³ Raut Raja : Uttarbange Hati Mrityu – Kichu Proshno in : “Bon” (Bengali) 6th June, 2011 p – 10.

villagers had displaced from their livelihoods and natural forest is replaced by commercial forestry. The local people as well as timber mafias are felling the forest and those abandoned lands are replaced by the industrial forestry.

4.6.2 Mangrove Forests :

Mangrove ecosystems are an unique association of plants, animals and micro organism adapted to live in the constantly changing environment of the intertidal belt of tropical coasts. The intertidal zone is flooded by the incoming sea and exposed to air when the tide recedes. There are about 80 different species of exclusive mangrove trees and shrubs. In addition, vines, grasses and algae also grow in the intertidal area where mangrove trees flourish, and some of them may be found beyond the mangrove area.⁸⁴

Sundarban is a mangrove forest in the Littoral tracts of Bengal Delta at the head of the Bay of Bengal. The famous ‘Sundarban’ region covers the Southern parts of Ganga delta bordering the Bay of Bengal. Upto 14th August 1947, the entire forest area of Sundarban was under one single forest division, manely Sundarban Division with Headquarter at Khulna, now in Bangladesh. After the partition of the country, the Western part of Sundarban, confined within the then 24 Parganas district of West Bengal. Nearly one-third of the total Sundarban forests lie within the Indian jurisdiction and the rest is under the control of Bangladesh. The Reserved forests of Indian Sundarban is bounded on the north and west by cultivated lands / settlements, on the east by the rivers Kalindi, Raimangal and Harinbhang and on the south by the Bay of Bengal. The islands in the rivers of Muriganga, Saptamukhi and Thakuran are

⁸⁴ Chitkara. M.G. : Encyclopedia Of Ecology, Environment And Pollution Vol. VIII (APH Pub. 1998) p - 91

also included in the Sundarban forest. The total area of Sundarban forests in Indian part is 4262 sq. km., out of which 2585 sq. km. has again been reconstituted as Sundarban Tiger Reserve from the year 1973. [land area 1680 sq. km. and water area 905 sq. km.] The river Matla separates the Tiger project from the 24 parganas Forest Division..⁸⁵

4.6.2.1 Soils And Salinity of Mangrove : The name of Sundarban has been coined either from the forest of ‘**Sundari**’ (*Horitiera fames*) a species of mangrove. Sundarban is a conglomeration of about 54 small islands separated from each other by a network of tidal channels, rivers and creeks. Soils of Sundarban are saline. In some blocks (viz. Kultali) percentage of saline / alkaline and degraded alkaline is 70 – 80 and 30 – 20 respectively. In some other blocks (viz. Basanti, Mathurapur – II, Patharpratima, Kakdwip, Namkhana, Sagar etc.) percentage of saline / alkaline is 80 – 90 and “saline” soil 10 – 20. The soils of this forest contain about 45% clay, 20% silt, 35% sand and less than 1% organic matter. Continuous silt deposit makes the soil fertile but poor drainage condition makes the soil salt water – laden. The most important vegetation is, however, mangrove which is found in land-sea interface in tropical and sub-tropical regions. According to UNESCO, there are about 50 numbers of typical mangrove species distributed throughout the mangrove tracts of the world; out of which Sundarban contains about 30 – 35 species possessing the typical characteristics of mangrove viz., peculiar respiratory roots, pneumatophores, knee roots, stilt roots and interesting germinating patterns like viviparous germination. Salinity of river water in outer estuaries reaches the highest in the month of May and

⁸⁵ Raha, Shukla, Mukherjee, Samal & Mahapatra in Subhashranjan Basu edited “Changing Environmental Scenario of the Indian Subcontinent” (acb Pub. 2002) Pp 198 – 99.

lowest in the month of August. Sub-soil water in Sundarban is saline and available within 1 to 2 meter below the ground level in the pre-monsoon season.⁸⁶

4.6.2.2. Biotic Resources Of Sundarban : The first systematic division of Sundarban mangrove vegetation was drawn up by Prain in 1903. He divided the region into three parts (i) Southern coastal strip and South Western part containing mainly mangrove species, (ii) Central zone of *Heritiera* and (iii) North Eastern part of Savannah type vegetation. The main floral resources of Sundarban are Sundari (*Heritiera littoralis*), Garan (*Ceriops roxburghiana*), Gengwa (*Excoecaria agallocha*), Kaorha (*Sonneratia apetala*), Hental (*Phoenix paludosa*), Garjan (*Rhizophora conjugate*) etc.⁸⁷ Other varieties of plants available are Acacia, Trem clycosmos and Bamboo clumps. Marsh species of sphonocles, Hydroles, Ammania, Enhydra, Wadalia, Hygrophils and Sesbania are found in abundance. Weeds of different species both indigenous, European or African species like *Serebrera pinnatifide*, *Xanthium* and *pesidsum* are found. American species like *Croton spersiflorus* are also found in waysides and waste lands.⁸⁸

The forests of Sundarban covering about 4200 sq. km. have a variety of interesting fauna like deer, pig, tiger, barking deer, hog deer, lesser cats, civet cat, mangoose, monkey, Jackal, fox etc. Tigers of Sundarban are world famous. Trees and waters of Sundarban are inhabited by large variety of birds, fishes and crocodiles. 21st August observes as “**Sundarban Day**”.

⁸⁶ Sharma. B.C. : Lower Sundarban (The Asiatic Society 1994) Pp 16 – 19.

⁸⁷ Mukherjee K.N. in Subhashranjan Basu edited “Changing Environmental Scenario of the Indian Subcontinent (acb Pub. 2002) p – 278.

⁸⁸ Sharma. B.C. : Lower Sundarban (The Asiatic Society 1994) p – 24

4.6.2.3. Socio-Economic Condition Of The Forest Dwellers Of Sundarban :

Agriculture as well as fisheries constituted the major socio-economic activities of the region. The density of population in the region is only 440 per sq. km. as against the district and state figures of 694 and 904 per sq. km. respectively.⁸⁹ About 50% of the population is landless. Moreover, the concentration of Scheduled Castes and Scheduled Tribes in this region is also remarkable. A large proportion of the population living below the poverty line. The main forest area of Sundarban are spreading over Gosaba, Basanti, Pathar Pratima, Namkhana, Mathurapur, Kultali, Sagar and Sandeshkhali Police Station area. These areas belong to the Forest Department of Government of West Bengal. The forests are naturally grown except in a very few areas where plantation has been done under Social Forestry Programme. Fishing in the creeks and canals within the forest areas is prohibited. Only honey collectors on permit are allowed to collect honey from the deep forest of Sundarban.

Sundarban is not only a backward area, but a region having its own peculiar problems. Transport and communications are difficult, waterways are the main channel of transport. The physical environment in Sundarban involves struggle against nature. The region is infested with forests, wild beasts and interspersed with rivers, channels, creeks and estuaries. The struggle for existence has profound influence on the social and cultural life style of the people. The area is predominantly inhabited by the Scheduled Castes and Scheduled Tribes which brought their own cultural heritage into the region. The story of social life in Sundarban is not only one of the struggle against nature but also of persistent poverty and high rate of indebtedness. The prevalence of “**widow villages**” near forest areas of Sundarban,

⁸⁹ West Bengal State Forest Report (2006 – 07) p – 3

where hardly any male adult person exists, in an extremely tragic feature of the region. But the saddest part is that as per social custom, the young widow has to wait for nearly 15 years for missing husband to return, within which period she cannot remarry. Forests Department issue permits for collection of honey, but because of high market value many of the inhabitants go to the forest stealthily to collect honey and some of them fall prey to man-eating tigers every year. There are about 6000 families in this forest engaged in honey collection, locally called “*Mauli*”.⁹⁰ Every year, people from villages such as Dhamakhali, Sandeshkhali, Durgamondap, Amtoli, Satmalia, Pakhiralay, Gosaba, Bali and Birajnagar go inside the forest to collect honey to earn a livelihood. They sell the honey to the state forest department. Now the forest department has reduced the honey collection period from five months to one month.⁹¹

4.6.2.4 The Man Animal War For Food And Space : Sundarban Tiger Reserve was created in 1973, and constituted as a Reserve Forest in 1978. The current core area was established as a National park in 1984. Recognising the region and its unique biodiversity, the National Park was listed as a World Heritage Site in 1985. The entire Sundarban area was declared as Biosphere Reserve in 1989.

Global warming coupled with behavioural pattern to tigers is leading to an increase in man-animal conflict in the Sundarban. As a result of this conflict, increased instances of tigers straying into human habitation and attacking villagers are coming to the fore. Increase in global temperatures have led to a consequent increase

⁹⁰ Sharma. B.C. : Lower Sundarban (The Asiatic Society 1994) p - 41

⁹¹ The Statesman (Kolkata) Tuesday 9 May 2006. p - 11

in the surface salinity level of water in creeks of the area. As a result, tigers, which generally prefer water with low salinity levels for drinking, have started migrating towards northern areas of the Sundarban. The northern areas of the Sundarban, which act as a buffer zone, are areas where human activities are permitted. This has led to increasing incidents of tigers straying into the villages of Sundarban. Moreover, there are some behavioral patterns, characteristic to tigers of the Sundarban because of which they stray into human habitation. Old or injured tigers generally are unable to catch prey and hence prefer to move into human habitation because of easy availability of domestic animals. Another reason for straying is the fact that tigers in the Sundarban, unlike those in other parts of the country, are not territorial animals. A tiger generally marks his or her territory through urination marks. However, Sundarban experiencing two high tides and two low tides everyday. As a result, the markings are obliterated. So, the animals have no idea of their territory.⁹² The Sundarban Tiger Reserve has woken up to the threat of vanishing tigers as reported from other parts of the country especially from the Sariska Reserve. An intensified presence of Border Security Force and Wildlife personnel at forest camps in the Sundarban has witnessed a sharp rise in the capture of poachers in this area.⁹³ A single tiger can fetch up to Rs. 25 lakh in the black market, where its organs and bones are sold for use in traditional Chinese medicine. However, it is fact that man and animals in this mangrove delta fighting everyday for their own livelihood.

4.6.2.5. Hostility Of Nature In Mangrove Forest : The deltaic Sundarban is characterised by low, flat, alluvial plains covered by natural mangrove swamps and

⁹² The Statesman (kolkata) 27 Sept. 2008 (South Bengal)

⁹³ The Statesman (Kolkata) 18 April 2006. P – 4

marshes. This huge intertidal area consists of a group of islands which are about 54 in number interspersed by innumerable tidal rivers and inlets together with an intricate network of minor salt water courses. The climate of Sundarban is tropical oceanic. Three seasons, Winter (November – February), Summer (March – June) and Monsoon (July – October) are easily recognizable. West Bengal and Particularly Sundarban is cyclone prone. Number of severe cyclones may even be 3 – 4 in year. The wind velocity during cyclones often ranges from 80 – 140 km. per hour. Cyclones also initiate large-scale littoral drift and lead to devastating coastal modifications.⁹⁴ With sea surface temperature rising in the north Indian Ocean Basin, including this part of the Bay of Bengal, the number of cyclonic storms is set to rise rapidly. Studies show there is 26 percent rise in the frequency of severe cyclones over the past 120 years in this part of Bay of Bengal and its going to increase in coming years.⁹⁵

It was on the morning of May 25, 2009 that cyclone '*Aila*' struck Sundarban. The cyclone breached the mud embankments around the inhabited islands, flooding thousands of acres of farmland with saline water. More than a million people were rendered homeless within the span of a few hours. It took months to build rag-tag embankments again and the saline water left the paddy fields uncultivable at least for a couple of monsoons.⁹⁶ For this reason around 1,50,000 people had left their villages in search of jobs after the cyclone hit the region. Cyclone '*Aila*' created a new group of environmental refugees in this mangrove forest. With saline water of the rivers of the Sundarban seeping into farmland, people who were previously dependent on

⁹⁴ Bhattacharya & Das in Subhashranjan Basu edited "Changing Environmental Scenario of the Indian Subcontinent" (acb pub. Kolkata 2002) Pp 284 – 86.

⁹⁵ Hindustan Times, Kolkata, Nov. 29, 2009. p – 4

⁹⁶ The Times of India, Kolkata, Saturday, July 31, 2010, p – 2.

agriculture will now shift to other means of livelihood like aqua-culture, fisheries and even shrimp farming. Some will also migrate to the city in search of jobs.

Almost all gram panchayat areas under the Gosaba block have been affected because of the cyclone. Villages under the Amtoli, kumirmari, Lahiripur, Bali – I, Bali – II, Gosaba, Rangabelia, Satjelia and Kochukhali gram panchayats have been heavily affected because of the floods caused by the cyclone. Villages under the Sambhunagar, Biprodarpur, Bathkhali and Radhanagar have been partially affected.⁹⁷ After some cyclonic storm particularly after ‘Aila’ sea is advancing towards the mangrove forest and agricultural lands. In Sagar island of the area several peoples have lost their agricultural lands and they have no other alternative jobs. According to the School of Oceanographic Studies, even one degree rise in the temperature will cause 0.78 cm of rise in sea level. In the Sundarban, the situation is grave since the rising sea level is coupled with land subsidence. Since the late 1960s, the temperature on the islands has risen by over one degree. The number of cyclones has declined but they have grown in intensity.⁹⁸

4.6.2.6 Problem Of Desertification In Mangrove Forest : As the mangrove forest of Sundarbhan is the heart of ecological balance of the area, it has been conclusively established that coastal areas protected by mangrove belts have suffered much less damage than open areas during super-cyclone and tsunami. Significantly, the world Conservation Union had found that the 2004 tsunami killed only two people in kapuhenwala, a Sri Lankan village which was surrounded by 200 hectares of dense

⁹⁷ The Statesman, Kolkata, Friday, 5 June 2009, P – 13.

⁹⁸ The Statesman, Kolkata, Thursday, 5 August, 2010, P – 11.

mangrove and scrub forest. In contrast, nearly 6,000 people died in nearby Wanduruppa village, where mangrove forests had been cut down.⁹⁹ Also mangroves are known to be reservoirs of carbon. A team of researchers led by United States Forest Service's Pacific Southwest and Northern Research Stations have quantified the amount of carbon stored in mangrove ecosystems. They studied 25 mangrove forests spread across the Indo-Pacific region. Two major geomorphic settings – Estuarine mangroves (situated on alluvial soil deltas) and Oceanic mangroves (situated on the coast of islands) – were considered. They say per hectare mangrove forests store up to four times more carbon than most other tropical forests around the world, containing an average of 1,023 mg carbon per hectare. Their deforestation accounts for 10 per cent of the emissions globally.¹⁰⁰ Also mangrove roots provide support in unstable soil and mudflats not only to withstand currents and storms, but also to breathe.

But, throughout the country, including Sundarban, the mangrove areas are being subjected to a variety of threats. These range from lopping for firewood or fodder to wholesale destruction of mangrove eco-systems for residential and industrial developments. What is interesting is that despite the advent of kerosene and LPG in some affluent urban areas, the fishing communities still prefer to cook their meals on mangrove wood. However, cutting down mangroves for commercial use in bakeries and in leather industries (mangroves are rich in tannin) has lead to large areas being wiped out. Mangrove areas have also been destroyed for the sake of aquaculture projects since these are very easy to set up in such areas. Saltpans have also come up in areas that once housed mangroves. But most distressing is the illegal conversion of

⁹⁹ The Statesman, Kolkata, Wednesday, 10 May, 2006, P - 10

¹⁰⁰ Idrisi Mohd Sajid in "Down To Earth" (New Delhi June 16 – 30, 2011) p – 49.

mangroves stretches to builders' paradises in some cities. Since all mangrove areas are in the CRZ-I category (where no construction is allowed), an ingenious *modus operandi* has been adopted to destroy them. Areas such as the Sundarbans are now being threatened by "eco-friendly" tourism projects'.¹⁰¹ Another problem of this forest is over population made by illegal immigration. In the 1951 – 71 period a few small pockets were reclaimed primarily for refugees (From East Pakistan, now Bangladesh), rehabilitation in police stations of Hingaljanj (Southern part), Gosaba (Southern part and in Satjelia), Basanti (Jharkhali area), Kultali (South), Pathar-Pratima (northern part of Dhanchi), Namkhana (Bak khali), and Sagar. The illegal immigration is continuing even now.¹⁰² This over population making pressure upon the natural resources of Sundarbhan and as a result man-animal conflict is increasing. The so-called rivers in Sundarban are mostly creeks. For promoting agricultural operations peoples of the area made mud embankments. But during high tides the rivers interrupted and spreads over the adjoining flat lowlands. Another problem of Sundarban forest is water erosion. This is because the bulk of sediment load carried from upland is transported to contribute to the deep sea of Bay of Bengal.

4.6.3. South-Western Junglemahal :

This forest area is consisting of the districts of Midnapore West, Bankura, Purulia and some parts of Burdwan and Birbhum districts. Midnapore west has total forest coverage of 1,709 sq. km. Bankura has 1, 482 sq. km., Purulia has 876 sq. km. Burdwan has 277 sq. km, and Birbhum has 159 sq. km. of forest land.¹⁰³ West Bengal has 11,879 sq. km. of forests which covers 13.38 percent of its geographical area

¹⁰¹ Debi Goenka in Survey of The Environment (The Hindu, 2005) Pp – 28 - 29.

¹⁰² Mukherjee. K. N. in Subhashranjan Basu edited "Changing Environmental Scenario of the Indian Subcontinent" (acb Pub. 2002) p – 273.

¹⁰³ West Bengal State Forest Report (2006 – 07) p – 18

compared to India's 22.8 percent. More than 61 percent of West Bengal's forests are again located in the three districts of Darjeeling, Jalpaiguri and 24 – Parganas. The districts of South-Western Bengal, namely, Purulia, Midnapore, Bankura, Birbhum and Burdwan which once housed the Junglemahals have 37.9 percent of the total forest area of the state.¹⁰⁴ South-Western Junglemahal has red laterite soil and deficient in organic matter and plant nutrients. Junglemahal has Tropical Dry Deciduous forest type and main species are *Sal*, *Kusum*, *Palash*, *Tendu*, *Bhalai*, *Mahua*, Common bamboo etc. Kangsabati, Subarnarekha, Damodar, Bandu, Thurga, Bamni are various rivers originated and running through this laterite forest. Tribals are mainly from Astro-Asiatic group. In the year 2000 West Bengal Government created “*Paschimanchal Unnayan Parshad*” for the development of 74 tribal oriented block of this area. Main economy of the area depending upon agriculture. Other than agriculture the tribals are depending upon Minor Forest Produces. Dried mahua flowers, kendu leaves, sal seeds and lacks are main minor forest produce here.

4.6.3.1 Midnapore West And Its Forests : This district has 1,709 sq. km. of total forest coverage, under which 8 sq. km. is reserved forest, 1,166 sq. km. is protected forest and 535 sq. km. is unclassed state forest and other type of forests.¹⁰⁵ Mainly Jhargram Sub-Division of this district is under Junglemahal. The main forest area of Midnapore West spreading over Jhargram, Nayagram, Gopiballavpur, Jamboni, Sankrail, Goaltorh, Binpur, Belpahari and Lalgah polic station areas. Sal, Peasal, Mohua, Kusum, Tendu are the main original tree species of the forest. Presently Eucalyptus, Casew, Akashmoni, Sonajhuri are planted under social forestry

¹⁰⁴ Biswas Arabinda in Subhashranjan Basu edited “Changing Environmental Scenario of the Indian Subcontinent (acb pub. 2002) p – 89.

¹⁰⁵ West Bengal State Forest Report (2006 – 07) p - 18

programme. Wild Bore, Hyaena, Bear are the main wildlife of the forest, although their number is decreasing. Frequently wild elephants from nearby Dalma range attacked into the agricultural crops of the area. Tribal peoples are mainly from the Santal, Mahali, Sabar, Munda, Bhumij groups.

The forest dwellers are mainly from Scheduled Caste and Scheduled Tribe communities. The villagers in the forest-fringe areas are depending upon the collection of kendu leaves for bidi making and other forest products like Sal leaves for making of plates and bowls. But the economic condition is not healthy of the forest dwellers here. They usually get Rs. 25 against 2,000 kendu leaves (locally called chata). But the government appointed cooperatives fixed the price for a chata at Rs. 15 and tried to jeopardize their agitation by deploying the police. Similarly, they get Rs. 20 to Rs. 25 by selling sal plates and Rs. 15 to Rs. 18 from bowls, while traders earn lakhs of rupees by taking advantage of their distress sale. The story is similar to other forest produce. Though a labour is supposed to get Rs. 62 as wages, they barely get Rs. 20 to Rs. 25 after working for 12 hours,¹⁰⁶ Forest dwellers of some blocks like Belpahari, Jhargram, Lalgah, Salboni, Goaltorh, Jamboni are living below the poverty line. Schooling, Primary health centre, Electricity are nil in some region. Some revolutionary organizations, particularly the C.P.I. (Maoist) are making all these non-facilities are their political agenda and have given a call to start a movement under their leadership to crush police atrocities and governments' exploitation. But by this type of so-called movement tribals of the area are get nothing and still they have to depend upon the forest produce for their daily life.

¹⁰⁶ The Statesman, South Bengal Plus, Sat. 4 March, 2006.

The woodland of West Midnapore Junglemahal came into limelight since colonial government. In January 1767 the emerging company raj took its first steps to settle the jungle zamindaries. After receiving charge of revenue collection in Midnapore, the East India Company quickly controlled settled agricultural eastern part of the district. The British soon discovered the large Western jangle tracts which were in the hands of Zamindars who had paid little revenue since the Maratha incursions of 1740-50. In 1767 the Resident at Midnapore was instructed to reduce Zamindars to the Westward' and then demolish their mud forts, other than those required for the protection of the Country. In 1773, Edward Baber, the Collector of Midnapore, provided the first detailed description of the Jungle Mahals : the western jungle is an extent of country of about 80 miles in length and 60 miles in breadth. On the east it is bounded by Midnapore, on the West by Singhbhoom, on the north by Panchete, and the south by Mayurbhanj. ...The soil is very rocky , the country is mountainous and overspread with thick woods which render it in many places impassible. With the creation of the South West Frontier Agency (SWFA) in 1833, the jungle mahals were placed in a special administrative category of regions.¹⁰⁷ This jungle mahals of South-Western Bengal receiving 1000 – 1500 mm of rainfall a year, enough moisture to sustain what is known in technical parlance as mixed dry deciduous forest. During colonial period the sal and other trees of this area were heavily exploited for shipbuilding and creation of Bengal Nagpur railway tracts. Apart from this falling, local Zamindars also exploited timbers and forest produces.

After independence, with the abolition of Zamindaris and the conversion of their forests to nationalized status – protected and reserved status – there was literally

¹⁰⁷ Sivaramakrishnan. K. : Modern Forests, Statemaking and Environmental change in colonial Eastern India (Oxford 1999) Pp 38 – 43.

a free-for-all in the appropriation of forest resources. Between 1950 and 1980 these forests, for all practical purposes, turned into open-access areas, leading to their rapid degradation. The fact that the process of nationalization itself was fraught with administrative irregularities. Pressures for fuel wood and fodder from a rapidly expanding population further contributed to the reduction of forest cover and quality in the state. The newly formed West Bengal forest department found it increasingly difficult to preserve the forests under its control, being faced with hostile local people who often resorted to ‘stealing’ to meet their subsistence needs.¹⁰⁸ The government rapidly acquired private forests in the first 10 years of Independence. A forest division was created in Midnapore. The forests were open, coppiced and exceptionally pure, with 95 percent *sal*. A few *kendu*, *mahua*, *sidha*, *pial*, *kusum*, *bhel*, *peasal*, *haldu*, *amla*, *dhaw*, *podasi*, *asan*, *behera* and *simul* were present. Land reforms brought about 1,500 square miles of Zamindari forests in Midnapore, Bankura and Purulia – the jungle mahals – under state forest department control by the late 1950s. These forests are spread out in hundreds of blocks interspersed through fields and settlements. In Jhargram, by 1964 the total forest area was 330 square miles, being 27.73 percent of the total area of the subdivision. Around 8,000 acres of coppice forest were being felled each year to yield Rs. 1.5 million from coupe purchasers, who used mostly local labours to fell and remove trees auctioned to them.¹⁰⁹ In the decade of 1970 the government of West Bengal began an attempt towards the regeneration of degraded forests in the State. West Bengal is the pioneer state in India in initiating Joint Forest Management (JFM). This movement of JFM had its genesis at Arabari in Midnapore district, where 618 families of 11 villages were motivated in early 70’s to rejuvenate 1,186 hacter of degraded sal forest by roping in their participation through

¹⁰⁸ Shahabuddin Ghazala : Conservation at the Crossroads (Permanent Black 2010) p - 142

¹⁰⁹ Jeffery & Sundar ; A New Moral Economy for India’s Forests? (Sage 1999) Pp – 86 - 87

a set of activities of employment generation and sharing of profits from such forests. The JFM movement gained momentum with the implementation of World-bank-aided West Bengal Forestry Project during 90's. The main objective of which inter-alia was to promote people's participation in management and development of forests.¹¹⁰ During this management there were noticeable increases in tree generations, plant species diversity, and forest biomass in the degraded area and JFM has emerged as one of the model experiments in community-based forest management anywhere in the world, but the power to decide the management policies is limited to the hands of the original forest dwellers. Only forest officials have legal power to deal with timber mafia and local theft leaving the villagers helpless.

4.6.3.2 Bankura And Its Jungle Mahal : Bankura is another district of South Western Junglemahal, adjoining with Hooghly, Midnapore West, Purulia and Burdwan districts. The district has 6,882 sq. km. of geographical area, under which 1,482 sq km. is its recorded forest area, which is 21.53 percent of its geographical area. Under 1,482 sq km. of forest area 80 sq. km. is Reserved Forest, 1,311 sq. km. is Protected Forests and 91 sq. km. is Unclassed State Forest.¹¹¹ Forest area of Bankura junglemahal divided into three division – Bankura (South), Bankura (North) and Panchet Soil Conservation. Soil of the area is red lateritic and low in organic matter. Main Forest type is Tropical Dry Deciduous with main species of *Sal*, *Kendu*, *Mahua*, *Salai*, *Pea sal*, *Haritaki*, *Palash*, *Behera* and *Dhok* trees. Apart from the Sal-dominated forests, considerable areas of previously barren lands have been planted over with exotic species such as Australian acacia (*Acacia auriculiformes*),

¹¹⁰ West Bengal state Forest Report (2006 – 07) p – 82

¹¹¹ West Bengal State Forest Report (2006 – 07) p – 18

Eucalyptus (*Eucalyptus spp.*), and Cashewnut (*Anacardium occidentale*) for social forestry. Dense forest of junglemahal mainly spread over South Bankura. Police Station areas of Taldangra, Khatra, Sarenga, Ranibandh, Raipur, Barikul, Simlapal and Indpur comprising of heavy forest with tribal population. These areas are mainly situated in Bishnupur and Khatra Sub-division. In northern part of the district scattered forests are situated in some parts of Gangajal Ghati, Barjora, Joypur and Onda police station areas. Santals and Mundas are main tribal group with a major portion of scheduled caste population. Main agricultural produce is paddy depending upon seasonal rainfall. Only some blocks of Sonamukhi and Barjora is irrigated from river Damodar. Kangsabati, Darakshwar, Shilabati, Kumari, Bhairabbanki are some other rivers of the area. Presently some parts of Gangajal Ghati and Barjora blocks declared as Industrial Zone (*Shilpa Taluka*).

Mainly the southern part of the district is Forest oriented. But due to less production of agricultural crops, the villagers destroyed woodland. Mainly village peoples are destroying wood for fuel, house building and manufacture of plough, and the process being aggravated by the increasing of population and rising demand for timber. Villagers of forest fringe areas also collect a variety of minor forest produce for consumption and sale. The produces are includes 3 to 4 types of Mushrooms during rainy and autumn season, *kendu* and *sal* leaves, Gum from the *Bohera* trees, *Mahua* fruit and flower, *tasar* cocoons, Honey and different types of wild fruits. Before the colonial period the woodland of Bankura was under the domain of *Malla Rajas* of Bishnupur. During British period the forest was destructed for construction of Bengal-Bagpur Railway Lines. After independence although some protective measures have taken by the government in ‘Social Forestry Scheme’, but it cannot

stop the total destruction of forest in northern Bankura. In the decade of 1980 famous ‘*Hanspahari Jungle*’ was totally destructed by D.V.C. for creation of Thermal Power Plant at Mejia. This Mejia Thermal Power Station (***Aalok Tirtha***) Producing electricity from last 20 years but there are no programme of reforestation scheme taken neither by the government nor by the company. In some areas there are some seedlings of *Eucalyptus* and *Sonajhuri* grown; which are inadequate in number. Almost all the villages of Gangajal Ghati and Barjora blocks are facing air and water pollution from some sponge iron factories. Following industries are instances, which are situated around the forest area of Barjora : (i) XPRO India Ltd. Biax Division, (ii) Surya Alloy Industries Ltd., (iii) GPT Casting Ltd. At Chousal , (iv) C.P. Ispat Pvt. Ltd. At Nirisa, (v) Sristi Ispat Aloys Ltd. At Dejuri, (vi) Nilkantho Ferro Ltd. At Chousal, (vii) Maa Kali Stone Crusher at Chousal, (viii) Sree Syanji Steel Pvt. Ltd. At Milegora, (ix) Timespac India Ltd. (TIMCON) at Ghutgaria, and (x) Nilkamal Furniture at Borjora. Apart from these there are also some sponge iron factories and brick kilns situated at the villages of Hat Ashuria, Gopinathpur and Shitla. Except XPRO India Ltd. Biax Division no other industries have taken programme of plantation in their industrial unit. Forest area and forest fringe villages of Barjora and Gangajal Ghati blocks facing heavy pollution from these industries.

It has revealed that between 1972 – 78 and later mid 1980s were the main periods when deforestation took place. Bankura district have experienced introduction of the ‘**Social Forestry Scheme**’ in the form of strip plantation between 1981 and 1986. The scheme include creation of village woodlot, embankment forest, afforestation on cremation ground, railway land, DVC canal bank as well as on private lands. In addition attempts have been made to promote farm forestry to

mobilize the participation of the farmers. Free seedlings were distributed only during the *Aranya Saptaha* in the month of July and each person was entitled to 5 seedlings. Consequently attention shifted to the promotion of Joint Forest Management Schemes. Thereafter Forest Protection Committees also created under the scheme.¹¹² The Bankura district has got 1,48,177 hectares of forest land in aggregate, which is 21.5 percent of the total geographical area. Since Bankura and Purulia are declared as drought-prone zones, the districts are monitored to expedite mass forestation. Under the direct supervision of the state forest directorate, Bankura has been undergoing with social forestry projects covering roadside, riverside and railway embankment with mass plantation. Besides the state forest department, the West Bengal Forest Development Corporation, Pulpwood Development Corporation together are working for enhancing the greenery in the district. The district is covered under the National Wasteland Development Board, which is working in seven blocks of the district – Chatna, Khatra, Hirbandh, Gangajal Ghanti, Saltora, Indpur and Ranibandh since 1993 – 94 financial year.¹¹³ The soil in the district consists mainly of sandy loam or laterite gravel which is very low in nutrients, discouraging forestation plans in general. The Bankura forests, however, braved natural obstructions and crossed the average state growth rate. The forests extend over an area of about 1,454 sq. km. which is 21.30 percent of the district's total command area. Saltora, Mejia and kotulpur areas, meanwhile, are yet to develop a sustained forest reserve. These areas, however, grow Sal, Asan, Bahera, Peasal, Kurchi, Bhurra, Atang and Kulkanta plants – most of which have a high timber value.¹¹⁴ To create awareness among people

¹¹² Ray Chaudhuri Jayasri in Subhashranjan Basu edited “changing Environmental Scenario of the Indian

Subcontinent “ (acb pub. 2002) p – 242.

¹¹³ Siddiquil Kanchan in “The Statesman” (Kolkata) 19 Jan 2006 – District focus.

¹¹⁴ The Statesman (Kolkata) 16 July 2009 p – 13

regarding afforestation, all there Forest Divisions in Bankura observed “Forest Week” every year.

The Bankura forest division has secured an average 31 per cent growth of forest reserve in the last few years. The Bankura (South), Bankura (North) and Panchet Soil Conservation in Bishnupur together have stressed planting seedling varieties, especially those favoured by elephants. The reason is that, every year, the marauding herds of elephants from the Dalma range of Jharkhand are raiding Bankura and causing extensive damage to the farmland. The elephants mostly favoured trees like *Piyal*, *Mahul* and *Bahera* varieties, The Bankura forest divisions has also ensued a strict vigil in the domestic areas where social forestry has become a significant part of afforestation so that the provisions of the “**West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006**” are maintained properly.¹¹⁵ Although there are some strict provisions of law but most of the sponge iron factories located in various blocks of Bankura (North) forest division have not taken any steps of afforestation in their project areas. Forest department also planted some trees only for timber values, not for natural forestry. By these types of activities Bankura forest in loosing its naturility and slowly proceeding towards desertification.

4.6.3.3 Purulia and Its Jungle Mahal : Once within the Chotonagpur area, Purulia district came within the territory of West Bengal in the year 1956. This district had 6,259 sq. km. of total geographical area, under which recorded forest area is 876 sq. km., which is 14 per cent of total geographical area of the district. Out of 876 sq. km. of recorded forest area 112 sq. km. is Reserved Forest, 729 sq. km. is Protected Forest

¹¹⁵ The Statesman (Kolkata) 22 July 2010 p - 13

and 35 sq. km. is Unclassed State Forest.¹¹⁶ The district has three Forest Divisions – Purulia, Kangsabati – I and Kangsabati – II. Famous Junglemahal of Purulia district spread over Jhalda, Baghmundi, Arsha, Kotshila, Joypur, Balarampur, Bandwan and Barabazar Police Station areas. There are some forest areas are available in Hura, Kashipur, and Manbazar Police Station areas. There are 8 Territorial Range in Purulia Forest – Balarampur, Matha, Baghmundi, Audhya, Jhalda, Kotshila, Joypur and Arsha.

In the year 1908, there was Chottonagpur Tenancy Act prevailing over the Junglemahals of Purulia. Thereafter the district came to the State of Bihar, where Bihar Private Forest Act was enacted. Under which there was provision to give *Rayati* Title towards farmers over the forest land. In the year 1956 district of Purulia came to the State of West Bengal. But within this span of time so many forest land was converted to agricultural land. After 1990 some forest committees was created in Purulia.¹¹⁷ Forest committees are engaged with plantation. But most of the trees under plantation programme is eucalyptus and akashmoni. The most aboriginal trees of the region is *Sal*, *Mahua*, *Kendu*, which are vanishing from the forest. In a result local forest dwellers of Purulia district are not getting their income from the minor forest produces, which are the outcome of some aboriginal trees. In the other hand forest department are planting eucalyptus, akashmoni for the purpose of commercial benefit. But these neo-planted trees has no business with the local inhabitant nor with local ecology. Another resource in Purulia forest is Lac. During the months of January to March Lac is produced from the trees of Palash, Kusum Satnar, Kul etc. Excepting palash other Lac producing trees are decreasing in Audhya hill forests.

¹¹⁶ West Bengal State Forest Report (2006 07) Pp – 18 - 19

¹¹⁷ Dutta Sangita in “Dainik Statesman” (Bengali) 7th. Oct., 2007 p - 2

Dense forest in Purulia situated in and around the Audhya hill, Balarampur, Baghmundi and Arsha area. Only in Audhya hill 74 villages are situated in different slopes of the hill. The inhabitants are mainly tribals, sabars and mahatos. Khuntarh, Chakadoba, Saharjuri, Jorhbandh, Borojoran, Bhudagram are different villages in the Audhya hill area, which are totally covered by forest and peoples are depending only upon the forest resources. Japanese Power Project in Audhya hill destroyed some greenery of the forest. Similarly in Balarampur area, forest cover of Panchet hill are affected by some sponge iron units due to heavy pollution. Maa Kamakshya Iron, Rabindra Udyog, Mythone Steel are some industries of Panchet hill area.

In Kanshabati (North) Division some forests are located in Hura, Kashipur and Manbazar blocks. Raakab and Keshargarh are forests of such type that some villages are also established within the forest area. “Raakab” is nearly 30 km. away from district head quarter situated on Purulia – Bankura route under the jurisdiction of Hura Police Station. It has dense tree cover of *Sal*, *Mahua*, *Peal*, *Neem*, *Kendu*, *Bohera*, *Haritaki*, *Aamlaki*, *Bhalai*, *Kusum* etc. Kulgora, Morejungle, Keshargarh, Kaarudoba, Lakshmanpur are some villages within the forest. Santals are the main inhabitant of the area and they are mainly depending upon the forest. Some patches of agricultural lands are there, which are depending upon seasonal rainfall. It has stated by the local villagers that “Raakab” was highly dense forest 30 to 40 years ago and it was spread upto Hura, Puncha, Balarampur and Manbazar area. But now the density of forest area is decreasing. Some local persons sold out *Sal* and *Mahua* trees. For making the poles and house building materials good demand of *Sal* tree is there in the market. In this way, green cover of Purulia, from Audhya to Manbazar and from Bandwan to Arsha are being decertified by deforestation. Forest department planted some trees of

Eucalyptus, Sonajhuri, Cashew nuts etc. for fill up the gaps. But all these trees are for the purpose of meeting the needs of commercial demand not for tribal demand. Another problem is Maoist activity in some villages of Audhya, Baghmundi, Balarampur, Bandwan area. According to police these areas are hub of armed Maoist. They took refuge in these areas after conducting operations. Some of the villages has no drinking water facilities, no school, no health care units. Villagers have job cards but no jobs under MGNREGA. Felling of trees and collecting of wood and other forest products is the only income of these forest dwellers.

4.6.3.4 Parts of Birbhum and Burdwan Districts : Southern part of Birbhum and Western part of Burdwan districts are within the area of Junglemahal. This region has red lateritic soil and covered an area from eastern part of Chotanagpur plateau merging towards Bengal basin on Indogangetic plain. This portion of forest land mainly occupied by the *Sal*, *Mahua*, *Peal* trees. Damodar, Ajoy and Mayurakshi are the main river flow of the area. Since British period forest coverage of this area decreasing day after day by Industrialisation, Mining activity and Urbanisation.

About Junglemahal of Birbhum district, W.W. Hunter has stated in “The Annals of Rural Bengal” that, “..... we find the district a sequestered and an impassable jungle. In ancient times it had been the highway of armies, the favourite battle-field on which was more than once decided the fate of Bengal; in 1780 a small body of sepoy could with difficulty force their way through its forests. they marched through but an extensive wood, all the way a perfect wilderness; sometimes a small village presented itself in the midst of these jungles, with a little cultivated ground around it. These woods abounds with tigers and bears, which infested the

camp every night, but did no other damage than carrying off a child and killing some of the gentlemen's hackery bullocks. A belt of jungle, filled with wild beasts, formed round each village; the official records frequently speak of the mail-bag being carried off by wild beasts; and after fruitless injunctions to the land holders to clear the forests, Lord Cornwallis was at length compelled to sanction a public grant to keep open the new military road that passed through Beerbhoom"¹¹⁸ So, from the ancient time part of Birbhum district was covered with dense forest. But now, particularly from the British time tree coverage started to decrease.

Now, some patches of forestland alive in Birbhum district. In Rampurhat and Bolpur sub divisions, two forests are the examples of green forest patches on red laterite soil. One on Bolpur – Ilambazar route Choupahari jungle situated over nearly 1,400 hec. of land. It's a dense forest of *Sal*, *Mahua*, *Peal*, *Murga* trees. In some area Eucalyptus, Aakashmoni and Cashew trees are planted. Hyna, Bengal fox, Rabbits are the main faunal inhabitants of the jungle. Nearly 14 forest fringed tribal villages like Murgaboni, Bonshuli, Rangabandh, Lakhipur, Nimboni, Panskura, Aamkoi, Jamboni, Khoerdanga are situated in and around the forest. Main occupation of the Santals forest dwellers is collection of minor forest produce and labour to agricultural field. Some of them went to nearest town, Ilambazar market to work as labourer in brick kiln and rice mill. Another area in Birbhum, "*khowai*", just outskirts of Shantiniketan in Bolpur town is presently vulnerable to soil erosion. Some creeks and canals were spread over the area but it is found that, in the time of monsoon the laterite soil of the area washed out through these canals. Some protective measures was taken by plantation of sonajhari and Eucalyptus trees but the roots of these trees

¹¹⁸ Hunter. W.W. : The Annals of Rural Bengal (Cosmo Pub. 1975) Pp – 64 – 66.

are not been able to catch the soils from water erosion. It is required to plant aboriginal trees which can spread its deep route under the soil.

From the ancient time Birbhum is home of the Santals. The worship of the Santals is based upon the family. Each household has its own deity (*Ora-bonga*). Besides the villages deities of the sal grove, the Santals finds gods, ghosts, or demons, requiring to be appeased, wherever he goes.¹¹⁹ In this way by their worshiped they have preserved some groves in every villages, which they believe to be the favourite resort of all the family gods. The myth of the Santal tribe that, they are the people living inside the woods in forests. They have dense forests and prefer to live there, and all the rituals are performed within the village forest. Several times a year the whole tribe hamlet dressed out by music and sacrifice of red cocks and goats.

The district of Burdwan is characterized by the mining belt and industrial landscape in the western part and prosperous agricultural area in the eastern part. The western part which is endowed with coal reserve suffered from severe deforestation at different stages of mining expansion, industrialization and urbanization. Eastern Burdwan, by virtue of its high cropping incidence and intensity, is believed to be performed green revolution. In terms of production of rice, Burdwan is now a surplus district. High concentration of industries in the Western Burdwan includes couple of iron and steel centers and a thermal power plant too. Industrialised urban corridor between Asansol and Durgapur replaced the historically famous Jungle Mahal. And it is not only the forest which became scapegoat of development, but all other components of nature also land, water and air have been affected by various

¹¹⁹ ibid p - 184

developmental activities though magnitude and character of suffering very spatially from the east to the west.¹²⁰

The vast area under the Western Burdwan region was covered obscure and dormant rural settlement in the midst of dense lush green Sal forest. The presence of coal and river was the causes for continuous mining in the region which later culminated with industrial development. In this region only some forest areas are still live in Kanksa block in Durgapur sub-division. Kanksa forest on the route of Panagarh – Moregram highway is consisting of mainly sal trees. But urbanization and nearby industrialization are the common threat to the forest.

After independence, 16,188 hec. of agricultural land has become barren due to encroachment of the mines, in Asansol subdivision of Burdwan district. Both opencast and underground mining operations are being conducted here since 1774. 4,555 hec. of land and 2,00,000 people are directly affected by deadly subsidence of land due to unscientific mining. In 1932, the first Coal Mines Regulations Act, dealing with subsidence was enacted. After independence, a regulation was passed in 1952. But in 1956, severe subsidence took place in Chinakuri near Asansol. Apart from subsidence and recession of the water level, other environmental crises do occur in the mining belt of Burdwan district. Dumps of huge over-burden material culminates in a problem of solid waste disposal. Toxicity in the water, coal dust and suspended particulate matters increases abruptly endangering health.¹²¹ Compared to mining of coal in Western Burdwan, indiscriminate removal of sand from river

¹²⁰ Basu Ranjan is Subhashranjan Basu edited "Changing Environmental Scenario of the Indian subcontinent" (acb Pub. 2002) Pp 429 - 30

¹²¹ ibid p- 433

Damodar in Raina and Jamalpur blocks has caused degradation of soil and making the area desertified by river bank erosion.

Deforestation and desertification due to soil erosion go hand in hand. The Durgapur steel township created in the decade of fifties of last century at the cost of lush green sal forest, once forming the part of Junglemahal. Durgapur Steel Plant, Alloy Steel Plant, Durgapur Projects Ltd., Philips Carbon Black, Durgapur Cheminals, Hindusthan Fertiliser are some heavy industries built after cutting green woods of the area.

In the Western Burdwan, symptoms of sheet erosion have been observed. Higher slope coupled with lack of vegetal cover appear to be root of such maladies. The concept of urban forestry is yet to be materialized by the Asansol -Durgapur Development Authority (A.D.D.A). Afforestation and social forestry programme have been launched by the Forest Department, impact of which has not yet been assessed.¹²² In the year 2010, the district, affected by rampant air pollution, has stressed the extensive plantation of broad leaf trees across the district, especially in the industrial segment of Asansol – Durgapur. The two forest divisions operating in the district, Burdwan and Durgapur, together have managed to distribute 1.50 lakh saplings during the forest week celebrations. The divisions expected that at least 30,000 trees would be planted across the roadside stretches, parks and community places. Forest Department stated that, they have distributed saplings of 27 varieties, mostly broad leaf like *Amloki*, *Haritaki*, *Bahera* and those to traditional fruits varieties

¹²² ibid p - 431

like mango, guava and berry.¹²³ Apart from these noble initiatives some degradation was happened. More than 1,000 broad leaf trees have felled down on both sides of Kalna – Katwa S.T.K.K. road by the P.W.D. roads. In some areas of the district, eucalyptus trees are introduced for forestation. In reality species of Eucalyptus, Sonajhuri are more industrial raw material and less an economic base for the tribale people. There is need for participatory management of forest in the district.

4.6.3.5 Problem of Desertification in Junglemahal : The main problem of desertification in five jungle mahal districts has occurred due to soil erosion, indiscriminate cutting of trees, mining, industrialization and urbanization. After independence so many people settled here from other districts and states. It has earlier discussed that, for creation of Bengal – Nagpur railway the Britishers introducing systematic logging that by 1898 had yielded 8,07,627 broad gauge sleepers from 20,921 trees in the Porahat reserve.¹²⁴ Some trees were cut at one to one-half feet above ground so that the stump could be dressed down and burned to make charcoal. Live sal stools are preferred for charcoal by blacksmiths in Bankura and Midnapore.¹²⁵ So, in this way Junglemahal forest are varnishing from the era of the Britishers. In the independent India some low-scale industries was also built up on the cost of the woodland.

In three districts of Junglemahal due to repeated penetration of purely agricultural castes from the eastern plains, the tribals have been forced to recede to

¹²³ The Statesman (Kolkata) Thursday, 22 July 2010 p - 13

¹²⁴ Sivaramakrishnan. K “Modern Forests, Statemaking and Environmental change in Colonial Eastern India (Oxford 1999) p - 163

¹²⁵ Sivaramakrishnan. K in Jeffery & Sundar edited “A New Moral Economy For Indias Forests?” (Sage Pub. 1999) p – 80

remoter parts which are less prospective for agriculture. However there are at least four core areas where forests have been able to avoid total destruction. These four cores also show considerable concentration of tribals in the sense that they constitute at least 30 percent of the population of the police stations concerned. These four tribal cores are :

1. The Baghmundi core including parts of the P.S. of Baghmundi, Balarampur and Barabazar in the district of Purulia.
2. The Bundwan core covering parts of the P.S. of Bundwan and Manbazar in the district of Purulia, Ranibandh, Raipur and Khatra in Bankura and Binpur and Jamboni in Midnapore West.
3. The Nayagram core spanning the P.S. of Nayagram, Sankrail, Gopiballavpur, and Keshiary in Midnapore West.
4. The Santuri core in the same P.S. in the district of Purulia.

The stress imposed in the overall economy due to deforestation create a much greater distress in the economy of those people who tried to take part in the open system but failed miserably because of their lack of political control in the decision – making process.¹²⁶ Deforestation is very fast in these areas leaving only some trees like kendu, Sal, Mahua, Palash, which supplies the marketable products of biri, lac, tassar etc. Price of these M.F.P. controlled by the government. So, the tribals have become accustomed to exploit the forest wood resulting desertification. In some areas of these districts Eucalyptus and Akashmoni had planted for reforestation programme; but these species has no social and domestic use in the life of the local

¹²⁶ Biswas Arabinda in Subhashranjan Basu edited “Changing Environmental Scenario of the Indian Subcontinent (acb pub. 2002) Pp 89 - 91

forest tribals. In Western Burdwan Junglemahal industrial wastes and sewage jeopardizing the soil and rivers of the area. Both opencast and under ground mining operations in Asansol – Raniganj region collapsing the ground level soil, resulting into desertification.

4.6.4 Wildlife Conservation And Protected Areas in West Bengal :

West Bengal is rich in biodiversity conservation. The main strategy for conserving its unique biodiversity has made by the creation of protected area network of national parks, sanctuaries, biosphere reserves and identified wetlands and coastal areas. The State has 4064 sq. km. of forests under protected areas network which is 34 percent of the state's total forest area and 4.54 percent of the total geographical area. There are six national parks, fourteen sanctuaries, two tiger reserves, two elephant reserve and one biosphere reserve. The protected area network includes 886 sq. km. Sanctuaries, 1909 sq. km. National Parks and the balance are being represented by buffer areas of the two Tiger Reserves – Sundarban Tiger Reserve and Buxa Tiger Reserve.

Table 4.5

**Wildlife Conservation and Protected Areas of West Bengal
Through National Parks And Sanctuaries**

Sl No.	Protect Area	Area in Sq. Km.	Bio-geographic Zone	District
1	Singalila N.P.	78.60 Sq. Km	2C	Darjeeling
2	Neora Valley N.P.	88.00 Sq. Km	2C	Darjeeling
3	Buxa N.P.	117.10 Sq. Km	7B	Jalpaiguri
4	Gorumara N.P.	79.45 Sq. Km	7B	Jalpaiguri
5	Jaldapara N.P.	216.51 Sq. Km	7B	Jalpaiguri
6	Sundarban N.P.	1330.10 Sq. Km	8B	South 24 Parganas
7	Jorepokhri Salamander W.L.S.	0.04 Sq. Km	2C	Darjeeling
8	Senchal W.I.S.	38.88 Sq. Km	2C	Darjeeling
9	Chapramari W.L.S.	9.60 Sq. Km	7B	Jalpaiguri
10	Mahananda W.L.S.	158.04 Sq. Km	7B	Darjeeling
11	Raiganj W.L.S.	1.30 Sq. Km	7B	North Dinajpur
12	Bethuadahari W.L.S	0.6686 Sq. Km	7B	Nadia
13	Ballavpur W.L.S.	2.021 Sq. Km	7B	Birbhum
14	Ramnabagan W.L.S.	0.14 Sq. Km	7B	Burdwan
15	Bibhutibhusan W.L.S.	0.64 Sq. Km	8B	North 24-Parganas
16	Nerendrapur W.L.S	0.10 Sq. Km	8B	South 24 Parganas
17	Sajnakhali W.L.S.	362.40 Sq. Km	8B	South 24 Parganas
18	Halliday Island W.L.S	5.95 Sq. Km	8B	South 24 Parganas
19	Lothian Island W.L.S.	38.0 Sq. Km	8B	South 24 Parganas
20	Buxa W.L.S.	267.92 Sq. Km	7B	Jalpaiguri

Source : West Bengal State Forest Report (2006 – 2007)

Apart from the National Parks and Sanctuaries, there are two Tiger Reserve, Two Elephant Reserve and one Biosphere Reserve in West Bengal to protect the flora and fauna naturally.

Table 4.6

Wildlife Conservation And Protected Areas of West Bengal Through Reserves And Biosphere

Sl No.	Protected Area	Area in Sq. Km.	Bio-geographic Zone	District
1	Tiger Reserves: Buxa Tiger Reserve (including W.L.S. & N.P)	760.87 Sq. Km.	7B	Jalpaiguri
2	Sundarban Tiger Reserve	2585.00 Sq. Km. Buffer Zone (including Sajnakhali W.L.S) : 1255 Sq. Km. Core Area	8B	South 24-Parganas and parts of North 24-Parganas
3	Sundarban Biosphere Reserve	96.30 Sq. Km.	-	South 24-Parganas and North 24-Parganas
4	Elephant Reserve : Eastern Dooars Elephant Reserve	977.51 Sq. Km. Core Area : 484.00 Sq. Km. Buffer Area : 493.51 Sq. Km.	7B	Jalpaiguri
5	Mayurjharna Elephant Reserve	414.00 Sq. Km.	6B	Midnapore West, Bankura and Purulia

Source : West Bengal State Forest Report (2006 – 2007)

4.7 Field Survey :

A Study With Reference to some of villages In West Bengal (By Sampling Method) : The whole portion of this study was to analyse and explore the possibilities of desertification and deforestation in rural Bengal through various methods. For the purpose of analysis based on historical, social and legal background of forest and using of forest land and resources has already done by the author in earlier discussion.

Theoretical analysis reveals so many things regarding forest and forest dwellers of Bengal. But practically through field survey, the exact position of desertification to be seen in right perspective. For this purpose the author choose to complete the survey of a few villages situated in different regions of the State to explore the real position of forest. It was quite impossible for the researchers to do survey of all villages or all districts of Bengal, due to lack of fund and manpower. Thus through sampelling method some villages are taken to highlight the problem regionwise so that the whole area of the State should be covered. For the purpose of survey, questionnaires (in vernacular language i.e. Bengali) were distributed amongst the literate villagers. The schedule method was adopted for literate population. The relevant information acquired through this process may be analysed as follows :-

Village – I

Name of the Village	:	Sankosh
Block	:	Kumargram
Police Station	:	Kumargram
Sub Division	:	Alipurduar
District	:	Jalpaiguri

To cover the Himalayan Terai and Dooars forest of West Bengal this village was selected for survey. This village is situated within the east division of Buxa Tiger Reserve of Alipurduar sub division of Jalpaiguri district. The village is situated within Kumargram blok and North Kumargram Panchayet. Alipurduar is nearly 48 km. away from this village. Northern part of this village is close to the international boundary of Bhutan. The Sinchula hill range lies all along northern side and on the east it touches the Assam State. Kumargram, Newlands, Teamari, Indubasti, Khuntimari, Balapara are some villages nearing this village. The fragile Terai Eco System constitutes a part of this area and this area serves as international corridor for elephant migration between India and Bhutan.

The total population of this village is 749. Out of which 377 are male and 372 are female. Nearly 30 per cent of the villagers are literate. Main source of income of the villagers are cultivation of paddy, vegetables and maize. Some self-help groups are there organised by the forest department. Other source of income includes poultry and animal husbandry. Peoples residing in the village are mainly from Nepalese and Bhutia origin. Few Rava, Tokpo, Tirki, Minj, Paraik and Rajbasshi peoples are also resident of this forest fringed village. Main industry is Tea garden and manufacturing of tea leaves. Sankosh Tea Garden, New Lands Tea Garden, Kumargram Tea Garden, Turturi Tea Garden are the main tea gardens of the area. *Sal*, *Champ*, *Gamar*, *Simul* and *Chikrasi* are the main tree species of this area.

During the survey, it reveals that the local villagers are the aboriginal people since long. Now they are mainly attached to agriculture and tea plantation. The villagers are depending upon forest for firewood. They have stated that some species

of trees are decreasing from the forest. There is no specific area allotted for the graziers. It is true that tourism has changed the economy of the area but too much tourism can affect the eco-system of the region. The villagers have specifically stated that, they have no idea about Forest Rights Act and no knowledge about rights and duties as forest dwellers.

Village – II

Name of the Village	:	Satjelia
Block	:	Gosaba
Police Station	:	Gosaba
Sub Division	:	Alipur Sadar
District	:	South 24 Parganas

This village has selected for the study of problem relating to desertification in Mangrove forest. This village is situated in the northern part of Sundarban in Gosaba block of South 24 Pargana district. The village is surrounded by three rivers – Gumar, Melmel and Raimangal. Gosaba town is few miles away from this village. Hetalberia, Kumirmari, Bijohnagar, Jamespur are some other neighbouring forest fringed villages.

Total population of the village is 2856. Out of which 1435 are male and 1421 are female. Almost 45 per cent villagers are below the poverty line. More than 50 per cent of the population is scheduled Cast and 20 per cent are scheduled tribes. Entire economy of the area is totally depending upon agriculture and fisheries. Agriculture includes paddy in *Kharif* season and in *Rabi* season chillies, pulses, wheat, water melon and some other minor crops and vegetables. The mangrove forests have all

over the region contributed to the growth and development of fisheries. The villagers are mainly engaged into pond fisheries. The village has lower percentage of literacy. Most of the houses are made of thatched or tiled roofs with mud walls. Main species of mangrove trees are *Sundari*, *Garan*, *Ganoaa*, *Game*, *Hental*, *Bari* etc. Tidal channels within mangroves support communities of phytoplankton and zooplankton and act as a nursery for small fish. Large settlement and industrial waste are making disturbances to this upper Sundarban delta. This village is threatened and vulnerable to Royal Bengal Tiger. Several tiger attacking was happened before ‘*Aila*’. After cyclone ‘*Aila*’ economy of village has destructed. As the agricultural lands are damaged by salinity, the male persons went elsewhere for better jobs.

It reveals in the survey that this forest fringed village is in the northern part of Sundarban and far away from core forest area. Villagers have not got any idea about Forest Rights Act although they are living around the forest since generations. All of the villagers stated that they have not degraded mangrove vegetation. In their view river embankments and river pollution caused severe damage to the mangroves. Grazing grounds are very few in the region. Some paddy stocks are available in the fields to cater the bovine. Most of the villagers has no permit to enter into the core forest area. Beside agriculture and fishery, honey collection is another source of income. Salinity is the main cause of degradation of soil.

Village – III

Name of the Village	:	Metyala
Block	:	Jhalda 1
Police Station	:	Jhalda
Sub Division	:	Purulia Sadar (West)
District	:	Purulia

After entering into Junglemahal, this village has selected in Purulia district. Metyala village is situated under Marru Mosima Panchayet and fall within Purulia Sadar (west) sub division. Total number of villagers in this forest fringed village is 502. Out of which 261 are male and 241 are female. Most of the persons are illiterate and living below the poverty line. Most of the persons are scheduled tribe origin. Some scheduled caste families are also residing in the village. Main species of the forest cover is *Neem, Palash, Shimul, Mahua, Sal* etc. The soil is lateritic with low fertile quality. Main source of income is agriculture and *bidi* making from kendu leafs. Agriculture is totally dependent upon seasonal rainfall. Some villagers engaged with animal husbandry.

During survey the villagers stated that, the area of forest is decreasing from earlier. Some valuable trees are stolen out from jungle for the purpose of supply to saw mill. Soil of the area is low in organic matter. During off season they were engaged with “100 days work” by panchayet. Some of them has cow and goat, but there is no specific area located for grazing. Villagers have access to forest and they collect firewood, Sal leafs, Kandu leafs, Mahua flowers from that. After passing of Forest Right Act, 2006 there is no specific change on their life. Local inhabitants are mainly Murra, Sing, Sardar etc.

Village – IV

Name of the Village	:	Lakshmanpur
Block	:	Hura
Police Station	:	Hura
Sub Division	:	Purulia Sadar (East)
District	:	Purulia

This village is a forest fringed village under Kangsabati (North) forest division. Purulia town is 30 km away from this village. “*Raakab*” is the forest covering this village along with other villages such as Kulgora, Morejungle, Keshargarh, Karudoba etc. The area is under Keshargarh panchayet. Main tree species are *Sal*, *Mahua*, *Peal*, *Neem*, *Kend*, *Bohera*, *Haritaki*, *Aamlaki*, *Bhalai*, *Kusum*, etc. The village has tribal population around 70 percent. Mainly Santhal Communities like Murmu, Hembram, Soren, Kisku, Hansda are the original inhabitants of the area. Literacy rate is nearly 50 percent. Village peoples are mainly depended upon agriculture. Some patches of agricultural land is there, which are totally depended upon rainwater. Villagers are agricultural labourer and occasionally they went outside for jobs. Some of them have cattle, but no specific land is there for grazing of livestock. They collect minor forest produces like *Sal* and *Kendu* leafs, different fruits. Mainly *Sal* and *Mahua* trees are felled earlier for woods. Now Kangsabati (North) Forest Division has planted some *Eucalyptus*, *Sonajhuri* and Cashew nuts trees under Social Forestry Scheme. Name of the nearby jungle is Raakab.

During survey it has stated by the villagers, that 30 to 40 years back Raakab was highly dense forest and it spread over Hura, Pucha, Balarampur and Manbazar area. Karudoba is a forest hamlet of 9 tribble families. They are totally depended upon forest resources. Villagers collect *Sal* and *Kendu* leafs and sold to local retailers. Some of them has cattle. Under social forestry scheme some *Eucalyptus*, *Sonajhuri* and Cashew nuts were plants by the forest department but this trees has no value in the life of the villagers, nor the degraded forest is recovering with these species of trees. In the near past there is no incidence or case leveled against the villagers for felling of trees.

Village – V

Name of the Village	:	Lichitpur
Block	:	Rabibandh
Police Station	:	Ranibandh
Sub Division	:	Khatra
District	:	Bankura

Lichitpur is a forest village in Khatra sub-division of Bankura district. Name of the nearby jungle is Danrkadoba. It is a dense *Sal* forest of southern portion of Bankura district. Other species of trees are *Aakashmoni*, *Palash*, *Mahua*, *Bhabri*, *Bhalai*, *Kusum*, *Haritaki*, *Dhok*, *Kend* etc. The village is nearly 40 km away from sub-divisional town Khatra. Kuleaam, Jhuribera, Banka Kocha are other forest fringed villages around Lichitpur. Mainly *Santhals* are the inhabitants of the village. *Sabar*, *Kumar*, *Dome* and *Mahatos* are the other castes living in the area. Economy is depending upon monsoon agriculture. Rocky spring is another source of water in agriculture. Beside this, collection of fire wood and Lac from *Kul* tree are other sources of income. Some persons are also engaged with basket making. Around 400 peoples are residing in the area out of which nearly 20 percent are literate.

During survey it has stated by the villagers, that they have the access to forest of Danrkadoba and Baromile for collection of *Sal* and *Kendu* leafs, *Mahua* flowers, mashrooms and lacs. Under social forestry scheme forest department are planting commercially valued trees. Soils are lateritic and low in organic materials. After decreasing of density of forest, trees like *Kusum*, *Kul* and *Sal* trees are also destroying. By this way production of *Lac* is now minimising. Most of the tribals have

little land to cultivate and they are marginal labourer. Water has scarcity during summer.

Village – VI

Name of the Village	:	Lotiaboni
Block	:	Gangajal Ghati
Police Station	:	Gangajal Ghati
Sub Division	:	Bankura Sadar
District	:	Bankura

This village is situated 25 km east from Bankura town. It was a village surrounded by dense sal forest known as Hanspahari. Kopatia and Deuli are other forest patches of the area. During 1980s decade almost 80 percent of Hanspahari jungle was felled down to establish Mejia Thermal Power Plant. Now on the deadlands of forest one Cement factory and so many sponge iron factories is operating. Nearly 500 villagers are residing in the village. Most of them are agricultural labourer. Out of agriculture previously they were depended upon forest but now they have joined in different factories and Thermal Plant as temporary labour. Agriculture is depending upon seasonal rainfall. Locality is vulnerable to Elephant migration from Dalma range. Most of the persons residing in village are from scheduled caste origin.

Villagers have stated that after establishment of Thermal Power Plant and Cement factory economy has improved. But forest and local environment has damaged. Fly ash and dust damaged the agricultural land and ponds. Different animal species and birds have vanished. Under social forestry scheme forest department planted eucalyptus and *sonajhuri* trees. Nearby Koro hill is also decorated by

sonajhuri. Villagers have nothing to collect from this forest. Area of the forest is decreasing.

4.7.1 Analysis of Field Survey :

After the field survey made in different parts of the State, some matters reveals about the project. Field survey conducted in three different regions of the State's forest – Terai, Mangrove and Junglemahal. Villages of these three different regions are varied by soil, forest types, inhabitants and by their problems. This research project has sum up all the problems under one roof; and the main echo of all such problem is degradation of forest.

In the terai dooars area the problem is not so serious as it is in South Bengal. Some incidence of tree felling are there in terai forest and also tourism and encroaching populations causing damage to the green vegetation. Sometime by heavy floods topsoil of the region are being washed away, which is one of the causes of desertification. Most of the tribal persons are engaged in tea gardens but they have no rights to access to the forest produce in National Parks and Sanctuaries. Organising mafia activities are common to many protected areas. Mafia activities take many forms like felling of commercially valuable timber trees, extraction and smuggling of precious medicinal and dye plants, poaching of wild animals of highly endangered species and trading in their body parts. The villagers are worried by crop damage and even deaths due to attacks by elephants. Since the year 1800 the British government was carrying out felling and timber operations in this area and much of the forests were cleared for tea plantation. Monoculture plantation for commercially valued trees has replaced the originality of the forest. Many villagers are living as labourers in the

tea gardens in acute poverty. Local villagers rely on the forest for cattle grazing, extraction of firewood, timber and other minor forest produce. This terai area is a biodiversity hot spot with different species of flowering trees, shrubs, herbs, canes, bamboos and wild orchids. The remoter hill forests still sheltered the wildlife and birds. But the commercial forestry is decreasing the natural forest of the region.

The Sundarban mangrove forest which is one of the proud of this State is also facing so many problems of decreasing of tree coverage and desertification especially after cyclone 'Aila'. During the field survey in the northern part of Sundarban village it reveals from the local persons that before 30 years back the forest area was highly dense. Declining of mangrove forest mainly caused due to salinization or increasing of sea water level. Over 102 islands on the Indian side of Sundarban, only 54 are inhabited and are home to some five million people. Due to global warming melting of polar ice increase the sea water levels and the southernmost inhabited islands changing their shape almost every day, with shifting courses of river channels and powerful tidal waves eroding land from one side and building sandbanks elsewhere. This is a process of natural activity of desertification in this region. Ghoramara Island is sinking by this process. Mangrove forests and swamps of Sundarban form a productive and protective barrier on the coastal line of West Bengal. The coastal forests act as effective wind breakers and resist soil erosion. But due to damaging of mangrove forest, sea water is encroaching towards the habitable area. Surveyed areas' economy is mainly depending upon fisheries. Almost every villagers used to catch fish by using boat. Due to salinization of soil, agriculture is not so fruitfull. One seasonal crop and vegetables like chillies, watermelon are cultivated. *Khalisha*, *Garan*, *Kaora* are different mangrove flowering trees from where they collect honey.

But after *Aila* super cyclone total situation has changed. Some portion of agricultural land totally salinized. Villagers have lost their lives, cattles and household articles. Villagers are depending upon the mangrove forest but they have no access to enter into the forest area. Villagers stated that the area of forest is decreasing as well as the rich biosphere of the area is under threat. Fresh drinking water supply, primary health, education are very poor and communication and transport far from satisfactory level. Irrigation has no existence for agricultural purposes.

South Western Junglemahal covers the districts of Bankura, Midnapore west, Purulia and some parts of Birbhum and Burdwan. Junglemahal area is totally different from terai and mangrove forest. Villagers of the surveyed area are mostly from scheduled castes and scheduled tribes. The total region's agriculture is completely depending upon rain water. Irrigation facility in surveyed area is nil. Massive deforestation has happened in one of the villages in Bankura. In all the regions forest department has planted commercially valued trees like eucalyptus, *sonajhury*, cashew nuts etc. for generating revenue. Thermal power project and some sponge iron units are causing air, water and surface pollution to the forest fringed villages. Some species of wild animals like Bengal fox, Hyena, Rabbit has disappeared from these forests. Original tree species of Junglemahal like *sal*, *mahua*, *kendu*, *peal*, *aamloki*, *Bhalai*, *dhok* trees are decreasing from the forest. The forest department planting commercially timber valued trees in open land, canal bank and in degraded forest areas; of which the local forest-dwellers has no access and no interest. Drinking water facility, primary health care is in poor condition. Peoples have to walk miles to fetch drinking water. During last one decade peoples of Junglemahal witnessed to political unrest between Government and Maoists. This political situation can't change their

lives. It is surprise that the forests of Junglemahal not developed any National Park or Wildlife Sanctuaries. Most of the villagers has cattles and forest areas are used as place of grazing. Some saw mills are operating in the region. Some incidents of tree feelings also caused in the area. Villagers are depending upon fruits, mahua flowers, mashrooms and firewood from the forest. Although soil of the area is lateritic and low in organic material, but there is no specific programme taken by the forest department to check soil erosion.

This chapter has discussed the causes of desertification. It is highlighted that desertification can caused either by climatic variation or by human activities. The research area has divided into three main regions of the State according to their geographical, social and soil variety. Problems are differing according to its geographical locations, but the main problem is degradation of forest coverage, which is one of the root cause of desertification. National Parks, Sanctuaries and activity of the persons living there has discussed. It is found that the person has symbiotic relationship with the forest. Developmental activity as well as natural disaster has changed the green coverage and personal life of the forest dwellers. Plantation of commercially valued timber trees can meat the demand of wood but it cannot check the menace of the problem.

REGULATORY MEASURES TO COMBAT DESERTIFICATION

Desertification is one of the most serious environmental and socio-economical problems of the world. The problem is more severe in the arid lands in the north-western part of the country. But, beside the mainstream desertification in the desert tracts some other parts of the country facing this problem due to climatic variations and human activities. Desertification is a global phenomenon of land degradation, which reduces the natural potentiality of the ecosystems and has a direct impact on the people in terms of vulnerability to food shortages and natural disasters, depletion of natural resources and deterioration of the environment. Unsustainable agricultural practices, overgrazing, deforestation and forest degradation resulting in loss of forest and vegetation cover, leading to further land degradation. So, the problem is very serious and vulnerable to the land and people of the country. Some measures were taken from ancient times to the modern period to arrest desertification and regenerate barren areas. International organizations took some steps to combat this problem globally. Indian judiciary plays a very significant role by giving series of its illuminating judgments. Indian parliament also passed some new legislations separating from colonial legislation.

5.1 Ancient thoughts for Combating desertification :

Under the Hindu culture moral injunctions acted as guidelines towards environmental preservation and conservation. Such injunctions were propounded and propagated. Kautilya in his Arthashastra highlights the importance of forestation for the progress of a nation. This ancient tradition has been followed in the civilization of

Moherjodaro, Harappa, Channudaro and Dravidian civilization, which flourished and perished in India in between 2000 and 5000 B.C. There is no record to tell us as to what exact environment protection policy in the above civilizations had been. But it seems that these civilizations lived in consonance with its ecosystem and the harmony with the environment was maintained by their small populations and their needs¹. Apart from the religious injunctions tribal peoples are protecting their forests through indigenous knowledge. The meaning of a forest is reflected in its cultural perception and societies have developed their notions of what forests mean to them over the ages. The frequency of sacred groves, some enchanted and magical and some inhabited by deities, is a common theme in Indian narratives. The tree was and is, personified as a deity and some trees are sacred in their association with deity. The spirit of the tree mingled with the spirit of the cults of water and mountains as well as those of animals². The religious notions and perceptions of certain plant species of the Hill Kharias, inhabitants of Simlipal, make Sal (*Shorea robusta*) a sacred species. Sacred Groves are one of the finest instances of traditional conservation practices and they also serve as centre of cultural and religious life. Due to population explosion and over-exploitation of forest resources for commercial purposes, numerous sacred groves were included in forest-working plans for selective felling. Nature worship in India is a very ancient tradition, described in the Epics of *Ramayana and Mahabharata*, in the ancient antiquities of human civilization – Vedas, India folk literatures, etc. The forest is the house of a great diversity of plants and trees, useful to human well-being. The interrelations of man and forests have given birth to many myths and legends in which forests are perceived in many ways : biologically, economically, emotionally,

¹ Thakur Kailash : Environmental Protection Law and Policy in India (Deap & Deap 1999) Pp 102 - 104

² Thapar Romila : Forests and Settlements in Mahesh Rangarajan edited Environmental Issues in India (Pearson Longman, 2007) p – 36.

ecologically and are associated in one way or the other with all these religious beliefs³. In the time of Mauryan dynasty Kautilya had made viable reforms in flora management. His knowledge of various categories of plants, their products, socio-religious uses, economical benefits and medicinal properties is well-reflected in the *Arthashastra*. Since forest was a state property, its proper maintenance and use had been undertaken by the state officials. This was a separate department controlled by a head *Samaharta*, similar to collector. Some officials are there and they were divided with their duties, responsibilities and accountability⁴.

5.2 Combating desertification in the Medieval Period :

The post Vedic period saw the emergence of two important religions – Buddhism and Jainism. Buddha and Mahavira, the protagonists of these popular religions, got enlightenment in the forests under sacred trees. The Gupta period known in history as the golden age experienced renaissance in all branches of learning and culture. The temples in the post – Gupta and medieval periods were not merely the abodes of gods and goddesses but were the eminent centers of culture and religions⁵. In this way the emperor himself took steps for protecting the natural resources. It is evident that the Indian subcontinent suffered substantial ecological loss due to destruction of forests resulting from unstable rulers for over nine centuries, after the fall of Gupta dynasty. During this period environmental conservation did not receive attention. The Mughals also made no attempts on forest conservation nor to eradicate desertification. Perhaps, they did not even realise the need. For their sense,

³ Jena Mihir Kumar : Forest and Tribal Sacred Complex in “Man and Forest” (D. K. Print world, 2000) Pp 169 – 171.

⁴ Rath Saraju : Kautilya’s attitude towards flora in the *Arthashastra* in V. N. Jha edited ‘Kautilya’s *Arthashastra* and social welfare’ (Sahitya Akademi, 2006) Pp 276 – 279

⁵ Das Harish Chandra : “Man Relationship with Forest in ‘Man in the Forest’ (D. K. Print world, 2000) p - 223

forest meant not more than woodland where they could hunt and collect some revenue.

5.3 Forest Conservancy during the British Period :

It the Mughal rulers took no steps to conserve forests, the early British administrators did worse. The Mughals were only indifferent to forests; the British administrators were predators. The only concern of the early British administrators in the Indian forests was to secure big supplies of teak and other timber for the Royal Navy. Till about the middle of the nineteenth century, the attitude of the British administrators, with some notable exceptions was :

- to obtain and export large quantities of Indian timber of use by the British Navy;
- to obtain timber for local constructions;
- to fell and export the scented sandalwood to various European Countries;
- to allow free development of agriculture by clearing forests;

It is indeed, ironical that the first officer, Captain Watson of the Police, appointed a conservator of Forest in November, 1806, was assigned the duties of procuring maximum quantities of Indian timber for building the ships of the British Navy. Watson plundered rather than conserved the forests in Travancore and Malabar. It was some justice that this post of so-called Conservator of Forest was abolished in 1823⁶.

⁶ Lal. J. B. : India's Forests, Myth & Reality (Natraj Pub. Dehra Dun 1989) p – 18.

5.3.1 Beginning of the organised forest management :

By the middle of the 19th century, the depletion of forests began to assume serious proportions in India. The British government was forced to recognise that forests in India were, after all, not inexhaustible. The first action to improve the forests in the country came in 1842, when Conolly, the then collector of Malabar, assisted by an Indian, Chatter Menon, a Sub-conservator of Forests, raised the pioneer teak plantations at Nilumbur. Gibson was appointed the conservator of Forest in the Bombay Presidency in 1847 and Cleghorn appointed in Madras in 1856. In 1856, a significant year in the history of forests in India, Lord Dalhousie emphasised the need for a definite forest policy⁷. No steps were, however, taken either to regulate feelings or to improve forests in Central and North India till a few years after the sovereignty of Queen Victoria as Empress of India was declared by a Royal Proclamation in 1858⁸.

The systematic management of forests in the country began with the appointment of **Dietrich Brandis**, a trained German Forester, as the first Inspector General of Forests in 1864. The objective of management of forests changed from obtaining supplies of timber of various purposes to protecting and improving forests and treating them as a biological growing entity. Almost simultaneously, with the appointment of the first Inspector General of Forests, the then Government of India took the mammoth decision of treating forests as a state property.

⁷ Upadhyay & Upadhyay : Handbook on Environmental law (Vol. – I) (Lexis Nexis 2002) p – 18.

⁸ Lal. J. B. : India's Forests, Myth & Reality (Natraj Pub. Dehra Dun 1989) p – 19.

5.3.2 Beginning of Forest Conservancy in Bengal :

During the period 1795 to 1850, the company raj chiefly viewed forests as limiting agriculture. In Bengal, forested lands, classified as wastelands, had been included in landlord (Zamindari) estates. Dr. T. Anderson, Superintendent of the Royal Botanical Gardens, Calcutta, was appointed as the first conservator of Forests in Bengal in August 1864. Under his direction operations for felling, conversion of logs into sleepers and the establishment of plantations began in British Sikkim, Jellapahar hills and the Darjeeling terai. In 1871, as the Bengal Forest Rules came into Force, the province remained a major importer of wood. By the end of the nineteenth century the colonial forest estate had emerged as a chequer-board of reserved, protected, and unclassed forests. In each of these distinct forest spaces district patterns of forest management emerged. With the last ninety years of the colonial period when through laws, administrative machinery, and scientific planning and execution of operations, forestry become a formal, directed endeavour of state-making in Bengal⁹.

5.3.3 Forest Legislations by the Britishers :

In 1865 the first attempt on forest legislation was made, and the Government Forests Act 1865 was enacted. Before that the founder fathers of forestry in India realised right from the beginning that forests needed a special law for better protection and management. Probably the law-makers also took inspiration from the prevalent forest laws in Europe, such as the French Forest Code of 1827, the Austrian Law (Forestgesetz) of 1852 and the Bavarian Law of 1852¹⁰. The first forest law titled

⁹ Sivaramakrishnan. K. : Modern forests, statemaking and Environmental change in colonial Eastern India (Oxford 1999) Pp 132 - 45

¹⁰ Bist. S.S. "Beginning of forest legislation in West Bengal" in "Banabithi" Forest Week Issue 2009

“The Government Forests Act, 1865, came into force on 1st May 1865 in many parts of the British India including Bengal.

5.3.3.1 Government Forests Act, 1865 (Act VII of 1865) and its drawbacks :

Section 1 of the GFA, 1865 defined Government Forests as “such land covered with trees, brushwood or jungle, as shall be declared in accordance with the second Section of this Act to be subject to its provisions”. Section 2 of the Act stipulated that the Local Governments may, by Gazette notification, bring under the provisions of this Act, any land covered with trees, brushwood or jungle, provided that such notification should not abridge or affect any existing rights of individuals or communities. Sections 3 and 4 of the Act authorized the Local Governments to frame rules, subject to confirmation by the Governor General in Council, for preservation of either all or some specified trees, shrubs and plants, within Government Forests by prohibiting felling and lopping thereof; by prohibiting the kindling of fires and the grazing of cattle within such forests; etc. The rules could also be framed for regulating the use of streams and canals for the transport of timber; for safe custody of timber from Government Forests by laying down the procedure for harvesting and disposal of such produce; and for regulating the duties of the Government Officers charged with the management and conservancy of Government Forests. Sections 7 and 8 empowered any police officer or person employed as an officer of Government to prevent infringement of the rules made in pursuance of this Act to arrest any person infringing any of such rules, and seize any implements, timber or forest produce involved in such infringement. Section 13 provided that all fines and penalties under the rules would be enforced by a Magistrate in the manner prescribed by the Code of

Criminal Procedure. Section 14 of the Act empowered the Local Government to remit the penalty or discharge the offender within three months after final judgement. Section 17 of the Act stipulated that no charge of an offence under the Act would be instituted except within three months after the commission of such offence.

The first reservations were notified in the official Gazette on 13th July 1865 according to the new Act in the forest areas of the present Darjeeling Division as well as the Sal forests of the Terai districts reserved from sale under the Waste Land Rules. A code of rules for the better management and control of the forests of British Sikkim, under the GFA, 1865, received the confirmation of the Government of India on 5th September 1866. Rules for the management of the forests in the Dooars were sanctioned by the Government of India through a notification dated 16th February 1871. These rules recognised two distinct classes of forests, viz. Open and Reserved Forest. All forest reservations in Bengal, or North Bengal to be precise, till 1877-78 proceeded on the basis of the GFA, 1865 and the rules made there-under.

Applications of the GFA, 1865 did not prove to be satisfactory. In the first place, it professed to deal only with the Government Forests. But the definition of the Government Forests given in the Act was a great source of confusion. Baden Powell (1882) called this definition imperfect and unsatisfactory. He remarked that: "Indeed, it is mischievous: since if a forest is land covered with trees, etc., and declared under the Act, it would follow that a tract of land not so covered, even if it were declared, would not be legally a forest, or subject to the law. It may happen that land perfectly bare, or covered only with grass, is taken up for a large plantation which can only be gradually completed; nevertheless, it would be important to have the whole area under forest law from the beginning." The Act also failed to provide a satisfactory procedure

for reservation of forests and settlement of rights thereon. In their letter dated 24th September, 1868 to the Government of Bengal, the Government of India observed: “Act VII of 1865, under which any forest rules would have to be sanctioned at present, contains no provisions concerning the regulation of forest rights, but only stipulates that the notification defining Government forests shall not abridge or affect any existing rights of individuals or communities. No rules, therefore, can be framed under this Act to facilitate the regulation of forest rights”. The Act even failed to define the term ‘Forest Officer’. The GFA, 1865 lasted only for 13 years and was superseded by a new Act titled ‘The Indian Forest Act, 1878’.¹¹

5.3.3.2 Indian Forest Act, 1878 (Act VII of 1878) :

The IFA, 1878 came into force on 8th March 1878 in many parts of the British India including the Lower Provinces (as the Bengal and Assam were referred to at that time). This Act provided for the constitution of ‘Reserved Forest’ (R.F.) [Chapter II] and ‘Protected Forest’ (P.F.) [Chapter IV] and laid down the procedure for this purpose. It also made provisions for the constitution of Village Forests (Chapter III) and management of forests and lands which, though ‘do not belong to the Government, yet need protection’ (Chapter VI). It empowered the Local Government to make rules for imposing duty on timber (Chapter VII); regulating transit of timber and other forest produce (Chapter VIII); and collection of drift and other stranded timber (Chapter IX). The Act identified the activities in the R. Fs (Section 25) and the P.Fs (Section 32) which would be regarded as offences and laid down the procedure for trial of offences and imposition of penalties (Chapter X). The Act made the provisions of the Cattle Trespass Act, 1871 applicable to the R.Fs and the P.Fs, but

¹¹ ibid Pp 2 – 3

laid down a different scale for levying fines for the impounded cattle (Chapter XI). The Act defined the term Forest Officer (Section 2), empowered the Local Government to invest the 'Forest officer' with certain powers (Section 71), recognised Forest Officers as public servant (Section 72), and barred them from trading in timber or other forest-produce (Section 74). The Act also made provisions for involving the beneficiaries from a R.F. or a P.F. in preventing fires and offences in such forest (Section 78). It also provided for a procedure for recovering the money due to the Government on account of revenue from the forest produce (Sections 81 and 82).

The IFA, 1878 was amended by the Forest Act, 1890 (Act V of 1890), the Amendment Act, 1891 (Act XII of 1891), the Indian Forest (Amendment) Act, 1901 (Act V of 1901), the Indian Forest (Amendment) Act, 1911 (Act XV of 1911), the Repealing and Amending Act, 1914 (Act X of 1914), the Indian Forest (Amendment) Act, 1918 (Act I of 1918) and the Devolution Act, 1920 (Act 28 of 1920).

After the promulgation of the IFA, 1878, fresh notifications were issued notifying all the reserved forests under the new Act.¹²

5.3.3.3 Indian Forest Act 1927 :

The preamble to the Act states that the Act seeks to consolidate the law relating to forests, the transit of forest produce and the duty leviable on timber and other forest produce. The Act establishes three classes of forests namely **Reserve**

¹² ibid p - 3

Forest, Protected Forest and Village Forest. Chapter V deals with control over forests not being the property of the government. Chapter VI deals with the duty on timber and other forests produce. Chapter VII deals with timber and forest produce in transit. The object of chapter VIII is to regulate the rights of the owner.

The Indian Forest Act establishes three categories of forests. The most restricted category is “**Reserved Forest**”. Sec. 3 of the Act provide power to the State Government on any forest land or Waste land which is the property of the government on which the government has propriety rights, or to the whole on any part of the forest produce of which the government is entitled, to declare that as Reserved Forest. Where the land is not a forest land or waste land, under Sec. 20 of the Act, government can issue any notification to declaring the land as Reserve Forest. Sec. 27 also gives the power to the government to declare forest no longer reserved. In reserved forests, most uses by local people are prohibited, unless specifically allowed by a Forest Officer in the course of settlement.

Under Sec. 29 (2) the state government is empowered to constitute any land other than reserved forests as “**Protected Forest**” over which the government has proprietary rights. Sec. 30 of the Act gives power to issue notification reserving trees or class of trees or any portion of such forest specified in the notification, and closed the rights of private persons not exceeding thirty years. The Act prohibit private persons to quarrying stones, on the burning of lime or charcoal or cultivations or herding cattle or hunting, shooting, fishing etc. This power has been used to establish state control over trees, whose timber; fruit on other non-wood products have revenue-raising potential.

A third classification is “**Village Forest**” described in Sec. 28 of the Act, in which the State government may assign to any village community to rights of government to or over any land which has been constituted a reserved forest. The state government may also make rules for regulating the management of such forests.

The Indian Forest Act establishes an elaborate procedure for settlement of rights when a reserve forest is intended to be constituted. The settlement procedures require the Forest officer called the Forest Settlement Officer to consider the claims of local inhabitants to certain usage, rights and inquiries. During all stages of inquiry, the Forest Settlement Officer is required to give notice to all the affected parties. The power to levy duty on timber and other forest produce in transit vests with the Central Government and State Government respectively.

Sec, 26 of the Act, prescribe punishment for acting prohibited in such forests. The Act, provide imprisonment for a term which may extend to six months, or with fine which any extend to five hundred rupees, or with both. For the purpose of West Bengal, by state amendment, the figure for punishment has doubled. For any prohibited acts in such forests in West Bengal imprisonment for a term which may extend to one year or with fine which may extend to one thousand rupees, has prescribed.

5.4 Forestry in Independent India :

The Indian Constitution is amongst the few in the world that contains specific provisions on environmental protection. The directive principles of state policy and the fundamental duties chapters explicitly enunciate the national commitment to

protect and improve the environment. Judicial interpretation has strengthened this constitutional mandate¹³. Apart from the Constitution of India the independent government took certain policies to safeguard the forest eco-system and passed so many legislations both by the Centre and the States. From 1951 onwards the government outlayed successive five year plans, in which there are some allocations for forestry sector. After independence, government introduced systematic management in forest areas which formed parts of ex-princely states.

In the result of passing of Zamindari Abolitions Act, large private forest areas vested in the government forest. These forest areas were neither surveyed nor demarcated on the ground, and while some occurred in compact blocks, others were in small, scattered patches, interspersed with cultivations or habitations. The legal status of such areas was also nebulous. In 1946 – 47 that is immediately before Independence the recorded area of the forests in the provinces of British India (excluding the area that was transferred to Pakistan as a result of partition) was 39.94 million hectare. With the addition of ex-princely and ex-proprietary forests, the recorded area of forests increased to 68.02 million hectare in 1950 – 51. The country adopted a national festival of tree planting, *Van Mahotsava*, in 1950 and resolved a new forest policy in 1952¹⁴.

5.4.1 The Constitution of India for wholesome environment :

Under India's federal system, governmental power is shared between the Union or 'Central' Government and the State Governments. Part XI of the

¹³ Divian & Rosencranz : Environmental Law and Policy in India (Oxford, 2001) p - 41

¹⁴ Lal. J. B. : India's Forests : Myth & Reality (Natraj Pub. 1989) p - 26

constitution governs the legislative and administrative relations between the Union and the States. Parliament has the power to legislate for the whole country, while the State Legislatures are empowered to make laws for their respective states. Article 246 of the Constitution divides the subject areas of legislation between the Union and the states. The Union list (List I) in the Seventh Schedule to the constitution contains 97 subjects over which parliament has exclusive powers to legislate. The State Legislatures have exclusive power to legislate with respect to 66 subjects in the State List (List II). Under the Concurrent List (List III), both parliament and the state legislatures have overlapping and shared jurisdiction over 52 subject areas including forests and protection of wildlives. The Constituent Assembly that framed India's constitution did not specifically consider the question of whether parliament or the state legislatures should regulate environmental matters. Instead, the distribution of environmental subjects within the three lists were influenced by the Government of India Act 1935 and by the conflict between those who wished to create a strong centre and others who preferred to secure more powers for the states.

Environmental protection and improvement were explicitly incorporated into the constitution by the constitution (Forty Second Amendment) Act of 1976. Article 48-A was added to the directive principle of state policy. It declares : 'The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country. Article 51A (g) in a new chapter entitled 'Fundamental Duties', imposes a similar responsibility on every citizen 'to protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures'. The Forty Second Amendment was also moved 'Forests' and 'Protection of wild Animals and Birds' from the State List to the

Concurrent List. Article 253 of the constitution empowers parliament to make laws implementing India's International obligations as well as any decision made at an international conference, association or other body¹⁵. Apart from these Articles of the Constitution the Apex court has elaborated the meaning of Article 21 that include environmental protection as Right to Life.

5.4.2 National Forest Policy, 1952 :

The first year of parliament stated the first post independence policy on forests in 1952, where 'national interest' overrode all interests and forests were viewed as a national asset. It was felt that "the revolutionary changes which had taken place during the interval in the physical, economic and political fields call for a reorientation of the old policy". It was stated that the value of forests was recognised not only in the physical field such as conservation of moisture and prevention of erosion, but also in the economic field, such as the development of agriculture, industry and communications. The National Forest Policy was revised in 1952 and was announced as a Resolution of the Government of India. It proposed the classification of forests on a functional basis into protection forests, national forests, village forests and treelands.

The national forest policy discouraged the indiscriminate extension of arable land by the excision of forests, for this not only deprived the local population of wood, grass etc. but stripped the land of its natural defence against dust storms, hot winds and erosion. Even before the revised National Forest policy was introduced, the Government of India had constituted a Central Board of Forestry (CBF) in 1950 to

¹⁵ Divan & Rosencranz : Environmental Law and Policy in India (Oxford 2001) Pp 41 – 47.

provide guidance to the government in the formulation of forestry policies and programme. This policy had recommended that forests should cover 33 percent of the total area. The policy laid stress on weaning away the tribal people, by persuasion from the practice of shifting cultivation, increasing the efficiency of forest administration by having adequate forest laws, giving requisite training to the staff of all ranks, controlling grazing in forests and promoting the welfare of the people¹⁶.

The important features of the forest policy resolution of 1952 were :

- i. Government has recognised that in order to achieve self-sufficiency, our forest earnings should be increased at a higher rate.
- ii. It lays stress on evolving a system of balanced and complementary land use.
- iii. It stresses the need for establishing treelands for the amelioration of physical and climatic conditions.
- iv. It proposes the classification of forests on a functional basis.
- v. It recognises the importance of forests in the development of a balanced economy and reiterates that an adequate share of land be earmarked for the growth of forests.

5.4.3 The Wildlife (Protection) Act, 1972 :

India's legal framework for the conservation of biodiversity is comparatively came after the Stockholm declaration. The words 'Conservation' and 'Protection' arrived in the sphere of environmental law only in the 1970's, with the coming into force of the wildlife (Protection) Act, 1972 and the Forest (Conservation) Act, 1980.

¹⁶ Desai Vasant : Forest Management in India (Himalaya Pub. 1991) p – 62

By virtue of Sec. 35 of the wildlife (Protection) Act, 1972, the State Government declared an area as '**National Park**' where its ecological, faunal, floral, geomorphological or zoological association or importance, needed to be constituted as National Park for the purpose of protecting, propagating or developing wild life therein on its environment. Similarly, in sec. 18 of the Act, the State Government can declare an area as **Sanctuary** if any area comprised within any reserve forest or any part of the territorial waters, which is considered to be of adequate ecological faunal, floral, geomorphological, natural or zoological significance for the purpose of protecting, propagating or developing wildlife or its environment. No person shall destroy, exploit or remove any wild life including forest produce from a National Park. Grazing of live-stock is prohibited in National Park is prohibited. Central Government has also holds the powers to declaring any area as National Park or Sanctuaries.

5.4.4 The National Forest Policy, 1988 :

The Government of India presented in December 1988 the National Forest Policy, 1988. In view of the social, economic and ecological importance of forests, considerable thought has to be given to the multifarious implications of the Forest Policy. Although the 1952 Forest Policy aimed at forest coverage of one-third of the total land area of the country, due to various constraints, this could not be attained. Rather, extensive diversion of forest land has taken place for non-forest use. The genetic diversity has also been considerably affected by the destruction of flora and fauna. The government has increasingly realised the great importance of forests in contributing to the ecological stability of the country. This has necessitated a re-

examination of the Forest Policy and giving emphasis to the conservational and ecological aspects¹⁷.

This new policy stressed upon Forest management, wildlife conservation, Tribal people, shifting cultivation and Forest based industries. Having regard to the symbiotic relationship between the tribal people and forests is a primary task of all agencies responsible for forest management, including the forest development corporations. The basic objectives of the new forest policy are :-

- i. Maintenance of environmental stability through preservation and, where necessary, restoration of the ecological balance that has been adversely disturbed by serious depletion of the forests of the country.
- ii. Conserving the natural heritage of the country by preserving the remaining natural forests with the vast variety of flora and fauna.
- iii. Checking soil erosion and denudation in the catchment areas of rivers, lakes, reservoirs in the interests of soil and water conservation, for mitigating floods and droughts.
- iv. Checking the extension of sand-dunes in the desert areas of Rajasthan and along the coastal tracts.
- v. Increasing substantially the forest / tree cover in the country through massive afforestation and social forestry programmes.
- vi. Meeting the requirements of fuelwood, fodder, minor forest produce and small timber of the rural and tribal populations.
- vii. Increasing the productivity of forests to meet essential national needs.

¹⁷ Desai Vasant : Forest Management in India (Himalaya Pub. 1991) p – 71

- viii. Encouraging efficient utilisation of forest produce and maximum substitution of wood.
- ix. Creating a massive people's movement with the involvement of woman, for achieving these objectives.

5.4.5 Forest (Conservation) Act 1980 :

In India deforestation is taking place at a rapid rate, which may cause ecological imbalance and lead to environmental deterioration. So, with a view to prevent further deforestation, the Forest (Conservation) Act of 1980 was passed. The Indian Forest Act of 1927 was adopted to consolidate the law relating to forests, including (i) Reserved Forests, (ii) Village Forests, (iii) Protected Forest, (iv) Non-Government Forests. The transit of forest produce and the duty leviable on timber and other forest produce as regulated under the Indian Forest Act of 1927. This Act has nothing strictly observed for the conservation and protection of forest as the government contractors are provided licences to fell the tree but instead of felling the particular tree, they cut down several other trees. In addition, under the Act, tribals who are the most conservators, and protectors of forests were ousted from the forests; hence, forests are not adequately and properly conserved and managed. But the Forest (conservation) Act of 1980, restored their rights. By virtue of this Act they are entitled to stay in the forest and forest are being protected and conserved by them. The Indian Forest Act, 1927 adopted conservation and protection of forest only in regard to the reserved and protected forests; village forests and non-government forests without any concrete scheme. But with the adoption of the Forest (conservation) Act of 1980 the

supervisory role of the state government to all types of forest has been shifted to Central Government under section 2 of the Act¹⁸.

The Act was enacted with the twin objectives of restricting the use of forest land for non-forest purposes and preventing the de-reservation of forests that have been reserved under the Indian Forest Act. However, in 1988, the Act was further amended to include two new provisions, where it sought to restrict leasing of forest land to private individuals, authority, corporations not owned by the government and also restraining clear felling of naturally grown trees. The parts of the Act, which has been prone to litigation, especially in the higher courts – have been the grant for mining leases in forest regions. The Act, and a number of judicial decisions interpreting it, has made it clear that before granting a lease covering any reserved forest or any forest land for use of non-forest purposes, which will include mining operations, prior approval of the Central Government is a must. It has also been clarified that this bar imposed under section 2 of the Act shall apply even to cases of renewal of leases.

5.4.6 Five Years Development Plans :

The Forest Policy aspired well, but the efforts proposed in the forestry sector in successive **Five Year Plans** were much too inadequate to meet those aspirations. Forestry also suffered at the hands of those who managed state finances. They used a double-edge sword against forests. On the one hand they sought maximum revenue from forests, and on the other allowed little expenditure on their protection and

¹⁸ Chitkara. M. G. : Encyclopedia of Ecology, Environment And Pollution (vol. III) (APH Pub. 1998) p – 179

conservation. It would be seen that allocations to forestry from First to sixth plan have not touched the figure of even one percent of the total outlay in the public sector¹⁹.

The First and Second Five Year plans are maximum concern about survey, demarcation and rehabilitation of vast forest areas which as a result of merger of princely States and abolition of Zamindaries have come to vest in the government. The most significant provision in the sectoral programme, however, was for checking soil erosion and halting the menacing march of the desert in Rajasthan. In Shiwaliks region of Punjab forest department took pioneer efforts to control soil erosion. The important institutional development in the First plan was the establishment of the Desert Afforestation Research Centre at Jodhpur for investigating methods of desert control, by creating vegetal cover and shelter belts. During second plan construction of forest roads and economic plantation received more attention.

The Third Five year plan enticed special interest in meeting the long term requirement of the country in order to reduce the yawning gap between the demand and supply of forest produce and in order to ensure more economic and efficient utilization of valuable forest products. In order to attain self-sufficiency in industrial timbers, fuel wood and other forest products, large scale plantation of industrially valuable species, through centrally sponsored schemes of “Plantation of Quick Growing Species” were undertaken. A new scheme “Pre-investment Survey of Forest Resources” was also started during the plan in 1965 in collaboration with the United Nations Special Fund (UNSF) and Food and Agriculture Organisation (FAO) with a

¹⁹ Lal. J. B. : India's Forests, Myth & Reality (Natraj 1989) p – 30

view to investigate the availability of raw materials in the possible industrial catchment areas and determine their economic viability²⁰.

The Fourth Five Year plan recognised that the major problem of India's forests was their low productivity and laid emphasis on increasing the growing stock by extensive plantations.

Before the finalisation of the Fifth Five Year plan, a major development that took place, relating to agriculture and allied sectors was the appointment of the National Commission on Agriculture (NCA) in August, 1970. The proposal in the Fifth Plan were based on the recommendations of the NCA. The major objective identified in forestry was the creation of large scale man made forests through institutional financing. The plan proposed a network of State Forest Corporations, for the establishment and management of man-made forests. An amendment to the Constitution was made to bring the subject of forest on the concurrent list.

'Development without destruction' was the theme of the Sixth Five Year Plan, which laid emphasis on ecological and social security. The major thrust of the plan was saving natural forests from further depletion, formation of new fuel and fodder reserves to meet the growing needs of local population and creation of more National Parks and Wildlife Sanctuaries. The legislative development was the enactment of the Forest (Conservation) Act, 1980, which prohibited dereservation of a forest²¹.

²⁰ Thakur Kailash : Environmental Protection Law and Policy in India (Deep & Deep 1999) p – 113

²¹ Lal J.B. : India's Forests, Myth & Reality (Natraj 1989) p – 34

The Seventh plan which began in 1985, has the telling words, “Forests for survival”, as its theme. The plan aims at preserving biological diversity, increasing the vegetal cover by massive afforestation into a people’s movement, enhancing the productivity of existing forests, and meeting the basic needs of people such as fire wood for domestic energy, fodder for cattle, and small timber for agricultural implements and for dwellings²².

The next Five Year Plans evolve on early warning and rapid response system through strengthened, meaningful, comprehensive and integrated surveillance system on sustainable development by linking health, safety and environmental and forestry monitoring networks. During these plans it would also be endeavour to internalize the spirit of **Agenda 21** of Rio declaration in our environmental management and economic development strategy. In this period the concept of **Sustainable Development** has emerged as a prescription for human survival and at the same time ensures long-term maintenance of ecosystem health.

5.4.7 Joint Forest Management :

West Bengal is the pioneer state in India in initiating Joint Forest Management (JFM). The movement of JFM under the leadership of Ajit Bandyopadhyay had its genesis at Arabari in Midnapur district of West Bengal, where 618 families of 11 villages were motivated in early 70’s to rejuvenate 1,186 hectare of degraded Sal forest by roping in their participation through a set of activities of employment generation and sharing of profits from such forests. This was followed by the adoption

²² ibid

of the government's decision in 1989 to share 25 percent of usufructs and net profit of the intermediate and final yield respectively.

In pursuance of the objectives of J.F.M., the Ministry of Environment and Forest issued a circular in June 1990 to various state Departments of Forest (vide no. 6 – 21 / 89 – FP) encouraging the involvement of village communities and voluntary agencies for regeneration of forest land. Most of the states have issued notifications pertaining to JFM in line with the central government circular. However, the legal bases of these notifications and its place in legal hierarchy has been a major concern to ensure real benefits to the people along with sustainability to forest products²³.

Successful execution of the West Bengal Social Forestry Project in the 1980's opened up avenues of Forest Department Personnel for interaction with communities in fringes of forests and building up of rapport. The JFM movement gained momentum with the implementation of World-Bank-aided West Bengal Forestry Project during 90's. The main objective of which inter-alia was to promote people's participation in management and development of forests. Subsequently, India Eco-Development Project implemented in Buxa Tiger Reserve and UNDP in Sunderban Tiger Reserve came as a boon to carry on with the process of consolidation of JFM. As on March, 2007, there are 4,084 Forest Protection Committees (FPC) are in the State, in which 3,603 in South-West Bengal, 430 in North Bengal and 51 in Sunderban comprising of total number of 5,62,202 members protecting the total forest areas over 5,41,751.797 hectare²⁴.

²³ Upadhyay & Upadhyay : Handbook on Environmental Law (/vol. – I) (Lexis Nexis 2002) p - 49

²⁴ W.B. State Forest Report (2006 – 07) P - 82

5.4.8 Panchayat (Extension to the Scheduled Areas) Act 1996 (PESA) :

The panchayat stands on a higher footing, as it derives its sanctity from the constitution and thus any law contrary to that is liable to be struck down. The panchayat are empowered to legislate on matter specified in the Eleventh Schedule of the Constitution. The items that relate to forestry, including land improvement, Soil Conservation, Watershed development, social forestry, farm forestry, Minor Forest Produce (MFP), fuel fodder etc. This Act specifically endows the *Gram Sabhas* with ownership rights to MFP, management of water bodies etc.

This PESA limited only to tribal areas in eight states, gave rights over MFP to *gram sabhas*. But it failed to define MFP. Forest departments of most states used this ambiguity to retain control over MFP trade²⁵. Technically, it is meant to provide for the extension of the provisions of part IX of the Constitution, relating to the panchayats, to the scheduled areas. At the same time, it gives radical powers to the tribal community and recognises its traditional community rights over natural resources.

5.4.9 The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 :

Forest dwelling tribal people and forests are inseparable. One cannot survive without the other. The conservation of ecological resources by forest dwelling tribal communities has been referred to in ancient manuscripts and scriptures. The colonial rule somehow ignored this reality for greater economic gains and probably for good

²⁵ Down to Earth (Nov. 1 – 15, 2010) p – 29

reasons prevalent at that time. There is a recognition of the fact that forest have the best chance to survive if communities participate in its conservation and regeneration measures. Insecurity of tenure and fear of eviction from these lands where they have lived and thrived for generations are perhaps the biggest reasons why tribal communities feel emotionally as well as physically alienated from forest and forest lands. So, considering the symbiotic relationship of Scheduled Tribes dwelling in the forests for generations, Forest Rights Act, 2006 was enacted.

The Act defines, “forest dwelling Scheduled Tribes” as the members or community of the Scheduled Tribes who primarily reside in and who depend on the forests or forest lands for bona fide livelihood. According to the Act, “Other traditional forest dweller” means any member or community who has for at least three generations prior to the 13th day of December, 2005 primarily resided in and who depend on the forest or forests land for bona fide livelihood needs. Here “generation” means a period comprising of twenty-five years. Section 3 of the Act defines about the forest rights of the forest dwellers, which includes right to hold and live in the forest land, right to collect, use and dispose of minor forest produce, other community rights of uses or entitlements such as fish and other products of water bodies and grazing and so on. Section 5 of the Act, defines duties of holders of forest rights. Primary duty is to protect wildlife, forest and bio-diversity and ensure that adjoining catchments area, water sources and other ecological sensitive areas adequately protected. It is also provided by the Act, that occupation of forest land of an individual or family or community shall be restricted to four hectares. This Act also put an end to the holds of forest department over the adivasis by recognizing the gram sabha as the authority to recognise and verify claims. The Forest Rights Act 2006

resolved the ambiguity in PESA and clearly says *gram sabhas* will hold rights to MFP defined as “all non-timber forest produce of plant origin”, including bamboo, tendu leaves and tussar silk cocoons.

5.5 Forest Legislation in West Bengal :

Keeping in view of the present research project it is highly indispensable to highlight on the legislations passed only for West Bengal. Law was passed after independence as well as much before the independence. These Laws can be called as protection of green coverage legislations rather protection of forest. Because all the laws are mainly applicable to urban city areas.

5.5.1 The Bengal Public Parks Act, 1904 :

This Act was passed to protect public parks and gardens in Bengal from injury, and to secure the public from molestation and annoyance while resorting to such parks and gardens. But this Act is only confined to five Gardens in the State. Those gardens are:-

1. The Indian Botanical Garden, Sibpur
2. The Zoological Garden, Alipur
3. The Eden Gardens, Calcutta
4. The Liroyd Botanical Garden, Darjeeling
5. The Victoria Pleasance, Darjeeling

5.5.2 The West Bengal Private Forests Act, 1948 :

This Act was passed for conservation of forests and for the afforestation of waste lands in West Bengal, where such forest lands are not the property of the government. Section 3(1) stated that the State Government may, by notification, direct that every owner of a private forest shall prepare and submit working –plan for the conservation of such private forest. If the owner of such forest fails or neglects to carry out any of the terms and conditions of such plan or removes any tree from such forest, section 6 of the Act prescribes punishment of imprisonment which may extend to three months or fine which may extend to one thousand rupees or with both. Regional Forest Officer has the power to control the activity in private forest. The State Government may impose cess in the prescribed manner on all private forests within a notified area. Section 29 of the Act, provides punishment for imprisonment extend to one month or with fine which may extend to five hundred rupees or with both, if any person fells, lops, taps or burns any tree or quarries any stone or burns any lime or charcoal, or removes any forest produce from a controlled or vested forest, or clears any land for cultivation, set fire to a controlled forest or permits cattle to damage any tree.

5.5.3 West Bengal Town and Country (Planning and Development) Act 1979 :

The Act stated in Section 31(4) (b) (i) that, the land use and development control plan allocate areas or zones for residential, commercial, industrial, agricultural, forest, wildlife etc. This Act is clearly mentioned that a planned town must be associated with certain number of trees, otherwise the developmental work is destroying the city's lungs.

5.5.4 West Bengal Trees (Protection And Conservation in Non-Forest Areas) Act 2006 :

Considering Article 48-A of the Constitution of India, this Act was passed in the public interest, to prevent the felling of trees in non-forest areas and to encourage and promote plantation of trees and to protect and conserve trees. Particularly those looked upon as sacred groves, or identified as belonging to an endangered species or given the status of heritage, bearing in mind that trees have great environmental value and are renewable resources.

Section 4 of the Act restrict the person to fell or to cut, remove or dispose of any tree in the non-forest areas. Section 5 is stating about permission to fell trees and it is also mentioned that no permission is required in rural areas, if not more than three trees are felled at a time. By virtue of Section 8 of the Act, every person should have obligation to plant trees, who fells any tree. There is a provision in Section 9 of the Act, that development agency or the promoter, intending to carry out development in the form of erection of high rise for the purpose of residential, commercial, industrial or institutional uses, undertake plantation for trees.

Section 11 of the Act provide penalty for felling of trees, For violation of this Act there is punishment of imprisonment upto one year and fine upto rupees five thousand or with both. But if the offender is a development agency or the benevolent activists or the entrepreneur or promoter fails to implement the plantation plan as approved under Section 9(4) of the Act, shall be punished with imprisonment which may extend to two years or with fine which may extend to ten thousand rupees or with

both. The Act provides a schedule, where eleven types of trees are there for felling which permission is mandatory. The scheduled trees are –

1. *Acacia catechu* (Khair)
2. *Bombax ceiba* (Simul)
3. *Dalbergia sisoo* (Shishu)
4. *Diospyros melanoxylon* (Kend / Kendu / Tendu)
5. *Gmelina arborea* (Gamar)
6. *Madhuka indica* (Mahua)
7. *Michelia champaka* (Champ)
8. *Shorea robusta* (Sal)
9. *Swietenia mahagony* (Mahogany)
10. *Tectona grandis* (Teak / Segun)
11. *Mangrove trees*

5.6 Some Forest Movements :

Alongside advances in civilizations, there is disjuncture in set of relationships between men and nature. This disjuncture is manifested through considerable downgrading in the quality of basic natural resources like air, land and water, and other supportive life systems like forests, marine resources and the like. All over the world, the people at local levels, who have been directly victimized by depletion of natural resources like water, fuel, fodder etc. are organizing themselves to raise voice against this menace. There are instances of people's movements in all parts of the world for articulation of their demand for restoration of status quo and total abandonment of capricious ways of modernization. In this ever increasing and

expanding battle of the common masses in urban and rural areas, new discourse is emerging with focus on reinterpretations of terms like common good, citizenship share, human rights, democracy and partnership. Relations between the people and the state are being re-examined and restated to unfold the real face of the contradictions between ‘development’ and ‘survival’ of the common people²⁶.

The period of environmental degradation can be matched with the advancing footprints of the European colonists in America, Africa, India and, to some extent, the Pacific-rim countries. To begin with, American forests received the brunt of the British axe to be followed by Africa and India. Uprisings by the Santhals of Chhotanagpur in 1876 and the Marias of Bastar in 1910 were expressions of contempt against such denial of right on the sustenance base on these traditional forest dwellers. In Bastar the forest department was formed in 1899 and in 1909 the Matla forest block, entirely populated by forest dwelling Marias, was “reserved” solely for use of the state, refuting traditional livelihood and residence right of the people. In protest against such an atrocious decree, the **Maria rebellion** took place in 1910 when several state officials were killed and the rebels laid siege on the state capital at Jagdalpur²⁷.

Though the period from 1770 to 1800 is particularly marked by unrest and statemaking in the highland frontier of Western Bengal, **Chuar unrest** participated in the production of these primitive places through their influence on colonial imagination, ethnology and administrative policies. By the early 1800s, the jungle mahals witnessed a return to zamindari control of local policing. Jungle provinces

²⁶ Introduction of Pawar, Patil & Salunkhe edited Environmental Movements in India (Rawat 2005) p - 11

²⁷ Chaudhuri Kisor “Right to Survive” an Article published in “The Statesman” Kolkata, Tuesday, 21 March, 2006 p - 6

were the areas where Zamindars and their militia (Paiks and Chuars) are most dominant. By the beginning of 1796, the intensified depredations of chuars in the hilly tracts of Midnapore compelled local officers to seek military assistance from Calcutta. The chuars traversed the district in boodies of five to eight hundred, driving cattle and anything else that moves before them. The chuars concentrated their attacks on officials appointed for revenue collection, causing them to abandon their posts and raiyats to flee to more peaceful estates like Baminbhoom and Burdwan²⁸.

Forest, next to land, was the most important resource on which the tribals subsisted. A series of forest *Satyagrahas* were launched in 1930s by the Indian National Congress to demand restoration of tribal's customary rights to extract timber and collect minor forest produce for their consumption and sale. The freedom movement aroused expectations among the tribals that days of their oppression were numbered and that the era of *Swaraj* which could lead to the restoration of their rights in land and forests would dawn. After independence their rights and concessions in forest and forest produce were regulated and even restricted and their problems multiplied as the forests, which they were accustomed to look upon as their own; to be exploited for their benefit; was no longer their own; and their movements in it were subject to check and control. The tribals felt cheated. The tribes of Madhya Pradesh were the first to strike. In 1957 a forest movement developed in Khobi village (Ambikapur – Sarguja) as the base, involving the kharwal tribe, who were led by their Gond leader. However, in an encounter with police on December 18, 1957 two persons died and several were injured. Similar movement died down after a bloody conflict on February 1, 1958 in Palamau District of Bihar. Restriction of their rights in

²⁸ Sivaramakrishnan, K. : Modern Forests (Oxford 1999) Pp 53 – 56

forest has continued as a burning issue in Gond community 1940 onwards. The “**babbejari revolt**” is well known in the history²⁹.

One such struggle over a resource and its meaning occurred in 1972 when women in the Garhwal region hugged trees to prevent them from being felled by a sports-goods contractor licenced by the state. This resistance was effective in restraining tree felling locally and it later captured the environmentalist imagination worldwide. The **Chipko Movement** became an archetype for an environmental form of resistance to the felling of trees both in India and abroad, contributing to the building up of an environmental consciousness³⁰. In the next decade, Chipko spread rapidly to other parts of Uttar Pradesh Himalaya. In over a dozen separate incidents, villagers successfully stopped felling operations. The movement has received wide publicity, and its two main leaders, Chandi Prasad Bhatt and Sunderlal Bahuguna, have emerged as among the best-known environmentalists in India. A decade after it began, Chipko’s echoes were picked up in northern Karnataka, where a similar conflict between villagers and the forest department gave rise to the **Appiko Movement** (Appiko means ‘to hug’ in kannada). In this district, Uttara Kannada, the forest department had for several decades been promoting teak plantations after clear-felling the existing mixed semi-evergreen forests. Inspired by Chipko, in August 1983 the villagers of Sirsi taluk requested the forest department not to go ahead with selection felling operations in the Bilegal forest of Hulekal range. When their requests were unheeded, villagers marched into the forest and physically prevented the felling from continuing. A particularly important case in Karnataka involves the transfer of land previously under the control of the revenue department to a joint-sector

²⁹ Tiwari. D. N. : Forestry in National Development (Jugal Kishore & co. 1986) Pp 198 - 99

³⁰ Brara Rita in Veena Das edited “Handbook of Indian Sociology”

company, formed to grow industrial wood for the exclusive use of one factory, Harihar Polyfibres (owned by the powerful industrial house of the Birlas). These areas have been traditionally used by villagers for fuel and fodder collection, and they have organized several '**Pluck and Plant**' *satyagrahas*, symbolically uprooting eucalyptus (a species of very little use to the local economy) and planting saplings of more 'useful' local species instead³¹. In August, 1979 the Bihar Forest Corporation's policy of replacing sal and mahua forests with teak has been sharply opposed by Ho, Munda and Santhal tribals in the Chottanagpur area.

In early 1990, a group of adivasis who lived in the Dangs district of Gujarat entered an area of reserved forest and began clearing it for cultivation. They claimed that the area was *juni gaathan*, meaning the site of an old village in which they had an ancient right of cultivation³².

In Dinkia village in Odisha's Jagatsinghpur district, residents gathered around fragile bamboo gates, armed with sticks, brooms and lathis. Union environment ministry gave environmental clearance to South Korea's Pohang Iron and Steel Company (**POSCO**) to build its steel plant along with a captive power plant and a port in Jagatsinghpur. After the decision of allowing the project, angered protesters caused movement against the project³³. In Niyamgiri hills of the same state Dongria Kondh tribes are celebrating after the authorities in Delhi have ruled that a British based company '**Vedanta Resources**' will not be permitted to mine there for bauxite³⁴. **Mendha Lekha** would get management rights over 1,832 hectares and

³¹ Gadgil & Guha : This Fissured Land in "The Use And Abuse of Nature (Oxford 2008) Pp 224 – 227

³² Hardiman David : Histories for the Subordinated (Permanent Black, 2006) New Delhi p - 362

³³ Juneja Sugandh & Sayantan Bera in "Down To Earth" (Feb 16 – 28, 2011) p – 9

³⁴ Buncombe Andrew & Alistair Dawber in "The Statesman" (Kolkata, 26th Aug. 2010) p – 5

Marda would get rights over 517 hectares of forestland in Gadchiroli district of Maharashtra and this two villages are the first in the country to win community rights over forest under Forest Rights Act, 2006. In the same time forest dwellers of Orissa have been granted conditional title to forest lands³⁵. Despite stiff opposition from residents and activists, the APPCB, held a public hearing for a proposed laterite mining project at **Bhamidika**, a notified Scheduled Tribe village in Visakhapatnam district. Protestors say the mining will cost the tribes their livelihood and land, and put the area's ecology at risk³⁶. Spread over 80,000 hectares in West Singhbhum district, **Saranda** is the largest Sal forest in Asia. It also stands atop one of the world's largest single deposit of iron-ore over 2,000 million tones. At least 36,000 Ho tribals live inside the forest. Most of them collect minor forest produce like Sal leaves and seeds to earn a living or are small farmers. Earlier in February, 2012, the centre had renewed and expanded the lease of SAIL to mine iron ore in the forest. The public sector unit is the only company mining inside the forest. Nineteen more projects to mine iron-ore in the heart of Saranda are in different phases of approval. Strategically, it comes next to the Dandakaranya forests of Chhattisgarh, which the Maoists have declared the liberated zone. Analysts say the mining leases inside Saranda are in violation of the Fifth Schedule of the Indian Constitution that protects the rights of the tribals like the Ho³⁷.

So, from the time immemorial, traditional rights of the forest dwellers were ignored. Colonial legislations was made mostly for surveillance and revenue collection. Alongside concerns about survival and livelihood of tribal people, is the concern about India's declining and degrading forest cover and consequent threat to

³⁵ Pallavi Aparna & Sumana Narayanan in "Down to Earth" (Sept. 1 – 5, 2009) p – 17

³⁶ Suchitra. M. in "Down To Earth" (Dec. 1 – 15, 2011) p – 11

³⁷ Bera Sayantan in "Down To Earth" (Apr. 16 – 30, 2012) Pp 16 - 19

wild life and environment. Forest rights are the result of thousands of movements throughout the country from very beginning of the colonial days and movements are still going on.

5.7 Recent Desertification Control Technologies in India :

Desertification is a major problem in the drylands of India, affecting the way of life for its inhabitants. The problem is more severe in the arid lands in the north western part of the country, especially in the desert tracts of Rajasthan and Gujarat, as also in the states of Haryana and Punjab. Studies have been carried out at the Central Arid Zone Research Institute (CAZRI), Jodhpur, to understand the problem, its severity and its spatial distribution. Over the past few decades CAZRI has also carried out researches for better technologies to counter the ill-effects of desertification. CAZRI taken different steps like Wind Erosion Control, Sand dune stabilization, Shelterbelt plantation to check the menace of desertification. The organization also controlled the new dunes and used to manage the permanent pastures and rangelands. But all these efforts are taken only in the north western desert part of the country.

5.8 International Environmental Law :

In International law, a distinction is often made between hard and soft law. Hard international law generally refers to agreements or principles that are directly enforceable by a national or international body. Soft international law refers to agreements or principles that are meant to influence individual nations to respect certain norms or incorporate them into national law. Although these agreements sometimes oblige countries to adopt implementing legislation, they are not usually

enforceable on their own in a court. International institutions are generally not responsible for directly implementing and enforcing international environmental law, but they often play important monitoring, informational and diplomatic roles.³⁸

5.8.1 Stockholm Conference of 1972 on the Human Environment :

The U.N. Conference on the Human Environment held at Stockholm from the June 5 to June 16, 1972 has rightly been reckoned as the first major attempt to solve the global problems of conservation and regulation of human environment by international agreement on the Human Environment. The declaration proclaims that, Man is both creature and mouldar of the environment, which gives him physical sustenance and affords him the opportunity for intellectual, moral, social and spiritual growth. The protection and improvement of the human environment is a major issue which affects the well being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all Governments. The declaration is divided into two parts – first part proclaims seven truths about man in relation to his environment and 26 principles.

5.8.2 Earth summit of 1992 at Rio de Janeiro :

The Earth Summit or United Nations Conference on Environment and Development (UNCED) was held at Rio De Janeiro (Brazil) from 3rd to 12th June 1992. It was the largest international conference in the history of international relations. It was attended by 178 nations and more than 20,000 participants. UNCED Chief Mourice Strong described it “Parliament of the Planet”.

³⁸ Divian & Roseneranz : Environmental Law and Policy in India (Oxford 2001) p – 579

The Summit at Rio had some major accomplishments. It left us with a number of valuable agreements, including a biodiversity treaty and a frame work convention for dealing with climate change. The Rio Declaration and the Forest principles were endorsed and **Agenda 21** a 300 page plan for achieving sustainable development in the 21st century was also adopted. It was a big step taken at the UNCED. Agenda 21 was a through and broad ranging programme of actions demanding new ways of investing in our future, to reach global sustainable development.³⁹

Principle 7 of the conference proclaims that : State shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. Principle 22 also proclaims that, the indigenous people and their communities, and other local communities, have a vital role in environmental management and development because of their knowledge and traditional practices. State should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

This conference confirms the symbiotic relationship of forest dwelling persons with the nature and it also confirm that the nature should remain protected with the complete harmony of man and nature.

5.8.3 Earth Summit of 2002 at Johannesburg :

Faced with alarming deterioration in the earth's vital life – supporting ecosystems, world leaders gathered at the world Summit on Sustainable Development

³⁹ The Competition Master (Nov. 2002, New Delhi) p – 326

(WSSD) in Johannesburg, South Africa from 26th August to 4th September, 2002 to pursue new initiatives to implement sustainable development and build a future of prosperity and security for their citizens.

Prior to this summit a special session of the general assembly held in June 1997, which adopted a comprehensive document, entitled programme for the further implementation of Agenda 21, prepared by the commission on sustainable development. The Johannesburg Summit offered a historic opportunity to confront serious and growing threats to human well-being such as world's forests have shrunk in the last decade by an area larger than Venezuela.⁴⁰

5.8.4 United Nations Conference On Desertification 1977 :

Some 500 delegates from 94 countries gathered in Nairobi, Kenya from 29th August to 9th September 1977 to discuss the problems of desertification. The reasons are evident in the documents prepared for the conference, for they show that the problems of desertification are larger, more widely shared, and require greater and longer term action than expected. Just few years before this conference, in 1973 the Sahelian region of Africa, the southern margin of the Sahara, had seen five years of uninterrupted drought. Lake Chad had shrunk to a third of its normal size, the Niger and Senegal rivers had not flooded, leaving barren much of the best agricultural land of the area. Shallow and seasonal wells dried up. Vegetation disappeared as hungry animals stripped the land. Patches of newly created desert seemed to grow and link with the great desert to the north. As people fled the stricken area in large numbers the world was faced with a series of unanswered questions :- was the Sahelian drought

⁴⁰ Civil Services Chronicle (Oct. 2002, New Delhi) p – 12

evidence of larger changes of global climate? Was the Sahara expanding south? What implications did this have for the countries directly involved? For their neighbours? For the international Community?

U.N. General Assembly called for a world conference on desertification to discuss all unanswered questions. Though this is not a convention, but it discussed some important matters relating to desertification. During its two week session the Desertification Conference spent most of its time considering a plan of Action. A draft plan had been prepared by the secretariat, in consultation with an international group of experts and with the help of governments at four regional meetings as well as at meetings of the UNEP Governing Council. The conference resulted in document of 104 paragraphs, containing 28 recommendations for action. The conference suggested for not only to stop the physical processes of desertification, but to educate people in minimizing the harm done to the fragile ecosystems of drylands by existing economic and social activities.

5.8.5 International Tropical Timber Agreement, 1994 -

To conserve and sustainable development of all types of forests in the developing countries, recognizing the sovereignty over their natural resources, the agreement has following objectives :-

- To provide an effective framework for consultation, international cooperation and policy development among all members with regard to all relevant aspects of the world timber economy;

- To provide a forum for consultation to promote non-discriminatory timber trade practices;
- To Contribute to the process of sustainable development;
- To promote and support research and development with a view to improving forest management and efficiency of wood utilization as well as increasing the capacity to conserve and enhance other forest values in timber producing tropical forests;
- To improve market intelligence with a view to ensuring greater transparency in the international timber market, including the gathering, compilation, and dissemination of trade related data, including data related to species being traded;
- To encourage members to support and develop industrial tropical timber reforestation and forest management activities as well as rehabilitation of degraded forest land, with due regard for the interests of local communities dependent on forest resources.

This agreement only recognized the need to promote and apply comparable and appropriate guidelines and criteria for the management, conservation and sustainable development of all types of timber producing forests.

5.8.6 United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and / or Desertification, Particularly in Africa, 1994 :

According to this Convention ‘desertification’ means land degradation in arid, semiarid and dry sub-humid areas resulting from various factors, including climatic variations and human activities. Appreciating the significance of the past efforts and experience of states and international organization in combating desertification and mitigating the effects of drought, particularly in implementing the Plan of Action to Combat Desertification (PACD) which was adopted at the United Nations Conference on Desertification in 1977, this convention was adopted.

This Convention was adopted in Paris on 17 June 1994 after negotiations extending over a period of one year. It came into force on 26 December 1996 and had 177 member states as of November 2001. It is a direct product of the Rio Conference in more ways than one. The convention is governed by several guiding principles that give it a basic programme. Firstly, the convention highlights the need for state parties to involve local people and local communities to various projects to combat desertification. Secondly, the Convention focuses on the need for all relevant actors to cooperate towards finding solutions to the problems of land degradation. Thirdly, the Convention recognizes the necessity to take into account the specific needs and circumstances of developing countries. The Convention also focuses on the necessity to eradicate land degradation. This Convention constitutes the latest confirmation by the international community of the significance of land degradation, and it is the central international instrument for addressing land degradation issues. Its successful implementation is of tremendous importance of vast regions of the world where

desertification impacts not only on the environment but also contributes to declining levels of socio-economic development.⁴¹

5.9 Foreign Countries view towards controlling of desertification :

Around the world, desertification is a common problem, where soil is being washed or blown away – that is, eroded wind and water. Erosion occurs when rock and soil particles are detached by wind or water, transported away, and deposited in another location, often in lakes and streams. It is a problem in the developed as well as the developing nations. For combating this problem some nations has created new legislations and changes in their municipal laws. This present project is discuss few of those initiatives.

5.9.1 Forests and their management in Canada :

Canada has a land area of some 921 million hectare, of which 416 million hectare is classified as forest (Canadian Forest Service, 1994). Canada's forest area comprises about 10% of the world's forests. Some 71% of the forest land is owned by the provincial governments, 23% by the federal government, and only 6% by private concerns.⁴²

Canadians clearly want their public forests to be managed in such a way that biodiversity is conserved. The forest community seems to have accepted this responsibility, in declaration at least, and is now in the process of making its

⁴¹ Cullet Philippe : Desertification (Encyclopedia of Life Support Systems)

⁴² Duinker. P. N. "Managing Biodiversity in Canada's Public Forests' in Biodiversity, Science and Development (CAB International, Wallingford, UK 1996) p – 324

declarations operational. Under Canada's Green Plan, the Canadian Forest Service is sponsoring a series of 'model' forests across Canada and abroad. The model forests are to attempt new approaches to sustainable forest development, a key element of which is biodiversity conservation. At a national level, strong language regarding forest biodiversity conservation and related issues appears in the Canada Forest Accord, the latest national forest strategy, the final report of the National Round Table on the Environment and the Economy and the Draft Canadian Biodiversity Strategy.⁴³ Ontario Forest Industries' Association's guiding principles and code of forest practices and the new ***Crown Forest Sustainability Act*** are some instances of Canadian legislations.

5.9.2 Principles for Combating desertification in China :

Desertification is one of the most serious environmental and socio economic problems in the world, which has been suffering China for a long time. According to research and practices for nearly 20 years, causes leading the land to be desertified may be of varied description, but there are two most important factors can be recognized known as 'natural factor' and 'human factor'. The Chinese Government attaches very importance to combat desertification, so far substantial work has been done and certain achievements and experience have been gained. As stipulates in Article 19 of Law of Environmental Protection of the People's Republic of China issued on 26 December 1989, 'measures should be taken to protect eco-environment in exploiting and utilizing natural resources'; in Article 20, 'people's government at various levels should strengthen protection of agricultural environment, prevent soil

⁴³ ibid p – 326

pollution, land desertification, salinization, impoverishment, swamp, ground subsidence and prevent and control vegetation devastation, soil and water loss, water source exhaustion, species extinction as well as the occurrence and development of other phenomena concerning ecological disturbance.

Soil and Water Conservation Law of the People's Republic of China was reviewed and carried through at the Standing Committee of the National Peoples Congress on 29 June 1991. In this special law on prevention and control of soil and water erosion, aspects concerning principles on soil and water conservation soil erosion prevention and supervision, soil erosion control, role of government and public in soil and water conservation, and legal obligations were stipulated in detail.

Item 1 of Article 19 of ***Forest Law of the People's Republic of China*** implemented on 1 January 1985 stipulates, 'Prohibit destroying forest for reclamation and destroying forest for quarrying, sand and earth mining as well as Other relevant Laws can be listed as followings :

- **Grassland Law of the Peoples Republic of China** implemented on 1 October, 1985.
- **Law of Mineral Resources of the People's Republic of China** implemented on 1 October, 1986.
- **Land Management Law of the People's Republic of China** issued on 29 December, 1988.

- **Law of Agriculture of the People's Republic of China** issued and implemented on 2 July, 1993.⁴⁴

The spread of deserts affects the lives of millions of peasants in China. In the highlands of northern China, for example, the land is cut with gullies, some hundreds of meters deep. According to one estimate, an area larger than Italy has become desert or semidesert in China in the last 30 years. In 1978, the Chinese Government launched a reforestation project to stem the tide. By planting trees, shrubs, and grasses, they hope to form a **giant green “wall”** across the northern reaches of the nation. Between 1979 and 1993, 13 million hectares (32 million acres) were replanted, and 6 million hectares (15 million acres) were naturally regenerated in mountainous and sandy areas. The nation planted 5.5 billion trees. Eleven million hectares of farmland were protected from desertification.⁴⁵

5.9.3 Controlling of Desertification in the United States :

Cattle and other livestock range over half the earth's surface, feeding on grassland vegetation. The grasslands on which many of the world's livestock depend are known as rangelands and are a vital component of global food, leather, and wool production. In the United States, over 90 million hectares of grassland, much of it public land, have been turned to desert in the last 200 years. In 1978, the **Public Rangelands Improvement Act** was passed by the U.S. congress as a means of promoting better range management. Range management involves a number of basic techniques that are often employed simultaneously :

⁴⁴ Tao Wang & Wu Wei : Combating Desertification in China (Institute of Desert Research, Chinese Academy of Sciences) Lanzhou

⁴⁵ Chiras Environmental Science (Wadsworth Pub. Co. New York, 1998) p – 176

- i. Controlling the number of livestock on land,
- ii. Deferred grazing,
- iii. Controlling the distribution of livestock,
- iv. Restoration, and
- v. Rangeland improvements.

In the United States, forest management began in the late 1800s. In 1905, President Theodore Roosevelt established the U.S. Forests Service. Its first head, Gifford Pinchot, promoted careful use of forests over strict preservation. He promoted the multiple – use concept and sustained yield – using the forest for many purposes, but managing it scientifically to sustain its valuable services. In 1986 the U.S. Congress passed a law that prevents the U.S. Agency for International Development from funding projects such as dams and roadways that will destroy tropical forests in developing nations. The law also directs the agency to help countries find alternatives to forest colonization and requires it to support preserves and other measures to save forests and promote biological diversity.⁴⁶

5.9.4 Forest Policies of Some South and South – East Asian Countries :

Forest is seen as a fundamental component of life of millions of rural inhabitants of South and South-East Asia. Conflicts have arisen and continue between local people and the State over the rights to manage and utilize forest resources. The rights of local people over forests are often claimed for customary and historical reasons, whereas the rights of national governments are claimed through policies.

⁴⁶ Chiras Environmental Science (Wadsworth Pub. Co. New York, 1998) Pp 207 – 222

Bhutan is a small country in the central Himalayas that has a rich history, substantial forests that cover more than 70% of the land. All rural villages in Bhutan depend on the forest for timber, fuel wood, fodder, leaf litter and water. Non-timber forest products such as mushrooms and edible ferns not only supplement vegetables, but also provide people with alternative income. Nationalization of forests occurred in 1969 through the **Bhutan Forest Act**, and it expressly designated all forests outside of private tenure to be ‘government reserve’ forest and under the purview and management authority of the central government. **The Forest and Nature Conservation Act (1995)** further delineated users’ rights and requirements to government reserve forest. This Act requires local people to obtain a permit from the Forest Department of extract products from the forest. Another major policy influencing people-forest relationships was the land *kidu* policy. Land *kidu* is a land grant from the king of Bhutan to needy families who directly apply to him for agricultural land.⁴⁷

Unlike many countries in Asia where forest management is usually under a forest department and protected areas management falls under the Ministry of Environment, in **Indonesia** both forest and protected area management fall under the Department of Forestry. As such, forestry policies must also include policies related to protected areas management. The Indonesian government has classified forest area by function into : (a) protection forest, (b) conservation forest, (c) production forest, (d) limited production forest and (e) conversion forest. The first two categories of forest fall under protected areas. Because forest management policy includes protected areas, it is important to measure how local communities surrounding

⁴⁷ Webb Edward L. & Lam Dorji in Decentralization, Forests and Rural Communities (Sage 2007) Pp 68 – 83

protected areas respond to the evolving protected area policies. The success and failure of forestry policy will affect forest condition in protected areas as a function of local people and external actors' compliance or non-compliance with emergent forestry policies.

There has been an enormous literature dealing with how the centralized model of forest management implemented during the New Order Regime since the late 1960s in Indonesia has caused forest degradation and has diminished local participation in forest management. During the New Order period, forest area in Indonesia declined from 150 million hectares in 1960 to only 90 million hectares in the year 2000. Current forest governance and management in Indonesia is guided by **Law No. 41/1999** issued during the government administrative transition. This law explicitly articulated decentralization and local people's empowerment and the drafting of the law included the participation of civil society groups. Article 6.1 of the law outlines three main forest functions : conservation, protection and production. Production forests perform the main function of producing forest products; protection forests protect life-supporting systems for hydrology, prevent floods, control erosion, prevent sea water intrusion and maintain soil fertility; and conservation forests enclose an area with specific characteristics to preserve the ecosystem and its species.⁴⁸

It has been more than two decades since **Nepal** formally adopted the concept of participatory forest management through the formulation of *Panchayat Forest* (PF) and *Panchayat Protected Forest* (PPF) Rules in 1978. Since then, there have been a

⁴⁸ Yonariza & Ganesh P. Shivakoti in *Decentralization, Forests and Rural Communities* (Sage 2007) Pp 128 – 132

number of changes in forest policy. Community based forest management evolved from limited participation of local agencies in forest management in some areas to being the most prioritized forestry program of the government during the period. There has been increasing handover of public forest lands to the local communities under the community and leasehold forestry programs implemented by the government with support from various bilateral and multilateral donor agencies. Community forestry as a formal national forest management strategy was conceived in 1976 after the government drafted a national forestry plan in that year. The plan for the first time recognized the role of local communities and specifically emphasized local participation in forest management. This change in policy was the result of the government's realization that forests can not be managed without the cooperation of local communities. To implement the concept laid down by the plan, the ***Forest Act of 1961*** was amended in 1977 to define the new categories of forests to be managed by local communities, religious institutions and individuals.⁴⁹

Thailand is similar to many developing Asian countries in that it has adopted a model of forest conservation that excludes local communities from protected areas. These protected areas include national parks, wildlife sanctuaries and legal head watershed areas (designated watershed Class 1 and 2). Despite having a policy emphasizing forest protection by exclusion, many communities in northern region traditionally manage their forests according to their spiritual beliefs, uses, and biophysical and cultural circumstances.⁵⁰ More recently, the Government of Thailand has begun to recognise the necessity of people's participation in forest conservation.

⁴⁹ Gautam Ambika . P & Ganesh P. Shivakoti in Decentralization, Forests and Rural Communities (Sage 2007) Pp 150 – 152

⁵⁰ Kijtewachakul Nitaya, Ganesh P. Shivakoti & Edward L. Webb in Decentralization, Forests and Rural Communities (Sage 2007) p 232

This has come about as a result of both local movements and state-sponsored pilot projects.

Vietnam has conducted radical renovation in the forestry sector since 1990 by involving local people in forest management. Households and village communities have been increasingly recognized as important stakeholders in national forestry policies. Most of these policies have been towards allocating land and forests to households for forestry related purposes. Allocation is the process by which a household or group of households receive 50 year use and management rights over a specified area of barren land for reforestation (plantation), or natural forest for management and protection. The ownership rights are contained in an allocation document called the Red Book.

In the central Vietnamese province of Thua Thien Hue, forests have been under state control since the reunification of the country in 1975. State control and management of forests was executed through State Forest Enterprises (SFE), which logged forests and were charged with forest ‘protection’ from degradation, particularly unauthorized logging. Forest protection duties have also been shared with the Forest Protection Department (FPD).⁵¹

From the ancient time India as well as State of West Bengal witnessed several injunctions, rules and legislations. Aryan, Mauryas, Mughals, Britishers and lastly the independent government enacted certain legislations to protect the forest. But still there is need for legislation regarding control of desertification or land degradation.

⁵¹ Dung Ngo Tri & Edward L. Webb in *Decentralization, Forests and Rural Communities* (Sage 2007) p 269

Although there are so many International Convention was attained by the country, but there is still need for a particular legislation. Some foreign Country has specific rules to eradicate this problem. After a massive debate, parliament passed Forest Rights Act, 2006 but there is still a dispute between Tiger Lobby versus Tribal Lobby. It has been proven that ecosystems can be managed sustainably only when local people have participation over the area's resources, as they have symbiotic relationship with nature. The Chipko movements of 1973, 'Save the Silent Valley' in Kerala, 'Thingam' in Mizoram are three different examples of people's participation. Central Arid Zone Research Institute (CAZRI), Jodhpur taken certain steps in the north – western desert tracts of the country. But desertification is a worldwide phenomenon and it varies state to state. This problem cannot be effectively tackled without international cooperation. Evidently, the best strategy to deal with desertification is a partnership among communities, non-governmental organizations, the government and the international community.

ROLE OF THE JUDICIARY TOWARDS PROTECTION OF FORESTS

After the industrial revolution, commercial pressure, local demands and urbanization have resulted in rapid destruction of vegetation cover throughout the world. Protection of forests during the last few years has become not only a matter of national concern but for global importance. Decline in environmental quality has been evidenced by increasing pollution, loss of flora and fauna, excessive concentration of harmful chemicals in the atmosphere and food chains are posing threat to life support system. This has drawn the attention of all the nations including developed, developing and underdeveloped. How could the judiciary remain a silent spectator when the subject has acquired high importance and become a matter of caution and judicial notice. The courts have used their wisdom in deciding several substantive issues relating to the use of forest resources. Since, the last few years the Supreme Court of India has taken the task of comprehensive conservation and protection of forests across the country. In dealing with the issues of saw mill, mining, tribal dependency, minor forest produce, dams, infrastructure projects, the Supreme Court had balancing the competing claims and projects while at the same time trying to interpret and differentiate between the genuine and bonafide needs of the local inhabitants, with that of necessity of biodiversity conservation. Through, series of illuminating judgments, orders and directions, the Supreme Court using its writ jurisdiction and interpreted various legislations through purposeful construction so as to ensure its implementation in its true letter and spirit.

6.1 Role of the Court on Rights of Forest Dwellers :

For industrial growth and progress, energy is indispensable; exploitation of resources available from forest cannot be ruled out. In *Banwasi Seva Ashram vs. State of Uttar Pradesh & Ors.*¹ the question that required detailed consideration was related to the claims of the adivasis, living within Dudhi and Rabertsganj tehsils in the district of Mirzapur in Uttar Pradesh, to land and related rights. The land so required by the state was for setting up the Rihand Super Thermal Power Project of the N.T.P.C. Systematic attempt was made to obstruct to the forest dwellers from free movement. The court granted the land that was sought to be acquired by following the process of land Acquisition Act.

The Court, in trying to balance the twin needs of development while upholding the traditional rights of forest dwellers, held :

Indisputable, forests are a much wanted national asset. On account of the depletion thereof, ecology has been disturbed; climate has undergone a major change and rains have become scanty. These have long term adverse effects on national economy as also on the living process. At the same time, we cannot lose sight of the fact that for industrial growth as also for provision of improved living facilities, there is great demand in this country for energy such as electricity..... A scheme to generate electricity, therefore, is of national importance and cannot be deferred.²

¹ A.I.R. 1987 S.C. 374

² *ibid* Pp 376 – 378

The Court said the concept of sustainable development demanded that the oustees be rehabilitated after examining their rights. Directions regarding demarcation, expeditious settlement of rights, granting of appropriate title deed to the claimants were also given.

In *Fatesang Gimba Vasava & Ors. Vs. State of Gujarat & Ors.*³ the writ petitions were preferred by the adivasis, known as *Kotwalias* and *Vansfodias* in Gujarat, where the main grievance is that they are being harassed by the officers of the Forest Department with a view to deprive them of the privileges conferred upon them by the State government. These petitioners have their residence in reserved forests and they claim certain privileges in regard to the collection of forest produce including bamboo. According to them, they have privileges to collect a certain quantity of bamboo per family from the reserved forests for the purpose of making *toplas*, *supdas*, *palas* etc. for their livelihood.

While establishing the petitioners – who were *kotwalias* and *vonsfodias* – as tribals, the court quoted the Gujarat Manual, which lays down that ‘Aboriginal or hill tribe’ includes persons who are residents of forest tracts and who depend entirely on manual labour for their living, and usually eke out their subsistence by labour in the forest and by the collection and sale or barter of forest produce. In light of the above the Court held that, Bamboo being a tree would certainly fall within the definition of ‘forest produce’, but *toplas*, *supdas* and *palas* made out of bamboo chips, would not fall within the definition of forest produce.

³ A.I.R. 1987 Guj 9

In ***Suresh Lohiya vs. State of Maharashtra & Ors.***⁴, the question involved in the case whether bamboo mats are a forest produce under the Indian Forest Act and hence, whether the order of confiscation of bamboo belonging to the appellant was in accordance with law. The owner of the bamboo mat had approached the Supreme Court by way of this appeal. The appeal was allowed and it was held that bamboo mat is not a forest produce in the eyes of the Act, and the order of confiscation passed by the Conservator of Forest was not in accordance with law.

In the ***Second Banwasi Seva Ashram vs. State of Uttar Pradesh***,⁵ the court imposed more responsibilities on the NTPC to find out alternative plots, render resettlement and subsistence allowance, give free transportation, reserve jobs and provide facilities of roads, water supply, health care and electricity.

People displaced due to implementation of projects should be properly rehabilitated. They can also be assigned lands in reserved forest for cultivation. However such assignment is not without limit.⁶ The facts of ***State of Orissa vs. Duti Sahu***⁷ show that the local people were assigned forest area for cultivation. The Supreme Court, interfered with transit permits granted to them, on the basis of this assignment. It also held that since the grant was only for cultivation, the respondents did not have any right to deforest the land and to cut and take the trees that belonged to the government much less without permission.

⁴ A.I.R. 1987 SC 103

⁵ (1992) 2 S.C.C 202

⁶ Leclakrishnan, P. : Environmental Law in India (Laxis Nexis, 2002) p – 15

⁷ A.I.R. 1997 S.C 1040

In ***Pradeep Krishan vs. Union of India***,⁸ the Supreme Court suggested :

If one of the reasons for the shrinkage is the entry of villagers and tribals living in and around the sanctuaries and the national parks, there can be no doubt that urgent steps must be taken to prevent any destruction or damage to the environment, the flora and fauna and wildlife in the areas.

Besides felling trees, certain other acts are also prohibited in reserved forests. Nobody can hunt, shoot or fish or trespass or pasture cattle in contravention of the rules. Further, once the State Government declares an area a sanctuary or national park, the limits of rights and claims are determined.⁹ In ***Animal and Environment Legal Defence Fund vs. Union of India***,¹⁰ the Supreme Court had to resolve a dispute between two neighbouring states on the rights of tribals. The government of Madhya Pradesh allowed fishing permits to the displaced tribal people in Toltadoh reservoir within Pench National Park. The government of Maharashtra objected on environmental grounds such as potential danger of felling trees, harm to crocodiles and turtles in the reservoir, disturbance to water birds and migratory birds and the possibility of lighting fires and throwing garbage and polythene bags around and into the reservoir. The fact that displaced persons were not systematically rehabilitated weighed more in the balance. The court observed :

..... while every attempt must be made to preserve the fragile ecology of the forest area and protect the Tiger Reserve, the right of the tribals formally living in the area to keep body and soul together

⁸ A.I.R. 1997 S.C 2040 at p – 2047

⁹ Leelakrishnan, P. : Environmental Law in India (Lexis Nexis, 2002) p – 16

¹⁰ A.I.R 1997 S.C 1071

must receive proper consideration. Undoubtedly, every effort should be made to ensure that the tribal, were resettled, are in a position to earn their livelihood.¹¹

The observations in both the cases are relevant in assessing the symbiotic relationship between the tribals and the forest. Tribal people were considered protectors of forest in the past. Only when men from plains began mixing with them and when needs of development started to displace them from their habitat, were the tribals seen as a group posing a threat to the environment. Time was when the tribal people constituted the best friends of the (Forest) Department and served to inform in advance the movement of strangers in the forest and the commission of forest offences. They were also the guides and the eyes and ears to the forest. With the increasing strictures on their access to and use of the resources that their habitat once provided them and which they used to take for granted, they have now tended to identified themselves with the settlers, encroachers and deprecators of forest wealth who pay them a moiety for their services in furtherance of their own nefarious interests.¹²

Similarly, in *Mulla Mohammadali vs. State of Gujarat*,¹³ the contractors entered into an agreement with *Jagirdars* to cut standing trees thinking that the latter had proprietary rights alleged to have been granted under the *Chhota Udaipur* State. The old position was clear : *Jagirdars* had no rights to cut trees in reserved forests. This position had not changed. The Supreme Court held that the contractors could have no

¹¹ *ibid* p – 1073

¹² Madhav Menon T, ‘Law and Tribal Societies in Kerala’ in (1985) *Cohin University Law Review* 157 at Pp 170 – 71

¹³ A.I.R. 1993 S.C 335

greater rights than those of the *Jagirdars*. The same situation exists in the case of other forest dwellers and tribal people who may not have more or greater rights than those they had before the formal legal system became applicable.

In this way the Indian Judiciary Continued to interpret the existing legislations and extend the meaning of forest, which covered with trees, shrubs, vegetation and its dwellers. Such a wide meaning is necessary for the preservation of forest land, maintenance of ecology and prevention of environmental degradation.

6.2 Forest Protection : Some Judicial Perspectives in Mining Cases :

In *Rural Litigation and Entitlement Kendra, Dehradun vs. State of Uttar Pradesh*¹⁴ is significant as the first case requiring the Supreme Court to balance environmental and ecological integrity against industrial demands on forest resources. The case arose from haphazard and dangerous limestone quarrying practices in the Mussoorie Hill Range of the Himalayas. Miners blasted out the hills with dynamite, extracting limestone from thousands of acres. The miners also dug deep into the hillsides, an illegal practice which resulted in cave-ins and slumping. As a result, the hillsides were stripped of vegetation. Landslides killed villagers and destroyed their homes, cattle and agricultural lands. Mining operations upset the hydrological system of the Dehradun Valley. Springs dried up and severe water shortages occurred in the valley, an area formerly blessed with abundant water supplies. At the same time, mining debris clogged river channels and during the monsoon season severe flooding occurred.¹⁵

¹⁴ A.I.R. 1988 S.C 2187

¹⁵ Divan & Rosencranz : Environmental Law And Policy in India (Oxford 2001) p – 308

The Supreme Court played an activist role in this litigation, essentially conducting a comprehensive environmental review and analysis of the national need for mining operations located in the Dehradun Valley. In addition, the court provided for funding and administrative oversight of reforestation of the region. The court appointed an expert committee (the Bhargava Committee) to assess the mines. In March, 1985, the court, upon the recommendations of the Bhargava Committee, ordered that the most dangerous mines and those falling within the Mussoorie city board limits be denied leases and that their operations cease immediately. The second committee (the Bandopadhyay Committee) was empowered to consider plan submitted by the miners to safeguard the environment and to hear the claims of people adversely affected by the mining. In 1987, the court concluded after review of the Bandopadhyay Committee's report that based on ecological considerations alone, mining in the valley should cease.

In *Ambica Quarry Works etc. vs. State of Gujarat & Ors.*¹⁶ the appeal centre around the question of how to strike a balance between the need of exploitation of the mineral resources lying hidden in the forests and the preservation of the ecological balance and to arrest the growing environmental deterioration. The Supreme Court made it categorically clear that renewal of a license can be made only on getting prior permission from the central government. The Forest (Conservation) Act was passed in order to arrest ecological imbalance, a consequence of deforestation.

¹⁶ A.I.R. 1987 S.C. 1072

In *Samatha vs. State of Andhra Pradesh*,¹⁷ the guidelines for bureaucrats assessing an application to mine in a forest were set out by the Supreme Court. The Court held that, mining operations, though detrimental to forest growth, are part of layout of the industry, provision should be made for investment or infrastructural planning to reforest the area; and to protect environment and regenerate forest. The Ministry of Environment and Forests and all Secretaries of all the State Governments holding charge of Forest Departments have a duty to prevent mining operations are carried on within the reserved forest or other forest area, it is their duty to ensure that the industry or enterprise does not denude the forest to become a menace to human nor a source to destroy flora and fauna and biodiversity. No distinction can be made between the Government Forest and Private forests in the matter of forest wealth of the nation and in the matter of environment and ecology.

Tarun Bharat Sangh, Alwar vs. Union of India,¹⁸ or popularly known as **Sariska Case** is another example of prohibition of mining in forest area. Open-cast mining of lime stone and marble in the Alwar District was disturbing aquifers, springs and the water holding capacity of the Aravalli. The use of dynamite had scared and devastated the hills. The court directed the listed mines to stop forthwith. The Central Government was directed to submit a report within 3 months on the state government's proposal to delete 5.02 sq. kms from the protected area. Mines situated outside the protected forests within the tiger reserve were permitted to continue for 4 months, within which period they were permitted to approach the Central Government for permission to continue their operations. If no permission was obtained, they were directed to cease mining activity.

¹⁷ A.I.R. 1997 S.C. 3297

¹⁸ A.I.R. 1992 S.C. 514

6.3 Eco – Tourism And the Role of Judiciary towards Forest Protection :

There are differing views on the benefits of eco-tourism. While it provides opportunities for nature lovers to experience its beauty and appreciate its importance, its promotion also results in polluting and harming the environment.¹⁹

Eco-tourism was one of the objects of the project for a biological park, which was examined in *Niyamavedi vs. State of Kerala*.²⁰ Petitioners contend that the proposed project for Biological Park would result in denudation of forest in the State of Kerala and if the project materializes it would pose threat to the environment and ecology. The project was designed after consulting many experts who gave full support to watching wildlife at close quarters, without interfering with the sanctity of flora and fauna. The Kerala High Court held that the government's decision to establish a park after such consultation was a policy decision which could not be interfered with. According to the Court, the object of a biological park, not being a non-forest purpose, prior approval of the Central Government was not necessary.

In *Nagarahole Budakattu Hakku Sthapana Samithi vs. State of Karnataka*,²¹ the establishment of a restaurant with boarding and lodging, in the midst of the Nagarahole National Park was the main issue. On the basis of 18 year lease from the government, the lessee, a private company, renovated old buildings for the establishment of the facility. The Court held that once an area was declared a National Park no one has any right on or over the land unless it is specifically granted.

¹⁹ Leelakrishnan. P. : Environmental Law in India (Lexis Nexis 2002) p – 22

²⁰ A.I.R. 1993 Ker 262

²¹ A.I.R. 1997 Kant 288

In *Union of India vs. Kamath Holiday Resorts Pvt. Ltd.*,²² the collector leased out a site in a reserve forest area for putting up a snack bar and restaurant to cater to the needs of the tourists visiting the forest. Since the area leased out was within a Union Territory, the collector did not deem it necessary to comply with the procedure under Sec. 2 of the Forest Conservation Act. The Conservator of Forest challenged the grant of the said lease.

The court directed the collector to send a proposal, incorporating the objections of the Conservator of Forest, to the Central Government as required under the Forest Conservation Act. On receipt of the proposal and after obtaining advice from the Advisory Committee, the Central Government would pass orders. The collector shall, thereafter, abide by the order and the entire exercise was required to be over within a period of three months from the date of the decision.

An artificial deviation of the flow of a river in forest land for the purpose of augmenting facilities of a motel was challenged in *M.C. Mehta vs. Kamalnath*.²³ Quashing prior approval for the lease and imposing on the motel the responsibility of restoration of environment and ecology of the area, the Supreme Court observed :

Our legal system – based on English Common Law – includes the public trust doctrine as part of its jurisprudence. The state is the trustee of all natural resources, which are by nature meant for public use and enjoyment. Public at large is the beneficiary of the sea-shore, running waters, air, forests and ecologically fragile lands. The state as

²² A.I.R. 1996 S.C 1940

²³ (1997) 1 S.C.C. 388

a trustee is under a legal duty to protect the natural resources. These resources meant for public use cannot be converted into private ownership.

On the facts of the case, the court found that the bank of the river, which was part of protected forest, had been leased out for commercial purpose and held that the State Government committed a patent breach of public trust by leasing out the ecologically fragile land for a hotel.²⁴

In *Supreme Court Monitoring Committee vs. Mussoorie – Dehradun Development Authority & Ors*,²⁵ the case involves the question of construction of large residential and commercial buildings taking place in various areas in Mussoorie without the consent of the Central Government and in violation of the order passed by the Supreme Court in *T. N. Godavarman* Case. The petitioner was a monitoring committee appointed by Supreme Court for monitoring the environmental aspects of the Doon Valley. The petitioner filed the writ petition in public interest pointing out that the Mussoorie – Dehradun Development Authority (MDDA) had sanctioned construction plans in a large number of private forest estates in Mussoorie without the permission of the Central Government as required by the Forest Conservation Act.

The Supreme Court held that the term ‘Forest land’ therefore, has to be understood as including an extensive track of land covered with trees and undergrowth, sometimes intermingled with pasture, that is, it will have to be understood in the broad dictionary sense. Any building activity permitted within the

²⁴ *ibid* p – 413

²⁵ (1997) 11 S.C.C. 605

forest area would certainly be a non-forest activity, which requires the prior approval of the Central Government.

6.4 Godavarman Case : A Highwater Mark in Forest Protection :

In 1995, T.N. Godavarman Thirumulpad filled a writ petition with the Supreme Court of India to protect a part of the Nilgiris forest from deforestation by illegal timber felling. The Supreme Court clubbed the Godavarman Case with another writ petition with similar issues, and expanded its scope from ceasing illegal operations in particular forests into a reformation of the entire country's forest governance and management.²⁶ This case represent the single biggest judicial intervention in forest administration in the country. The case was initially filed in the Supreme Court in order to give effect to the provisions of the National Forest Policy of 1988. The Court formed the opinion that the matter requires a further in-depth hearing to examine all the aspects relating to the National Forest Policy.

The balance between environment and development is necessarily to be maintained. This idea of sustainable development had its influence on the judiciary in interpreting the provisions of laws relating to the forest. Various dimensions of this problem came to be examined by courts. ***T. N. Godavarman Thirumulkpad vs. Union of India***,²⁷ is a remarkable illustration. In view of the significance of the problem, the Court gave notice to both the Central Government and State Governments enabling them to present their views. The pronouncements of the court can be summarized as follows :

²⁶ Rosencranz & Lele : Supreme Court and India's Forests in Economic & Political weekly (Feb. 2, 2008)

²⁷ A.I.R. 1997 S.C 1228 at Pp 1230 – 1233

- Forest includes the area noted in the government records as forest, irrespective of ownership.
- Mining licence in such an area without prior approval is violative of the FCA. All on-going activity under such invalid licence must cease. The State Governments have to take necessary remedial measures.
- Running sawmills of any kind is a non-forest activity. All saw mills within a distance of 100 kilometers from the border of the State of Arunachal Pradesh are to be wound up.
- Responsibility is imposed on each State Government to report on the number of sawmills, actual capacity of the mills, proximity to the nearest forest and their sources of timber.
- Complete ban on felling of trees in the tropical wet ever-green forests in Arunachal Pradesh is essential 'because of their significance to maintain ecological balance needed to preserve biodiversity'. Felling of forests in other states except in accordance with working plans is suspended.
- Movement of the cut trees and timber is banned with the exception of certified timber required for defence purposes.
- Each State Government should constitute expert committees to identify forest areas, denuded forests and covered by plantation trees and to assess the sustainable capacity of the forest qua saw mills.
- In the State of Jammu and Kashmir, no private agencies should deal in felled trees or in timber. No permission should be given for sawmills within a distance of eight kilometers from the boundary of demarcated forest area.
- In Tamil Nadu the tribals who are part of the social forestry programme in respect of *patta* lands other than forests may continue to grow and cut trees

according to the government scheme and in accordance with the law applicable.

- Plantations are not allowed to expand further and encroach upon forests by way of clearing or otherwise.

The case came back within four months for review of the follow up action as directed by the Court. Interestingly, the Court proceeded to constitute a High Power Committee to oversee the strict and faithful implementation of its orders in the North Eastern region. Directions were given that this Committee should prepare an inventory of all timber, whether in transit or lying in mills and to examine whether the use or sale of timber or timber products could be permitted through the state forest corporations under its overall supervision. That the collection of minor forest produces, including bamboo, could be exempted from the ban, is a significant holding of the Court. Unlicensed saw mills and veneer and plywood industries in the states of Maharashtra and Uttar Pradesh were directed to be closed. All shade trees felled in janmam areas in Tamil Nadu were ordered to be delivered by the plantations to the State Government. However, plantations were permitted to fell fuel trees subject to certain restrictions. No further clearing in janmam lands by plantations was allowed by the court.²⁸

6.4.1 Godavarman Case towards Saw Mills And Wood Based Industries :

The Court in its order dated 12-12-1996 directed that all ongoing activities within any forest without the prior approval of the Central Government must cease forthwith. The Court made it absolutely clear that the running of saw mills of any

²⁸ Leelakrishnan P. : Environmental Law in India (Lexis Nexis 2002) p – 25

kind, including, veneer or plywood mills are not permissible without prior Central Government approval. Specifically concerned about the danger to the tropical wet evergreen forest of Tirap and Changlang in Arunachal Pradesh, the Court directed the immediate closure of all saw mills, plywood mills and veneer mills within a distance of 100 kms from the border of Assam. Further, in order to stop the trade in timber the Court directed that there shall be a complete ban on the movement of cut trees and timber from any of the seven North Eastern States to any other State.

Further, each State Government was directed to file within two months a report regarding the number of saw mills, veneer and plywood mills operating within each State, the real owners of these mills, the licensed and actual capacity of the mills, their proximity to the nearest forest and their source of timber. Further, the States were also directed to constitute within one month an Expert Committee to;

- assess the sustainable capacity of the forest of the State *vis-a-vis* saw mills and timber based industries;
- the number of existing saw mills that can be safely be sustained by the State; and,
- the optimum distance from the forest at which the saw mills should be located,

In view of the large number of saw mills operating in the North Eastern Region, the Court constituted a High Power Committee (HPC) on 04-03-1997 in order to oversee the 'strict and faithful implementation' of the orders of the Court.²⁹

²⁹ Dutta Ritwick & Bhupender Yadav : Supreme Court on Forest Conservation (Universal 2007) p – 5

The order dated 15-01-1998 was very significant and dealt at length with the running of wood based industries specifically in the North Eastern States. The Court in its order observed :

“Even though the proliferation of wood based industries has been the main cause of degradation of forest in the North Eastern States, considering the extent of forest (64% of the geographical area) and the dependence of local people on the forest in the region it is neither feasible nor desirable to ban completely either the timber trade or running of wood based industries. However, their number and capacities are to be regulated and they are also required to be relocated in specified industrial zones. Moreover, industrial requirements have to be subordinated to the maintenance of environment and ecology as well as *bona fide* local needs.”

With a view to regulating the saw mills, the Court directed the State Governments to notify industrial estates for locating wood based industrial units in consultation with the Ministry of Environment and Forest. Some of the important directions issued are as follows :

- Licenses given to all wood based industries shall stand suspended.
- Wood based industries cleared by the HPC will have the option to shift to identified industrial estates.
- Units who do not want to shift shall be allowed to be wound up as per law.
- Licenses of units shall be renewed annually, only when on illegality is attributed.

- Number of wood based industries shall be determined strictly within the quantity of timber that can be felled annually on a sustainable basis as determined by approved working plan from time to time.
- There shall be a complete moratorium on the issue of new licenses for any wood based unit for the next five years.

In its order 12-05-2001, the Court made it clear that movement of timber products including sawn timber, veneer and plywood out side North East Shall be permitted only if sourced from or processed in HPC cleared wood based unit situated inside an approved industrial estate except in case of Mizoram where no industrial estates exist. Round and hand sawn timber shall not be allowed to be transported outside the North East except with prior approval of HPC or Ministry of Environment and Forest.

The issue of wood based Industry and its serious implication was critically examined in respect to the Andaman and Nicobar Islands. The applicants comprising of Society for Andaman and Nicobar Ecology, the Bombay Natural History Society and Kalpavriksh had brought to the attention of the Court, the serious threat to the rain forest of the Andaman and Nicobar Islands as well as the local tribes inhabiting the Islands due to the unrestricted activities of the large number of wood based units functioning in the islands. Considering these impacts the Commission appointed by the Court recommended as follows :

- There should be a complete ban on establishment of any new wood based unit for the next ten years.
- All existing small scale wood based units (Saw Mills) should be relocated within industrial estates, or where industrial estates are not feasible, in

locations contiguous to forest offices or otherwise convenient for the forest department to monitor.

- This relocation should be completed within one year after which non-complying saw mills should be closed down.
- No subsidy of any kind, including transport subsidy should be given to any wood based unit.
- Existing medium and large scale wood based industries can be allowed to function provided they import their entire requirement of wood and other forest based raw material from abroad or the mainland. No subsidies should be allowed to them.
- No timber, either as logs or as sawn timber or plywood-veneer, or in any other form, should be transported out of the Islands through any means whatsoever.

The Court on 07-05-2002 accepted the recommendations of the Commission and further ordered as follows :

- The licenses of all the saw mills and wood based industries shall not be renewed after 31st March, 2003. This will not debar the authorities from canceling licenses in accordance with law, if there is no breach of the License conditions by the Licensees before that date.
- The ecology of the area does not permit any kind of industrial activity for which the wood is likely to be consumed. Therefore, licenses of wood based industries shall stand cancelled but they will be permitted to exhaust the existing stock till 31st March, 2003.
- The Union of India if it so adopts and thinks appropriate may take steps for re-locating the dislocated wood-based industries in the main land area anywhere in India as long as it is not within the vicinity of forest area. Henceforth for

meeting the local requirements it is only the Government saw mills, which shall operate.

- No fresh wood or logs shall be given to any of the saw mills or the wood based industries till fresh working plans are prepared and submitted to this Court and the approval obtained.

6.4.2 High Power Committee And Central Empowered Committee :

The increasing number of pending cases before the Supreme Court made it difficult to examine each and every issue in detail and pass appropriate orders. The Forest (Conservation) Act, 1980 did not provide for any opportunity for setting up Tribunals or Authorities to adjudicate on such issues. As saw mill owners, encroachers, contractors and other affected people started approaching the Court, the need was felt to urgently set up a system in place to render justice, faster if not more effectively. Then the court relied upon sec. 3(3) of the Environment (Protection) Act, 1986 on 04-03-1997 constituted a **High Power Committee (HPC)** to oversee the strict and faithful implementation of the orders of the Court in the north-eastern region. The committee was entrusted the task of overseeing the preparation of inventory of all timber in all forms. On 09-05-2002 the Court constitute an Authority at the national level called the **Central Empowered Committee (CEC)**. The task assigned to it included the monitoring of the implementation of the orders of the court, removal of encroachment, implementation of working plan, compensatory afforestation plantations and other conservation issues. The order dated 29-10-2002 conferred additional functions on the CEC. It was directed that no State or Union Territory shall permit opening of any saw mills, veneer, plywood industry without prior permission

of the CEC. It was further directed that there shall be no relaxation of rules with respect to grant of licence without previous concurrence of CEC.³⁰

6.4.3 Godavarman Case towards Felling of Trees and Compensatory Afforestation :

While dealing with the Application of M/s South Eastern Coal Ltd. seeking permission to fell trees for mining operation, the Court dealt at length on the Forest clearance procedure under the Forest (Conservation) Act, 1980 and the Rules framed under it. The Court raised a pertinent question *viz.* whether the present practice which is being followed, namely, of the applicant depositing money with the State Government and requiring it to carry out the afforestation, is satisfactory or not. The Court felt that in order to ensure regeneration of forests, the primary responsibility should be the applicant concerned, the party that is going to use the dereserved forest.

The Courts' order was highly innovative. For example :

- It suggested that the Government must specify the period within which the afforestation must commence and be completed.
- Furthermore, there should be a requirement of "environmental audit" in order to ensure that after the saplings are planted the survival rate is high.
- The Government might consider requiring each applicant who is under an obligation to carry out afforestation to publish the results of the environmental audit every year in a newspaper and forward the same to the Central Government.

³⁰ *ibid* Pp 10 – 12

- The Applicant is not only responsible for planting trees rather it should be its responsibility to look after and maintain the same and ensure its survival and full growth.

On 12-05-2001, the Court laid down detailed guidelines for the felling of trees from forest areas as well as non forest area including plantations. As per the order, the felling of trees from forest areas could be allowed only as per the approved Working Plans / schemes, whereas the felling of trees from non forest area could be allowed only as per detailed guideline which are prepared by the State Government with the concurrence of the Central Government.³¹

In respect of diversion of 9.872 hectares of forest land falling inside the Ratpani Wild Life Sanctuary. The Supreme Court in its order dated 24-11-2003 permitted the use of the forest land subject to deposit of 5% of the estimated cost of the project in the tune of Rs. 45.35 crores towards the compensatory afforestation fund for protection and conservation of sanctuary.

6.4.4 Godavarman Case towards Protection of National Parks And Sanctuaries :

In 1998, the *Amicus Curiae* brought to the notice of the Court the illegal felling of trees in the buffer zone of the **Kanha National Park** and adjoining corridors of East Mandla Forest in the State of Madhya Pradesh. It was submitted that under the garb of removing infected Sal trees, (said to be infected with the Sal Borer epidemic) uninfected trees have also been cut. The Court took a very serious view of this matter and in it's order dated 23-02-1998, restrained the State Government of Madhya

³¹ ibid Pp 13 - 15

Pradesh from felling any tree, even if in the opinion of the State Government, the particular tree or trees are considered to be infected.

On 21-07-1998, the Court considered the application of the State of Madhya Pradesh seeking permission to cut trees for the purpose of catching and killing adult insects by using “trap-tree operation” to prevent further growth of Sal Borer. The Court agreed to the request of the State Government and permitted it to cut Category IV trees for use as “trap-trees” and also injured and wind fallen trees. The Court further directed that not more than one tree per two hectares should be cut. The felling, however, was to be done under the Supervision of the committee appointed by the Court.

A similar issue also related to the **Rajaji National Park** situated in the State of Uttaranchal. An application was filed by the then State of Uttar Pradesh seeking permission for felling and extraction of 203 Sal trees, which were infected by the Sal Borer epidemic. The Court allowed the extraction on the condition that it will be done under the supervision of the scientists of the Entomology Division of the Forest Reserch Institute, Dehradun.

Despite the above specific order, violations were taking place through out the country. In 2001, K.M. Chinappa, representing a local NGO: Wild Life First!, filed an Intervention Application through the *Amicus Curiae*, pointing out before the Court, that despite the orders dated 12-12-1996 and 14-02-2000, mining activities were taking place in the **Kudremukh National Park** in Karnataka by the Kudremukh Iron Ore Company limited (KIOCL), a Government of India, Public Sector Unit.

The Court accepted the time period for stopping mining activities as fixed by the Forest Advisory Committee, constituted under Section 3 of the Forest (Conservation) Act, 1980. It meant that KIOCL was to be given five years to wind up operation from the time its earlier lease expired (it had already expired). This meant mining would be allowed till the end of 2005 by which time the weathered secondary ore available in the already broken area will be exhausted. The Court, however, made it clear that this was subject to fulfillment of the recommendations made by the committee on ecological and other aspects.

A further violation of the order dated 14-02-2000, took place in the famous ***Ranthambhore National Park and Tiger Reserve*** in Rajasthan, when the Central Empowered Committee was informed that about 600 persons along with about 6,000 livestock had forcibly entered the National Park and were camping within the Core area. The Central Empowered Committee in its order addressed to the Chief Secretary of the State requested the Chief Secretary to immediately take steps to ensure the compliance of the order dated 14-02-2000 wherein the grazing and removal of grasses of trees from National Parks was strictly prohibited. It was further stated that any removal of grass etc. would make the State liable to contempt proceedings.³²

The legal canons of the Apex Court unfold the panorama of progressive development of environmental awareness. In the seventies, Courts cater the claims of helpless persons on the cost of environmental degradation. In the eighties, first wave of environmental jurisprudence was being recognised. In the nineties the Court further interpreted the environmental values into the existing law. The judiciary played an

³² Dutta Ritwick & Bhupender Yadav : Supreme Court on Forest Conservation (Universal, 2007) Pp 17 – 21

important role in protecting forest and wildlife. Concept of sustainable development implemented by the Court in various ways. Besides several judgments relating to saw mills, mines, compensatory afforestation, the Courts endeavoured to protect the rights of persons affected by development projects and tribal people, who has the symbiotic relationship with forest eco-system. Relying on the doctrine of '**Public trust**' the Court protects and preserves the natural vegetation and upheld the controls on exploitation of wildlife. **Godavarman case** is the second wave of environmental jurisprudence where Supreme Court deals with series of issues like saw mill, mining, dams, infrastructure projects while at the same time trying to differentiate between the genuine and *bonafide* needs of the local people. The Court constitutes two committees to monitor the outcome of the case. The role of the *amicus curiae* has been very crucial at every stage as the case progressed. The term 'Forest' and 'Forest land' also interpreted by the Court Although there is no specific case relating to eradicate the problem of desertification decided by the Court but there are several judgments which eliminating the evils of forest degradation and mismanagement at various levels throughout the country.

CONCLUSION AND SUGGESTIONS

Desertification is unanimously acknowledged to have significant adverse impacts for affected countries and its societies. It is associated with accelerated soil erosion by wind or water, salinization, indiscriminate felling of trees, reduction of species diversity and plant biomass and reduction in overall productivity of dryland ecosystems. Indiscriminate grazing and poor land management system also caused this great menace. Tribes of the Sahel grazed their livestock on the land with abandon, eventually causing its destruction. In ancient Greece, Aristotle recognised that communal property, shared by many people, often deteriorates severely. For getting the fruits of civilization we have clear-cut our community forests and overgrazed the cattle in grasslands. History, however, shows that the civilizations paid dearly for their disregard. The skeletons of buildings and temples in the ancient desert cities speaks that, those were once the rich forest and grassland eco-systems of the fertile land.

The picture is not different in Indian subcontinent. Desertification related to land degradation is affected in more than two thirds of India's geographical area. In human terms, we can say that land degradation affects millions of Indians, including the population of this State too. Land degradation in the forms of deterioration of soil, salinization, over grazing and felling of trees has caused severe problems leads to desertification. Not long ago, many villages had water sources from ponds, tanks and

rivers to provide water to farming lands and cattle. There was tree coverage nearing almost every village. Today, the same villages have undergone a terrible transformation. Even cities have not been spared. Forests play an important role in global cycling of oxygen and carbon dioxide. By global deforestation, carbon dioxide has increased, which is a major factor for global warming. Forests are also home to indigenous tribes that have lived sustainably for thousands of years. Clear cutting of forests exposes the soil to intense rains that wash away the soil and fill nearby streams and rivers with sediment. As the area of deforestation spreads, rainfall declines over large regions, and once lush green areas turn into barren deserts. Fertile soils back to a hard, bricklike consistency when exposed to sunlight. Present research work has tried to find out all these problems in the previous chapters of this thesis.

Second chapter of the thesis examine and define the forest in ancient and modern period. It has considered the relationship of trees with living creatures from the very beginning of this planet. Indian socio-cultural history provides excellent examples of the preservation of forest resources from the ancient thoughts of religious injunctions to the present globalised era. Researcher has discussed the efforts taken by the rulers of Hindu, Islamic and British periods for conservancy of forest resources. It reveals that ancient thoughts and religious injunctions had some how manage to save and flourished the forest eco-system. But after the Islamic invention to the power there is no attempt to conserve the forest. If the Mughal rulers took no steps to conserve, the early British administrators did worse. Only concern of them in the

Indian forests to secure big supply of timber for navy and railway sleepers. They have hunted wild animals and cleared the forest land for establishing agriculture, which have generated timber and revenue both. It reveals that the forests of Terai-Dooars and South-Western Junglemahal felled down for tea plantation and supply of sal tree for railway sleepers. Keeping in view of the present research project, the Researcher has highlighted on the three major regions of forest of the State i.e. Terai – Dooars, Sundarban Mangrove and South-Western Junglemahal. Forest land, forest cover and the persons living around that has also examined and it reveals that, in three major regions of the State, the forest resources and living creatures are completely different from each other.

Third chapter mainly discuss about the major forest resources and minor forest produces mainly. Most segments of Indian society – peasants, tribals, pastoralists, city dwellers and industry have a heavy dependence on the produce of the forests, as the source of fuel, fodder, construction timber or industrial raw material. Any impact on forest vegetation will have adverse implications for the livelihood of million of forest dwelling communities. Major forest industries include railway sleepers, packaging, match wood, building construction etc. Minor forest produce and its related industries includes fibres, grasses, bamboos, canes, oils, resins, gums, lacs and various medicines. Wild animals and forests are inseparable from each other. Author has briefly pointed about the position of mammals, avifauna, and reptiles in the Indian forest. The largest concentration of tribal people anywhere in the world except

perhaps Africa is in India and there are 613 tribal communities of three major families – the Astro – Asiatic, the Dravidian and the Tibeto – Burma lives in all over India, out of them mostly are forest dwellers and depended upon forest resources. It has seen that the forest dwelling tribals has a close symbiotic relationship with forest since time immemorial and they have protected the forest resources form generations.

Researcher examines emerging issues for Desertification in the fourth chapter of this thesis. In the first part, author describes the root causes of global desertification. This work discuss about the climatic variations and human activities, which are responsible for the problem. It has reveals that water erosion, salinization, shortage in rainfall lead to desertification or soil degradation in projected areas. Indiscriminate cutting of trees, uncontrolled grazing, irrational land use system, mines, dames and unplanned tourism has caused great destruction to flora, fauna and topsoil of the projected area. Effect of drought, devastating flood and cyclone of ‘Aila’ also examined in the projected area. Author has also discussed the phisiography of soil and its use in Bengal. It has described, erosion classes and salinity classes of soils in Himalayan and Gangetic region. The author has classified the forest areas of the State of West Bengal and classified the area into three major areas – Himalayan Terai and Dooars, Mangrove and South-Western Junglemahal for the purpose of this study. This study has examined the every corner of forests of these areas regarding the problem and describes about the flora, fauna, inhabitants and their socio-economic condition of life. In second part of the chapter the author has conducted field survey

through questionnaire method in the selected areas. The local inhabitants raised some new issues regarding the problem. Some of the related issues are, joint forest management, collection of minor forest produces, Forest Rights Act and commercial forestry.

Fifth chapter gives a detailed idea about the regulatory measures to combat desertification in both International and national legal mechanism. In the colonial period systematic forest management came in the year 1864 when Dietrich Brandis was appointed as the first Inspector General of Forests. In the same time forest conservancy was started in Bengal. But that conservancy is only limited to reserved, protected and unclassed forests. In 1865, Government Forests Act was passed, but it has so many drawbacks. There after, Indian Forest Act of 1878 passed and it has amended in the year 1890, 1891, 1901, 1911, 1914, 1918 and 1920. The last legislation by the colonial government in forest conservation is Indian Forest Act, 1927. The Act establishes three classes for forests namely, Reserve Forest, Protected Forest and Village Forest. It has seen that during the colonial rule there is no provision for combating the land degradation or there is no rights specified for the forest dwellers. They are only concern to earn revenue from the forest. After the independence, Indian Constitution contains specific provisions on environmental protection. Out of the constitutional provision the independent government established National Forest Policies and allocate funds for successive Five Year Plans. Although allocation towards forestry sector is very minimum. Parliament of India in

order to further implement its commitment at the U.N. Conference on Human Environment held in Stockholm in 1972, came forward with two legislations to protect the flora and fauna of the country. Wildlife (Protection) Act of 1972 and Forest (Conservation) Act of 1980 was passed. Joint Forest Management is another steps originating in the State of West Bengal in early decade of 1970 which had generated income among the villagers. In 2006, Forest Rights Act was enacted after much debate in parliament. The Act has given some rights to the forest dwellers. In the same time, the State legislative assembly has enacted some legislations to save the greenery in urban areas. Author has discussed about some forest movements, which has some direct and indirect reflection upon the law makers. This project also examines some countries municipal laws regarding the subject. In 1994, the United Nations Organised a Convention to combat desertification, but still we are waiting for such a protective legislation in our country.

Sixth chapter is lastly describing the role of judiciary towards protection of forest. The Supreme Court through its interpretation, examines the issues of saw mills, mines, tourism and forest dwellers problems. But the Supreme Court of India through a landmark judgment in *Thirumulpad* case called for a change in the forest management of the country. The judgment and its supplementary orders are of special significance to the northeastern region compared to the rest of India as this region represents a population dependent on forest resources. Most remarkable aspect of the judgment is that the court has given a definition of forest, which is not defined by the

Indian Forest Act, 1927 or Forest (Conservation) Act, 1980. In the instance case, under which all the forest related cases are still pending, the court set up two committees to see the implementation of the orders.

After the above discussion of the research work, Researcher has come to a conclusion that, desertification in the form of land degradation is a slow process of environmental deterioration causing in the country including this state. The society is affected but there is no specific voice raised against this environmental menace as the other issues of water, air, climate, and biodiversity has a chance to share public opinion. There are so many legislation, but little justice regarding the problem. The Researcher thinks this is the right time to eradicate this menace with following suggestions:-

- i. Problem of deforestation has received maximum public attention. Commercial forestry is contributing significantly to the destruction of original forests and their biological diversity. Several thousands hectares of natural grass land and degraded forest land have been replaced by monoculture plantations by the forest department. Species such as eucalyptus, *sonajhuri*, cashew nuts were planted, which has little for ecological restoration, enhancing soil fertility or for soil and water conservation. Nor did they meet local people's livelihood needs. This thing can adversely affect the aboriginal plant species, that produce fruits,

flowers, nuts, leaves and many other minor forest produces, upon which millions of forest dependent communities survived. This afforestation programmes, thus, were often as anti people; because, social forestry is a term to mean tree – raising programmes to supply firewood, fodder, small timber and minor forest produces to rural populations. But the present system is ending up in urban and industrial sector, instead of in the livelihood of forest dwellers. **So, this model of social forestry programme is poor as it has no benefit upon the forest dwellers and there is need for a new model which can generate income to the forest dwellers.**

- ii. Apart from Government schemes, N.G.O's, Panchayet and Municipal boards should take plantation schemes on plot division line of agricultural field; along roadsides, railway lines and canals. In urban areas, parks and gardens are a city's lungs, larger areas may be planted with suitable trees and shrubs to provide a forest like atmosphere. **The Government should pass an order to implementation of plantation by the local self government in the wastelands.**
- iii. 70 per cent of petroleum used in India is imported, mostly from the Gulf region, at the cost of crores of rupees. Using of Biodiesel can reduce India's burgeoning oil import bill. Oil yielding plants like jatropha (*Jatropha cureas*) and pongamia (*Pongamia pinnata*) are hardly and can

grow even in poor soils. The government intends to replace 10 per cent of the fossil fuel with biofuels by 2017. Some other States like Uttar Pradesh, Rajasthan, Chattishgarh, Orissa, Madhya Pradesh, Andhra Pradesh have brought nine million hectares under biofuel vegetation. So, Cultivation of biofuel is a kind of agro-forestry which could uphold the economy as well as saving the land degradation in wasteland. **Therefore, government and private investors should take steps for this type of agro forestry in Wastelands.**

- iv. Legal status of the Joint Forest Management (JFM) circular is on a weak footing. The primary goal of JFM was to empower local communities to manage forests for their livelihoods through joint management with forest department. Various States have issued a Government Order in line with the circular of JFM and not formalized it under any statute. Villagers' participation was found to be limited and only forest officers have legal powers to deal with offenders and encroachers. The unequal distribution of power between the forest department and people made worse by the fact that this circular has no legal sanctity. **So, the existing JFM policy needs to provide secured management rights to forest dwellers to monitor, control and market systems with legal framework.**
- v. The land surface is turning into non-productive desert not only just because of lack of rain but because of overgrazing of cattle and stripping

away the trees for firewood. As the country has no specific land for livestock grazing, the forests are easily accessible to the livestock who depends entirely on forests for grazing. To remedy this problem, a forest should be closed to graziers, when the planted trees are in tender age and it should remain so until the forest seedlings have grown beyond danger from cattle. The key to proper management is maintaining livestock populations within the carrying capacity of ecosystem. **So, there should be rule on deffered grazing and control of population of the graziers in forest fringed areas.**

- vi. From the decade of Sixties of last century, the central government provided financial incentives, to encourage State governments to take up industrial plantations. 'Production Forestry' has its mainspring by clear – felling of existing forests and their replacement by fast-growing commercial species. In effect, tropical rain forests and forest of original species were converted into man-made deserts. Eucalyptus, *akashmoni* and *sonajhuri* plantations were found to combine the restoration of green cover to barren land with the quick production of industrial raw materials. Many farmers now find it profitable to switch from traditional agricultural crops to eucalyptus even on irrigated holdings. **So, there should be a rule to ban on cultivation of commercial forestry in agricultural holdings and forest areas.**

vii. Symbiotic relationship between the tribal population and forests exists only as long as the pressures of the population do not exceed the carrying capacity of forests. The symbiotic relationship between forest and tribal is also broken by the growing population. As more land is now needed to keep families going, many families have extended their agriculture into the forest. With increasing population cycle of shifting cultivation was reduced, many more areas were brought under cultivation and homestead, and the degradation of forest became noticeable. Forest boundaries are fast receding as there are no concrete steps taken towards family planning or population stabilization either. **As the population explosion is a big menace, the government should take concrete steps for family planning in whole country including the persons living around the forests.**

viii. To accommodate the increasing population, cities are converted to concrete jungles as cities are expanding beyond their borders. There is hardly any land available for plantation of trees. Almost every piece of available land in the city can qualify to be a part of an urban forest. Streets, roadsides, city bypasses, parks, educational institution, hospitals, crematoriums, grave yards and religious places can be brought under urban forestry plantation. Trees on streets can reduce pollution substantially; decreasing suspended particulate matter and reduces ambient air

temperature. **There should be provision to the West Bengal Town and Country (Planning and Development) Act, 1979 for mandatory tree plantation in cities, towns and apartments to cater ecological and sociological needs of urban growth.**

- ix. Since independence so many million hectares of forest land have been diverted for dams, industries and mining operations. Perhaps an even larger area has been affected by multiple effects such as illegal timber felling for clearing the submergence area, for construction of colonies and for resettling the displaced people. **So, the government should have a national policy to save the forest eco-system and its adjoining areas, where dam, mines and industries are operating.**
- x. Legal framework for conservation of biodiversity came into India after Stockholm Conference. The words 'Conservation' and 'Protection' arrived in the environmental law after enacting of Wild Life (Protection) Act, 1972 and the Forest (Conservation) Act, 1980. The Forest (Conservation) Act is not really a protective legislation rather it provides some policies to managing the natural resources. Only central government is empowered to give permission to any prohibited activities. **The Forest (Conservation) Act should ensure the protection of ecological and environmental security for human and non human species and should prescribe some guide lines to conserve the forest land.**

- xi.** Most States have their own specific law relating to forests, many of which are unique and fundamentally different from the Indian Forest Act of 1927. Such as Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Meghalaya, Manipur, Nagaland, Orissa, Rajasthan, Tripura, Uttar Pradesh have their own laws and rules for management of plantation, grazing, removal of timber, sawmills, acquisition, fire protection and so on. But the State of West Bengal has not specifically enacted any law or rules regarding the above stated matter. Although the state amendment has doubled the punishment for forest offences prescribed by the Forest Act of 1927, but it is too minimum for greater offences. **Apart from the colonial legislation the State government of West Bengal should enact law and rules regarding the subjects of related matters.**
- xii.** The Forest Rights Act, 2006 has passed to correct continuing injustices against forest dwellers by providing the legal basis and procedures for the recognition of forest rights to ancestral forest land and resources; as the law makers thinks conservation is embedded in the ethos of tribal life. Sec. 3 (2) of the Act specifies felling of trees for diversion of forest land to establish school, hospitals, fair price shop, electric and telecommunication lines, vocational training centres etc. The Act also specifies in Sec. 5 (a)

duty to protect the wild life, forest and bio diversity. But, it is important to acknowledge that the recognition of forest rights and the protection of wild life are both important but separate goal. It is not proper to assume that both goals can be fully achieved by using the same legal line. Diversion of forest land can create new colonies into the forest and our wildlife; another historically dispossessed entity will be in danger. The wildlife Act of 1972 was always meant to recognise and settle the rights of forest dwellers, but in practice it has been used largely as a blunt weapon against them. It is entirely possible that the Forest Rights Act, 2006 could tomorrow become a similar blunt weapon to the wildlife. It has also seen that most of the tribals or forest dwellers are not aware about this Act and most of States have not implemented it yet. Diversion of forest land for tribal development is not alone a key development factor, as there are so many schemes for tribals are there, which have not implemented yet. Gram Sabha is more powerful than an individual tribal and there is every chance to make political interference and influence to the Gram Sabhas. **So, the welfare government should take steps to eradicate these cloudy atmospheres between the forest, forest dwellers and wildlife resources.**

- xiii.** Tourism inflow in the forests of Dooars of North Bengal has gone up by as much as 50 per cent in the last five years. Once a safe haven for rhinos, elephants, bison and a spectacular range of other animals – is being slowly

becoming a concrete jungle. Most of the hotels and resorts do not have no objection certificate from the state pollution control board. Rising number of resorts has not only disturbed the animal corridors, but has also increased the pollution levels to some virgin forest area. Strong lighting at night discourages animals from emerging from their territory and drink water. Safaris also threatened animal movement and that might lead to conflict with humans. The main problem is that the State still does not have an eco-tourism policy. **So, the Government should prepare an eco-tourism policy with guidelines to promote and protect the virginity of forest eco-system.**

- xiv.** Sundarban – a National Park (1984), World Heritage Site (1985) and a Biosphere Reserve (1989) is a vital contiguous area of mangrove forest in the Country. But the forest is vulnerable to salinization as the huge sediments from Ganga – Brahmaputra river system causing threat to the mangrove eco-system. Conversion of private farmland to shrimp farming leads to pollution, land degradation and water salinization.. **A special policy is needed to protect the eco-system of mangroves of Sundarban as it is different eco-system compared to other forest area.**

- xv.** It is a present trend that in urban areas, apartments and high-rise multi unit buildings for the purposes of residential, commercial, industrial or institutional uses are developed either by a person or developer or

promoter. There is provision for compulsory plantation in these areas in Sec. 9 of the W.B. Trees (Protection and Conservation in Non-Forest Areas) Act, 2006. Everyday the newspapers hold some picturesque advertisement of the proposed project / multi-storied apartments with some green areas and plantation. But in reality most of the cases the developer or promoter does not comply the rule of plantation. Sec. 11 (2) of the Act, prescribes punishment for violation of Sec. 9 (4) of the Act. **So, a strict vigil is required from urban development authority in this regard.**

Schedule of Sec. 21 of the W.B. Trees (Protection and Conservation in Non-Forest Areas) Act, 2006 provides a list of 11 species of trees, for which permission is mandatory for felling. But the schedule not included species like Banyan (*Ficus benghalensis*), Peepal (*Ficus religiosa*) Neem (*Azadirachta indica*), Arjuna (*Terminalia arjuna*) etc. which has great utility in medicine, soil conservation and eco-system. **So, apart from the timber species, these common tree species of Bengal may include to the schedule of the Act.**

- xvi.** It is common practice in the State, that Brick field owners collected clay from top soils of agricultural land and river bank. But this practice leads to desertification for loss of top soil and cause river erosion. **So, there is need to stop or change this practice.**

- xvii.** Burning of dead bodies in wood, consumes about 160kg. of wood. For the purpose of making of wooden crates, match sticks and so many articles wood is needed. In almost every sweet shop, firewood is used for making of sweets. These should be replaced by electric crematoria, plastic boxes and L.P.G. for minimum using of wood. **So, the society can think about the matter.**
- xviii.** Almost every environmental pollution matter such as air, water, noise has been covered by legislation or rules but there is still no legislation or rules framed either by the Central or State to eradicate the menace of ‘Desertification’ or land degradation. **So, the legislator should think the matter on the line of conservation of land and its biodiversity.**
- xix.** There is need of seminars and meetings to aware the public about the problem of desertification and the matter should promote to school level forestry programme through models in affected areas.
- xx.** There are so may laws, but little justice about this problem. Existing legislations should add some provisions to eradicate this problem. A new forest policy with aim to combat desertification or land degradation should made with principle of sustainable development.

In addition to aforesaid suggestions the planner of the welfare state must be aware and fully conscious for enforcement of their policies to arrest the problem of

desertification. Proper implementation of the policies will pave the way for healthy society and thereby this great menace may be eradicated. Hopefully the Researcher thinks that the coming generations of people as well as land and ecology shall be saved through new devices of laws. On this count and desire Researcher hopes for a forest and land ecology without desertification.

Bengali version of Letter

নবেন্দু মণ্ডল
 "নারায়ণালয়"
 ৪৮, ফোর্থ এ্যাভিনিউ,
 "উল্লাস"
 বর্ধমান - ৭১৩ ১০১

প্রতি,
 মাননীয়
 মহাশয় / মহাশয়া,

আমি বর্তমানে বর্ধমান বিশ্ববিদ্যালয়ের আইন বিভাগের অধ্যাপক ডঃ শিব সহায় সিংহ-র তত্ত্বাবধানে "Laws to Control Desertification : A Study with special reference to West Bengal" বিষয়ে গবেষনারত।

উল্লিখিত বিষয়ের উপর আপনার সুচিন্তিত মতামত আমার গবেষনাকে সাহায্য করবে বলে মনে করি। এই কারণে কিছু প্রশ্নবলীর মাধ্যমে আপনার এলাকা সম্বন্ধে আপনার মতামত সংগ্রহে ব্রতী হয়েছি। আশা করি আপনার সহযোগীতা থেকে বঞ্চিত হব না।

আপনার দেওয়া তথ্য সম্পূর্ণভাবে গোপন রাখা হবে বলে আমি অঙ্গীকার করছি।

ধন্যবাদান্তে

ভবদীয়

বর্ধমান

নবেন্দু মণ্ডল

২০-১০-২০১০

BENGALI VERSION OF QUESTIONNAIRE

প্রশ্নাবলী

- ১। নাম -
- ২। বয়স -
- ৩। ঠিকানা -
- গ্রাম -
- থানা -
- ব্লক -
- মহকুমা -
- জিলা -
- ৫। পেশা -
- ৬। শিক্ষাগত যোগ্যতা -
- ৭। গ্রামের লোক সংখ্যা (আনুমানিক) -
- ৮। গ্রামের কাছাকাছি কোনও বনভূমি আছে ?
- ৯। কি কি ধরনের গাছ আছে উল্লিখিত বনভূমিতে ?
- ১০। বনভূমির আয়তন বাড়ছে না কমছে ?
- ১১। পূর্বে কোন ধরনের পশুপাখি দেখা যেত, যা এখন আর দেখা যায় না ?
- ১২। গ্রামবাসীরা বনজ সম্পদের উপর কতটা নির্ভরশীল ?
- ১৩। চাষাবাদ ও গো-চারন কি ভাবে হয় ?
- ১৪। গ্রামের কাছাকাছি কোনও শিল্প আছে কিনা ?
- ১৫। ভূমিক্ষয় ও বৃক্ষছেদন-এর কোনও ঘটনা আছে কি ?
- ১৬। সামাজিক বনসৃজন নিয়ে কি মতামত আপনার ?
- ১৭। অরন্যের অধিকার আইন সম্পর্কে কি জানেন ?
- তারিখ -
- স্বাক্ষর -

LETTER FOR FIELD SURVEY

Nabendu Mondal
“Narayanalaya”
46, Fourth Avenue,
“Ullhas”
Burdwan – 713 101

To
Respected,
Sir / Madam,

Presently I am pursuing research on “Laws to Control Desertification : A Study with Special Reference to West Bengal” under the supervision and guidance of Prof. (Dr.) Shiv Sahai Singh of department of Law, The University of Burdwan.

I think that your thoughtful opinion will help my research work. For that reason a questionnaire is supplying to you for your valuable information and opinion about your locality. Hope, I shall not be debarred from your assistance and opinion.

I assure you that your information in this regard is kept in full secret.

Thanking you,

Yours Sincerely

(Nabendu Mondal)

Burdwan
20-10-2010

QUESTIONNAIRE

1. Name :	4. Male / Female :
2. Age :	
3. Address :	
Village :	Police Station :
Block :	Sub Division :
District :	
5. Occupation :
 6. Educational Qualification :
 7. Total Population of village (Approx) :
 8. Is there any forest coverage near the village ?
 9. Which are the species of trees found in that forest ?
 10. Forest coverage nearing your village is increasing or decreasing ?
 11. Which types of wild lifes and birds are nearing extinction ?
 12. Villagers are how much depended upon forest produces ?
 13. What is the way of agriculture and grazing ?
 14. Is there any industry near the village ?
 15. Is there any incidence of soil erosion and tree fellings ?
 16. What is your idea about Social Forestry ?
 17. How much know about Forest Rights Act ?

Date :

Signature

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