Environment Statistics of Punjab

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Preface

The rapidly growing population and economic development leads to environmental changes and degradation mainly through the uncontrolled growth of urbanization and industrialization, expansion and massive intensification of agriculture, and the destruction of forests. The existence or the absence of favorable natural resources can facilitate or retard the process of socio-economic development. Environmental Statistics, which, nowadays, has become an important area requiring special attention, has three major sub-areas, namely, basic Environmental Statistics, environmental indicators and environmental accounting.

The Central Statistical Organisation (CSO) coordinates with various central agencies to bring out 'Compendium of Environment Statistics India' at national level under the broad Framework for Development of Environment Statistics (FDES) provided by United Nation Statistical Division (UNSD). The first issue was brought out in 1997 and since then twelve issues of the publication have been brought out and the latest one i.e. twelfth issue covering the data up to 2011.

The National Statistical Commission has recommended that CSO should continue to co-ordinate and collate the relevant information on environment as is being done at present and bring out the Compendium on Environment Statistics on an annual basis. CSO should also provide necessary guidance to the States for development of Environment Statistics and indicators. NSC has also recommended that Environment Statistics Cells should be created in the Directorate of Economics and Statistics in all the States and the same should be responsible for coordination and collation of information from other related agencies in the State.

Degradation of environment is an emerging issue in the state of Punjab too, thus data on various environment indicators is urgently needed for formulation of long term policies and programmes to address the environmental problems. Keeping it in view and as a follow up of the NSC's recommendations, Economic & Statistical Organisation (ESO), Punjab has decided to bring out an annual publication on Environment Statistics of Punjab and the present issue is its 1st one of its kind by the department.

Punjab is one of the leading states in terms of development and pioneer in green revolution. However it is also one of the most environmentally affected states of the country. This publication will useful in understanding various aspects of environment and find out an alternative model of the sustainable development.

I appreciate the officers and staff associated with the preparation of this publication for their hard and sincere efforts in bringing out the publication.

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As this is the 1st issue on the subject which may have some deficiencies. Hence comments, suggestions and advices for improvement in the report are welcomed.

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Chapter-1

AN OVERVIEW

Introduction

Environment is defined as the physical surrounding of living organisms of which it is a part and on which it is dependent for its activities like physiological functioning, production and consumption. Physical environment stretches from air, water and land to natural resources like soil and plants, animals and ecosystems. Living things grow and interact with the environment. The activity of growing human population and other living organisms modifies the natural environment producing what is referred to as the built environment. The potential of the natural environment to sustain these changes while continuing to function as an ecosystem is an issue of major concern. Key environmental areas of concern include air pollution, water supply and waste water, waste management and hazardous waste, and land use issues such as deforestation, desertification, urban sprawl and climate change

1.2 The rapidly growing population and economic development leads to environmental changes and degradation through the uncontrolled growth of urbanization and industrialization, expansion and massive intensification of agriculture, and the destruction of forests. Growth of population and developmental activities also adversely affect the natural resources and pose the challenge to sustainable development. The existence or the absence of favorable natural resources can facilitate or retard the process of socio-economic development.

Environment versus Development

1.3 Development activities are measured in terms of national products, which in turn are defined as production of goods and services during accounting period. However, certain environmental functions, which are crucial for economic performance and generation of human welfare such as provision of natural resources to production and consumption activities, waste absorption by environmental media and environmental services of life support and other human amenities, are taken into account only partly in conventional accounts. The scarcities of natural resources now threaten the sustained productivity of the economy and economic production and consumption activities. These activities impair environmental quality by over loading natural sinks with wastes and pollutants. The environmental consequence of development tends to offset many benefits that may be accruing to individuals and societies on account of rising incomes. There are direct costs on the health of individuals, their longevity and on quality of life on account of deterioration in environmental quality to mention a few. More importantly, the environmental damage can also undermine future attainments and productivity, if the factors of production are adversely affected. Therefore, the private and social costs of the use of the natural resources and the degradation of the environment may be taken into account for the ‘sustainable development’ in the conventional accounts.

1.4 'Sustainable Development' is a broad concept and there is a number of definitions available on it. The World Commission on Environment and Development (the Brundtland Commission, 1987) defines it as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs". This definition is perhaps the easiest and most acceptable one. Sustainable development recognizes the interdependence of environmental, social and economic systems. The principles of sustainable development include fulfillment of human needs for peace, clean air and water, food, shelter, education and useful and satisfying employment.

1.5 Environmental issues are important, such as ecological integrity through careful stewardship, reduction of wastes, and protection of diverse species and ecological systems. Sustainable development focuses on local people through public involvement in the definition and development of local solutions to environmental and development problems. Achievement of equity is attained through the fairest possible sharing of limited resources among contemporaries and between our generation and that of our descendants. Sustainable development requires the maintenance of natural capital. By natural capital we mean natural resource stocks, land and ecosystem. If any pattern of development continues to deplete natural capital, then that development is not sustainable.

Impacts of Development Activities on Environment

1.6 Some impacts of development activities on environment are listed below:

- **Forest clearing and land resettlements:** Extinction of rare species of flora and fauna, creation of condition for mosquito breeding leading to infectious diseases such as malaria, dengue etc.
- **Shifting cultivation in upland agriculture:** Soil erosion in upland areas, soil fertility declines due to shorter cultivation cycle, which is practiced due to population pressure, flooding of low land areas. The problems could be resolved by terraced cultivation.
- **Agro industries:** Air pollution due to burning of bagasse as fuel in sugar mills, large amount of highly polluting organic wastes, surface water pollution.
- **Introduction of new varieties of cereals:** Reduction of genetic diversity of traditional monoculture resulting in instability, danger of multiplication of local strains of fungus, bacteria or virus on new variety.
- **Use of pesticides:** Organism develops resistance and new control methods are needed (e.g. in malaria, widespread use of dieldrin as a prophylactic agent against pests of oil palms made the problem worse), creation of complex and widespread environment problems. The pesticides used in agriculture sometimes go into food chain or in water bodies which may result in harmful health hazards.

- **Timber extraction:** Degrades land, destroys surface soil and reduces production potential of future forests.
- **Urbanization and industrialization:** Concentration of population in urban centers makes huge demands on production in rural areas and put pressures on land, air and water pollution.
- **Water resource projects, e.g. Dam, extensive irrigation:** Human settlement & resettlement, spread of waterborne diseases, reduction of fisheries, siltation, physical changes e.g. temperature, humidity.

Local, Regional and Global Impact

1.7 The environmental stress caused by developmental activities emanating from emissions and discharges of various substances into air, water and soil. These emissions and discharges have not only local effects but regional and global effects too as under:

- **Local effects-** Heavy metals in air, soil, water and plants, e.g. from industrial emissions and Discharges Noise, Smell, Air pollution.

- **Regional Over Marine-** Eutrophication, Contaminants in the soil & water, Landscape changes due to mining or agriculture.
- **Water and Continents-** Eutrophication, Acidification, Environment Contamination due to Radioactivity.
- **Global-**Changes the climate due to ozone depletion and the greenhouse effect.

Effect on Atmosphere

1.8 The emission of ammonia contributes to the acidification. Sulphur dioxide and nitrogen oxides emitted into the air are also converted into acids. At their deposition, they have an acidifying effect on soil and water. Main sources of emission of sulphur dioxide in the air are due to burning of sulphur containing fuel like coal mine, power plants, oil by vehicles, and also due to refining of oils in refineries. Volatile organic substances may also affect health. Many of such substances are carcinogenic. In combination with nitrogen oxides and in sunlight, some of them might form ozone and other photochemical oxidants. These are harmful to plants.

1.9 The greenhouse gases (carbon dioxide, methane etc.) prevent some of the heat radiation from the earth into space. The concentration of greenhouse gases is responsible for raising the temperature of the earth in a long term. Eighty percent of the effect of the greenhouse gases is caused by carbon dioxide itself.

1.10 Nutrients, mainly nitrogen and phosphorus, contribute to the eutrophication of lakes, rivers and marine waters. Approximately, half of the nitrogen discharges are estimated to originate from agricultural land. A considerable proportion of the

phosphorous discharge derives from waste water not passing through sewage treatment plants. In addition to discharges from human activities, there is a natural leaching from various types of soil. The quantities are estimated to be of about the same magnitude as those originating from human activities**.**

1.11 Discharges and emissions of heavy metals are difficult to estimate. A large proportion of emissions/discharges of heavy metals into air originate from the iron and steel industry. Vehicular traffic is the main source of lead emissions. Mines and mining wastes account for the major part of the discharges of heavy metals into water. Besides, Cadmium depositions originate from commercial fertilizers containing phosphorus.

Some Major Pollutants and their Sources are as under:

- **Carbon monoxide-** Incomplete fuel combustion (e.g. two/four stroke engines)
- **Sulphur dioxide-** Burning of sulphur containing fuel like coal in Power Plants and emission by vehicles.
- **Suspended particulate matter-** Smoke from domestic, industrial and vehicular sources.
- **Oxides of nitrogen-** Fuel combustion of motor vehicles, emission from power stations and industrial furnaces.
- **Volatile hydrocarbons-** Partial combustion of carbonaceous fuels (two stroke engines, industrial processes, disposal of solid wastes).
- **Oxidants and ozone-** Emissions from motor vehicles, photochemical reactions of nitrogen oxides and reactive hydrocarbons
- **Lead-** Emissions from motor vehicles

Atmosphere degradation and Health

1.12 Atmosphere degradation has direct impact on health of human being and other living beings. The persistent presence of bad elements in the atmosphere of a particular locality or region results in physical and nervous disorder in living organisms of tha locality or region. The pollutants and their related health hazards are as follows:

Pollutants	Health Effects
Carbon Monoxide (from gasoline cars, 2-wheelers, 3-wheelers)	Fatal in case of large dose: aggravates heart disorders; effects central nervous system; impairs oxygen carrying capacity of blood
Nitrogen Oxides (NOx) (from diesel vehicles)	Irritation of respiratory tract

Ozone	Eye, nose and throat irritation; risk asthmatics, children and those involved in heavy exercise
Lead (from petrol vehicles)	Extremely toxic: effects nervous system and blood; can impair mental development of children, causes hypertension
Hydrocarbons (mainly from 2-wheelers and 3-wheelers)	Drowsiness, eye irritation, coughing
Benzene	Carcinogenic
Aldehydes	Irritation of eyes, nose and throat, sneezing, coughing, nausea, breathing difficulties; carcinogenic in animals
Polycyclic Aromatic Hydrocarbons PAH (from diesel vehicles)	Carcinogenic

Health versus Water Quality

1.13 Water borne diseases are single most important factor responsible for nearly 80% of human mortality in India. Children are worst affected, especially in rural areas and urban slums. Typical water born diseases and their causative factors are summarized as under:

SN	Name of the Disease	Causative Organism
1	**Water-borne diseases Bacterial:**	
	Typhoid	Salmonella typhi
	Gastroenteritis	Vibrio cholerae
	Paratyphoid	Slmondlla parayphi
	Cholera	Enterotoxigenic Escherichia coli
	Bacterial dysentery	Variety of Escherichia coli
	Viral:	
	Infectious hepatitis	Hepatitis-A-virus
	Pliomycetis	Polio-virus
	Diarrhea Diseases	Rota-virus, Norwalk agent,
	Other symptoms of enteric diseases	Other virus Echono-virus, Coxsackie-virus
	Protozoan:	
	Amoebic dysentery	Entamoeba hystolitica
2	**Water-washed diseases:**	
	Scabies	Various skin fungus species
	Trachoma	Trachoma infecting eyes
	Bacillary dysentery	E. coli
3	**Water-based diseases:**	
	Schistosomiasis	Schistosoma sp.
	Guinea worm	Guinea worm

4	**Infection through water related Insect Vectors:**	
	Sleeping sickness	Trapanosoma through tsetse fly
	Malaria	Plasmodium through Anaphelis
5	**Infection primarily due to Defective sanitation:**	
	Hookworm	Hook worm, Ascaris

Need and Importance of Information on Environment

1.14 One of the important challenges is to achieve closer integration between economic policies and policies for management of natural resources and environment. For closer integration, decision-makers need more information about the environmental impacts of developmental policies and identification of pressure points such as population, industrialization, large power generation and irrigation projects, etc. This calls for collection, compilation and dissemination of a wide variety of statistical data on biodiversity, atmosphere, land and soil, water, human settlements, etc. Environmental Statistics, which has become an important area requiring special attention, has three major sub-areas, namely, basic Environmental Statistics, Environmental Indicators and Environmental Accounting. Data on environment and environmental change are required for assessment of Climate Change and its impacts in terms of higher maximum temperatures, more hot days/ heat waves; higher minimum temperatures, fewer cold days, frost days/cold waves; increase summer drying and drought, increased flood, landslides, avalanche and mud slide damage, increased soil erosion, increased flood run of, increased recharge floodplain aquifiers, sea level rises threatening many low lying islands and coastal zones, increased heat stress in livestock and wild life, increased risk of damage to a number of crops, extended range and activity of pests and disease vectors. Increased summer drying results in decreased crop yields, decreased water resource quantity and quality, increased risk of forest fires etc.

Chapter-2

EVOLUTION OF ENVIRONMENT STATISTICS

Natural resources provide the basic infrastructure for producing goods and services for the use of human and other species on the earth. The level of consumption of Natural Resources per capita has increased very significantly over the decades particularly during the last fifty years. This has happened especially due to the high growth in population, urbanization and industrialization during this period. While Research and Development has taken into account the needs of human in the form of food, shelter, health, transport, communication, and entertainment related requirements, the needs of the other species of earth are not adequately considered. It has resulted in skewed and imbalanced use of Natural Resources resulting in depleting and deteriorating quality of eco-system services and undue pressure on earth. As such it is imperative to plan for balanced use of Natural Resources while planning for growth and development of economies.

2.2 The whole world has now realized the threat to its precious environment due to depletion of natural resources and the growing pace of degradation of the environment. Environmental issues, which have been for a long time part of Indian thought and social processes, are reflected in the Constitution of the Republic of India adopted in 1950. The Directive Principles of State policy, an integral and significant element of constitution of India, contain provisions, which reflect the commitment of the State to protect the environment with regard to forests and wildlife and which join upon the citizens of India the special responsibility to protect and improve the environment.

International Efforts on Environment Statistics

2.3 The international efforts in this field started in 1973 with a seminar in Warsaw with recommendation of giving high priority to pollution-related data continuing exchange of information on the related parameters. The draft programme of international work in the field of Environment Statistics was submitted to the Statistical Commission in eighteenth session in 1974 which advocated a step-by-step approach concentrating on need for and the availability of environment statistics and on providing methodological guidelines. The statistical commission in its twentieth meeting in 1979 requested the United Nations Statistical Office (UNSO) to explore the feasibility of developing a framework for the organization of environment statistics. The first draft of international framework was presented in twenty-first meeting in 1981 and it was revised after regional discussions and reviews by specialist agencies by the group of experts in 1982. On the request of the twenty-second meeting of the United Nations Statistical Commission (UNSC) in 1983, the publication of the revised Framework was made. It was observed from the experience of regional workshops that for both the industrialized as well as the developing countries, the scope of

Environment Statistics is similar, while the priorities assigned to the different areas may differ from country to country.

2.4 United Nations Statistical Division (UNSD) developed a Framework for the Development of Environment Statistics (FDES) which was published in 1984. A list of environmental indicators was later prepared by UNSD in collaboration with the Inter-governmental Working Group on the Advancement of Environment Statistics. The fourth meeting of the Working Group held at Stockholm in 1995 agreed on the List of environmental and related socio-economic indicators given at Annexure-I. The Statistical Commission, at its twenty-eighth session in New York in 1995 approved this list for international compilation by UNSD.

National Efforts on Environment Statistics

2.5 The foundation of the institutional framework for environmental programmes in India as well in States goes back to the 1970s with the establishment of the National Committee of Environmental Planning and Coordination immediately after the historic Stockholm Conference on Environment held in 1972. The Committee was gradually upgraded into a Department of Environment in 1980 and five years later to a full-fledged Ministry of Environment and Forests (MOEF) of the Government of India (GOI). The State Governments also followed this example by establishing their own Departments of Environment to address the rapidly increasing policy initiatives and programmes in the environment and forests sectors. Ministry of Environment and Forests has engaged itself in the task of managing country's environment by focusing on the development of important administrative tools and techniques, impact assessment, research and collection and dissemination of environmental information.

2.6 However, environment being a multi-disciplinary subject involving complex subjects like Biodiversity, Atmosphere, Water, Land and Soil and Human Settlements, it seemed difficult to collect and analyse data on these parameters and develop interrelationships among them. It, therefore, became necessary to develop an efficient statistical system on environment that could meet the growing demand of data on various aspects of environment by the various governmental agencies, environmentalists and general public.

2.7 Recognising the importance of Environment Statistics as an emerging area, the subject was first discussed in the 5th Conference of Central and State Statistical Organisation (COCSSO) held at New Delhi in 1981. The Conference recommended the need for developing an appropriate environment statistical system in the country. The subject was again discussed in the 6th and 7th COCSSO. On the recommendation of the 7th COCSSO held in 1985, a multidisciplinary working group comprising Department of Environment, CSO, State Directorates of Economics and Statistics (DESs), and other concerned Central and State organisations and research institutions involved in the related subjects, was set up in CSO under the Chairmanship of its Director General in July, 1986

2.8 The Working Group, in its Report, submitted in 1990, suggested a provisional list of variables for Framework for Development of Environment Statistics (FDES). The FDES for the country was prepared based on the broad framework provided by UNSD and was officially adopted in 1997. As a part of the Asian Development Bank's Project in 1996, a suggestive list of environment indicators (Annexure-II*)* required to be maintained by India was recommended. The group also suggested a few variables on which data needed to be collected on priority basis. During the second half of 1996, a Steering Committee on Environment Statistics under the chairmanship of Director General, CSO was constituted. In its first meeting held in January 1997, a draft framework for the development of environment statistics was discussed along with the table formats to be used for preparing the compendium. The data source agencies were identified and it was decided to hold a workshop cum second meeting of the Steering Committee to discuss draft compendium of environment statistics. The workshop cum second meeting was held at Pune in March 1997. As per the recommendations of the second meeting, the draft compendium of environment statistics was modified and finally got approved in the third meeting of the Steering Committee held in August 1997.

2.9 Ministry of Statistics & Programme Implementation (MOSPI), GOI has set up a Environment Statistical Unit (ESU) in the Statistical Division of Central Statistical Office (CSO), GOI which so far has brought out twelve issues of the publication entitled "Compendium of Environment Statistics" for the years 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2006, 2007, 2008-09, 2010 and 2011 presenting available data relating to environment of the country.

Recommendations of National Statistical Commission

2.10 The National Statistical Commission set up by the Government of India under the Chairmanship of Dr. C. Rangarajan, in 2000, observed that at the Centre, the Central Statistical Organisation co-ordinates with various central agencies to publish in its annual '**Compendium of Environment Statistics'**. However, since there is no suitable coordinating mechanism at the State level, the availability of State-level data on environment is quite poor. Data on a number of

indicators listed by Asian Development Bank (ADB) are either presently not being compiled or are only partially available. The database on a variety of environmental parameters and indicators as available presently through different sources is quite weak and needs to be substantially augmented. Although the Ministry of Environment and Forests is the nodal agency for maintenance of proper statistical system related to environment, the availability of statistical infrastructure in the Ministry is totally inadequate to meet the growing data requirements. The situation is more or less similar in organisations such as Forest Survey of India, Indian Council for Forestry Education & Research, Central Pollution Control Board, etc. functioning under the administrative control of the Ministry of Environment and Forests. The Commission made the following recommendations:

i. Central Statistical Organisation (CSO) should continue to co-ordinate and collate the relevant information on environment as is being done at present and bring out the compendium on Environment Statistics on an annual basis. CSO should also provide necessary guidance to the States for development of Environment Statistics and indicators.

ii. The database on Environment Statistics should be strengthened and it should be linked with the Environmental Information System (ENVIS) already functioning in the Ministry of Environment and Forests.

iii. CSO in collaboration with the Ministry of Environment and Forests and other agencies should finalise the list of Environmental indicators needed for the country and should take the steps for regular collection of relevant information.

iv. Considering the emerging need for Environment Statistics, a Statistical Division in the Ministry of Environment and Forests should be established to cater to the requirements of environment and forest related data and analysis of the same. A Statistical Adviser at an appropriate level from Indian Statistical Service should head the Division.

v. Environment Statistics Cells should be created in the Directorate of Economics and Statistics (DESs) in all the States and the same should be responsible for coordination and collation of information from other related agencies in the State.

Action Taken on recommendations made by NSC

2.11 Alongwith the implementation of other recommendations made by National Statistical Commission (NSC), CSO has requested to the State Governments to bring out their State Compendium similar to the Compendium of Environment Statistics brought out by the CSO. The States have also been

requested to create separate Environment Cell in DES to coordinate with data source agencies at State level. The State Governments were also offered necessary guidance for the development of Environment Statistics.

Natural Resource Accounting

2.12 The economy draws inputs from the environment. These consist of natural resources, both non-renewable and renewable including mineral resources, timber and non-timber forest produce, aquatic resources, and also the ecosystem services *viz.* recycling of nutrients and supply of clean air and water necessary for sustaining life. Besides, economy also uses the environment as a sink for dumping unwanted wastes generated in industrial and other anthropogenic activities. The conventional System of National Accounting (SNA) hardly takes into account the environmental components and the goods and services they contribute to the economic development. Rather, it is entirely based on monetary considerations, which if dealt in isolation may prove disastrous, both to the economy as well as to the environment. Hence, links between economy and environment have to be properly understood and appreciated in order to achieve sustainable development of the society. There is an urgent need to generate data on environmental goods and services and their valuation in economic terms, so that information generated can be used for proper policy formulation to achieve overall sustainable development of the society. As a result, concept of Integrated Environmental and Economic Accounting (IEEA) has emerged on the initiative of the United Nations.

2.13 The main objectives of integrated environmental accounting are segregation and elaboration of all environmental and economic accounts, linkages of physical resource accounts with monetary environmental accounts and balance sheets, assessments of environmental costs, benefits and accounting for the maintenance of the tangible wealth. It is, thus, a complete accounting procedure for environmental assets. The IEEA later revised and termed by the City Group formed by UNSD namely, London Group as "System for Environmental and Economic Accounting" (SEEA) taking into consideration the contributions of the environment to the economy and the impacts of the economy on the environment. The United Nations, the European Commission , the International Monetary Fund, the Organisation for Economic Cooperation and Development and the World Bank undertook jointly the task of revision of the United Nations handbook of National Accounting-Integrated Environmental and Economic Accounting (commonly referred to as SEEA- 2003). Much of the work was done by the London Group on Environmental and Natural Resources Accounting, through a review process that started in 1998. SEEA 2003 provides a common framework for economic and environmental accounting, permitting a consistent analysis of contribution of environment to the economy and of the impact of the economy on the environment. It is intended to meet the needs of policy makers by providing indicators and descriptive statistics to monitor the interaction between the economy and the environment as well as serving as a tool

for strategic planning and policy analysis to identify more sustainable development paths. However, data on environmental components and the goods and services rendered by them, and their valuation in economic terms required for Environmental Accounting are lacking in various areas like Land, Water, Air, Energy, Agriculture, Forest, Mining, Industry etc. At present, in the fast changing environmental and economic scenario, data pertaining to various natural resources are highly desirable for proper policy formulation for sustainable development.

Natural Resource Accounting in India

2.14 The field of Environmental Accounting of Natural Resources in India is in developing stage. Various works done by experts on methodology of generating data and adding values to it have given valuable inputs for development of the area. The entire process of Environmental Accounting of Natural Resources involves three steps viz. Physical accounting; Monetary valuation; and Integration with Economic Accounting. Physical accounting determines the state of the resources types and extent (qualitative and quantitative) in spatial and temporal terms. Once the physical account of resources is available, monetary valuation is done to its all-tangible and intangible components. Thereafter, the net change in natural resources in monetary terms is integrated into the Gross Domestic Product in order to reach the value of Green GDP of a nation/state/region.

2.15 A Technical working Group on Natural Resource Accounting was constituted in the Ministry of Statistics & Programme Implementation to finalize the methodology of Natural Resource Accounting (NRA). This group held its first meeting in November 1997. Following the deliberations of this group Ministry has under taken 8 studies on NRA to develop sector-wise uniform methodology for natural resource accounting to finalize the Natural Resource Accounting methodology. In 2010, a study has been awarded to Centre for Economic and Social Studies (CESS), Hyderabad to prepare a synthesis report of the 8 studies conducted by CSO and suggest a methodology which is applicable to India. The first phase of the project is completed and the synthesis report has already been submitted by CESS. A Technical Advisory Committee (TAC) under the Chairmanship of Dr. Kirit Parikh, Ex- Member, Planning Commission was constituted to monitor and guide the project. An 'Expert Group on Green National Accounting' was constituted in August, 2011 under the Chairmanship of Prof. Sir Partha Dasgupta, Professor Emeritus, Cambridge University, UK with a mandate to (a) to develop a frame work for 'Green National Accounts' for India keeping in view of the previous work done on the subject, including the findings of the studies award to CESS (b) to identify the data requirements for the implementation of the recommended framework, and (c) to develop a road map for the implementation of the framework. The first meeting of the Group was held on 23rd August, 2011.

State Level Efforts on Environment Statistics

2.16 In line with the recommendations contained in the Report (2001) of the National Statistical Commission (NSC), MOSPI, GOI is implementing an important project namely "India Statistical Strengthening Project (ISSP)" for strengthening the statistical capacity of the States and UTs with regard to the collection, compilation and dissemination of statistics, in accordance with the relevant recommendations contained in the NSC's Report. As per the requirements of this project, Economic & Statistical Organisation (ESO), Punjab, being a nodal department for ISSP, has prepared a "State Strategic Statistical Plan (SSSP)", on the basis of which, Government of India will provide grant to the State Government for carrying out necessary reforms for strengthening state statistical system.

2.17 Under SSSP, alongwith other various proposals, it has also been envisaged that an **Environment Statistics Unit** will be established in ESO for the collection, compilation and dissemination of environment statistics for implementing the recommendations of the National Statistical Commission (NSC) and for fulfilling the State's own need regarding environment statistics. The degradation of environment is an emerging issue in the state of Punjab too, thus data on various environment indicators is urgently needed for formulation of long term policies and programmes to address the environmental problems. Keeping all these things in view, the compilation of environment Statistics has been started from the year 2012-13 under which this report namely "Environment Statistics of Punjb-2011" is prepared.

2.18 This is the 1st issue of Environment Statistics of Punjab. The coverage of information in this publication may not be exhaustive with respect to the entire domain of environment. However it provides the basic sets of data on the nature and extent of the problem. This publication consists of 13 chapters. The first four chapters relate to general introduction, environment related acts and state's geographical & environmental features. The remaining chapters are on specific subjects such as Biodiversity, Atmosphere, Energy, industry, Land utilization pattern, Agriculture, Natural Disasters, Water and Human Settlements. The data broadly in the report pertained to the year 2010-11 or nearest possible previous year depending upon its availability. The main framework of the report is based on Compendium of Environment Statistics India 2011, by Central Statistical Office, Ministry of Statistics & Programme Implementation Government of India (GOI). Some part of the text as well as statistical tables has been used for this publication from the above mentioned compendium of GOI. In addition to it the information available on the various websites and other related reports has also been utilized to enrich the publication. The sources used for this report are given at the end of report at annexure-II. The main objective of this publication is to compile and present the statistical data on various environmental issues which may be useful for further analysis by the experts, policy makers, researchers and government & non-government organisations.

STATE'S ADMINISTRATIVE SET UP ON ENVIRONMENT

2.19 In Punjab the **Department of Science, Technology, and Environment & Non-Conventional Energy has been** entrusted the responsibility to look after the matters relating to environment and to coordinate with State and Central Government authorities in this connection. This department executes its activities through the following six authorities at State level:

i. Punjab State Council for Science & Technology
ii. Punjab Pollution Control Board
iii. Punjab Energy Development Agency
iv. Punjab Biotechnology Incubator
v. Pushpa Gujral Science City
vi. Punjab Biodiversity Board

2.20 The department coordinates and monitors the activities of these institutions and is responsible for facilitating their financial resources and strengthening human resources. For this the department liaises with the state department of planning, finance and other associated departments and agencies and the Central Ministries of Environment and Forest, Science & Technology, Non-Conventional and Renewable Energy and Ministry of Culture and other related ministries.

A Brief of these authorities is as under:

Punjab State Council for Science & Technology (PSCST)

2.21 The Punjab State Council for Science & Technology was established on July 21, 1983 under the aegis of the Department of Science, Technology & Environment, Punjab. The Council is responsible for promotion of sustainable development including conservation of natural resources, rural environment improvement and grass root applications of Science & Technology. It takes up technology development and demonstration projects in small scale industries for industrial pollution control. The council also conceptualizes and promotes development of S &T infrastructure and has been responsible for promoting mega project like, Pushpa Gujral Science City, National Agri Food Biotechnology Institute, Punjab Biotechnology Incubator, and Biotechnology Park etc. The council also conducts S&T outreach and Capacity Building activities including IPR issues and conducts and promotes R & D and survey projects. It liaises with international, national and state S & T bodies and provides policy inputs to the government.

2.22 PSCST alongwith completion of other has also prepared draft of the 'State Policy for environment and developmental guidelines' for 14 development departments. The draft policy has been prepared in accordance with the draft of the Environmental Policy prepared by Ministry of Environment & Forests, Govt.

of India. It identifies environmental issues requiring special attention in the State & actions taken and future needs w.r.t. environmental conservation and sustainable development. The Policy is based on the concept of promotion of sustainable development based on carrying capacity and the 'Polluter Pays Principle.' The draft policy was circulated to all development departments and their comments have been incorporated. The policy is under consideration of the Govt.

2.33 An **Environment Division** has been established in PSCST. This Division assists the State Department of Environment, Govt. of Punjab in technical matters pertaining to environment, identification of major areas of ecological concern, defining the State Government's policies and plans on various environmental issues, coordinating & monitoring schemes related to environment, creating environmental awareness and promoting environmental education, training & research. It is also implementing projects and programmes related to environment for international bodies like, UNESCO, UNDP, etc. as well as, programmes of the Ministry of Environment & Forests at the national level.

2.34 Current Programmes Environnent Division are:

i. Environmental Training & Education
ii. Projects with UNESCO
iii. Status of Environment Reporting Project for Punjab & Chandigarh
iv. ENVIS Centre on Status of Environment & Related Issues
v. Conservation & management of wetlands
vi. National Environment Awareness Campaign
vii. National Green Corps Programme
viii. Conservation of Biodiversity

Environmental Training & Education-The division promotes environment education and awareness. It provides training for environment protection, natural resource conservation and pollution control. The major target groups are industry, school and college teachers, technical education personnel, officers from development departments and NGOs etc.

Projects with UNESCO- PSCST have been liaising with UNESCO, Paris & New Delhi offices for promotion of environmental education in the region.

Status of Environment (SoE)- To streamline and systematize the SoE reporting system in India, Ministry of Environment and Forests (MoEF), GOI initiated a Project on Status of Environment Reporting during the 10th plan period to bring out State of Environment Reports of all states/U.T of the country on a regular basis. PSCST had published a comprehensive Status of Environment Report in 1995. Some other states in the country had also published their SoEs. However, this exercise has been taken up on a sporadic basis only. Under this project, PSCST had also published "State of Environment-Punjab, 2005" and "State of Environment -Punjab, 2007" reports. As a part of State of Environment Project,

PSCST also brought out a report on 'Environmental Indicators for Punjab'. This publication is based on existing data as analyzed in State of Environment, 2005 i.e. Air, Water & Biodiversity.

ENVIS Centre on Status of Environment & Related Issues- An ENVIS Node on 'State Environmental Issues' at PSCST was established in December, 2002 under the World Bank Assisted Project of the MoEF, GOI to identify and highlight the state environment and related issues. The node was upgraded to Environment Information System (ENVIS) Centre in January, 2005 on the subject 'Status of Environment & Related Issues'. ENVIS in PSCST is a decentralized system with a focal point at the MoEF,GOI with a network of 78 Centers all over India established by Government of India in December 1982 to ensure integration of national efforts for collection, collation, storage, retrieval & dissemination of environmental information to decision makers, policy planners, scientists and engineers, research workers, etc. all over the country. The Centre has a website "www.punenvis.nic.in" with information and time series database covering various aspects of environmental issues of Punjab.

Conservation & management of wetlands- PSCST is being covering , Harike wetland, Ropar wetland , Kanjli wetland, Ranjit Sagar Wetland , Nangal, Wetland and State wetlands under this programme.

National Environment Awareness Campaign-The objective of the scheme is to create mass awareness among general public about environmental problems and to take measures for environment protection by active involvement general public. This scheme was initiated by MoEF, GOI in 1986. PSCST is acting as Regional Agency for Punjab and Chandigarh. PSCST organizes the celebration of environmentally important days as under by motivating all active NGOs and Schools/institutions in Punjab:

- World Wetland Day-2nd February
- Earth Day -22nd April
- World Environment Day-5th June
- International Day for Preservation of Ozone layer-16th Sep
- International Day for Conservation of Biodiversity-22nd May etc.

National Green Corps Programme- MoEF, GOI has initiated National Green Corps (NGC) programme for implementation through the mechanism of Eco-Clubs set up in schools from Class V-XII all over the country. Under this scheme 250 schools have been selected from each district. Each school is being provided financial aid of Rs. 2,500/- per year. Besides, trainings and retrainings are conducted for Incharge-teachers and **resource material** on environment aspects is provided to each school. Objectives of the scheme are (i) to make children understand environment and environmental problems and (ii) to provide environmental education opportunities for school children.

Conservation of Biodiversity-The Punjab Biodiversity Board has been set up as a statutory body under Section 22 of the Biological Diversity Act, 2002, promulgated by MoEF GOI) in response to actions required to be taken up under the International Convention on Biological Diversity of which India is a signatory. The Board has been assigned inter alia duty to

- regulate the use of State's biological resources, especially by granting approvals for regulating their commercial utilization and their bio-surveys/ bio-prospecting
- levy collection fee for these biological resources, wherever these are harvested by business houses and individuals for industrial/ commercial use.
- To promote biodiversity conservation activities, both in agricultural and wild areas.

2.24 The following projects have been completed by the Environment Division:

- Preparation of State Policy on Environment & Development and Guidelines for Development Departments
- UNESCO Projects
- Green Aid Plan
- Punjab Environment Status Report, 1995
- Village Environment Improvement Scheme
- Studies in Air, Water & Soil borne pollution in Amritsar
- Allelopathic Impact of Sun-flower of Punjab Crops
- Organizing Essay, Poster & Declamation Contest on Environment
- Analytical Studies on Aquatic Ecosystem of Punjab
- A study of Insecticides & Pesticides Pollution of Food stuffs & their toxic effect on man
- Survey & Analysis of Ornamental Trees of Punjab for use in landscaping for improvement of environment
- Effect of Budha Nallah Pollution on river quality and reproductive biology of some fishes
- Demonstration of Low cost sanitation and low cost soak pit technologies
- Survey of solid waste in seven towns
- List of Trainings/Seminars/Workshops held
- UNDP_GEF_SGP Project on wetlands

Punjab Pollution Control Board (PPCB)

2.25 It is responsible for implementation of Water Act (1974), Air Act (1981) & Environment Protection Act (1986) in the state. Under the Acts the Board prepares comprehensive programs for prevention, control and abatement of

pollution, advises state govt. on pollution prevention and conservation issues, collects and disseminates information on environmental quality and participates in investigations. The board also implements various Rules pertaining to Municipal Solid Waste Management, Biomedical Waste Management, Hazardous Waste Management, Plastic Waste etc.

Punjab Energy Development Agency (PEDA)

2.26 The agency identifies, promotes and implements projects related to renewal energy, especially solar, micro-hydel, bio-gas, bio-mass and wind energy. It is also responsible for promoting energy conservation in the state and is the nodal agency for CDM Projects and promotion of Energy Auditing in collaboration with the BEE.

Punjab Biotechnology Incubator (PBTI)

2.27 PBTI provides quality testing and certification services in agriculture, food and environmental sectors including training and dissemination on food quality safety aspects to producers, processors, consumers and industry. PBTI also conducts domain specific Research & Development (R&D).

Pushpa Gujral Science City (PGSC)

2.28 The PGSC is responsible for taking science to masses through non formal means and fun activities. It designs and develops exhibits in frontier areas of Science & Technology to sensitize students and general public on scientific issues and demystify complex scientific principles for easy understanding.

Punjab Biodiversity Board (PBB)

2.29 The Board is responsible for promoting conservation of wild and domesticated flora and fauna of the state, set up Biodiversity Management Committees, identify Biodiversity Heritage Sites and implement the Biological Diversity Act.

Other Agencies Pertaining to Environment in the State

Punjab Remote Sensing Centre

2.30 Punjab Remote Sensing Centre (PRSC), an autonomous organization under the Department of Agriculture, Government of Punjab, is the apex body in the State for all Remote Sensing (RS), Geographic Information System (GIS) and Global Positioning System (GPS) related works. It is designated as a Nodal Agency by the Govt. of Punjab for geospatial needs of the State and also acts as

the centralized hub for the geo-spatial data to all the user departments. It is among the main objectives of the PRSC

- to carry out surveys for monitoring and assessment of the entire gamut of natural resources using remote sensing techniques;
- to carry out special temporal surveys to monitor changing land use and soil patterns, environment, irrigation systems, forest resources, agricultural resources, ground water resources and crop disease surveillance; and
- to develop efficient data acquisition and retrieval system and to act as repository (data bank) of various natural resources data.

Forest & Wildlife Preservation Department, Punjab

2.31 In a state where agriculture is the predominant land use, Punjab Forest & Wildlife Preservation Department is making efforts to increase the forest/tree cover in accordance with the National Forest Policy. Simultaneously, measures are being taken to protect & conserve the existing tree species and fauna to arrest and reverse ecological degradation. Among the activities, besides plantation of quality tree species and conservation of forests and wildlife, the Department undertakes scientific management of forest areas that helps to increase forest productivity, check soil erosion in hilly areas and improve ground water recharge.

Department of Soil & Water Conservation

2.32 The Department of Soil and Water Conservation was established as a independent department in the year 1969, earlier it was a wing of Agriculture Department. The department is responsible for conservation of soil and water resources of the state through its various centre/state government programmes.

Environment Related Education Courses in Punjab

2.32 As environment is an emerging issue all over the world, therefore various courses and degrees on environment have been started by the educational institutions in the State. The main courses and degrees are as under:

SN	Name of Educational Institution	Name of Department	Course	Duration
1	Punjab University, Chandigarh	Centre for Environment and Vocational Studies	M.Sc. (Environment) & M.sc.(Solid Waste Management)	2 Years
2	Guru Nanak Dev University, Amritsar	Botanical Science	M.sc. (Hons.) Environment Science	2 Years

3	Panjab Engineering College, Chandigarh	Environment Engineering	ME(Environment)	2 Years
4	Thapar Institute of Engineering & Technology, Patiala	Biotechnology & Environment Sciences	M.Tech. (Environmental Science & Technology)	2 Years
5	Punjabi University, Patiala	Geography	Environment Geography	As a subject in M.Sc. Geography

Chapter-3

ENVIRONMENTAL LEGISLATIONS

In order to have uniform laws, all over the country for broad environmental issues endangering the health & safety of our people as well as of our flora and fauna and also to check environmental degradation, the Parliament of India has enacted various Acts/Rules. The Ministry of Environment & Forests, GOI and the Central Pollution Control Board is responsible for the implementation of these environment related legislations at national level. At the States/UTs level the Department of Forest & Environment and State Pollution Control Authority are assigned the responsibility for implementation and monitoring of these laws.

The main Acts and Rules to protect the environment are as under:

ENVIRONMENT ACTS

Water (Prevention and Control of Pollution) Act, 1974, amended in 1988

3.2 The Water (Prevention and Control of Pollution) Act was enacted in 1974 to provide for the prevention and control of water pollution, and for the maintaining or restoring of wholesomeness of water in the country. The Act was amended in 1988.

3.3 It is an Act to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water, for the establishment, with a view to carrying out the purposes aforesaid, of Boards for the prevention and control of water pollution, for conferring on and assigning to such Boards Powers and functions relating thereto and for matters connected therewith.

3.4 Under this act the "water pollution" means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organizers.

Water (Prevention & Control of Pollution) Cess Act, 1977

3.5 The Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess is

collected with a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

3.6 Under this Act, every person carrying on a specified industry and every local authority is required to furnish a return on prescribed Form- showing the quantity of water consumed in a month on or before the 5th of the following month to the concerned Regional Office of the Board for onward transmission to the Assessing Authority.

Air (Prevention & Control of Pollution) Act, 1981, amended in 1987

3.7 The Air (Prevention and Control of Pollution) Act was enacted in 1981 and amended in 1987 to provide for the prevention, control and abatement of air pollution in India.

3.8 It is an Act to provide for the prevention, control and abatement of air pollution, for the establishment, with a view to carrying out the aforesaid purposes, of Boards, for conferring on and assigning to such Boards powers and functions relating thereto and for matters connected therewith.

3.9 Under this act "air pollutant" means any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

Environment (Protection) Act, 1986

3.10 The Environment (Protection) Act was enacted in 1986 with the objective of providing for the protection and improvement of the environment. It empowers the Central Government to establish authorities charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991.

3.11 In this Act**:**

- **"environment"** includes water, air and land and the inter-relationship which exists among and between water, air and land and human beings other living creatures, plants, micro-organism and property.
- **"environment pollutant"** means any solid, liquid or gaseous substance present in such concentration as may be, or tend to be injurious to environment.
- **"environment pollutant"** means the presence in the environment of any environment pollutant.

The Forest (Conservation) Act, 1980 with Amendments made in 1988

3.12 The Forest (Conservation) Act, 1980 came into force with effect from October 25, 1980. Under the provisions of this Act, prior approval of the Central Government is essential for diversion of forest lands for the non-forestry purposes. In the national interest and in the interest of future generations, this Act, therefore, regulates the diversion of forest lands to non-forestry purposes. The Act was amended in 1988 The basic objective of the Act is, to regulate the indiscriminate diversion of forest lands for non-forestry uses and to maintain a logical balance between the developmental needs of the country and the conservation of natural heritage**.**

The Wild Life (Protection) Act 1972

3.13 The Government of India enacted **Wild Life (Protection) Act 1972** with the objective of effectively protecting the wild life of this country and to control poaching, smuggling and illegal trade in wildlife and its derivatives. The Act was amended in January 2003 and punishment and penalty for offences under the Act have been made more stringent. The Ministry has proposed further amendments in the law by introducing more rigid measures to strengthen the Act. The objective is to provide protection to the listed endangered flora and fauna and ecologically important protected areas

Public Liability Insurance Act, 1991

3.14 The main objective of the Public Liability Insurance Act 1991 is to provide for damages to victims of an accident which occurs as a result of handling any hazardous substance. The Act applies to all owners associated with the production or handling of any hazardous chemicals.

3.15 It is an Act to provide for public liability- insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.

3.16 Under this act an "accident" means an accident involving a fortuitous, sudden or unintentional occurrence while handling any hazardous substance resulting in continuous, intermittent or repeated exposure to death, of or injury to, any person or damage to any property but does not include an accident by reason only of war or radio-activity.

The Punjab Land Preservation (Chos) Act, 1900

3.17 To provide for the better preservation and protection of certain portions of the territories of the State the Punjab Land Preservation Act, 1900 is in vogue since 1900. This act extends to the whole of the State of Punjab. Under this act, whenever it appears to the State Government that it is desirable to provide for the conservation of subsoil water or the prevention of erosion in any area subject to erosion or likely to become liable to erosion, such Government may – by notification make a direction accordingly.

Punjab Preservation of Sub Soil Water Act 2009

3.18 To improve the ground water level Punjab Govt has enacted "The Punjab Preservation of Sub Soil Water Act 2009" according to which no farmer will be allowed to sow nursery of Paddy before 10th May of the agricultural year. Similarly no farmer can transplant paddy before the date fixed by State Government by notification. In case of violation, authorized officer is empowered to destroy the nursery of paddy or transplanted paddy as the case may be at the expense of such farmer.

ENVIRONMENTAL RULES

3.19 The aforesaid laws have been adopted by the Govt. of Punjab to control environmental pollution in the State. The Govt. of India, Ministry of Environment & Forests, has also framed the following rules for the management of Hazardous Waste, Bio Medical Waste, Municipal Solid Waste, Recycled Plastic, Used Batteries, Control of Noise Pollution and Protection of Ozone Layer under the provisions of the Environment (Protection) Act, 1986. The Environmental Rules are as under:

i. Water (Prevention & Control of Pollution) Cess Rules 1978
ii. Environment (Protection) Rules, 1986
iii. Hazardous Waste (Management & Handling) Rules, 1989
iv. Bio Medical Waste (Management & Handling) Rules, 1998, amended in 2003
v. Municipal Solid Waste (Management & Handling) Rules, 2000
vi. The Batteries (Management and Handling) Rules, 2001
vii. The Manufacture, Storage & Import of Hazardous Chemical Rules, 1989, amended in 2000
viii. The Recycled Plastics Manufacture and Usage Rules, 1999, amended in 2003
ix. The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996
x. The Rules for the Manufacture, Use, Import, Export and Storage of Hazardous micro-organisms genetically engineered organisms or cells

xi. Noise Pollution (Regulation and Control) Rules, 2000, amended in 2006
xii. The Ozone Depleting Substances (Regulation and Control) Rules, 2000

The description of major Environmental Rules is as under:

Noise Pollution (Regulation and Control) Rules, 2000, amended in 2006

3.20 To control noise pollution the Noise Pollution (Regulation and Control) Rules, 2000 was implemented which was further amended in 2006

3.21 Noise is generally regarded as an unwanted sound or sound, which produces unpleasant effects on the ears. Noise is produced by household gadgets, vehicles on the road, jet planes, loud speakers etc. Noise produces severe adverse effects on the quality of man's surrounding and is, therefore, considered to be polluting the environment. It is the loudness and duration of the noise which is disturbing and causes physical discomfort and damage to hearing.

3.22 The sources noise pollution are:

i. Household gadgets like mixer, grinder, vacuum cleaner, washing machine, cooler, air conditioners, greatly enhance the levels of sound and are deleterious to health.
ii. Loud speakers not only disturb the students in their studies but also the peace of the locality. Loud radios, stereos and televisions are also a major source.
iii. Printing presses, industries, vehicles on road, aero planes contribute to noise pollutions in large cities.

Control of Noise Pollution

3.23 Following measures should be adapted to control Noise Pollution:

- Use of horns with jarring sounds to be banned.
- Construction of sound proof rooms for noisy machines in industries.
- Noise producing industries, aerodromes, and railway stations to be shifted away from the inhabited areas.
- Proper law should be enforced to check the misuse of loudspeakers and public announcements systems.
- To enforce silence zones near schools / colleges, hospitals etc.
- Growing green plants/trees along roadside to reduce noise pollution as they absorb sound.
- Loud speakers are banned from 10pm to 6am. India enacted Air (Prevention and Control of Pollution) Act, 1981 and noise pollution has been declared an offence.

The Hazardous Wastes (Management and Handling) Rules, 1989

3.24 To provide control over the Hazardous Wastes, the Hazardous Wastes (Management and Handling) Rules, 1989 was framed and enacted by Govt. of India all over the country.

3.25 Under these rules the occupier generating prescribed hazardous wastes equal to or exceeding the prescribed limits is responsible to take all practical steps to ensure that such wastes are properly handled and disposed of without any adverse effects which may result from such wastes and the occupier shall also be responsible for proper collection, reception, treatment, storage and disposal of these wastes either himself or through the operator of a facility.

3.26 The occupier or any other person acting on his behalf who intends to get his hazardous waste treated by the operator of a facility shall give to the operator of a facility, such information as may be specified by the State Pollution Control Board.

Categories of Hazardous Wastes

Type of wastes	Regulatory Quantities
Mercury, Arsenic, Thallium and Cadmium bearing wastes.	5 kilograms per year the sum of the specified substance calculated as pure metal.
Non-halogenated hydrocarbons including solvent.	200 kilograms per year calculated as non-halogenated hydrocarbons.
Halogenated hydro-carbon including solvents	50 kilograms per year calculated as halogenated hydrocarbons.
Wastes from paints, pigments, glue, varnish and printing ink.	250 kilograms per year calculated as oil or oil emulsions.
Wastes from Dyes and Dye intermediate containing inorganic chemical compounds.	200 kilograms per year calculated as inorganic chemicals.
Wastes from Dyes and Dye intermediate containing organic chemical compounds.	50 kilograms per year calculated as organic chemicals.
Waste oil and oil emulsions.	1000 kilograms per year calculated as oil and oil emulsions.
Tarry wastes from refining and tar residues from distillation or prolytic treatment.	200 kilograms per year calculated as tar
Sludgesarising from treatment of waste waters containing heavy metals, toxic organics, oils emulsions and spend chemical and inceneration ash.	Irrespective of any quantity.
Phenols.	5 kilograms per year calculated as phenols.
Asbestos.	200 kilograms per year calculated asbestos.
Wastes from manufacturing of pesticides and herbicides and residues from pesticides	5 kilograms per year calculated as pesticides and their intermediate products.

and, herbicides formulation units.	
Acid/Alkaline/Slurry	200 kilograms per year calculated as Acids/Alkalies.
Off-specification and discarded products.	Irrespective of any quantity.
Discarded containers and Containers linear of hazardous and toxic wastes.	Irrespective of any quantity.

Bio-Medical Waste (Management and Handling) Rules, 1998

3.27 To manage and handle Bio-Medical Waste, Govt. of India has implemented Bio-Medical Waste (Management and Handling) Rules, 1998 all over the country.

3.28 Under these rules it is the duty of every occupier of an institution generating bio-medical waste which includes a hospital, nursing home, clinic, dispensary, veterinary institution, animal house, pathological laboratory, blood bank to take all steps to ensure that such waste is handled without any adverse effect to human health and the environment.

3.29 Every authorised person shall maintain records related to the generation, collection, reception, storage, transportation, treatment, disposal and/or any form of handling of bio-medical waste in accordance with these rules and any guidelines issued. All records shall be subject to inspection and verification by the prescribed authority at any time.

3.30 Bio-medical waste comprises:

- **Human Anatomical Waste** (human tissues, organs, body parts)
- **Animal Waste** (animal tissues, organs, body parts carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals colleges, discharge from hospitals, animal houses)
- **Microbiology & Biotechnology Waste** (wastes from laboratory cultures, stocks or specimens of micro- organisms live or attenuated vaccines, human and animal cell culture used in research and infectious agents from research and industrial laboratories, wastes from production of biological, toxins, dishes and devices used for transfer of cultures)
- **Waste sharps** (needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)
- **Discarded Medicines and Catatonic drugs** (wastes comprising of outdated, contaminated and discarded medicines)
- **Solid Waste** (Items contaminated with blood, and body fluids including cotton, dressings, soiled plaster casts, lines, beddings, other material contaminated with blood)
- **Solid Waste** (wastes generated from disposable items other than the waste sharps such as tubings, catheters, intravenous sets etc).

- **Liquid Waste** (waste generated from laboratory and washing, cleaning, house- keeping and disinfecting activities)
- **Incineration Ash** (ash from incineration of any bio-medical waste)
- **Chemical Waste** (chemicals used in production of biological, chemicals used in disinfection, as insecticides, etc.)

The Recycled Plastics Manufacture and Usage (Amendment) Rules, 2003

3.31 To provide control over the recycled plastics manufacture and usage, the Recycled Plastics Manufacture and Usage (Amendment) Rules, 2003 was framed and enacted by Govt. of India all over the country.

3.32 Under these Rules every occupier manufacturing carry bags or containers of virgin plastic or recycled plastic or both shall make an application to the State Pollution Control Authority for grant of registration or renewal of registration for his unit within four months from the date of publication of the Recycled Plastics Manufacture and Usage (Amendments) Rules 2003 in the official gazette.

3.33 On or after the commencement of these Rules, no person shall manufacture carry bags or containers irrespective of its size or weight unless the occupier of the unit has registered the unit with the State Pollution Control Authority prior to the commencement of production.

3.34 The State Pollution Control Authority shall not issue and renew a registration certificate of a unit unless that unit meets the norms prescribed under these rules and also possess a valid consent under the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981 as per the requirements laid down by the State Pollution Control Authority.

The Municipal Solid Wastes (Management and Handling) Rules, 2000

3.35 To manage and handle municipal solid wastes, Govt. of India has implemented The Municipal Solid Wastes (Management and Handling) Rules, 2000 all over the country

3.36 Under these Rules every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes. The State Pollution Control Authority is responsible to monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under rules.

Chapter-4

STATE'S MAJOR GEOGRAPHICAL AND ENVIRONMENTAL FEATURES

The Punjab State derives its name from five rivers namely Beas, Sutlej, Ravi, Chenab and Jehlum. The word Punjab is a combination of the Sanskrit words "Panj" meaning Five and "Ab" meaning Water. After the partition of India in 1947, the Punjab province of British India was divided between India and Pakistan. The Indian Punjab was divided in 1966 with the formation of the new states of Haryana and Himachal Pradesh. Thus the present Punjab came into existence on November 1, 1966. After the state's partition first in 1947, and subsequently its reorganisation in 1966, the State has been left with only three rivers namely Beas, Sutlej and Ravi.

4.2 The Punjab State is situated in the northwest of the India and bordered by the Indian states of Himachal Pradesh to the east, Haryana to the south and southeast and Rajasthan to the southwest as well as the Pakistani province of Punjab to the west. It is also bounded to the north by Jammu and Kashmir. The State is predominately a plain region state with farmers as the major inhabiting group, and Punjabi as the main and the official language of the state. Major cities of Punjab include Ludhiana, Amritsar, Patiala, Jalandhar, Firozpur, Bathinda and Mohali.

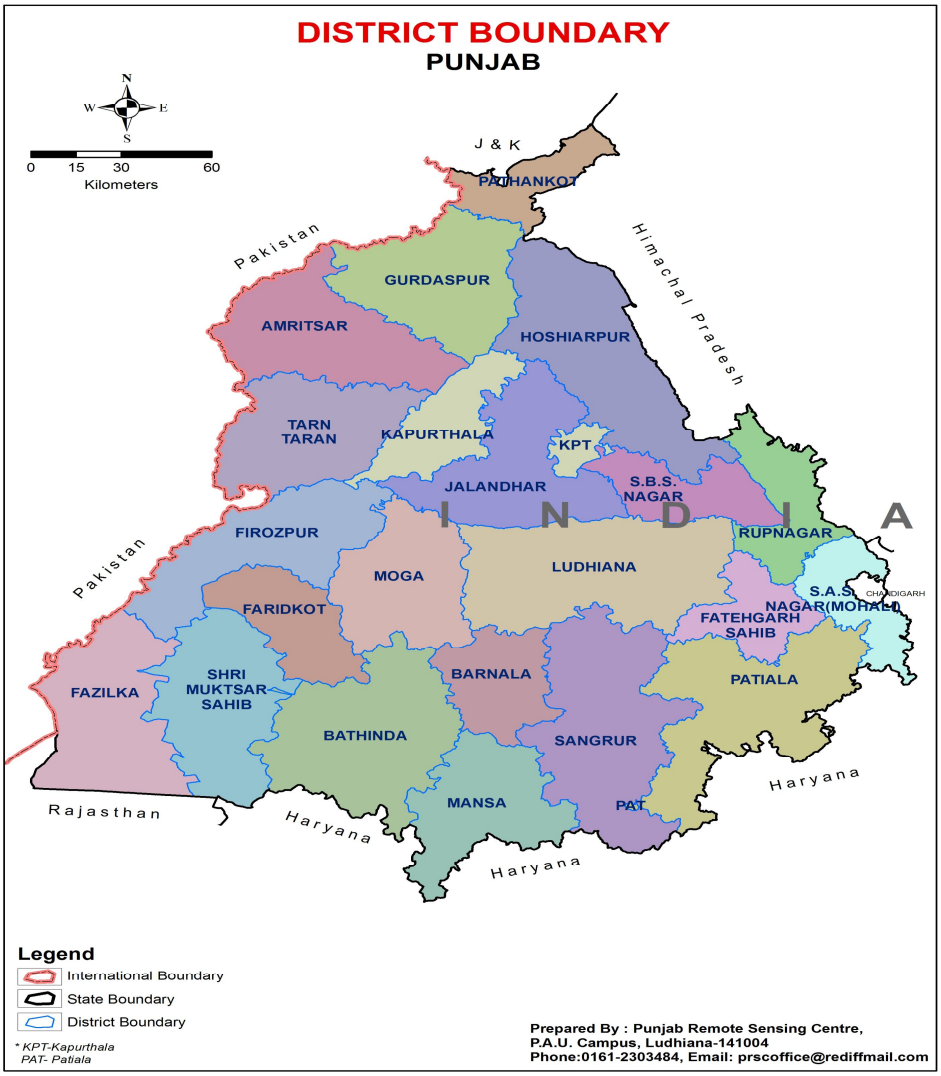
Administratively the State of Punjab has been divided into five divisions namely; Jalandhar, Patiala, Firozpur, Rupnagar and Faridkot. Divisions are further divided into 22 Districts, 81 Sub-Divisions, 81 Tehsils and 86 Sub-Tehsils.

4.3 Punjab is predominately an agrarian state which is the largest single provider of food grains to nation. Major industries include the manufacturing of scientific instruments, agricultural implements, electrical goods, financial services, machine tools, textiles, sewing machines, sports goods, starch, tourism, fertilizers, bicycles, garments, and the processing of pine oil and sugar. Punjab also has the largest number of Steel Rolling Mill Plants in India which are located in Steel Town known as Mandi Gobindgarh, District Fatehgarh.

4.4 Present Punjab is located in northwestern India, and has an area of 50,362 km. It extends from the latitudes 29.30° North to 32.32° North and longitudes 73.55° East to 76.50° East.

4.5 Most of the Punjab lies in a fertile plain, alluvial plain with many rivers and an extensive irrigation canal system. A belt of undulating hills extends along the northeastern part of the state at the foot of the Himalayas. Its average elevation is 300 meters above sea level, with a range from 180 meters in the southwest to more than 500 meters around the northeast border. The southwest of the state is

semi-arid, eventually merging into the Thar Desert. The Shiwalik Hills extends along the northeastern part of the state at the foot of the Himalayas.



4.6 The Climate of Punjab is typically subtropical with hot summers (temperatures reaching as high as up to 47 °C in certain areas) and cold winters (temperature reaching sub zero in certain areas). About seventy percent of the annual rainfall is received during monsoon months and rest is received during winters (which are beneficial for Rabi crop). The annual rainfall is around 58 cms in plains and 96cms in northern sub-montane regions characterized by the lower Shivaliks depending on its elevation. The rainfall decreases from north and north east to south.

4.7 There are a number of wetlands, bird sanctuaries and zoological parks across Punjab. These include the Hari-Ke-Pattan National Wetland and Wildlife Sanctuary at Harike in Tarn Taran Sahib District, the Kanjli Wetland, the Kapurthala Sutlej Water Body Wetland, the Rupnagar Zoological Park, Chhatbir,

Bansar Garden, Sangrur, the Aam Khas Bagh, Sirhind, the Ram Bagh Garden Amritsar, the Shalimar Garden, Kapurthala and the Baradari Garden at Patiala.

Brief on the main features relating to the major geographical and environmental aspects of the state are mentioned in forthcoming paragraphs.

CLIMATE

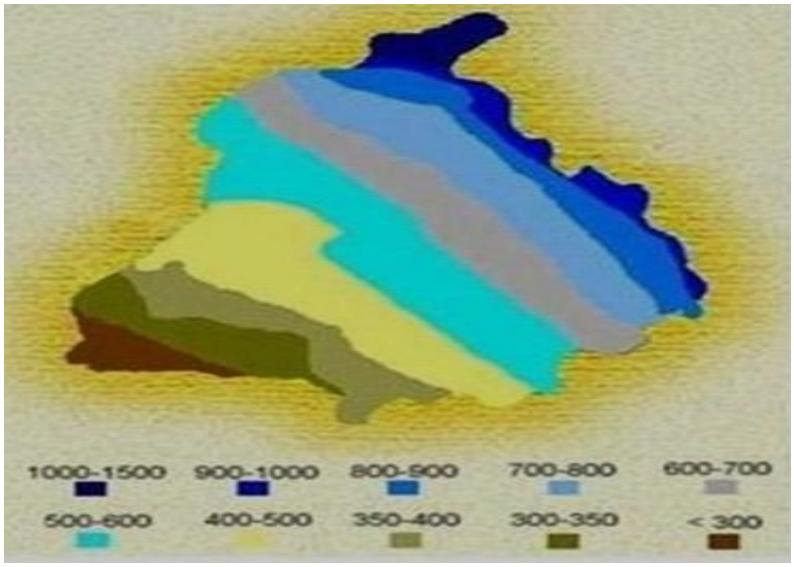
4.8 Punjab's climate is characterized by extreme hot and extreme cold conditions. Annual temperatures in Punjab range from −2 to 40 °C (min/max), but can reach 47 °C (117 °F) in summer and −4 °C in winter. The northeast area lying near the foothills of the Himalayas receives heavy rainfall, whereas the area lying further south and west receives less rainfall and experiences higher temperatures. Average annual rainfall ranges between 960 mm in the sub-mountain region and 460 mm in the plains**.**

Climate Map of Punjab

Source: Soil & Water Conservation Deptt.,Pb.'s website.

4.9 Punjab has three seasons-(i) Summer (April to June), when temperature typically rise as high as 110°F, (ii) Monsoon season (July to September), when a majority of rainfall occurs and (iii) Winter (December to February), when temperatures typically fall as low as 40°F. There is a transitional period between winter and summer in March and early April, as well as a transitional season between monsoon season and winter in October and November. Rainfall map of Punjab is as under:

Rainfall Map of Punjab



Source: Soil & Water Conservation Deptt.,Pb.'s website

District/year-wise annual average rainfall is as under:

District-wise Annual Average Rainfall (mm) (1970-2009)

District	1970	1980	1990	2000	2005	2009
Gurdaspur	926.3	1155.0	1214.9	830.1	925.2	589.0
Amritsar	594.6	869.8	650.8	207.9	527.4	239.5
Taran Taran	@@@	@@@	@@@	@@@	@@@	93.3
Kapurthala	554.9	683.0	780.5	542.0	645.6	644.0
Jalandhar	171.4	873.9	1195.7	364.2	848.1	543.9
Nawanshehar	@ @	@ @	@ @	699.4	701.6	70.8
Hoshiarpur	999.3	906.1	1075.6	658.0	679.1	609.1
Rupnagar	983.4	759.0	1092.4	793.4	443.6	724.8
S.A.S Nagar	@@@	@@@	@@@	@@@	@@@	459.0
Ludhiana	756.7	38.0	523.9	437.2	452.4	259.9
Firozepur	232.3	956.2	421.6	130.3	291.0	170.9
Faridkot	@	511.4	567.8	256.5	593.1	500.5
Muktsar	@ @	@ @	@ @	358.0	762.5	277.1
Moga	@ @	@ @	@ @	175.0	316.8	258.5
Bathinda	499.2	355.9	342.1	136.1	533.5	236.9
Mansa	*	*	*	77.1	269.6	120.7
Sangrur	521.9	521.4	527.2	202.0	500.4	450.0
Barnala	@@@	@@@	@@@	@@@	@@@	237.9
Patiala	555.6	835.7	662.7	641.2	645.2	460.2
Fatehgarh Sahib	*	*	*	155.0	485.2	751.5
Punjab (Average)	**672.3**	**739.1**	**754.6**	**391.9**	**565.9**	**384.9**

@ Data included in Firozpur & Bathinda Districts.
@@ Districts Mukatsar, Moga & Nawanshahar were created in 1996 so data is included in Faridkot & Jalandhar Districts.
@@@ Districts Tarn Taran, S.A.S. Nagar & Barnala were created in 2006 and data of these districts is included in Amritsar, Rupnagar,Patiala & Sangrur Districts.
* Districts Mansa & Fatehgarh Sahib were created in April 1992, hence data of these districts is Bathinda & Patiala

Source:PSCST's website www.punenvis.nic.in

AIR

4.10 Air is one of five basic natural ingredients of life system and also an inexhaustible natural resource. It is very essential for the survival of all the living organisms on earth. It is a mixture of different gases; nitrogen, carbon and oxygen are the major components. The normal composition of total volume of clean air present in atmosphere contains Nitrogen 78.084%, Oxygen 20.946%, Argon 0.934%, Carbon dioxide 0.0314%, Methane 0.0002% , Hydrogen 0.00005% and other gases traces.

4.11 “Air pollution" means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment. The main cause of air pollution is the use of fossil fuels (coal, oil and natural gas) in transport, power generation, industry and domestic sectors. In addition the burning of biomass such as firewood, agricultural and animal waste also contributes to pollution levels. Air in the most Indian cities has become highly polluted and concentration of certain pollutants exceed prescribed limit. Pollution emission has direct and indirect effects on air quality with a wide range of impacts on human health, ecosystem, agriculture and materials.

Ambient Air Quality of Punjab

4.12 The State Government has monitored the air quality of various cities/ towns of the state under NAAQM (National Ambient Air Quality Monitoring) scheme financed by CPCB and AAQM (Ambient Air Quality Monitoring) scheme financed by State Government. Further, regular monitoring of ambient air quality is being carried out by Punjab Pollution Control Board at twenty locations in the state. Out of these nine are in residential cum commercial areas and eleven locations are in industrial areas.

4.13 As per data of Punjab Pollution Board for the period 1995 to 2005 the 24 hourly and annual averages of SPM/RSPM at residential-cum-commercial monitoring locations generally exceed the permissible limits for residential areas (24 hourly permissible limits for SPM and RSPM are 200 µg/m3 & 100 µg/m^3 respectively and for Annual average permissible limits are 140 µg/m^3 & 60 µg/m^3) throughout the year and maximum values have been observed in parts of Ludhiana followed by Jalandhar and Amritsar with respect to their permissible limits. However, the annual average of SO_2 and NOx concentrations at all locations remain within permissible limits.

4.14 In the Industrial areas, SPM/RSPM levels have been reported to be above permissible limits in Mandi Gobindgarh and in parts of Ludhiana with respect to annual averages. A comparison of SPM/RSPM data with their respective permissible limits indicates that the concentrations of SPM/RSPM are beyond the permissible limits at all the monitoring stations. The concentration of SO_2 and

NOx at various industrial locations of the state indicates that the values are well within the permissible limits.

WATER

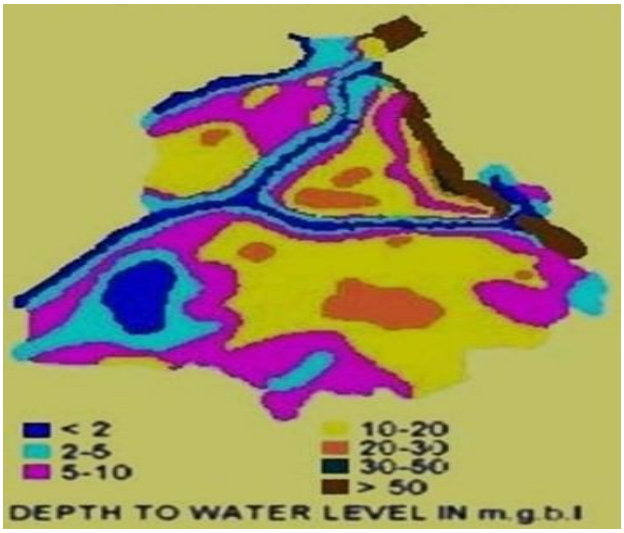
4.15 Water is the most precious gift of the nature and is essential for sustenance of life, next only to air. It is one of most important component, which influences economic, agricultural and industrial growth of mankind.

4.16 Of all water on earth, 97.5% is salt water, and of the remaining 2.5% fresh water, some 70% is frozen in the polar icecaps. The other 30% is mostly present as soil moisture or lies in underground aquifers. In the end, less than 1% of the world's fresh water (or about 0.007% of all water on earth) is readily accessible for direct human uses. India has only 4.2 percent of world's fresh water resources to sustain 16 and 17 percent of world's human and animal populations, respectively.

4.17 In India, per capita annual water availability has dropped form 5,177 cubic meter in 1951 to 1,820 in 2001. It is predicted that by 2025 it will be only 1,340 cubic meter approximately. Per capita annual water availability less than 1700m3 is considered as 'stress' level beyond which water availability gets classified as scarcity level. Below this level, availability of water is considered a severe constraint on economic development and environment quality.

4.18 Though the Punjab state has rich sources of surface and ground water but due to increase in population and over use of ground water for agriculture purpose the sources of water are shrinking. The rainfall is not sufficient and even not coherent in all regions of the state. About 80% of the annual rainfall is received in only three monsoon months and the rest 9 months remain almost dry. The Shivaliks receive about 1100 mm of annual rainfall every year as compared to 500 mm in Southern Zone and 730 mm in Central Zone. The total water resources available are 31 lacs Hectare meter, surface Canals provide 14.5 lacs Hectare meter and ground water recharge (rains and canal seepage) provides 16.8 lacs Hectare meter of water. The demand of water for agricultural purposes is 43.7 lacs Hectare meter and the excess demand of 12.4 lacs Hectare meter is met through over-exploitation of ground water resources. The underground water resources have deteriorated to a large extent especially as a result of Paddy-wheat cycle followed during post Green Revolution period. The ground water is going down by 30 cm per year. It is declining in area of the state where ground water quality is good and canal water is limited. Out of total more than 100 blocks have turned Dark.

Depth of Water Level in Punjab

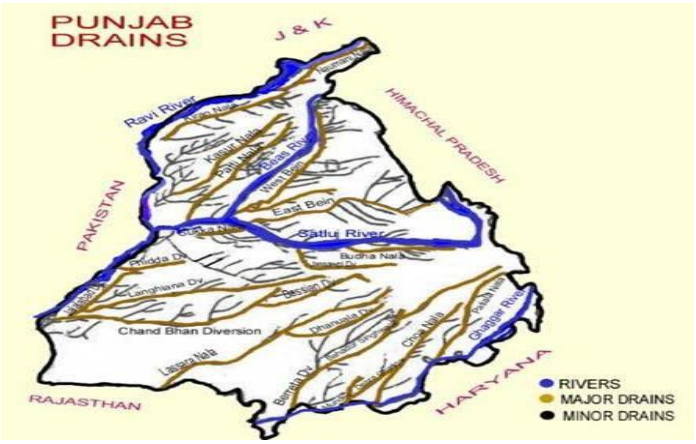


Source: Soil & Water Conservation Deptt.,Pb.'s website

Rivers

4.19 The state has major three rivers namely, Satluj, Beas and Ravi and also has another small river Ghagger. The Ravi, Beas and Satluj are the perennial rivers, while Ghagger, is seasonal river. Satluj and Beas flow through it, while Ravi touches it at its north border. Ghaggar flows through its southern border. The Ravi enters Punjab plains near Madhopur and passes on to Pakistan 26 km below Amritsar. The Beas enters Punjab near Talwara and enters the plains to meet the satluj at Harike. Its total length is 470 km and catchment area is 20303 sq km. The Satluj enters Punjab near Nangal, moves on to plains at Ropar, passes through district Ludhiana and joins Beas at Harike before crossing over to Pakistan. Its total length is 440 km in the state. River Gaggar Punjab near Mubarkpur traversing through district Patiala, Sangrur and Mansa and then it re-enters Harayana.

Rivers and Drains Map of Punjab



Source: Soil & Water Conservation Deptt.,Pb.'s website

Drainage

4.20 An 8000 km long drainage exists in the state. It helps in quickly dealing with heavy runoff and in preventing water logging. The drains between Ravi and Beas are Sakki Kiran Nallah, Hudiara Nallah, Kasur Nallah and Patti Nallah. Two Beins (rivulets) flow between Beas and Satluj i.e. the West/Kali Bein and West/Safed Bein. Other major drains falling in river Satluj are Jalabad drainage system and Budha Nallah.

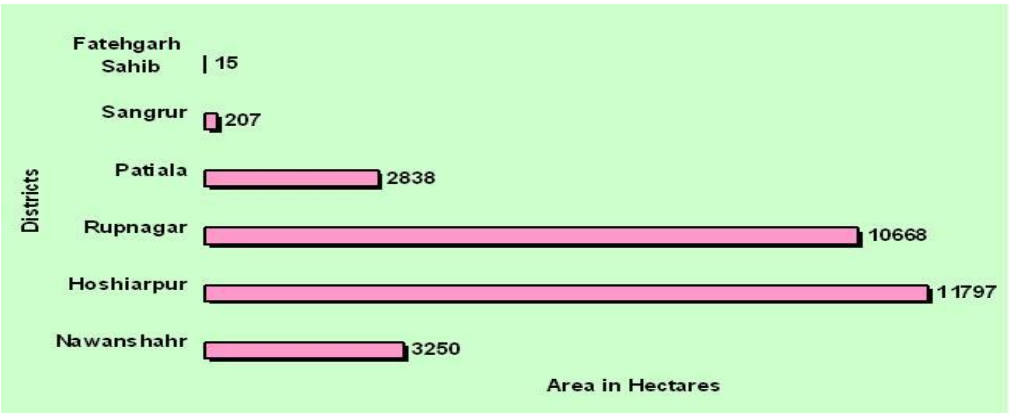
Dams & Reserviors

4.21 The state has two large dams, Bhakhra on river Sutlej and Ranjit Sagar on river Ravi. The major barrages are at Madhopur, Hussainiwala, Shahpur Kandi, Tajewala, Shah Nehar, etc., in addition to Harike, Kanjli & Ropar which have been constructed to facilitate hydro power production and irrigation in the state. The total state reservoir area amounts to 157 sq km.

Choes

4.22 Several seasonal rivers/rivulets known as 'Choes' are also found in the Shivalik area. These are mainly responsible for soil erosion in Hoshiarpur, Nawanshar & Ropar districts. As many as 93 'choes' are reported to flow in Hoshiarpur district alone. It has been reported that these seasonal rivulets used to bring down approximately 35 tonnes/ha/annum of soil. This has been reduced to about 18 tonnes/ha/annum with the efforts of Soil Conservation and Forests Departments.

District wise area under Choes and Sand in Punjab

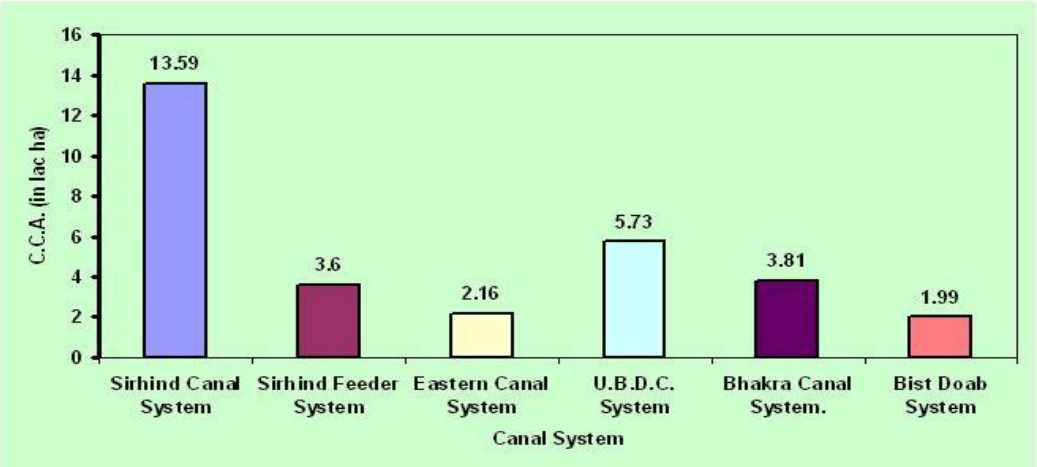


Source:PSCST's website www.punenvis.nic.in

Canal System

4.23 The state of Punjab has a well-developed canal system. Most of the canals were constructed/upgraded after independence and/or reorganization of the state. The main canals from River Satluj are Anandpur Hydel Channel and Bhakhra

Main Line (BML). BML further bifurcates into Narwana branch and Bhakhra main branch. At Ropar again two main canals, Sirhind canal and Bist Doab canal originate. At Harike, Satluj feeds water to Rajasthan feeder canal and Ferozepur feeder canal. The Bikaner canal (Gang Canal) originates at Hussainiwala, one main canal from Beas originates at Shah Nehar Barrage called Shah Nehar or Mukerian Hydel Channel. The major irrigation canal originating from Ravi at Madhopur is Upper Bari Doab Canal (UBDC). The total stretch of canals & distributaries (including minor distributaries) is approx. 14500 km. Sirhind canal system has the maximum Culturable Command Area (CCA) of 1.36 million ha. The details of Culturable Command Areas is presented in figure below:



Source:PSCST's website www.punenvis.nic.in

Wetlands

4.24 Punjab is well known for its wetlands with its three Ramsar sites (Harike, Kanjli and Ropar). There are 12 major natural and 9 manmade wetlands in the state. About 0.31% of the state's area is under natural and manmade wetlands. The twelve important natural wetlands cover a total area of 8.44 sq km and 9 manmade wetlands cover an area of 101.35 sq km.

Water Quality

4.25 Surface and groundwater resources provide drinking water supply in the State of Punjab. The south-western districts of the state are served by surface water whereas central and northern districts of the state receive drinking water supplies from tube wells which tap shallow and deeper aquifer system. Quality of surface water is getting deteriorated due to waste disposal, municipal wastewaters and surface runoff containing agro-chemicals from agricultural fields.

4.26 Punjab Pollution Control Board is monitoring water quality in different locations in the aquatic ecosystem of Punjab under the National Water Monitoring Program (NWMP) Scheme of the Central Pollution Control Board. At each

monitoring location, samples are collected every quarter (in the months of March, June, September & December) and analysed for physico-chemical parameters.

Water pollution

4.27 Water pollution has been defined as "such contamination of water or such alternation of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) which may create a nuisance or render such water injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals, plants or aquatic organism" . Water pollution affects ground water and surface water resources. This harms human health and natural environment in various ways.

4.28 In Punjab, following are the causes of water pollution:

- Rapid increase in population
- Urbanization,
- Industrialization
- Agricultural practices

Municipal /Waste Water Pollution: Untreated domestic and industrial effluent when discharged into the environment, find their way into the streams, nallahs and choes. These Nullahs further fall into rivers. The pollution load of municipal wastewater varies from drain to drain depending upon the nature of municipal discharge.

Industrial Waste water Pollution: Organic and toxic wastes from industries cause water pollution. Punjab Pollution Board has identified 13431 water polluting industries in the state under the provision of Water and Air Acts.

Agricultural Pollution: Agriculture practices also contributing towards non-point pollution of water in Punjab. Intensive agriculture and injudicious use of farm chemicals like fertilizers (e.g. nitrate) and pesticides, which further seep into the groundwater (leaching) and cause pollution. Due to introduction of high yielding verities, the consumption of chemical fertilizers has been increasing steadily. It has increased eight times in the past 36 years from 213 nutrient thousand tons in 1970-71 to 1692 nutrient thousand tons in 2006-07.

SOLID WASTE

4.29 According to World Health Organization, waste is defined as any substance or object arising from human or animal activities that has to be discarded as 'unwanted'. Solid waste consists of the discarded portion of household material,

dead animal remains, trade, commercial, agriculture & industrial waste and other large waste like debris from construction site, furniture etc. Solid wastes are generally categorized as:

- Municipal Solid Waste
- Hazardous Solid Waste
- Biomedical Solid Waste

4.30 District wise position of solid waste collected and treated is given in forthcoming paras & table given below. In Punjab, growth of population, industrialization and urbanization has resulted in generation of large volumes of solid waste. Most of the solid waste is presently disposed of on land and remains uncovered resulting in environmental pollution of surrounding area. The change in life style towards" consume and discard' culture is responsible for adding to municipal solid waste and changing waste composition. It also adds pressure on the existing municipal solid waste handling infrastructure, as well as, disposal sites.

4.31 **Municipal Solid Waste** includes commercial and residential wastes generated in municipal or notified areas in either solid or semi-solid form excluding industrial hazardous waste, but including treated bio-medical wastes.

4.32 **Hazardous waste means** any waste which by reason of any of its physical, chemical, reactive, toxic, inflammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes and substances

4.33 **Biomedical waste** means any solid or liquid waste, which is generated during the diagnosis, treatment or immunization of human beings or animals or in research activities etc. which may present a threat of infection to humans.

District wise Solid Waste Collected & Treated in the State (2008-09)

District	Municipal		Hazardous		Bio-Medical	
	Collected (M.T.)	Treated (M.T.)	Collected (M.T.)	Treated (M.T.)	Collected (M.T.)	Treated (M.T.)
Gurdaspur	24893.0	0.0	25.8	25.8	143.0	143.0
Amritsar	171823.3	0.0	335.1	335.1	140.5	140.5
Tarn Taran	3832.5	0.0	10.1	10.1	12.0	12.0
Kapurtahla	20640.0	0.0	1511.1	13.1	295.8	295.8
Jalandhar	141963.0	0.0	4808.8	894.0	493.3	493.3
SBS Nagar	19.7	0.0	1920.8	65.0	144.5	144.5
Hoshiarpur	54.4	0.0	6978.2	89.5	266.0	266.0
Rupnagar	7482.5	0.0	29270.0	0.0	21.5	21.5
SAS Nagar	28397.0	0.0	3334.3	0.0	92.6	92.6
Ludhiana	338282.0	0.0	13672.7	11122.8	419.0	399.2
Firozpur	34148.0	0.0	152.4	136.4	220.4	110.2
Faridkot	12528.0	0.0	165.5	153.3	109.2	94.5
Mukatsar	24550.0	0.0	37.9	37.9	1129.7	961.1

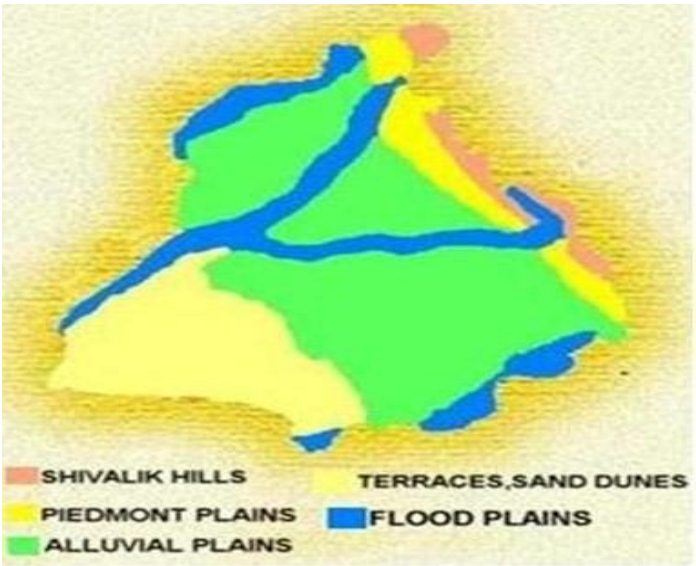
Moga	13762.4	0.0	79.8	75.3	114.7	106.0
Bathinda	49275.0	0.0	75.1	75.1	440.7	104.3
Mansa	16790.0	0.0	16.6	16.6	2451.5	2401.5
Sangrur	..	..	..	..	..	..
Barnala	..	..	..	..	..	..
Patiala	..	..	..	..	..	..
Fathehgarh Sahib	..	..	..	..	..	..
Total	**888441.6**	**0.0**	**62394.2**	**13050.0**	**6494.4**	**5786.0**
.. Not available						
Source:PSCST's website www.punenvis.nic.in						

LAND

4.34 Land is the fundamental basis for most of the human or natural activities and is one of the major natural resources on earth. Primary production of minerals and agricultural products depends entirely on the availability and use of suitable land.

4.35 The land of Punjab is primarily formed of the alluvium deposited by rivers of Indus system. Activities like agriculture, water resources, forests, living spaces, industrial and commercial purpose, transportation, pastures etc share land in Punjab.

Land Forms of Punjab



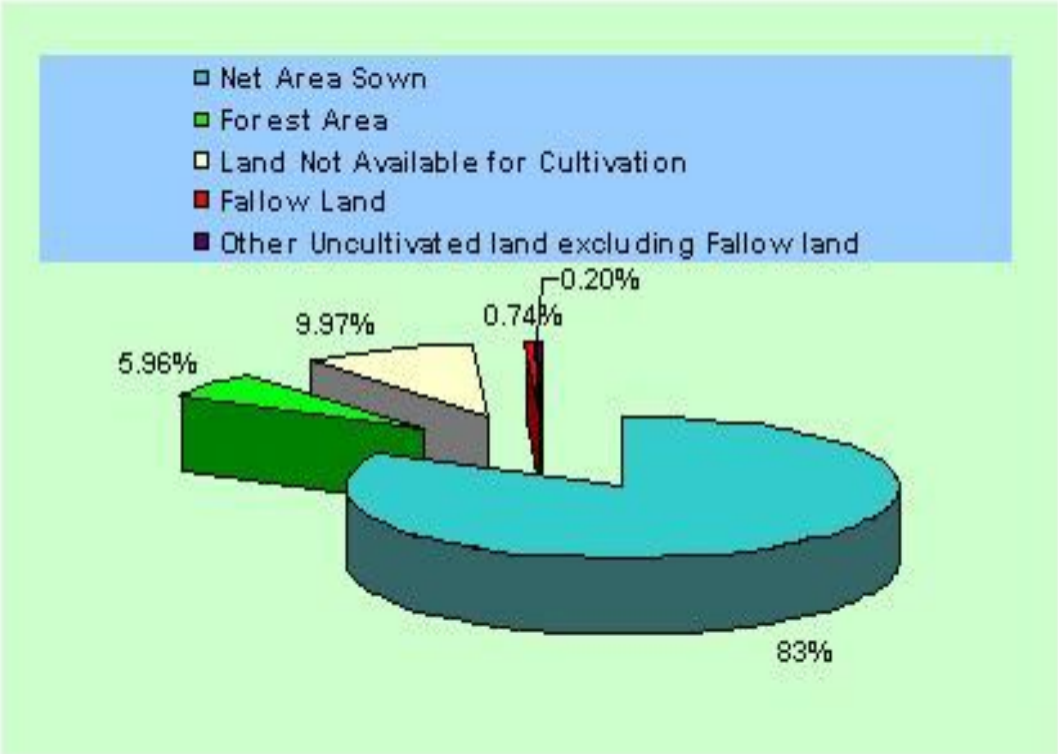
Source: Soil & Water Conservation Deptt.,Pb.'s website

4.36 Punjab has a total geographical area of 5036 thousand ha. About 83.13% area of total geographical area of Punjab is under agriculture, out of which some part has been utilized in developing canal and drainage irrigation system, 5.96% under forests, 9.97% not available for cultivation, 0.74% under fallow land and 0.20% falls under culturable waste land. 83.13% of the total land of Punjab is under agricultural activities and classified as net area sown. This percentage is

about double of the average percentage of the country as whole (40.38%). This is the highest percentage of the net area sown as compared to other agriculturally advanced states like Haryana (78%), Uttar Pradesh (69%), Maharastra (56%) and Karnataka (51.31%). Forest area is very small in Punjab. It is 5.96% of the total area of the state and about one fourth of the average percentage for the country (20.8%).The total cropped area of Punjab has increased from 5678 thousand ha. to 7882 thousand ha. from 1970 to 2010. While during 2004 to 2010 records indicated the gradual decrease in the total cropped area from 7932 thousand ha. to 7882 thousand ha.

4.37 The state land is poor in mineral resources. As a consequence of diversity in the natural environment, the land of Punjab vary widely and show difference in their nature, properties and profile development. Man above all, influences soils and their fertility through his activities. The improper land use or management by man is responsible for land degradation in the state. The Degradation of the soil is an important problem connected with land use and environment. It affects, apart from many other or indirect implications, the productivity and fertility of soils which is factor of great agricultural importance, and its more so for an agricultural dependent state like Punjab.

4.38 About 50% of the state's soil is low in nitrogen, 25% is low in phosphorus content but potassium content is generally sufficient. Organic carbon content is low. There is urgent need to take various measures like afforestation, check on overgrazing, better water management, rotation of crops, keeping the land under vegetation cover, adoption of dry farming, construction of wind brakes, extension of irrigation facilities, etc by the government and people of the state to overcome the problem of land degradation.



Soil Types

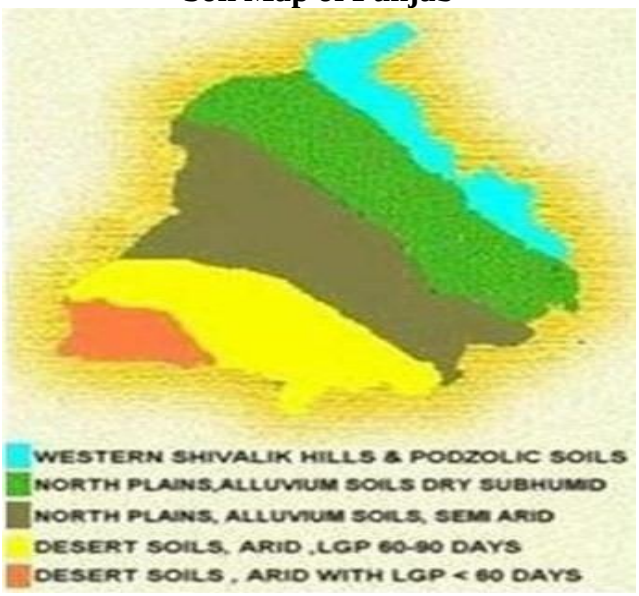
4.39 There are many different classifications of soils of Punjab by different sources. The layman does not easily understand the soil taxonomy classification. What follows is the simple texture based soil classification on the basis of texture, climate, and topography and denudation process. The soils of Punjab have been classified into the following major types:

Flood Plain or Bet Soils-These are *Khadar* soils of the periodically flooded or old flood plain areas of various rivers, streams or choes of the state. They are found in the form of elongated belts on the both side of the river channel such as those of Satluj, Ravi, Beas and Ghagghar. There is a wide belt of more mature bet soils of old flood plain extending along the west bank of river Satluj from Ropar towm to Fazilka town in the south west.

Loamy Soils-It is the most important, fertile and productive soil group of the state. It is the predominant soil especially of Nawa Shehar District, larger parts of Nakoder tehsil of Jalandhar district, Phagwara and central parts of Kapurthala district. In Malwa plain, loamy soils have a large coverage in western Patiala tehsil, Nabha area, Sangrur area, southern Moga district, some patches in Mukatsar area and Bathinda district. These soils cover nearly 25% area of the state. In Taxonomy classification these are Ustochrepts of Ustic zone of Punjab. The soils become clayey towards northwest in Amritsar and Gurdaspur districts.

4.40 Sandy Soils-These are arid soils of south-western and south central Punjab covering the districts of Bathinda, Mansa, southern parts of Firozepur and Mukatsar districts, larger parts of Sangrur, south -central parts of Patiala district and some patches of Ludhiana district.

Soil Map of Punjab



Source: Soil & Water Conservation Deptt.,Pb.'s website

4.41 Out of total geographical of the State, 83% is under cultivation. The soils in the State of Punjab is facing severe degradation because of many reasons, which includes soils erosion, raising water table, salt affected soil, over use of chemical etc. About 39% of the Soils in the State are degraded. During past two to three decades, intensive agricultural practices have put a tremendous pressure on the soils and resulted in steady decline in its fertility (nutrient availability), both with respect to macro and micronutrients. Rice and wheat crops have high nutritional requirements and the double cropping of this system has been heavily depleting the nutrient contents of soil. Hence, farmers in the state have been applying higher and higher doses of major nutrients, especially nitrogen for sustaining adequate production levels.

DEMOGRAPHY

4.42 India accounts for 2.4% of world's surface area and 17% of the world population. As per census of India 2011, it is the second largest populated country in the world after China. China remains the most populous country on the planet, with 1.34 billion, but India is closing the gap with 1.21 billion.

4.43 As per details from Census 2011, Punjab has population of 2.77 Crore, an increase from figure of 2.44 Crore in 2001 census. Total population of Punjab as per 2011 census is 27,704,236 of which male and female are 14,634,819 and

13,069,417 respectively. In 2001, total population was 24,358,999 in which males were 12,985,045 while females were 11,373,954. The total population growth in this decade was 13.73 percent while in previous decade it was 19.76 percent. The population of Punjab forms 2.29 percent of India in 2011. In 2001, the figure was 2.37 percent. Of the total population of Punjab state, around 62.51 percent live in the villages of rural areas. In actual numbers, males and females were 9,086,466 and 8,230,334 respectively. Total population of rural areas of Punjab state was 17,316,800. The population growth rate recorded for this decade (2001-2011) was 7.58%. In rural regions of Punjab state, female sex ratio per 1000 males was 906 while same for the child (0-6 age) was 843 girls per 1000 boys. In Punjab, 1,864,484 children (0-6) live in rural areas. Child population forms 10.77 percent of total rural population. In rural areas of Punjab, literacy rate for males and female stood at 77.92 % and 66.47 %. Average literacy rate in Punjab for rural areas was 72.45 percent. Total literates in rural areas were 11,195,395. Ludhiana is the at top district and Tarn Taran is at the bottom with respect to population in Punjab (Census 2011).

4.44 Out of total population of Punjab, 37.49% people live in urban regions. The total figure of population living in urban areas is 10,387,436 of which 5,548,353 are males and while remaining 4,839,083 are females. The urban population in the last 10 years has increased by 25.72 percent. Sex Ratio in urban regions of Punjab was 872 females per 1000 males. For child (0-6) sex ratio the figure for urban region stood at 851 girls per 1000 boys. Total children (0-6 age) living in urban areas of Punjab were 1,077,086. Of total population in urban region, 10.37 % were children (0-6). Average Literacy rate in Punjab for Urban regions was 83.70 percent in which males were 87.28% literate while female literacy stood at 79.62%. Total literates in urban region of Punjab were 7,793,216.

4.45 Around 60% of the State's area is already under population pressure at present, and this will have far-reaching effects on future plans to develop and exploit the natural resources of these areas. Industrial development is also very low. Thus the region has not much favorable natural and cultural conditions for sustaining large and dense population. This is a well-known fact that the high population densities have had a dramatic effect on the natural resources of the area. In the central Punjab the underground water table is depleting at an alarming rate because of intensive agriculture and high density of population.

BIODIVERSITY

4.46 India is exceptionally rich in biodiversity because its tropical locations, varied physical features and climate and is one of 12 mega-biodiversity centers of the world. Indian biodiversity represent 7% of world's flora and 6.5% of world's fauna with 45000 species of plants and 81000 species of animals, of which 3% Indian flora and 62% Indian fauna is endemic.

4.47 In Punjab the Shivalik area is the richest area of terms of floral and faunal diversity and has been identified as one of the micro-endemic zones of India. Amongst the Angiosperms, about 355 species of herbs, 70 tree species, 70 species of shrubs or under shrubs, 19 of climbers and 21 species of twiners have been recorded from the area. Apart from angiosperms, 31 species of Pteridophytes, 27 of bryophytes and one species of gymnosperms (Pinus roxburghii) have also been recorded. The area is also rich in faunal diversity including 396 species of birds, 214 species of Lepidoptera, 55 species of fish, 20 species of reptiles, and 19 species of mammals.

AGRICULTURE PRACTICE

4.48 Agriculture in Punjab is highly intensive in terms of land, capital, energy, nutrients, agriculture inputs & water etc. The soil and water in the state are under tremendous stress, soil is facing severe degradation because of many reasons, which includes soils erosion, salt affected soil, over use of chemicals etc. Similarly water quality and quantity is on decline. 80% of the total blocks of state are now under over exploited category. This calls for urgent steps to conserve the available ground water.

4.49 With the advent of high yielding, input-responsive dwarf varieties of rice and wheat during 60's, the entire agriculture production system in Punjab got revolutionized. Major shifts were witnessed in the cropping pattern, especially, in irrigated ecosystems where cereal based multiple cropping came into prominence, relegating less productive, risk prone legumes and oilseed crops to marginal lands. The farmers found the rice- wheat cycle most profitable. Consequently, they abandoned other crops. The practice resulted in depletion of organic content and plant nutrients in the soil. The farmers are now compelled to use more and more chemical fertilizers and other inputs to achieve the same production level.

4.50 The quality of soil is getting depleted due to this mono-cultivation of Paddy-Wheat rotation. Both Paddy and Wheat have heavy water requirements and the continuous usage of ground water is depleting the water level and this is already a cause of concern. The water-table in the central Punjab is going down. It is important to take cognizance of the fact that central Punjab has 72% area under paddy cultivation, out of which only 21% area has canal water irrigation facility. The tubewells in the central districts of the state constitute around 70% of total tubewells in Punjab (over 6% of the total tube wells of India are in Punjab), which have increased from 1.92 lacs (0.91 electric and 1.01 diesel operated) in 1970-71 to 12.76 lacs (9.96 electric and 2.80 diesel operated) in 2008-09 and during 2009-10 number of tubewells has reached 13.15 lacs (10.65 electric and 2.50 diesel operated).

4.51 During a short span of a decade between 1997 and 2007, there has been a four-fold increase in cumulative fall in water table in the central districts of Punjab. Accordingly, the traditional centrifugal water lifting technology is

becoming redundant and being replaced by the costlier submersible technology in the state (SOURCE). As per 2008 estimates, there were 45,680 submersible in the state, which was 45% of the total electric driven tubewells (9,68,007) in the state.

4.52 However, the rising discontent among the farm community due to their failure to get aspired farm income, and problems like declining water-table in some part, water logging in other parts, soil degradation and environment pollution have reached such proportion as to force the state government to make serious efforts to address these problems. The data given in the table below shows that the no. of tubewells and total area irrigated in Punjab had increased with the passage of time i.e. the percentage of irrigated area increased from 71% to 98% during 1970-71 to 2009-10.

Net Irrigated Area (000' hectare) by different Sources in Punjab

Year	Canals	Tube wells	Other sources	Total	Share of area irrigated to the gross area sown (%)
1970-71	1292	1591	5	2888	71
1980-81	1430	1939	13	3382	81
1990-91	1669	2233	7	3909	93
2000-01	962	3074	2	4038	95
2004-05(R)	1108	2919	8	4035	96
2005-06(R)	981	2912	126	4019	95.9
2006-07(R)	1148	2878	46	4072	97.3
2007-08(R)	1142	2922	4	4068	97.2
2008-09(P)	1113	2950	1	4064	97.4
2009-10 (P)	1115	2956	2	4073	98

Source: Statistical Abstract of Punjab, 1990, 2005 & 2008 and 2009

Chapter-5

BIODIVERSITY

5.1 The word 'biodiversity' deals with the variety of life on Earth. The variety of genes, species and ecosystems which encompass populations, communities & habitats constitute biological diversity. It forms the foundation upon which human civilization depends and is essential for maintaining the basic life processes and for performing environmental services. Population pressure, industrialization, intensive agricultural and extensive use of natural resources are, however, leading to loss of biological resources. India accounts for 7.8% of the global recorded species and is one of the 17 mega diverse countries of the world. Four biodiversity hot spots of world (out of 35) exist in India. The country is estimated to house about 45,000 plant species and 89,442 animal species representing 12.5% of the world's flora and 6.6% of fauna. The Biological Diversity Act, 2002 has been enacted by the Govt. of India to promote conservation and sustainable of biological resources.

5.2 When talking about the states, Punjab is basically an agricultural state with about 84% land area under agriculture and 70% of population is dependent on agriculture. The state harboured considerable genetic variability in the past, both, in wild and cultivated areas. However, this has reduced over the years due to changes in cropping pattern, extensive & intensive farming and higher dependence on HYVs. Though the state has only 6% area under forests, yet a large variety of flora & fauna has been recorded from Shivaliks and wetlands. Data indicates the presence of 397 species of algae, 560 species of fungi, 21 species of lichens, 34 species of bryophytes, 21 species of gymnosperms and 1939 species of angiosperms in the state. Faunal diversity includes 112 species of fishes, 15 species of amphibians, 35 species of reptiles, 442 species of birds and 43 species of mammals, besides, large number of invertebrates. Prior to the green revolution, 41 varieties of wheat, 37 varieties of rice, 4 varieties of maize, 3 varieties of bajra, 16 varieties of sugarcane, 19 species/varieties of pulses, 9 species/varieties of oil seeds and 10 varieties of cotton were reported to be in use in Punjab. Data given by Punjab Biodiversity Board indicates that out of 49 post green revolution varieties of wheat released by PAU, only 3 are widely used. Similarly, out of 27 varieties of rice released, only 9 are currently in use.

5.3 Punjab's rich and large agricultural base can be very advantageous in various agro based industries like food processing, textiles, paper, leather, etc. Further, bio resources (including medicinal and aromatic plants) are also being used as raw material by some pharmaceutical & nutraceutical industry in the state.

5.4 From the data available it is clear that the area under forests in Punjab is at constant during the last decade. The domesticated agricultural faunal diversity includes three breeds each of cows, buffaloes and sheep and two breeds each of

goats and poultry. Out of these Murrah & Nili Ravi breeds of buffaloes, Hariana & Sahiwal breeds of cattle, Lohi, Nali, & Desi breeds of sheep and Beetal breed of goat are indigenous. Out of these, Sahiwal breed of cattle, Nilli Ravi of buffaloes, Lohi of sheep and Beetal breed of goat are threatened. It is also indicating that the population of livestock is increasing with the time and it can also be proved as an alternative to the diversification from traditional farming practices towards new means of production in the face of livestock farming where value of output is more than other farm practices. Though the incidence of livestock and poultry diseases are also increasing which has causes in environmental changes and serious impacts on environmental balance.

Table No. 5.1 District wise Area under Forests in Punjab

SN	District	Area under Forest (sq km)	
		2008-09	2009-10
1	Gurdaspur	342	342
2	Amritsar	149	149
3	Tarn Taran	-	-
4	Kapurthala	27	27
5	Jalandhar	56	56
6	SBS Nagar	178	178
7	Hoshiarpur	1148	1148
8	Rupnagar	517	517
9	SAS Nagar	-	-
10	Ludhiana	100	100
11	Firozpur	105	105
12	Faridkot	20	20
13	Shri Mukatsar Sahib	38	38
14	Moga	32	32
15	Bathinda	75	75
16	Mansa	27	27
17	Sangrur	70	70
18	Barnala	-	-
19	Patiala	154	154
20	Fatehgarh Sahib	20	20
	Total	**3058**	**3058**

Source: Chief Conservator of Forests, Punjab, SS; Statistical Abstract of Punjab

Table No. 5.2 Area under Forest in Punjab-Year-wise

SN	Year	Total Area (sq km)
1	1980-81	2603
2	1990-91	2845
3	2000-01	3058
4	2007-08	3058
5	2008-09	3058
6	2009-10	3058
7	2010-11	3058

Source: Chief conservator of Forests, Punjab, SS: Statistical Abstract of Punjab

Figure-5.2

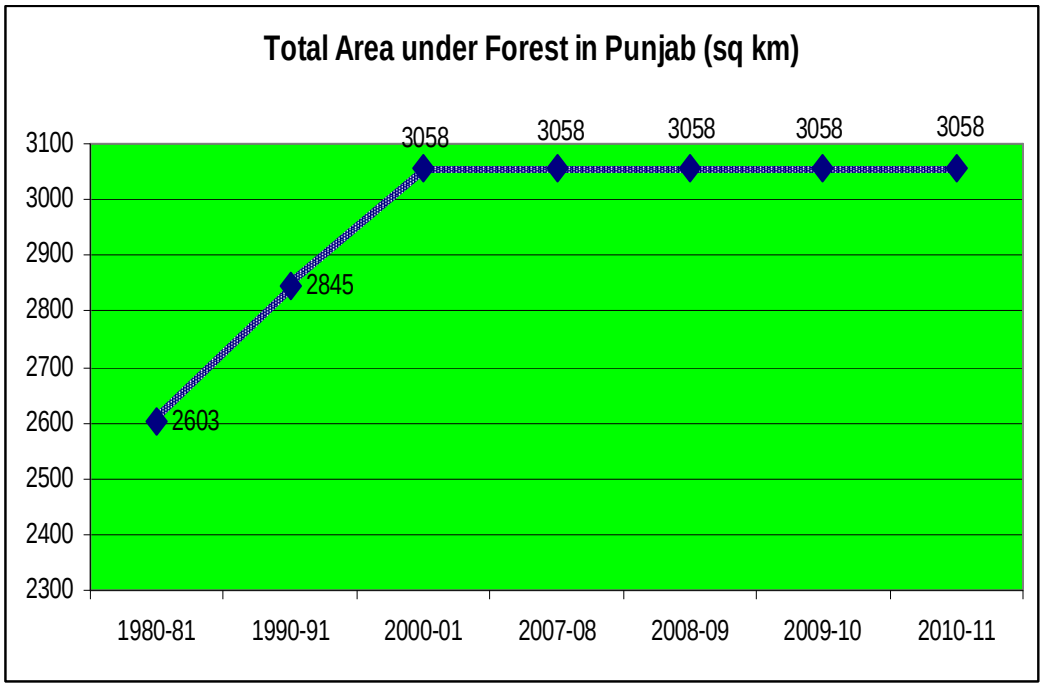


Table No. 5.3 State/UT wise Forest area in India

SN	State/UT	Geographic Area (sq km)	Recorded Forest Area, 2007 (sq km)				Percentage of Forest Area
			Reserved Forest	Protected Forest	Un-classed Forest	Total Forest Area	
1	Andhra Pradesh	275069	61210	1967	637	63814	23.2
2	Arunachal Pradesh	83743	10546	9528	31466	51540	61.55
3	Assam	78438	17864	-	8968	26832	34.21
4	Bihar	94163	693	5779	1	6473	6.87
5	Chhattisgarh	135191	25782	24036	9954	59772	44.21
6	Delhi	1483	78	7	-	85	5.73
7	Goa	3702	253	845	126	1224	33.06
8	Gujarat	196022	14122	479	4326	18927	9.66
9	Haryana	44212	249	1158	152	1559	3.53
10	Himachal Pradesh	55673	1898	33060	2075	37033	66.52
11	Jammu & Kashmir	222236	17643	2551	36	20230	9.1
12	Jharkhand	79714	4387	19185	33	23605	29.61
13	Karnataka	191791	28690	3931	5663	38284	19.96
14	Kerala	38863	11123	142	-	11265	28.99
15	Madhya Pradesh	308245	61886	31098	1705	94689	30.72
16	Maharashtra	307713	49226	8195	4518	61939	20.13
17	Manipur	22327	1467	4171	11780	17418	78.01
18	Meghalaya	22429	1113	12	8371	9496	42.34
19	Mizoram	21081	7909	3568	5240	16717	79.3
20	Nagaland	16579	86	508	8628	9222	55.62
21	Orissa	155707	26329	15525	16282	58136	37.34
22	**Punjab**	**50362**	**44**	**1153**	**1861**	**3058**	**6.07**
23	Rajasthan	342239	12454	17416	2769	32639	9.54
24	Sikkim	7096	5452	389	-	5841	82.31
25	Tamil Nadu	130058	19388	2183	1306	22877	17.59
26	Tripura	10486	4175	2	2117	6294	60.02
27	Uttar Pradesh	240928	11660	1420	3503	16583	6.88
28	Uttrakhand	53483	24638	9882	131	34651	64.79
29	West Bengal	88752	7054	3772	1053	11879	13.38
30	Union Territories	9478	3163	4257	10	7430	78.39
	Total	**3287263**	**430582**	**206219**	**132711**	**769512**	**23.41**

Source: Botanical Survey of India, Kolkata, SS: CSO

Table No. 5.4 Number and Status of Plant Species in India as on 2007

SN	Type	No. of Known Species in the World	No. of Known species in India	% of occurred-nce in India	No. of Species Endemic	No. of Species Endang-ered	No. of Species Extinct
I	**Flowering Plants:**						
1	Gymnosperm	650	48	7.38	8	7	..
2	Angiosperm	250000	17672	7	5725	1700	28
II	**Non-Flowering Plants:**						
1	Fern & Fernallics	10000	1135	11.35	193	113	..
2	Algae	40000	6500	16.25	1100	120	..
3	Fungi	70000	14500	20.71	3500	140	..
4	Lichens	13500	2021	14.97	417	400	..
5	Liverworts	7500	852	11.26	260	100	..
6	Mosses	7000	2000	28.6	608	115	..

..= not available Source: Botanical Survey of India, Kolkata, SS: CSO

Table No. 5.5 Annual forest planting of major species in Punjab (in lac)

Year	Forest Planting of Major Species						Miscell-aneous	Total
	Euclypt-us	Shisam	Kikar	Khair	Mulbery	Chil		
1980-81	69.74	1.51	19.85	20.14	1.33	-	3.25	115.82
1990-91	6.09	2.86	38.55	20.76	1.03	2.04	31.87	103.2
2000-01	13.45	14.88	24.53	59.31	1.50	1.93	110.47	226.07
2007-08	1.72	2.57	2.06	0.34	0.18	0.08	10.23	17.18
2008-09	1.20	1.80	1.44	0.24	0.12	0.06	7.14	12.00
2009-10	3.40	5.10	4.08	1.80	0.34	0.018	20.10	34.84
2010-11	3.40	5.10	4.08	1.80	0.34	0.018	20.10	34.84

Source: Director of Land Records/ Agriculture, Punjab
SS: Punjab State Council for Science & Technology

Table No. 5.6 Year-wise plants planted in Punjab (In lakhs)

SN	Year	By Forest Department	By other Departments	By People	Total
1	1980-81	108.00	-	67.12	175.12
2	1990-91	117.50	7.86	137.48	262.84
3	2000-01	145.20	25.13	32.87	203.20
4	2007-08	31.37	-	19.91	51.28
5	2008-09	10.00	-	30.00	40.00
6	2009-10	35.00	-	31.55	66.55
7	2010-11(P)	35.50	-	24.25	59.75

Table No. 5.7 Year-wise major forest produce in Punjab '000' cubic meters

SN.	Year	Timber	Firewood	Total	Total Value 000' Rs
1	1980-81	99	40	39	37778
2	1990-91	43	1	44	23209
3	2000-01	166	7	173	123885
4	2007-08	75	-	75	75415
5	2008-09	80	-	80	85520
6	2009-10	130	-	130	141230
7	2010-11(P)	45	-	45	120000

Table No. 5.8 Year-wise minor forest produce in Punjab (in Rs.)

SN.	Year	Bamboos and Canes	Fodder and Grass	Others	Total
1	1980-81	92875	1373060	1395583	2861518
2	1990-91	-	2814946	1414064	4229010
3	2000-01	11723000	2875225	2781347	17379572
4	2007-08	12851075	1574965	3327781	17753821
5	2008-09	12000000	1375000	3040500	16415500
6	2009-10	12510000	1520000	35000000	49030000
7	2010-11(P)	8000000	1000000	2500000	11500000

Source: Chief Conservator of Forests, Punjab SS: Statistical Abstract of Punjab

Table No. 5.9 State/UT- Wise Tree Cover Estimates

SN	State/UT	Geographic Area (Km^2)	Area (Km^2)	Tree Cover % of Geog. Area
1	Andhra Pradesh	275069	7191	2.61
2	Arunachal Pradesh	83743	592	0.71
3	Assam	78438	1590	2.03
4	Bihar	94163	2495	2.65
5	Chhattisgarh	135191	4027	2.98
6	Delhi	1483	123	8.29
7	Goa	3702	286	7.73
8	Gujarat	196022	8390	4.28
9	Haryana	44212	1409	3.19
10	Himachal Pradesh	55673	638	1.15
11	Jammu & Kashmir	222236	6764	3.04
12	Jharkhand	79714	3032	3.80
13	Karnataka	191791	5683	2.96
14	Kerala	38863	2801	7.21
15	Madhya Pradesh	308245	6871	2.23
16	Maharashtra	307713	9466	3.08
17	Manipur	22327	197	0.88
18	Meghalaya	22429	542	2.42
19	Mizoram	21081	172	0.82
20	Nagaland	16579	300	1.81
21	Orissa	155707	4435	2.85
22	**Punjab**	**50362**	**1699**	**3.37**
23	Rajasthan	342239	8274	2.42
24	Sikkim	7096	20	0.28
25	Tamil Nadu	130058	4968	3.82
26	Tripura	10486	171	1.63
27	Uttar Pradesh	240928	7381	3.06
28	Uttarakhand	53483	665	1.24
29	West Bengal	88752	2458	2.77
30	A. & N. Islands	8249	44	0.53
31	Chandigarh	114	11	9.65
32	Dadra & Nagar Haveli	491	27	5.50
33	Daman & Diu	112	9	8.04
34	Lakshadweep	32	4	12.50
35	Puducherry	480	34	7.08
	Total	**3287263**	**92769**	**2.82**

Source: India State of Forest Report-2009,
SS: CSO Compendium of Environment Statistics India

Table No. 5.10 District- wise Fish Production in Punjab 2010-11

SN	District	Fish Stocked in Hectare	No of Fingerlings (000)	Fishing Licenses issued	Total Receipts from Fisheries (000'Rs)
1	Amritsar	568	8699	11	1664
2	Barnala	247	4035	-	-
3	Bathinda	829	11682	-	28
4	Faridkot	430	6190	-	-
5	Fatehgarh Sahib	470	6516	-	-
6	Firozpur	713	10607	1	3937
7	Gurdaspur	674	8862	5	654
8	Hoshiarpur	538	7009	-	1014
9	Jalandhar	656	16914	14	451
10	Kapurthala	512	7145	5	1170
11	Ludhiana	792	12492	1	1444
12	Mansa	684	10853	-	84
13	Moga	468	7188	-	1
14	Shri Mukatsar Sahib	518	7960	-	5
15	Patiala	682	10853	-	151
16	Rupnagar	399	3937	108	1935
17	Sangrur	708	11460	-	90
18	SAS Nagar	305	3550	-	-
19	SBS Nagar	305	2912	-	-
20	Tarn Taran	359	5910	-	2
Total		**10857**	**164474**	**145**	**12630**

Source: Director and Warden of Fisheries Punjab &
Statistical Abstract of Punjab

Table No. 5.11 District-wise Fish Seed Farms and their Production 2010-11

SN	District	Number	Productions (in Lakhs)
1	Amritsar	1	50.00
2	Barnala	-	-
3	Bathinda	1	8.18
4	Faridkot	1	14.00
5	Fatehgarh Sahib	1	29.00
6	Firozpur	1	35.59
7	Gurdaspur	1	58.80
8	Hoshiarpur	1	45.50
9	Jalandhar	-	-
10	Kapurthala	1	46.00
11	Ludhiana	1	40.00
12	Mansa	-	-
13	Moga	-	-
14	Shri Mukatsar Sahib	-	-
15	Patiala	1	41.61
16	Rupnagar	1	36.12
17	Sangrur	2	81.00
18	SAS Nagar	-	-
19	SBS Nagar	1	46.00
20	Tarn Taran	-	-
	Total	**14**	**532.17**

Source: Director and Warden of Fisheries, Punjab

Table No. 5.12 State/UT-wise Fish Production in India

(tonnes)

SN	State/UT	2005-2006			2006-2007		
		Marine	Inland	Total	Marine	Inland	Total
1	Andhra Pradesh	21884	67225	89109	240.20	616.73	856.93
2	Arunachal Pradesh	0	275	275	0.00	2.77	2.77
3	Assam	0	18801	18801	0.00	181.48	181.48
4	Bihar	0	27953	27953	0.00	267.04	267.04
5	Goa	10091	404	10495	98.96	3.43	102.39
6	Gujarat	66388	6993	73381	670.51	76.82	747.33
7	Haryana	0	4820	4820	0.00	60.08	60.08
8	Himachal Pradesh	0	730	730	0.00	6.89	6.89
9	Jammu & Kashmir	0	1915	1915	0.00	19.20	19.20
10	Karnataka	17697	12060	29757	168.54	123.92	292.46
11	Kerala	55891	7798	63689	598.06	79.57	677.63
12	Madhya Pradesh	0	6108	6108	0.00	65.04	65.04
13	Maharashtra	44534	13520	58054	464.09	131.85	595.94
14	Manipur	0	1822	1822	0.00	18.61	18.61
15	Meghalaya	0	412	412	0.00	5.49	5.49
16	Mizoram	0	375	375	0.00	3.76	3.76
17	Nagaland	0	550	550	0.00	5.80	5.80
18	Orissa	12221	20324	32545	128.14	213.90	342.04
19	**Punjab**	**0**	**8564**	**8564**	**0.00**	**86.70**	**86.70**
20	Rajasthan	0	1850	1850	0.00	22.20	22.20
21	Sikkim	0	15	15	0.00	0.15	0.15
22	Tamil Nadu	30799	15504	46303	387.25	155.03	542.28
23	Tripura	0	2387	2387	0.00	28.63	28.63
24	Uttar Pradesh	0	28958	28958	0.00	306.73	306.73
25	West Bengal	16000	109000	125000	178.10	1181.00	1359.10
26	A & N Islands	1205	5	1210	28.60	0.08	28.68
27	Chandigarh	0	9	9	0.00	0.17	0.17
28	Dadar & Nagar Haveli	0	5	5	0.00	0.05	0.05
29	Daman & Diu	1772	7	1779	16.35	0.06	16.41
30	Delhi	0	70	70	0.00	0.61	0.61
31	Lakshadweep	1196	0	1196	11.75	0.00	11.75
32	Pondicherry	1927	218	2145	33.61	6.05	39.66
33	Chattisgarh	0	13175	13175	0.00	137.75	137.75
34	Uttranchal	0	279	279	0.00	3.03	3.03
35	Jharkhand	0	3427	3427	0.00	34.27	34.27
	Total	**281605**	**375558**	**657163**	**3024.16**	**3844.89**	**6869.05**

Source: Department of Animal Husbandry and Dairying, Ministry of Agriculture
CSO Compendium of Environment Statistics India

Table No. 5.13 District wise Livestock and Poultry Status in Punjab 2007 Census

SN	District	Cows	Buffaloes	Horses & Ponies	Donkeys	Mules & Ponies	Sheep	Goats	Camels	Pigs	Total	Poultry
1	Amritsar	101.79	298.01	2.47	0.64	0.63	8018	11.27	0.02	0.82	8433.65	271.65
2	Barnala	44.35	181.26	0.84	0.04	0.33	4.48	7.74	0.04	0.73	239.81	1282.33
3	Bathinda	105.47	274.03	2	0.21	0.68	23.75	39.3	0.86	1.04	447.34	247.45
4	Faridkot	47.2	125.97	1.37	0.04	0.25	7.3	11.43	0.03	0.29	193.88	107.13
5	Fatehgarh Sahib	43.01	147.6	0.32	0.01	0.26	1	5.78	0	1.12	199.1	628.5
6	Firozpur	184.02	392.11	1.82	0.4	0.54	54.27	32.7	0.83	0.67	667.36	176.08
7	Gurdaspur	143.05	281.39	3.77	0.35	0.49	4.33	10.64	0.03	0.41	444.46	3041.5
8	Hoshiarpur	126.5	232.95	1.24	0.45	0.42	1.06	15.29	0	0.63	378.54	629.15
9	Jalandhar	120.53	248.97	1.11	0.04	0.11	2.45	13.96	0	0.73	387.9	2885.08
10	Kapurthala	53.27	140.95	0.72	0.02	0.15	0.3	4.01	0	0.35	199.77	244.55
11	Ludhiana	153.48	505.09	2.42	0.13	1.45	4.76	13.79	0.01	4.82	685.95	2836.51
12	Mansa	55.67	233.1	1.23	0.12	0.62	18.6	18.41	0.18	0.78	328.71	216.98
13	Moga	91.96	244.53	2.3	0.11	0.39	5.32	10.59	0.01	1.07	356.28	122.14
14	Shri ukatsar Sahib	96.14	147.27	2.77	0.23	0.47	21.8	27.37	0.1	0.47	296.62	388.96
15	Patiala	92.9	337.36	1.24	0.19	0.69	13.73	13.84	0	4.13	464.08	726.66
16	Rupnagar	35.7	154.89	0.37	0.06	0.23	0.26	6.63	0	0.74	198.88	735
17	Sangrur	122.9	486.33	1.63	0.09	0.88	14.6	21.2	0.06	2.7	650.39	1172.26
18	SAS Nagar	27.45	147.81	0.44	0.17	0.15	6.04	6.33	0.04	2.8	191.23	2558.06
19	SBS Nagar	41	131.07	0.32	0.04	0.19	0.39	4.8	0	0.27	178.08	115.36
20	Tarn Taran	74.53	324.96	1.44	1.49	0.76	11.99	11.31	0.01	0.65	427.14	514.35
	Total	**1640.39**	**4786.68**	**28.71**	**4.79**	**9.58**	**8211.98**	**272.43**	**2.22**	**24.49**	**14981.27**	**16014.62**

Source: Animal Husbandry, Punjab, Statistical Abstract of Punjab

Table No 5.14 India's Livestock Population

(Lacs)

SN	Livestock	Number of Animals						
		1977	**1982**	**1987**	**1992**	**1997**	**2003**	**2007**
1	Cattle	180.0	192.5	199.7	204.6	198.9	185.2	199.1
2	Buffaloes	62.0	69.8	76.0	84.2	89.9	97.9	105.3
3	Sheep	41	48.8	45.7	50.8	57.5	61.5	71.6
4	Goats	75.6	95.3	110.2	115.3	122.7	124.4	140.5
5	Horses & Ponnies	0.9	0.9	0.8	0.8	0.8	0.8	0.6
6	Pigs	7.6	10.1	10.6	12.8	13.3	13.5	11.1
7	Mules	0.1	0.1	0.2	0.2	0.2	0.2	0.1
8	Donkeys	1.1	1.0	1.0	1.0	0.9	0.7	0.4
9	Camels	1.068	1.1	1.0	1.0	0.9	0.6	0.5
II	**Other Livestock**							
1	Yaks	0.1	0.1	0.0	0.1	0.1	0.1	0.1
2	Mithuns	0.1	0.2	0.1	0.2	0.2	0.3	-
Total		**369.0**	**419.6**	**445.3**	**470.9**	**485.4**	**485.0**	**529.7**

Source: Live Stock Census, Ministry of Agriculture;
CSO: Compendium of Environment Statistics India

Table No. 5.15 Location of Major Zoos in India 2010

SN	Name of Zoo	Location	State
1	Bilogical Park, Chidyatapu	Port Blair	Andaman & Nicobar Islands
2	Indira Gandhi Zoological Park	visakhapatnam	Andhra Pradesh
3	Nehru Zoological Park	Hyderabad	Andhra Pradesh
4	Sri Venkateswara Zoological Park	Tirupati	Andhra Pradesh
5	Biological Park Itanagar	Itanagar	Arunachal Pradesh
6	Assam State Zoo Cum Botanical Garden	Guwahati	Assam
7	Sanjay Gandhi Biological Park	Patna	Bihar
8	Kanan Pandari Zoo	Bilaspur	Chattisgarh
9	Maitri Baagh Zoo	Bhilai	Chattisgarh
10	National Zoological Park	Delhi	Delhi
11	Bondla Zoo	Usgao	Goa
12	Dr. Shyamaprasad Mukharjee Zoological Garden	Surat	Gujarat
13	Indoda Nature Park	Gandhi Nagar	Gujarat
14	Kamla Nehru Zoological Garden	Ahemdabad	Gujarat
15	Sakkarbaug Zoo	Junagarh	Gujarat
16	Sayaji Baug Zoo	Vadodara	Gujarat
17	Rohtak Zoo	Rohtak	Haryana
18	Himalayan Nature Park (Kufri)	Kufri	Himachal Pradesh
19	Jammu Zoo	Ram Nagar,(Jammu)	J&K
20	Kashmir Zoo	Srinagar	J & K
21	Bhagwan Birsa Biological Park	Ranchi	Jharkhand
22	Jawaharlal Nehru Biological Park	Bokaro	Jharkhand
23	Tata Steel Zoological Park	Jamshedpur	Jharkhand
24	Bellary Childrens Park-Cum-Zoo (Bellary Zoo)	Bellary	Karnataka
25	Children Park & Zoo (Gadag Zoo)	Gadag	Karnataka
26	Dr. K.Shivarma Karanth Pilikula Biological Park	Mangalore	Karnataka
27	National Park, Bannerghatta Zoological Garden	Bangalore	Karnataka
28	Sri Chamarajendra Zoological Gardens	Mysore	Karnataka
29	Tiger & Lion Safari, Thyyarekoppa	Shimoga	Karnataka
30	State Museum & Zoo	Thrissur	Kerala
31	Thiruvananthapuram Zoo	Thiruvananthapuram	Kerala
32	Gandhi Zoological Park	Gwalior	Madhya Pradesh
33	Kamla Nehru Prani Sanghrahalay Zoo	Indore	Madhya Pradesh
34	Van Vihar National Park	Bhopal	Madhya Pradesh
35	Aurangabad Municipal Zoo	Aurangabad	Maharashtra
36	Mahatma Gandhi Rashtriya Udyan Zoo	Solapur	Maharashtra
37	Nisargakavl Bahlnabai Choudhary Pranisansangahralay	Pune	Maharashtra
38	Rajiv Gandhi Zoological Park And Wildlife Research Centre	Pune	Maharashtra

SN	Name of Zoo	Location	State
39	Veermata Jijabai Bhosale Udyan & Zoo	Mumbai	Maharashtra
40	Manipur Zoological Garden	Imphal	Manipur
41	Lady Hydari Park Animal	Shillong	Meghalaya
42	Aizawl Zoo (Mizoram Zoo)	Aizwal	Mizoram
43	Indira Gandhi Park Zoo & Deer Park	Rourkela	Orissa
44	Nandankanan Biological Park	Bhubaneswar	Orissa
45	Wild Animal Conservation Centre	Mothijharan Sambalpur	Orissa
46	**Deer Park, Bir Moti Bagh Patiala Zoo)**	**Patiala**	**Punjab**
47	**Ludhiana Zoo**	**Ludhiana**	**Punjab**
48	**Mahendra Chaudhury Zoological Park**	**Chhatbir**	**Punjab**
49	Bikaner Zoo	Bikaner	Rajasthan
50	Jaipur Zoo	Jaipur	Rajasthan
51	Jodhpur Zoo	Jodhpur	Rajasthan
52	Udaipur Zoo	Udaipur	Rajasthan
53	Amirdhi Zoo	Vellore	Tamil Nadu
54	Arignar Anna Zoological Park	Vandalur Chennai	Tamil Nadu
55	Chennai Snake Park Trust	Guindy	Tamil Nadu
56	Children's Corner	Guindy	Tamil Nadu
57	Madras Crocodile Bank Trust/Centre For Herpetology	Mahabalipuram	Tamil Nadu
58	V.O.C. Park Mini Zoo	Coimbatore	Tamil Nadu
59	Sepahijala Zoological Park	Sepahijala	Tripura
60	Kanpur Zoological Park	Kanpur	Uttar Pradesh
61	Lucknow Prani Udyan	Lucknow	Uttar Pradesh
62	Pt Govind Ballabh Pant High Altitude Zoo	Nainital	Uttaranchal
63	Alipore Zoological Garden	Kolkata	West Bengal
64	Calcutta Snake Park	Badu	West Bengal
65	Jhargram Zoo	Jhargram	West Bengal
66	Marble Palace Zoo	Kolkata	West Bengal
67	Padmaja Naidu Himalayan Zoological Park	Darjeeling	West Bengal

Source: Central Zoo Authority, Ministry of Environment & Forests & CSO Compendium of Environment Statistics India

Table No. 5.16 State- wise information of National Parks and Wildlife Sanctuaries in India

(Area in sq km)

SN	State	National Parks		Wildlife Sanctuaries		Total Area
		Number	Area	Number	Area	
1	Andhra Pradesh	5	373.24	22	12599.19	12972.43
2	Arunachal Pradesh	2	2290.82	11	7606.37	9897.19
3	Assam	5	1977.79	18	1932.00	3909.79
4	Bihar	1	335.65	13	2949.17	3284.82
5	Chhatisgarh	3	2929.50	11	3409.13	6338.63
6	Delhi	0	0.00	2	27.20	27.20
7	Goa	1	107.00	6	647.96	754.96
8	Gujarat	4	480.11	22	16422.72	16902.83
9	Haryana	3	48.25	7	255.67	303.92
10	Himachal Pradesh	2	1430.00	32	6132.55	7562.55
11	Jammu & Kashmir	4	3930.25	15	10312.25	14242.50
12	Jharkhand	1	231.67	11	1862.72	2094.39
13	Karnataka	5	2472.18	21	3888.14	6360.32
14	Kerala	6	558.16	15	1859.07	2417.23
15	Madhya Pradesh	9	3656.36	25	7158.40	10814.76
16	Maharashtra	6	1273.60	35	14152.69	15426.29
17	Manipur	2	40.00	5	184.40	224.40
18	Meghalaya	2	267.48	3	34.20	301.68
19	Mizoram	2	150.00	7	840.75	990.75
20	Nagaland	1	202.02	3	20.34	222.36
21	Orissa	2	990.70	18	6969.15	7959.85
22	**Punjab**	**0**	**0.00**	**12**	**316.73**	**316.73**
23	Rajasthan	5	4122.33	23	5447.03	9569.36
24	Sikkim	1	1784.00	7	393.10	2177.10
25	Tamil Nadu	5	307.84	21	2539.82	2847.66
26	Tripura	2	0.00	4	603.64	603.64
27	Uttaranchal	6	4725.00	6	2413.76	7138.76
28	Uttar Pradesh	1	490.00	23	5222.47	5712.47
29	West Bengal	5	1693.25	15	1203.28	2896.53
30	Andaman & Nicobar Islands	9	1156.91	96	389.39	1546.30
31	Chandigarh	0	0.00	2	26.13	26.13
32	Dadra & Nagar Haveli	0	0.00	1	92.16	92.16
33	Daman & Diu	0	0.00	1	2.18	2.18
34	Lakshadweep	0	0.00	1	0.01	0.01
35	Pondicherry	0	0.00	0	0.00	0.00
Total		**100**	**38024.11**	**514**	**117913.77**	**155980.15**

Source: Wildlife Division of Ministry of Environment and Forests & CSO Compendium of Environment Statistics India

Table No 5.17 Wildlife protected areas in Punjab-2010

SN	Type of Protected Area	Number
1	National Park	None
2	Wildlife Sanctuary	12
3	Zoological Park/Tiger Safari	2
4	Dear Park	3
5	Community Reserve	2

Table No. 5.17a List of protected areas in Punjab-2010

SN	Type of Protected Area	Location (District)	Area (hect.)
	(A) Wildlife Sanctuaries:		
1	Bir Moti Bagh Wildlife Sanctuary	Patiala	654.00
2	Bir Bhunerheri Wildlife Sanctuary	Patiala	661.66
3	Bir Dosanjh Wildlife Sanctuary	Patiala	517.59
4	Bir Bhadson Wildlife Sanctuary	Patiala	1,022.63
5	Bir Mehas Wildlife Sanctuary	Patiala	123.43
6	Bir Gurdialpura Wildlife Sanctuary	Patiala	620.53
7	Bir Aishwan Wildlife Sanctuary	Sangrur	264.40
8	Harike Wildlife Sanctuary	Ferozepur, Amritsar, Kapurthala	8,600.00
9	Takhni-Rehmapur Wildlife Sanctuary	Hoshiarpur	382.00
10	Abohar Wildlife Sanctuary	Ferozepur	18,650.00
11	Jhajjar Bacholi Wildlife Sanctuary	Rupnagar	116.00
12	Kathlaur-Kaushlian Wildlife Sanctuary	Gurdaspur	758.40
	Total		**32,370.64**
	(B) Community Reserve (The first ever notified in this country):		
1	Lalwan Community Reserve	Hoshiarpur	1,266.80
2	Keshopur-Chhamb Community Reserve	Gurdaspur	340.00
	Total		**1,606.80**

Source: Department of Forests & Wildlife Preservation, Punjab

Table No. 5.17 b Zoological Parks and Zoo in Punjab 2010

SN	Name of Zoological Park/Zoo	District
1	Mohindra Chaudhary Zoological Park at Chhatbir	Mohali
2	Tiger Safari	Ludhiana
3	Deer Park, Neelon	Ludhiana
4	Deer Park Bir Moti Bagh	Patiala
5	Deer Park Bir Talab	Bhatinda

Source: Department of Forests & Wildlife Preservation, Punjab

Table No. 5.18 Indigenous and Threatened Breeds of Domesticated Fauna of Punjab 2009-10

SN	Domestic Animal	Existing Breeds	Indigenous Breed	Threatened Breeds
1	Cattle Breeds	Hariana, Sahiwal, Cross-breed Jersey, Holstein	Hariana, Sahiwal	Sahiwal
2	Sheep	Lohi, Nali, Desi, Cross Bred	Lohi, Nali, Desi	Lohi
3	Horse	Bhutia, Thorough Bred (for stud farm), Grey Sindhi, Marwari, Kathwari	Bhutia	Bhutia, Grey Sindhi
4	Buffalo	Nili ravi, Murrah, Murrah graded	Murrah, Nili ravi	Nili ravi
5	Goat	Desi, Beetal	Beetal	Beetal
6	Poultry	White Leg Horn, Desi	Punjab Brown	-

Source: Deptt. of Animal Husbandry, Govt. of Punjab
& Punjab State Council for Science and Technology

Chapter-6

ATMOSPHERE

The atmosphere is a complex dynamic natural gaseous system that is essential to support life on planet Earth. Stratospheric ozone depletion due to air pollution has long been recognized as a threat to human health as well as to the Earth's ecosystems. The world is warming up because Carbon Dioxide (CO2) from smoke and car exhausts collects in the atmosphere and traps some of the heat going back to space, like a greenhouse. The Earth's atmosphere contains gases that trap heat near the Earth's surface. These so-called 'greenhouse gases' are necessary to sustain life on Earth. They let the sun's rays enter but stop some heat from escaping to outer-space. This keeps the planet warm enough to allow life to thrive. However, as people cause more greenhouse gases to be released into the atmosphere, the greenhouse effect becomes stronger. More heat is trapped and the Earth's climate begins to change unnaturally. Human activity is changing the amount of greenhouse gases in the atmosphere in three important ways.

- **Burning fossil fuels**
- **Deforestation**
- **A growing world population**

6.1 The environmental impact of petroleum is often negative because it is toxic to almost all forms of life. The possibility of climate change exists. Petroleum, commonly referred to as oil, is closely linked to virtually all aspects of present society, especially for transportation and heating for both homes and for commercial activities.

6.2 Our planet is getting choked with poisonous gases mostly from our daily activities like driving cars, warming our houses and running power stations. The global warming is taking place because carbon dioxide (CO2) from smoke and car exhausts collects in the atmosphere and traps some of the heat going back to space, like a greenhouse. CO2 and other greenhouse gases are expected to raise global temperature by an average of 2°C by the year 2100 causing the polar icecaps to melt, sea levels to rise and freak weather conditions which may cause millions of deaths.

6.3 It is clear from the data that the number of vehicles increased many folds in the last some years causing a major pollution in environment of the Punjab. The Punjab State has registered about 45% increase in its population during the last two decades. It is among the most urbanized state in the country with increasing urban population. With an increase in population number of motor vehicles has also increased. This vehicular population resulted in releasing of harmful gases in environment causing many diseases in human and animals, which may also be curable or non-curable.

Table No. 6.1 District-wise number of motor vehicles registered in Punjab

SN	District	2007-08	2008-09	2009-10	2010-11
1	Amritsar	625253	658831	706563	755044
2	Barnala	5794	11364	18994	29299
3	Bathinda	206013	216517	229183	243051
4	Faridkot	177579	179545	187805	196516
5	Fatehgarh Sahib	66090	73308	86918	100503
6	Firozpur	206235	215640	228779	242829
7	Gurdaspur	220577	227263	249566	269785
8	Hoshiarpur	235009	249815	266069	284363
9	Jalandhar	703866	735352	793400	848273
10	Kapurthala	145202	155547	166081	176723
11	Ludhiana	1006304	1055764	1137872	1222687
12	Mansa	41718	44843	52935	61079
13	Moga	64405	72558	84348	93723
14	Shri Mukatsar Sahib	31852	35516	45299	54577
15	Patiala	404015	425229	445311	470964
16	Rupnagar	126417	134141	157613	178407
17	Sangrur	207425	217514	238534	255651
18	SAS Nagar	11658	21610	42862	67766
19	SBS Nagar	69987	76988	85838	95220
20	Tarn Taran	12520	19253	45001	64255

Source: State Transport Commissioner Punjab/
Statistical Abstract of Punjab

Table No. 6.2 Total number of motor vehicles registered in Punjab

SN	Year	Total passengers & vehicles	Total goods vehicles	Tractors	Others	Grand total	% age increase
1	1980-81	218552	22092	118845	665	360154	-
2	1990-91	983656	54411	289064	2351	1329482	369.14
3	2000-01	2375675	96703	434032	3823	2910233	218.89
4	2007-08	3930032	149983	485781	6783	4572579	157.12
5	2008-09	41668781	159251	492220	7899	4826248	105.54
6	2009-10	4590720	169553	498517	10181	5268971	109.17
7	2010-11	5015632	179365	504310	12408	5711715	108.40

Source: State Transport Commissioner, Punjab

Figure 6.2 Number of motor vehicles registered in Punjab

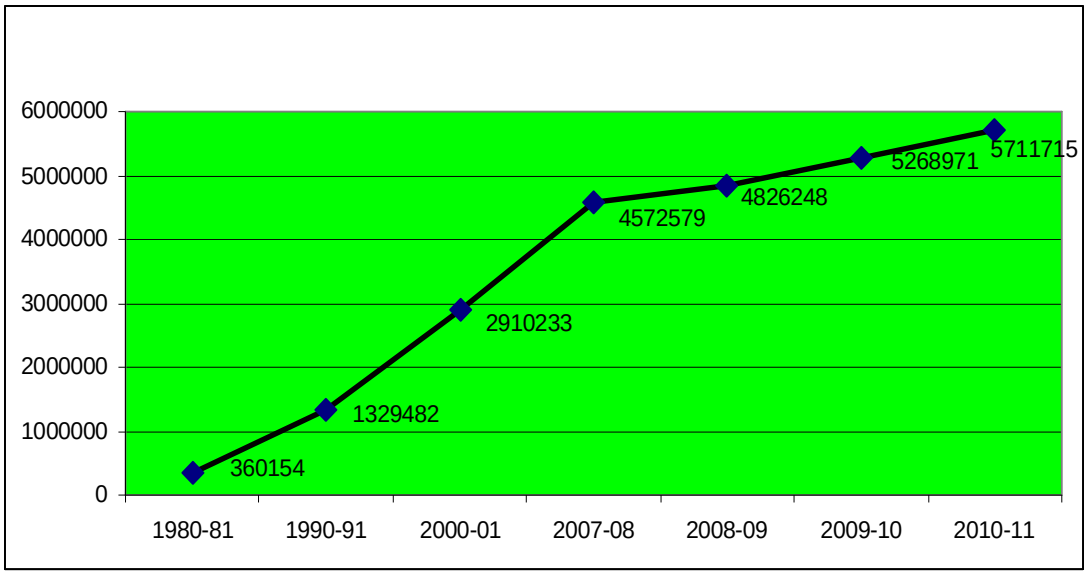


Table No. 6.3 Number of motor vehicles registered in India (Taxed &Tax-Exempted)

Year	Two-Whee-lers	Auto-Ricksh-aws	Jeeps	Cars	Taxis	Buses	Goods Vehicles	Misce-llaneous
1992-93	17183224	720364	512602	2550286	297941	363962	1752536	2124433
1993-94	18898701	771117	552038	2654232	362622	392148	1828117	2200903
1994-95	20831428	897383	614567	2875651	350331	423383	1938422	2769990
1995-96	23252287	1010344	671682	3150951	381011	448415	2030728	2966042
1996-97	25728982	1175283	727965	3527303	417013	484099	2343000	2927887
1997-98	28642351	1360151	824525	3829209	484374	537237	2535930	3154263
1998-99	31327607	1495200	837700	4201774	516449	539819	2553689	3403087
1999-2000	34117662	1583561	919067	4647969	575612	562308	2715005	3735620
2000-01	38556026	1777130	1126148	5297219	634357	633900	2948300	4017946
2001-02	41581058	1881085	1168868	5717456	688204	518658	3044976	4219191
2002-03	47525161	2114668	1196058	6597325	825638	727109	3487538	4559535
2003-04	51921973	2167324	1282113	7267174	901889	767593	3748484	4661385
2004-05	58799000	-	-	10320000	-	892000	4031000	7457000
2005-06	64743126	-	-	11526000	-	992000	4436000	7921000
2006-07	69128762	2697449	1460364	10146464	1042347	1350255	5118880	15909203
2007-08	75336026	2903821	1547825	11200142	1201862	142721	5600938	7419519
2008-09	82402105	3146619	1638975	12365806	1307805	1485605	6040924	6563194

Source: Transport Research Wing, Ministry of Road Transport & Highways, CSO Compendium of Environment Statistics India

Table No. 6.4 District-wise solid waste collected and treated in the Punjab State 2009-10

(Metric Tonne)

SN	Districts	Municipal		Hazardous		Biomedical	
		Collected	Treated	Collected	Storage	Collected	Treated
1	Amritsar	171824.0	-	118.08	118.08	142.5	142.5
2	Barnala	16242.5	-	150.895	150.895	39.42	39.42
3	Bathinda	49275.0	-	75.872	75.872	82.60	82.60
4	Faridkot	12528.0	-	17.325	17.325	113	113
5	Fatehgarh Sahib	31755.0	-	944.14	944.14	41.30	41.30
6	Firozpur	34148.0	-	38.66	38.66	224.3	224.3
7	Gurdaspur	20113.69	-	36.2214	36.2214	193.085	193.085
8	Hoshiarpur	19856.0	-	5264.321	5264.321	111.76	111.76
9	Jalandhar	141963.0	-	1656.704	1656.704	494.3	494.3
10	Kaputhala	206400.0	-	300.265	300.265	297.5	297.5
11	Ludhiana	338282.0	-	15712.85	15712.85	399.8	399.8
12	Mansa	16790.0	-	2.4	2.4	18.22	18.22
13	Moga	13762.4	-	2.225	2.225	121.65	121.65
14	Patiala	301.5	-	200.806	200.806	249.3	249.3
15	Roopnagar	7482.5	-	493.06	493.06	21.49	21.49
16	Sangrur	48545.0	-	377.9	377.9	113.06	113.06
17	SAS Nagar	28397.0	-	3522.17	3522.17	92.5	92.5
18	SBS Nagar	6716	-	424.033	424.033	106.22	106.22
19	Shri Mukatsar Sahib	24550.0	-	61.20	61.20	41.59	41.59
20	Taran Tarn	38325.0	-	90.108	90.108	125	125

Source: Statistical Abstract of Punjab

Table No.6.5 Number of water polluting industries units in Punjab

Year	Large and Medium Units		Small scale industries Units		Categories-wise Units		
	With ETP*	Without ETP	With ETP	Without ETP	Red	Orange	Green
2007-08	369	1	1915	92	7683	0	6073
2008-09	353	1	2101	96	8804	-	7868
2009-10	456	-	3200	106	12238	-	9289
2010-11	496	0	3558	41	12971	19	83#

*ETP: Effluent Treatment Plan.

This information is for large & medium scale industries

Source: Punjab Pollution Control Board.

Table No. 6.6 Number of Air Polluting Industrial Units in Punjab

Year	Large and Medium Units		Small Scale Industries Units		Categories-wise Units		
	With APCD*	Without APCD	With APCD	Without APCD	Red	Orange	Green
2007-08	494	-	8975	227	11703	-	6245
2008-09	394	-	7216	169	10753	-	7867
2009-10	507	-	9027	116	12238	-	9289
2010-11	489	-	9585	74	12877	25	83

*APCD: Air Pollution Control Device. Source: Punjab Pollution Control Board.

Table No. 6.7 State-wise level of SO_2, NO_2 and RSPM in residential areas under National Ambient Air Quality Monitoring Programme (NAMP) during 2008

SN	Name of the State	SO_2 µg/m^3 (Annual)			NO_2 µg/m^3 (Annual)			RSPM µg/m^3 (Annual)		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
1	Andhra Pradesh	74	2	8	108	7	26	425	12	85
2	Assam	21	2	6	33	5	13	450	16	89
3	Bihar	14	2	7	93	8	39	402	25	120
4	Chandigarh	2	2	2	49	5	14	217	21	89
5	Chhattisgarh	28	3	16	63	13	28	261	68	126
6	Delhi	31	2	5	138	23	55	630	18	209
7	Goa	11	2	2	30	4.5	13	197	14	57
8	Gujarat	45	4	12	40	4.5	18	293	33	83
9	Haryana	24	4	9	36	5	13	293	45	121
10	Himachal Pradesh	20	2	2	25	5	12	218	15	71
11	Jharkhand	30	11	19	66	20	38	454	31	152
12	Karnataka	49	2	10.5	66	8	27	381	28	77
13	Kerala	31	2	5	72	5	20	280	11	48
14	Madhya Pradesh	38	2	9	47	5	19	609	7	110
15	Maharashtra	90	2	16	159	5	31	579	3	101
16	Meghalaya	22	2	2	37	5	34	113	29	73
17	Mizoram	2	2	2	10	5	15	61	15	37
18	Manipur	6	2	3	38	14	19	125	34	84
19	Nagaland	5	2	2	62	7	14	133	16	72
20	Orissa	13	2	4	41	6	16	203	14	80
21	**Punjab**	**64**	**5**	**10**	**57**	**158**	**30**	**387**	**62**	**193**
22	Puducherry	10	2	4	21	5	10	182	25	45
23	Rajasthan	18	2	7	74	5	28	829	10	122
24	Tamil Nadu	80	2	12	106	5	20	302	11	58
25	Uttar Pradesh	68	4	12	64	5	30	442	50	170
26	Uttarakhand	61	21	27	31	23	28	159	73	126
27	West Bengal	70	2	9	137	5	66	514	6	101

Note: Data available as on date 15.04.09 Source : Central Pollution Control Board

Table No. 6.8 State-wise level of SO_2, NO_2 and RSPM in industrial areas under National Ambient Air Quality Monitoring Programme (NAMP) during 2008

SN	Name of the State	SO_2 µg/m^3 (Annual)			NO_2 µg/m^3 (Annual)			RSPM µg/m^3 (Annual)		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
1	Andhra Pradesh	2	83	6	6	121	27	9	493	87
2	Chandigarh	2	5	2	4.5	52	20	22	254	123
3	Chhattisgarh	12	22	17	33	51	42	129	288	212
4	Delhi	2	66	8	20	139	61	49	633	225
5	Goa	2	11	3	4.5	28	11	10	212	52
6	Gujarat	9	30	16	12	89	26	43	598	127
7	Haryana	7	23	15	12	89	28	102	598	267
8	Himachal Pradesh	2	6	2	4.5	21	12	17	649	134
9	Jharkhand	12	78	28	30	71	47	44	517	170
10	Karnataka	2	20	10	4.5	69	25	7	442	85
11	Kerala	2	43	6	4.5	48	11	6	320	45
12	Maharashtra	2	104	24	4.5	121	41	3	802	108
13	Madhya Pradesh	2	52	15	4.5	47	18	16	507	160
14	Orissa	2	21	8	10	37	21	19	276	95
15	**Punjab**	**48**	**35**	**11**	**11**	**66**	**35**	**99**	**666**	**229**
16	Puducherry	3	10	6	4.5	18	13	33	95	54
17	Rajasthan	4	24	8	11	72	31	10	538	135
18	Tamil Nadu	2	90	13	4.5	73	21	14	364	81
19	Uttar Pradesh	5	71	17	4.5	75	27	60	575	197
20	Uttarakhand	16	21	20	19	27	21	88	98	93
21	West Bengal	2	65	10	4.5	162	73	16	604	119

Note : Data available as on date 15.04.09

Source: Central Pollution Control Board
& CSO Compendium of Environment Statistics India

Table No 6.9 District-wise level of SO_2, NO_2 and RSPM in industrial areas under national Ambient Air Quality Monitoring Programme (NAMP) in Punjab-2010

SN	Name of District	Sulphur Dioxide SO_2 µg/m^3 (Annual)			Oxides of Nitrogen NO_2 µg/m^3 (Annual)			RSPM µg/m^3 (Annual)		
		Max.	Min.	Avg.	Max.	Min.	Avg.	Max.	Min.	Avg.
1	Gurdaspur	..	..	..	..	..	..	..	..	..
2	Pathankot	..	..	..	..	..	..	..	..	..
3	Amritsar	13	17	15	33	37	36	192	242	217
4	Tarn Taran	..	..	..	..	..	..	..	..	..
5	Kapurthala	..	..	..	..	..	..	..	..	..
6	Jalandhar	13	14	14	30	31	31	171	173	172
7	SBS Nagar	..	..	..	..	..	..	..	..	..
8	Hoshiarpur	..	..	..	..	..	..	..	..	..
9	Rupnagar	6	8	7	11	22	7	40	123	94
10	SAS Nagar	8	13	11	16	29	24	115	178	137
11	Ludhiana	6	17	11	26	54	36	198	262	244
12	Firozpur	..	..	..	..	..	..	..	..	..
13	Fazilka	..	..	..	..	..	..	..	..	..
14	Faridkot	..	..	..	..	..	..	..	..	..
15	Shri Mukatsar Sahib	..	..	..	..	..	..	..	..	..
16	Moga	..	..	..	..	..	..	..	..	..
17	Bathinda	7	14	9	12	32	22	134	195	153
18	Mansa	..	..	..	..	..	..	..	..	..
19	Sangrur	..	..	..	..	..	..	..	..	..
20	Barnala	..	..	..	..	..	..	..	..	..
21	Patiala	4	11	7	16	24	20	108	190	141
22	Fatehgarh Sahib	14	23	18	31	45	35	142	392	220

.. = Information not available. Source: Punjab Pollution Control Board.

Table No 6.10 District-wise level of SO_2, NO_2 and RSPM in residential areas under National Ambient Air Quality Monitoring Programme (NAMP) in Punjab-2010

SN	Name of District	Sulphur Dioxide SO_2 µg/m^3 (Annual)			Oxides of Nitrogen NO_2 µg/m^3 (Annual)			RSPM µg/m^3 (Annual)		
		Min.	Max.	Avg.	Min.	Max.	Avg.	Min.	Max.	Avg.
1	Gurdaspur	4	7	6	13	20	15	64	89	75
2	Pathankot	..	..	..	..	..	..	..	..	..
3	Amritsar	..	..	..	..	..	..	..	..	..
4	Tarn Taran	..	..	..	..	..	..	..	..	..
5	Kapurthala	..	..	..	..	..	..	..	..	..
6	Jalandhar	10	13	11	23	27	25	108	138	128
7	SBS Nagar	..	..	..	..	..	..	..	..	..
8	Hoshiarpur	..	..	..	..	..	..	..	..	..
9	Rupnagar	..	..	..	..	..	..	..	..	..
10	SAS Nagar	..	..	..	..	..	..	..	..	..
11	Ludhiana	6	12	9	25	45	31	168	268	225
12	Firozpur	..	..	..	..	..	..	..	..	..
13	Fazilka	..	..	..	..	..	..	..	..	..
14	Faridkot	..	..	..	..	..	..	..	..	..
15	Shri Mukatsar Sahib	..	..	..	..	..	..	..	..	..
16	Moga	..	..	..	..	..	..	..	..	..
17	Bathinda	..	..	..	..	..	..	..	..	..
18	Mansa	..	..	..	..	..	..	..	..	..
19	Sangrur	..	..	..	..	..	..	..	..	..
20	Barnala	..	..	..	..	..	..	..	..	..
21	Patiala	7	9	7	12	26	22	130	158	141
22	Fatehgarh Sahib	..	..	..	..	..	..	..	..	..

.. = Information not available. Source: Punjab Pollution Control Board.

Chapter-7

ENERGY

The environmental impact of electricity generation is significant because modern society uses large amounts of electrical power. This power is normally generated at power plants that convert some other kind of energy into electrical power like water and coal. As the demand of power is increasing day-by-day and the power shortage also growing. The energy efficiency and demand side management can help in mitigating power shortages and thereby drastically reduce capital need for power capacity addition.

7.2 There is a large potential for increasing end use energy efficiency in municipal street lighting, water pumping, buildings by using appropriate energy efficient appliances like CFL, energy efficient lights, motors, heating & cooling devices and various automatic control devices and solar energy. Human being is one of the God's creatures that living dangerously taking things from nature what suits him without a thought for tomorrow, or the harm he does to nature that will eventually backfire on him and the coming generations.

7.2 Energy is one such area that takes out a lot from nature. The earth is ruthlessly dug up in the greed for coal, petroleum and related gases. This makes the conventional sources of energy self-limiting. Environmentalists have long been warning to look for non-conventional sources of energy to reduce the dependence on non-conventional sources as well as providing breathing space to nature to repair itself. This in turn will ensure a safe future for mankind. The government of any country or state should ideally be the foremost practitioner of safe environmental practices that serves as an example to others to follow.

7.3 The Punjab Energy Development Agency (PEDA) was formed in 1991 as a nodal agency for promotion and development of non-conventional and renewable energy programs or projects in the State of Punjab. The mission statement of PEDA says a lot about itself "PEDA - Working towards a Sustainable Energy future". With growing energy demand and concern for depletion of conventional fuel resources and associated environmental pollution, there is an urgent need to develop alternative non-conventional sources of energy in Punjab. In This concern The Punjab Energy development Agency (PEDA) has recently been set up to give a fillip to these technology areas in the state.

Table No. 7.1 Number of Solar systems installed in Punjab

SN	Year	Domestic Solar Water Heater	Solar Photovoltaic Pump sets	Solar Cookers	Domestic Home Light Systems	Solar Driers	Solar Street Light
1	1990-91	243	82	1100	500	5	300
2	2006-07	-	-	-	1040	-	800
3	2007-08	1	-	-	400	-	500
4	2008-09	23	-	-	2600	-	500
5	2009-10	-	-	-	-	-	1017
6	2010-11	-	-	-	-	-	1017

Source: Punjab Energy Development Agency

Table No. 7.2 Number of Bio-Gas plants installed in Punjab

Year	Department of Agriculture, Punjab		Punjab Energy Development Agency		Total Bio-Gas Plants Installed
	Target	Achievement	Target	Achievement	
1990-91	2200	2334	-	-	2334
2000-01	-	289	1500	1500	1789
2007-08	-	245	3000	3000	3245
2008-09	-	147	8000	8000	8147
2009-10	-	117	10000	10000	10117
2010-11	-	25	16000	16000	16025

Source: Director, Agriculture, Punjab,
Director Punjab Energy Development Agency

Figure No.7.2 Bio-gas plants installed in Punjab

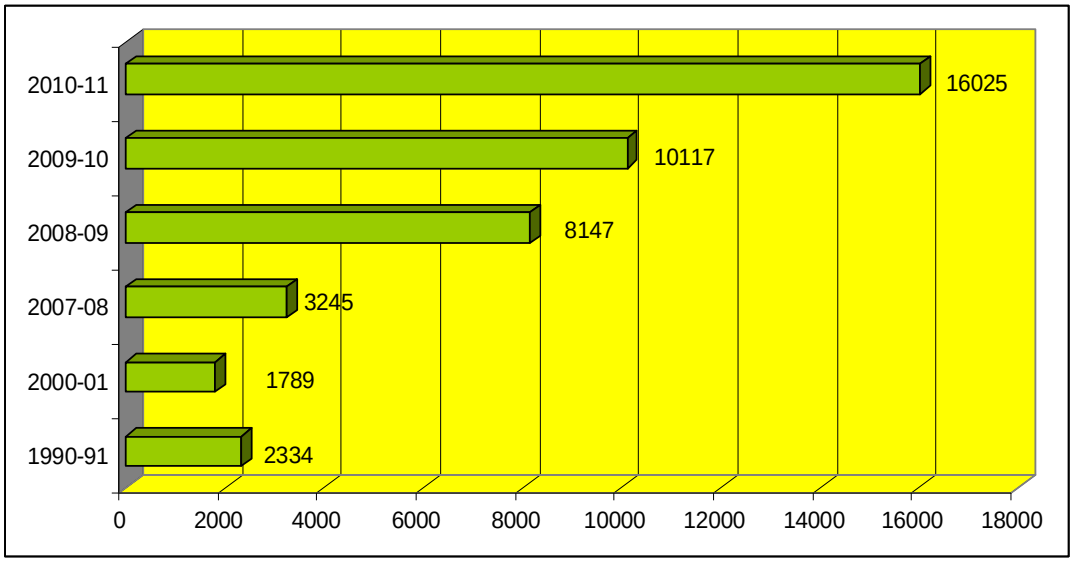


Table No. 7.3 Total Energy Generated in Punjab

(Mkwh)

Year	Thermal Total Generated	Hydel Total Generated	PSPCL share in common pool projects	Total Energy Generated
2006-07	15434	2612	4933	22979
2007-08	16457	4585	4458	25500
2008-09	18066	4175	4610	26851
2009-10	20295	3390	3977	27662
2010-11(P)	18326	4568	4874	27768
2011-12(RE)	18225	4507	4800	27532

(P): Provisional, (RE): Revised Estimates

Source: Punjab State Power Corporation Ltd.

Table No 7.4 Installed plant capacity and electricity generated in Punjab

Year	Installed Capacity (MW)	Generated (Million KWH)
1970-71	680	2364.80
1980-81	1536	6482.95
1990-91	3049	14617.54
2000-01	4443	21527.95
2007-08	4628	25369.00
2008-09	4878	26714.32
2009-10	4878	27503.38
2010-11	4878	27464.57

Source: Punjab State Power Corporation Limited.

Figure No.7.4 Installed plant capacity and electricity generated in Punjab

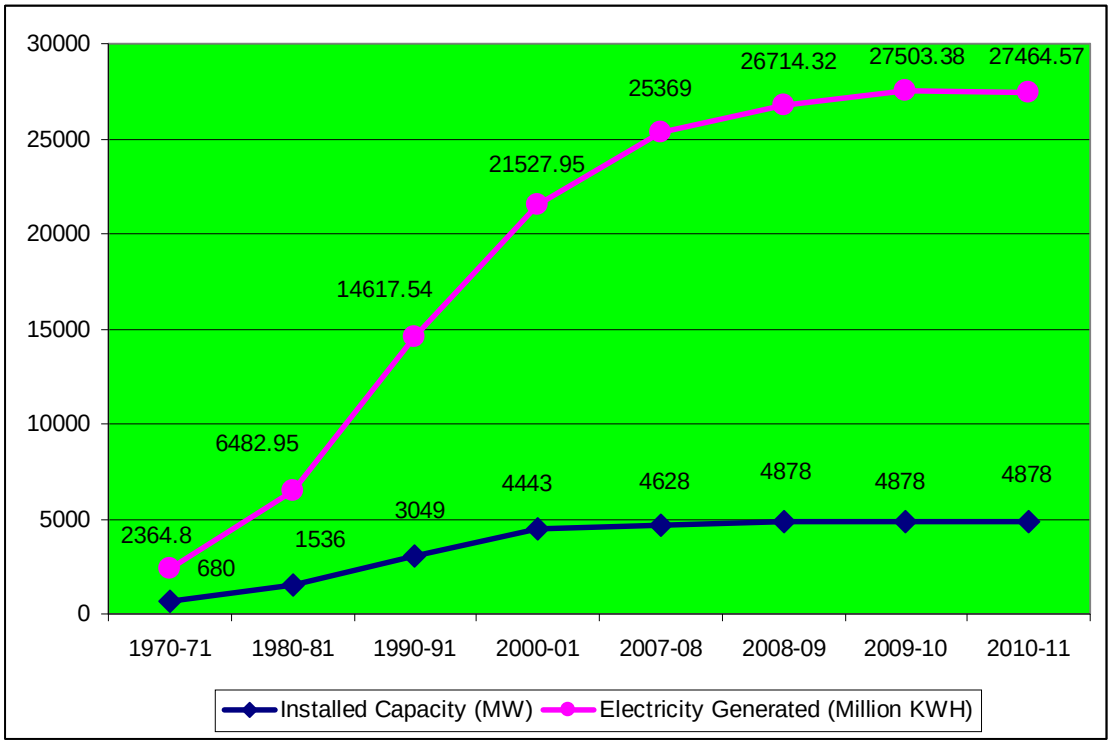


Table No. 7.5 Installed plant capacity for electricity supply in Punjab

(Megawatt)

Plant	2006 -07	2007 -08	2008 -09	2009 -10	2010 -11	2011 -12
Hydro:						
Shanan Power House, Joginder Nagar	110	110	110	110	110	110
U.B.D.C.(Stage-I & Stage-II)	91	91	91	91	91	91
Share in common pool Projects	1254	1257	1258	1258	1258	1258
Anandpur Sahib Hydel Project	134	134	134	134	134	134
Mukerian Hydel Project	207	207	207	207	207	207
Micro Hydel Schemes	4	4	6	6	6	6
Ranjit Sagar Dam Project	452	452	452	452	452	452
Total-I	**2255**	**2255**	**2258**	**2258**	**2258**	**2258**
Steam:						
Guru Nanak Dev Thermal Plant, Bathinda	440	440	440	440	440	440
Guru Gobind Singh Thermal Plant, Ropar	1260	1260	1260	1260	1260	1260
Rice Straw Plant, Jalkheri	-	-	-	-	-	-
Guru Hargobind thermal Plant, Lehra Muhabat	420	420	670	670	920	920
Total-II	**2120**	**2120**	**2370**	**2370**	**2620**	**2620**
Grand Total (I+II)	**4375**	**4375**	**4628**	**4628**	**4878**	**4878**

Source: Punjab State Power Corporation Ltd.

Table No. 7.6 Annual per capita sale of electricity in Punjab

Year	Dome-stic	Commer-cial	Industrial	Public Lighting	Agricultural	Total
1970-71	10.31	8.06	104.90	0.52	34.73	158.52
198081	30.10	8.43	150.91	1.10	111.97	302.51
1990-91	80.80	16.24	244.74	1.29	254.02	597.09
2000-01	174	38	331	19	228	790
2007-08	229	67	392	2.6	362	1076
2008-09	229	67	381	26	331	1033
2009-10	244	71	381	26	364	1087
2010-11	271	81	377	27	346	1102

Source: Punjab State Power Corporation Limited/ Statistical Abstract of Punjab.

Table No.7.7 Number of domestic electric connections and total households

Year	Total Households	Number of Domestic Connections as on 31st March
1981	2748453	1553629
1991	3424666	2754312
2001	4348580	3699739
2008	5139939	4494822
2009	5264183	4679397
2010	5391428	4271970

Source: Punjab State Power Corporation Limited/ Statistical Abstract of Punjab.

Table No. 7.8 Annual gross generation of power by source in India

(Metric Unit)

Year	Hydro	Steam	Diesel & Wind	Gas	Nuclear	Ther-mal	Total
1980-81	46541.8	60713.8	61.5	522	3001.3	-	110840.4
1985-86	51020.6	112540.1	50.6	1756.9	4981.9	-	170350.1
1990-91	71641.3	178321.7	111.3	8113.2	6141.1	-	264328.6
1995-96	72759.2	273743.5	714.4	24858.4	7981.7	-	380057.2
2000-01	74481	357006	3822	48311	16928	408139	499548
2004-05	84495.3	424083.2	2518.7	59473.6	16845.3	486075.5	587416.1
2005-06	103057.3	435096.6	1987.7	60128	17238.9	497214.3	617510.4
2006-07	116368.9	461340	2488.8	63718.6	18606.8	527547.4	662523
2007-08	128702.1	486763.2	3297.3	68930.6	16776.9	558990.1	704469

Source: Central Electricity Authority
& CSO Compendium of Environment Statistics India

Table No. 7.9 Number of towns and villages electrified in India

State/UTs	Towns		Villages	
	Total (2001 Census)	Electrified	Total (2001 Census)	Electrified
Northern Region	**1470**	**1470**	**196591**	**171394**
Haryana	106	106	6764	6764
Himachal Pradesh	57	57	17495	17183
Jammu & Kashmir	75	75	6417	6304
Punjab	**157**	**157**	**12278**	**12278**
Rajasthan	222	222	39753	27155
Uttar Pradesh	704	704	97942	86316
Uttranchal	86	86	15761	15213
Chandigarh	1	1	23	23
Delhi	62	62	158	158
Western Region	**1159**	**1159**	**131462**	**123819**
Gujarat	242	242	18066	17993
Madhya Pradesh	394	394	52117	50213
Chhatisgarh	97	97	19744	18877
Maharashtra	378	378	41095	36296
Goa	44	44	347	347
Daman & Diu	2	2	23	23
Dadra &Nagar Haveli	2	2	70	70
Southern Region	**1480**	**1480**	**70958**	**70603**
Andhra Pradesh	210	210	26613	26613
Karnataka	270	270	27481	27126
Kerala	159	159	1364	1364
Tamil Nadu	832	832	15400	15400
Puducherry	6	6	92	92
Lakshadweep	3	3	8	8
Eastern Region	**807**	**807**	**154794**	**93409**
Bihar	130	130	39015	20620
Jharkhand	152	152	29354	9119
Orissa	138	138	47529	26535
West Bengal	375	375	37945	36380
A & N Islands	3	3	501	330
Sikkim	9	9	450	425
North Eastern Region	**245**	**245**	**39927**	**29214**
Assam	125	125	25124	19741
Manipur	33	33	2315	1966
Meghalaya	16	16	5782	3428
Nagaland	9	9	1278	823
Tripura	23	23	858	491
Arunachal Pradesh	17	17	3863	2195
Mizoram	22	22	707	570
All India	**5161**	**5161**	**593732**	**488439**

Source: Central Electricity Authority; CSO: Compendium of Environment Statistics India

Chapter-8

INDUSTRY

The state has done remarkably well in the field of agriculture and is now laying emphasis on promoting industrial growth. During 2010-11, there are 1,68,000 small scale and 425 large and medium scale industries. The Industrial production has more than doubled in both, small scale industries (from Rs.183.24 billion in 2001 to Rs. 418.96 billion in 2010) as well as medium and large scale industries (from Rs. 265.76 billion in 2001 to Rs. 583.12 billion in 2010). Various industrial sectors like processed food, rice, yarn & textile, hosiery, pulp & paper and sports goods depend upon biological resources which are being cultivated and are normally traded.

8.2 The share of industrial sector (Secondary Sector) to State Gross Domestic Product has increased from 20% in 1980-81 to 29% in 2009-10. There are also 255 registered herbal units operating in the State, besides many unregistered units. These are extensively utilizing medicinal plants and herbs which are obtained from various parts of Punjab and adjoining states. But present industrial scenario has a depressing effect on the economy. The number of large industries in state is going down, the state economy is based on small scale industries mostly food processing industries. There is also clustering of the industrial units in some big cities like Fatehgarh Sahib, Ludhiana, Jalandhar and Amritsar. Ludhiana is popular in Textile and Bicycle industry and Jalandhar is popular in making sports goods which is world famous for its quality. This chapter contains the information regarding industries in Punjab, their effluent discharges causing damage to the environment.

Table No. 8.1 Number of Industries in Punjab

SN	Year	Small Scale Industries	Large & Medium Scale Industries
1	1980-81	43338	228
2	1990-91	160368	373
3	2000-01	200306	629
4	2006-07	191639	340
5	2007-08	167722	355
6	2008-09	162559	373
7	2009-10	164732	400
8	2010-11	168000	425

Source: Directorate of Industries Punjab.

Figure 8.1 Number of Industries in Punjab

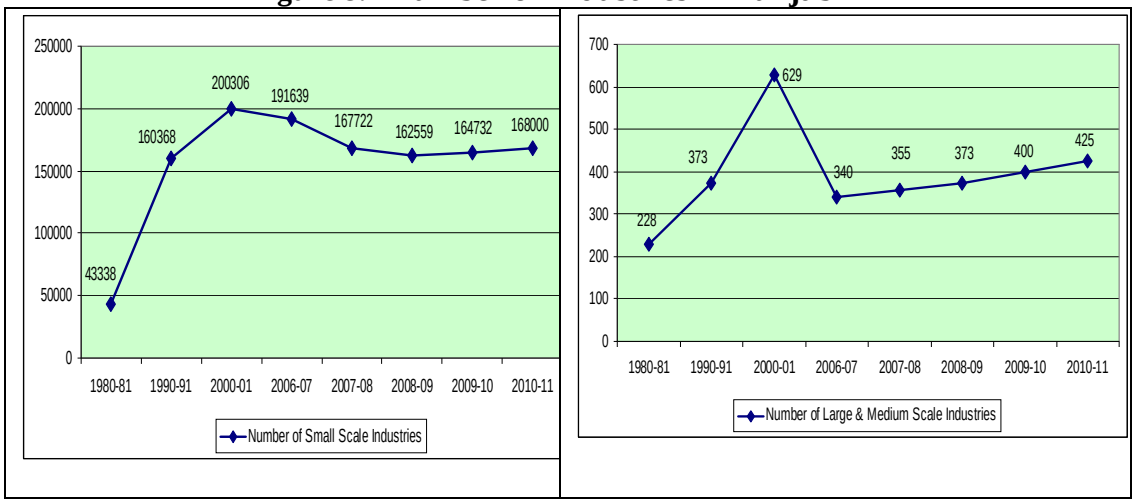


Table No. 8.2 Summary Status of Pollution Control in Grossly Polluting Industries Discharging their Effluents into Rivers and Lakes in Punjab 2010

SN	Name of District	Total	Complying	Closed	Defaulting
1	Gurdaspur	-	-	-	-
2	Pathankot	-	-	-	-
3	Amritsar	01	01		
4	Tarn Taran	-	-	-	-
5	Kapurthala	-	-	-	-
6	Jalandhar	01			01
7	SBS Nagar	-	-	-	-
8	Hoshiarpur	-	-	-	-
9	Rupnagar	03	02		01
10	SAS Nagar	-	-	-	-
11	Ludhiana	-	-	-	-
12	Firozpur	-	-	-	-
13	Fazilka	-	-	-	-
14	Faridkot	-	-	-	-
15	Shri Mukatsar Sahib	03	01	02	
16	Moga	-	-	-	-
17	Bathinda	07	05	02	-
18	Mansa	-	-	-	-
19	Sangrur	-	-	-	-
20	Barnala	03	03	-	-
21	Patiala	-	-	-	-
22	Fatehgarh Sahib	-	-	-	-

Source: Punjab Pollution Control Board.

Table No. 8.3 Summary Status of Pollution Control in Grossly Polluting Industries Discharging their Effluents into Rivers and Lakes in India

(As on 31.03.2010)

SN	Name of the State/Union Territory	Total	Complying	Closed	Defaulting
1	Andhra Pradesh	17	11	6	0
2	Assam	9	9	0	0
3	Bihar	22	16	6	0
4	Chhattisgarh	1	1	0	0
5	Gujarat	17	12	4	1
6	Haryana	76	71	1	4
7	Jharkhand	38	38	0	0
8	Karnataka	10	8	1	1
9	Kerala	36	18	7	11
10	Madhya Pradesh	1	0	0	1
11	Maharashtra	214	139	2	13
12	Orissa	20	6	5	9
13	Pondicherry	1	0	0	1
14	**Punjab**	**20**	**9**	**4**	**7**
15	Tamil Nadu	366	248	118	0
16	Uttar Pradesh	432	294	89	49
17	Uttrakhand	45	25	4	76
18	West Bengal	31	19	3	9
19	Daman Diu & Dadar Nagar Haveli	2	2	0	0
	Total	**1356**	**924**	**250**	**182**

Source: Ministry of Environment & Forests
CSO Compendium of Environment Statistics India

Table No. 8.4 State-Wise Summary Status of the Pollution Control in Medium and Large Scale Units of 17 Categories of Industries in India

(as on June,2007)

SN	State/UT	Complying#	Status (No. of Units)		
			Defaulting	Closed	Total
1	Andhra Pradesh	243	90	34	367
2	Arunachal Pradesh	0	0	0	0
3	Assam	10	3	5	18
4	Bihar	25	4	19	48
5	Chhattisgarh	18	5	2	25
6	Goa	10	0	1	11
7	Gujarat	263	61	21	345
8	Haryana	73	31	23	127
9	Himachal Pradesh	14	3	2	19
10	Jammu and Kashmir	8	0	3	11
11	Jharkhand	8	7	6	21
12	Karnataka	98	5	40	143
13	Kerala	23	11	15	49
14	Madhya Pradesh	60	4	15	79
15	Maharashtra	454	42	69	565
16	Manipur	0	0	0	0
17	Meghalaya	8	0	0	8
18	Mizoram	0	0	0	0
19	Nagaland	0	0	0	0
20	Orissa	38	12	2	52
21	**Punjab**	**53**	**31**	**17**	**101**
22	Rajasthan	94	9	8	111
23	Sikkim	0	0	0	0
24	Tamil Nadu	175	42	3	220
25	Tripura	10	0	0	10
26	Uttaranchal	16	18	2	36
27	Uttar Pradesh	234	13	27	274
28	West Bengal	49	18	20	87
29	Chandigarh	0	0	1	1
30	Daman	1	2	0	3
31	Delhi	2	3	0	5
32	Pondicherry	4	0	4	8
33	Andaman & Nicobar	0	0	0	0
34	Lakshadweep	0	0	0	0
	Total	**1991**	**414**	**339**	**2744**

Source: Ministry of Environment & Forest. (Central Pollution Control Board) & CSO Compendium of Environment Statistics India.

#: Having adequate facilities to comply with the standards

Table No. 8.5 Maximum permissible limits for industrial Effluent Discharges

(mg/Litre)

SN	Parameter	Into Inland Surface Waters Indian Standards 2490 (1974)	Into Public Sewers Indian Standards: 3306 (1974)	Onland for Irrigation Indian Standards: 3307 (1974)	Marine Coastal Area
1	pH	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.1
2	Biological oxygen demand (for 5 days at 20°C)	30.00	350.00	100.00	100.00
3	Chemical oxygen demand	250.00	-	-	250
4	Suspended solids	100.00	600.00	200.00	
5	Total dissolved solids (inorganic)	2100.00	2100.00	2100.00	-
6	Temperature (°C)	40.00	45.00	-	45.00
7	Oil and grease	10.00	20.00	10.00	20.00
8	Phenolic Compounds	1.00	5.00	-	5.00
9	Cyanides	0.20	2.00	0.20	0.20
10	Sulphides	2.00	-	-	5.00
11	Fluorides	2.00	15.00	-	15.00
12	Total residual chlorine	1.00	-	-	1.00
13	Pesticides	-	-	-	-
14	Arsenic	0.20	0.20	0.20	0.20
15	Cadmium	2.00	1.00	-	2.00
16	Chromium (hexavalent)	0.10	2.00	-	1.00
17	copper	3.00	3.00	-	3.00
18	Lead	0.10	1.00	-	1.00
19	Mercury	0.01	0.01	-	0.01
20	Nickel	3.00	3.00	-	5.00
21	Selenium	0.05	0.05	-	0.05
22	Zinc	5.00	15.00	-	15.00
23	Chlorides	1000.00	1000.00	600.00	-
24	Boron	2.00	2.00	2.00	-
25	Sulphates	1000.00	1000.00	1000.00	-
26	Sodium (%)	-	60.00	60.00	-
27	Ammoniacal nitrogen	50.00	50.00	-	50
28	Radioactive materials				
29	Alpha emitters (milli curie/millilitre)	10^{-7}	10^{-7}	10^{-8}	10^{-7}
30	Beta emitters (μ curie/millilitre)	10^{-6}	10^{-6}	10^{-7}	10^{-6}

Source: Central Pollution Control Board
& CSO Compendium of Environment Statistics India.

Chapter-9

LAND UTILISATION AND AGRICULTURE IN PUNJAB

Agricultural pollution refers to biotic and abiotic byproducts of farming practices that result in degradation of the environment and surrounding ecosystems, and cause injury to humans and their economic interests. The pollution can come from a variety of sources in agriculture practice such as over use of pesticides, herbicides fertilizers and water resources; alteration of landscape; deforestation and burning of farm wastages etc.

9.2 Pesticides and herbicides are applied to agricultural land to control pests that disrupt crop production. Soil contamination can occur when pesticides persist and accumulate in soils, which can alter microbial processes, increase plant uptake of the chemical, and also cause toxicity to soil organisms. Pesticides can also accumulate in animals that eat contaminated pests and soil organisms. In addition, pesticides can be more harmful to beneficial insects and to natural enemies of pests. The nitrogen (N) and phosphorus (P) applied to agricultural land via synthetic fertilizers, composts, manures, biosolids, etc. can provide valuable plant nutrients. However, if not managed correctly, excess N and P can have negative environmental consequences.

9.3 Agriculture has been shown to produce significant effects on climate change, primarily through the production and release of greenhouse gases such as carbon dioxide, methane, and nitrous oxide, but also by altering the Earth's land cover, which can change its ability to absorb or reflect heat and light, thus contributing to radioactive forcing. Land use change such as deforestation and desertification, together with use of fossil fuels, are the major anthropogenic sources of carbon dioxide; agriculture itself is the major contributor to increasing methane and nitrous oxide concentrations in earth's atmosphere.

9.4 Agriculture sector has a special place in Punjab’s economy. The share of agriculture and allied activities was more than both secondary as well as tertiary sector during last decades. But with the passage of time and exploitation of means of production the productivity in agriculture sector has reached to its saturated point which resulted in declined of the share of agriculture sector in the State’s GDP.

9.5 With the advent of high yielding, input-responsive dwarf varieties of rice and wheat during 60’s, the entire agriculture production system in Punjab got revolutionized. Major shifts were witnessed in the cropping pattern, especially, in irrigated ecosystems where cereal based multiple cropping came into prominence, relegating less productive, risk prone legumes and oilseed crops to marginal lands. The farmers found the rice- wheat cycle most profitable. Consequently, they

abandoned other crops. The practice resulted in depletion of organic content and plant nutrients in the soil. The farmers are now compelled to use more and more chemical fertilizers and other inputs to achieve the same production level.

9.6 The quality of soil is getting depleted due to this mono-cultivation of Paddy-Wheat rotation. Both Paddy and Wheat have heavy water requirements and the continuous usage of ground water is depleting the water level and this is already a cause of concern. The water-table in the central Punjab is going down. It is important to take cognizance of the fact that central Punjab has 72% area under paddy cultivation, out of which only 21% area has canal water irrigation facility. The tubewells in the central districts of the state constitute around 70% of total tubewells in Punjab (over 6% of the total tube wells of India are in Punjab), which have increased from 1.92 lacs (0.91 electric and 1.01 diesel operated) in 1970-71 to 12.76 lacs (9.96 electric and 2.80 diesel operated) in 2008-09 and during 2009-10 number of tubewells has reached 13.15 lacs (10.65 electric and 2.50 diesel operated).

9.7 The nutrient status of soil is also a key element in agriculture. The soils of Punjab are low in nitrogen (N) content, low to medium in Phosphorus (P) and medium to high in Potassium (K), except in Kandi belt which has low to medium K content. The exploitive agricultural practices in past two to three decades have put a tremendous pressure on the state's soils and resulted in steady decline in its fertility, both with respect to macro (NPK) and micronutrients (zinc, iron & manganese). As a result, consumption of chemical fertilizers has increased more than eight times in the past 35 years. Similarly, pesticide consumption has also increased. The state is having a very high per hectare usage of fertilizers (192.5 kg) and pesticides (923 gm) in the country. The overuse of fertilizer and pesticides could result in degradation of soil, water and crop quality.

9.8 Further, open field burning of straw after combine harvesting is a common practice in the state in order to ensure early preparation of fields for the next crop. Intensive agriculture is also a contributor to greenhouse gasses (GHG) like, carbon dioxide, methane and nitrous oxide causing climate change.

9.9 The state government is trying to launch new programs to promote sustainable agriculture and has set up various institutions like, Punjab State Farmers Commission, Agriculture Council and State Medicinal Plants Board. The objective of these institutions is to implement crop diversification. Various resource conservation technologies like Agricultural Diversification, timely transplantation of Paddy, Zero Tillage, Ridge planting method of paddy, artificial recharge of ground water and micro irrigation techniques (drip & sprinkler) for conservation of water in agriculture are being promoted in the state. To promote diversification of agriculture, contract farming was launched in the state in 2002 covering 8.9 thousand hectare area and 9100 farmers. Moreover twenty eight

chemical pesticides and insecticides have been banned to protect the soil from chemical pollution in the state for use in agriculture. Various other programmes like promotion of organic farming, vermincomposting, bio fertilizers, integrated pest management and bio-pesticides are being implemented to reduce the dependence of farmers on chemicals.

Table No. 9.1 Changes in land utilisation pattern in Punjab

('000' hectare)

SN	Item	1961	1971	1981	1991	2001	2009	2010
1	Geographical Area	5036 (100)	5036 (100)	5036 (100)	5036 (100)	5036 (100)	5036 (100)	5036 (100)
2	Net Area Sown	3757 (74.6)	4053 (80.5)	4191 (83.2)	4218 (83.8)	4250 (84.4)	4171 (82.3)	4171 (82.3)
3	Total Cropped Area	4732	5678	6763	7502	7941	7912	7876
4	Area Under Forests	35 (0.7)	123 (2.4)	216 (4.2)	222 (4.4)	305 (6.0)	305 (6.0)	305 (6.0)
5	Land put to non agri. Use	NA	416	436	343	410	494	503
6	Barren & Uncultivable land	NA	208	96	83	28	23	25
7	Total Fallow land	313	139	45	110	43	39	41
8	Uncultivated land excluding fallow land	255	92	49	57	22	22	22

* Figure in brackets=Percentage Source: Department of Land records/ Agriculture, Punjab.

Table No. 9.2 Land utilisation pattern in Punjab

(000' hectare)

Year	Reporting area for LUS	Net cropped area	Gross cropped area
1980-81	5033	4191	6763
1990-91	5033	4218	7502
2000-01	5033	4250	7941
2010-11	5033	4158	7882

LUS: Land Utilisation Source: Department of Land records/ Agriculture, Punjab.

Table No. 9.3 District-wise land utilisation pattern in Punjab

(000' hectare)

SN	District	2008-09			2010-11		
		Reporting area for LUS	Net cropped area	Gross cropped area	Reporting area for LUS	Net cropped area	Gross cropped area
1	Amritsar	264	218	422	264	217	424
2	Barnala	141	125	249	141	124	261
3	Bathinda	337	297	556	337	296	556
4	Faridkot	147	128	252	147	127	254
5	Fatehgarh Sahib	115	102	194	115	102	187
6	Firozpur	526	475	876	526	473	888
7	Gurdaspur	351	287	506	351	286	503
8	Hoshiarpur	339	201	365	339	200	357
9	Jalandhar	266	237	421	266	236	407
10	Kapurthala	167	134	275	167	134	270
11	Ludhiana	368	306	595	368	301	599
12	Mansa	214	190	369	214	190	366
13	Moga	223	198	383	223	198	383
14	Shri Mukatsar Sahib	264	224	449	264	226	436
15	Patiala	332	271	536	332	263	519
16	Rupnagar	139	79	143	139	79	146
17	Sangrur	361	311	620	361	313	620
18	SAS Nagar	111	75	120	111	78	127
19	SBS Nagar	127	95	184	127	97	183
20	Tarn Taran	241	218	397	241	218	396
	Total	**5033**	**4171**	**7912**	**5033**	**4158**	**7882**

LUS: Land Utilisation. Source: Department of Land records/ Agriculture, Punjab.

Table No. 9.4 Categories of Crop Ecosystems in Punjab

Category	Type	Districts	Major Crops
Zone-I	Sub mountainous undulating plans	Gurdaspur, Hoshiarpur,Ropar	Wheat in Rabi & Rice-Maize in Kharif Season
Zone-II	The central Alluvial Plains	Amritsar, Kapurthala, Jalandhar, Tarn Taran, SBS Nagar, Ludhiana,Fatehgarh Sahib, Patiala, Sangrur & Mohali	Wheat in Rabi and rice growing area in Kharif season
Zone-III	South Western dry zone	Bathinda, Faridkot, Ferozpur, Mansa, Moga, Shri Mukatsar Sahib& Barnala	Ground water is saline & unfit for irrigation. Cotton is an important Kharif crop but is being replaced by rice

Source: Punjab State council for Science and Technology

Table No. 9.5 Share of primary sub-sectors in Gross State Domestic Product (GSDP) in Punjab (at constant prices 2004-05)

(%age)

SN	Sub-Sector	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11
1	Agriculture	24.54	19.58	20.36	17.51	16.99	15.93	15.47
2	Livestock	11.17	10.04	9.31	8.87	8.40	7.82	7.43
3	Forestry & Logging	0.12	1.20	1.13	1.05	1.03	1.02	0.98
4	Fishing	0.62	0.30	0.29	0.23	0.24	0.24	0.24
5	Mining & Quarrying	0.02	0.02	0.02	0.02	0.03	0.02	0.02
	Total Share of Primary Sector in GSDP	37.07	31.14	31.09	27.68	19.08	25.10	24.14

Source: Statistical Abstract of Punjab

Figure 9.5 %age of Primary Sub-Sectors in GSDP

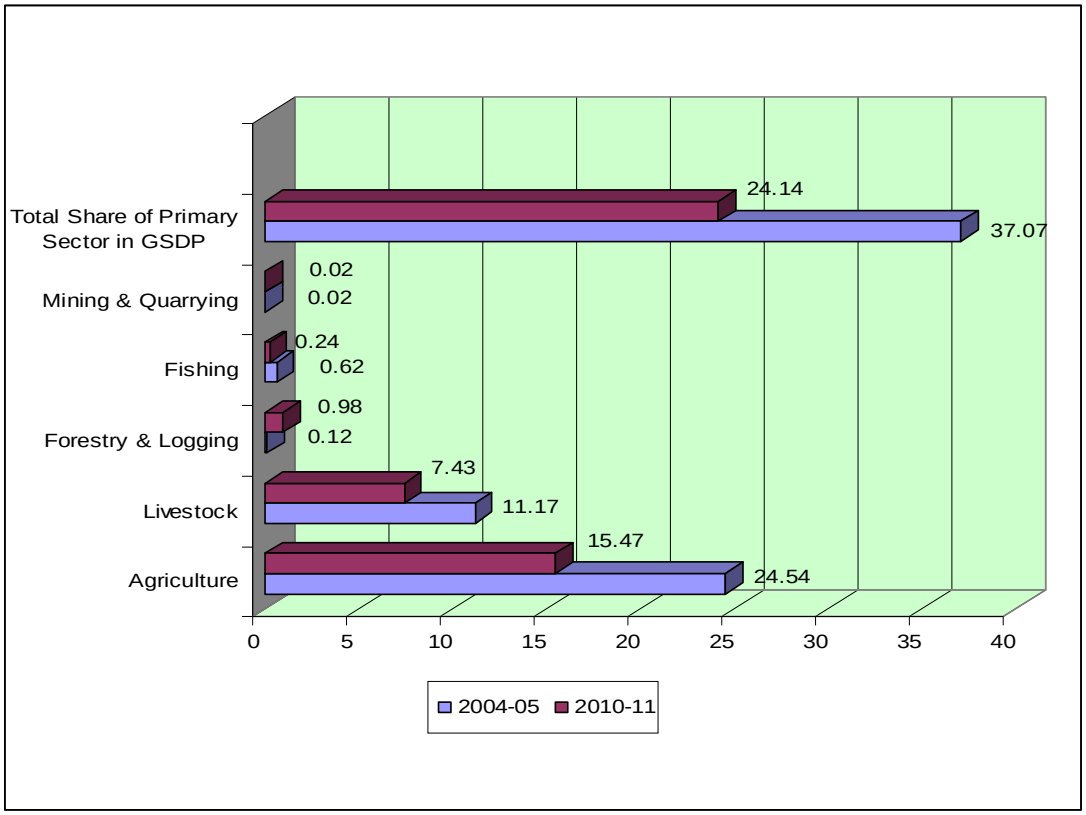


Table No. 9.6 Increase in Population and Food Grain Production in Punjab

SN	Year	Population (in lacs)	Decadal increase in Population (%age)	Decadal increase in Food Grains Production (%age)
1	1961	111.35	21.56	60
2	1971	135.58	21.7	128
3	1981	167.89	23.89	63
4	1991	202.82	20.81	61
5	2001	243.89	20.1	24
6	2011	277.43	13.76	93.97

Source: Statistical Abstract of Punjab.

Figure No. 9.6 Decadal increase in Population and Food Grain Production

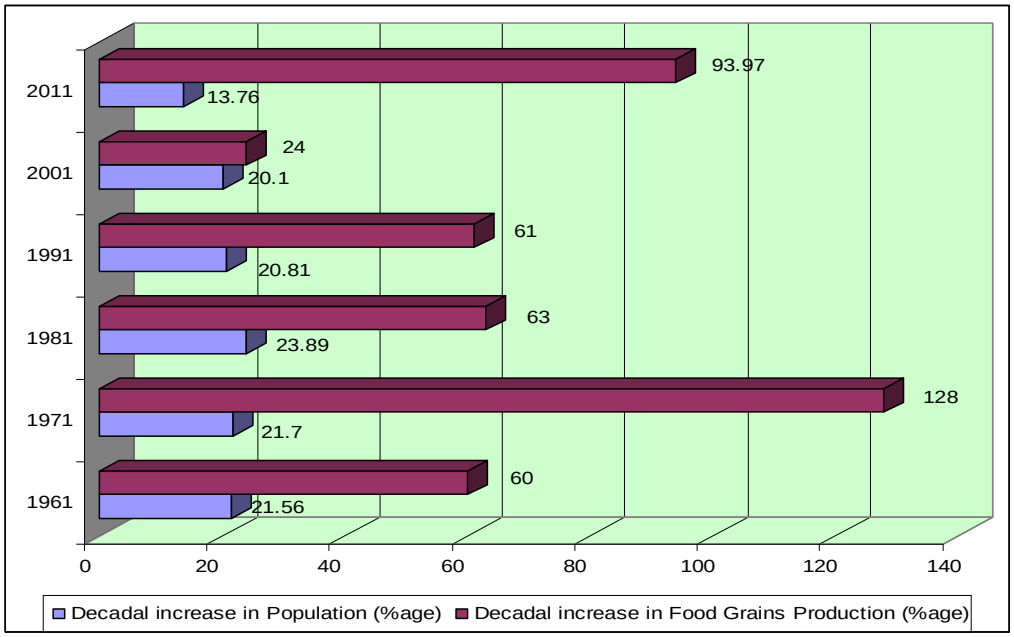


Table No. 9.7 Year-wise production of Paddy and Wheat in Punjab ('000' M ton)

SN	Year	Paddy	Wheat
1	1980-81	4850	7677
2	1990-91	9710	12159
3	2000-01	13735	15551
4	2006-07	15131	14596
5	2007-08	15651	15716
6	2008-09	16418	15733
7	2009-10	16770	15169
8	2010-11	16148	16472

Source: Statistical Abstract of Punjab: various issues

Fgure No. 9.7 Year-wise production of paddy and wheat in Punjab ('000' M ton)

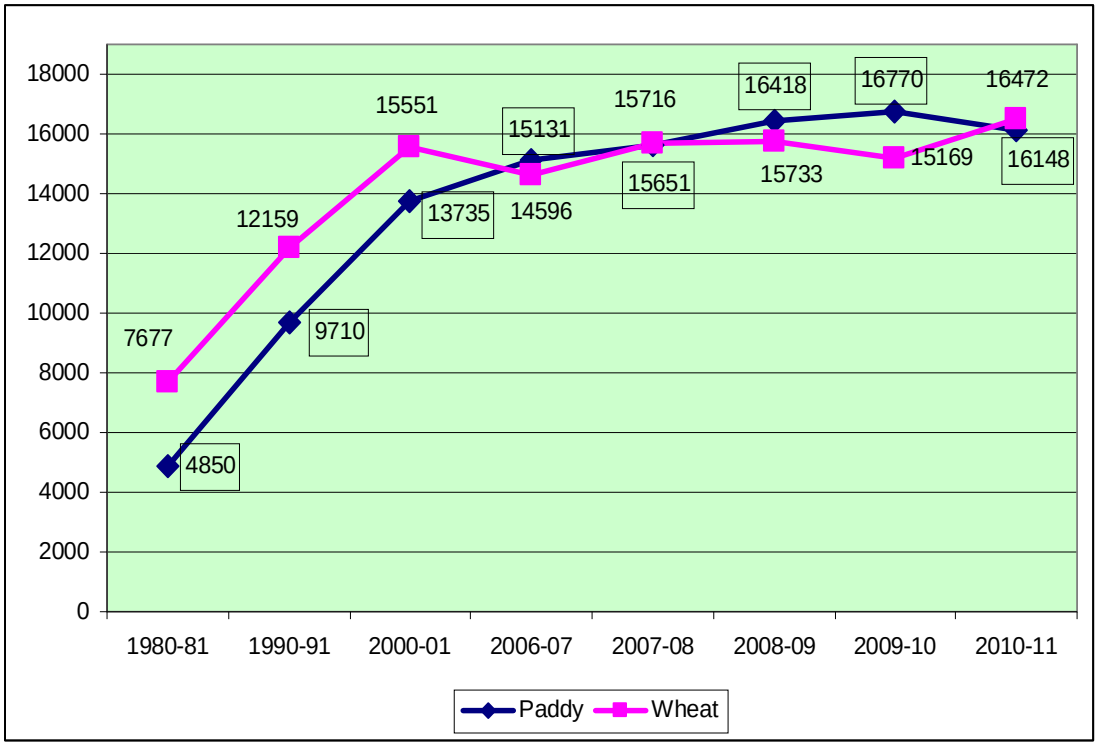


Table No. 9.8 Production of major crops in Punjab

('000' Metric ton)

SN	Item	1980-81	1990-91	2000-01	2008-09	2009-10	2010-11
1	Rice	3233	65.6	9157	11000	11236	10819
2	Jowar	0.8	0.5	-	0.1	0.1	0.1
3	Bajra	86	13	5.2	5	4	3
4	Maize	612	333	461	514	475	491
5	Wheat	7677	12159	15551	15733	15169	16472
6	Gram	150	45	8	3.5	3	3
7	Cotton American	164.73	306.4	156.68	379.7	334.69	303.51
8	Cotton Desi	35.53	18.24	47.32	8.55	6.50	6.13

Source: Statistical Abstract of Punjab

Table no. 9.10 Proportionate Area under principal crops in India (%age)

SN	Crops	2004-05	2005-06	2006-07	2007-08 (P)	2008-09
1	Rice	42.8	44.1	43.5	43.6	45.3
2	Wheat	26.9	26.7	28.4	28.6	27.9
3	Pulses	24.0	23.8	23.5	24.8	23.6
4	Food grains	123.1	124.1	124.2	125.7	124.2
5	Sugarcane	4.3	4.6	5.2	5.2	4.8
6	Oilseeds	29.8	30.5	28.5	28.7	30.2
7	Cotton	9.0	8.7	9.0	9.4	9.4
8	Jute	0.8	0.8	0.8	0.8	0.8
9	Mesta	0.2	0.1	0.2	0.1	0.1
10	Tobacco	0.4	0.4	0.4	0.4	0.4

Source: Department of Agriculture and Cooperation, Directorate of Economic & Statistics, Ministry of Agriculture. CSO Compendium of Environment Statistics India

Table No. 9.10 District-wise area under major crops in Punjab 2010-11

('000' Hect.)

SN	District	Rice	Maize	Wheat
1	Amritsar	186	1	189
2	Barnala	105	@	115
3	Bathinda	107	@	253
4	Faridkot	101	@	117
5	Fatehgarh Sahib	82	@	85
6	Firozpur	258	@	397
7	Gurdaspur	204	11	226
8	Hoshiarpur	73	63	154
9	Jalandhar	163	9	169
10	Kapurthala	118	2	108
11	Ludhiana	257	@	257
12	Mansa	178	@	170
13	Moga	172	@	177
14	Shri Mukatsar Sahib	111	1	192
15	Patiala	234	23	238
16	Rupnagar	38	@	65
17	Sangrur	272	6	287
18	SAS Nagar	37	14	153
19	SBS Nagar	58	1	74
20	Tarn Taran	172	@	186
	Total	2826	133	3510

(@)= Less than 500 hectares. Source: Director of Land Records/ Agriculture, Punjab.

Table No. 9.11 Year-wise area under major crops in Punjab 2010-11.

(000' Hectare)

Year	Rice	Maize	Wheat
1980-81	1183	382	2812
1990-91	2015	188	3273
2000-01	2612	165	3408
2010-11	2826	133	3510

Source: Director of Land Records/ Agriculture, Punjab

Figure No. 9.11 Year-wise area under major crops in Punjab.

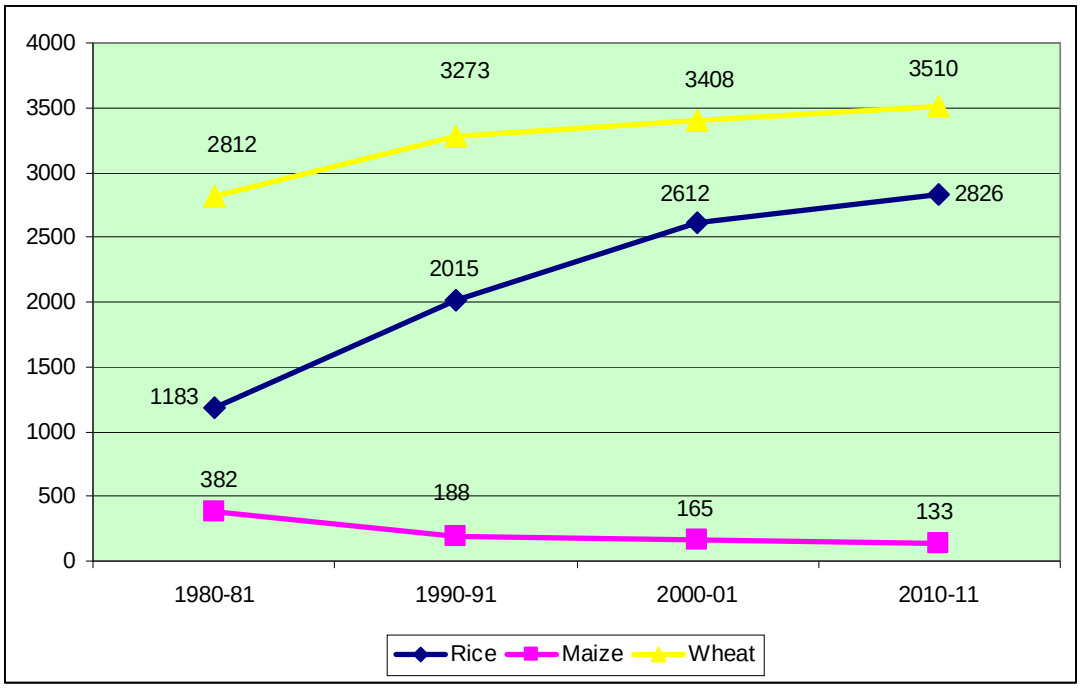


Table No. 9.12 Year-wise cropped area in Punjab

('000'hectare)

Year	Net area sown	Area sown more than once	Total cropped area	Net sown area %age to total area
1980-81	4191	2572	6763	83
1990-91	4218	3284	7502	84
2000-01	4250	3691	7941	84
2005-06	4192	3676	7868	83
2006-07	4184	3677	7861	83
2007-08	4187	3683	7870	83
2008-09	4171	3741	7912	83
2009-10	4158	3718	7876	83
2010-11	4158	3724	7882	83

Source: Director of Agriculture, Punjab.

Table No. 9.13 District-wise cropped area in Punjab-2010-11

(000'Hectare)

SN	District	Net area sown	Area sown more than once	Total cropped area	Net sown area %age to total area
1	Amritsar	217	207	424	82
2	Barnala	124	137	261	89
3	Bathinda	296	260	556	88
4	Faridkot	127	127	254	87
5	Fatehgarh Sahib	102	85	187	89
6	Firozpur	473	415	888	90
7	Gurdaspur	286	217	503	81
8	Hoshiarpur	200	157	357	59
9	Jalandhar	236	171	407	89
10	Kapurthala	134	136	270	80
11	Ludhiana	301	298	599	83
12	Mansa	190	176	366	89
13	Moga	198	185	383	89
14	Shri Mukatsar Sahib	226	210	436	85
15	Patiala	263	256	513	82
16	Rupnagar	79	67	146	57
17	Sangrur	313	307	620	86
18	SAS Nagar	78	49	127	68
19	SBS Nagar	97	86	183	76
20	Tarn Taran	218	178	396	90
	Total	**4158**	**3724**	**7876**	**1640**

Source: Director of Land Records/Agriculture, Punjab

Table No.9.14 District-wise %age of area sown to total area-2009-10

(%age)

SN	Districts	Area sown to total area	Net area irrigated to total area	Rice area in State	Rice to State produc-tion	Wheat area to total area	Wheat to State produc-tion
1	Amritsar	5.25	5.37	6.69	4.84	5.3	4.81
2	Barnala	2.8	3.05	3.73	4.41	3.23	3.52
3	Bathinda	6.7	7.31	3.55	3.88	7.06	7.32
4	Faridkot	2.92	3.15	3.47	3.76	3.35	3.5
5	Fatehgarh Sahib	2.28	2.51	3.11	3.3	2.41	2.39
6	Firozpur	10.45	11.67	9.51	9.56	11.2	11.75
7	Gurdaspur	6.97	5.73	7.35	6.03	6.55	5.89
8	Hoshiarpur	6.74	4.46	2.19	1.9	4.37	3.46
9	Jalandhar	5.28	5.83	5.67	5.35	4.84	4.5
10	Kapurthala	3.32	3.3	4.17	3.89	3.15	3
11	Ludhiana	7.31	7.53	9.29	10.32	7.35	7.23
12	Mansa	4.25	4.68	2.59	2.69	4.85	5.03
13	Moga	4.43	4.87	6.36	7.27	5.02	5.55
14	Shri Mukatsar Sahib	5.25	5.46	3.47	3.65	5.73	6.21
15	Patiala	6.6	6.6	8.7	9.17	6.86	7.23
16	Rupnagar	2.76	1.72	1.32	1.26	1.81	1.35
17	Sangrur	7.17	7.65	9.76	11.21	8.08	8.61
18	SAS Nagar	2.21	1.65	0.99	0.8	1.39	1.32
19	SBS Nagar	2.52	2.09	1.9	1.94	2.16	1.89
20	Tarn Taran	4.79	5.37	6.18	4.77	5.28	5.44

Source: Statistical Abstract of Punjab.

Table No. 9.15 Consumption of Fertilizers in Punjab

('000' Nutrient Tonne)

Year	Nitrogenous (N)	Phosphatic (P_2O_5)	Potassic (K_2O)	Total (NPK)
1980-81	526	207	29	762
1990-91	877	328	15	1220
2000-01	1008	282	23	1313
2006-07	1299	354	39	1692
2007-08	1316	344	38	1698
2008-09	1332	379	57	1768
2009-10	1358	434	74	1866
2010-11	1403	435	73	1911

Figure No. 10.7 Consumption of Fertilizers (NPK) in Punjab

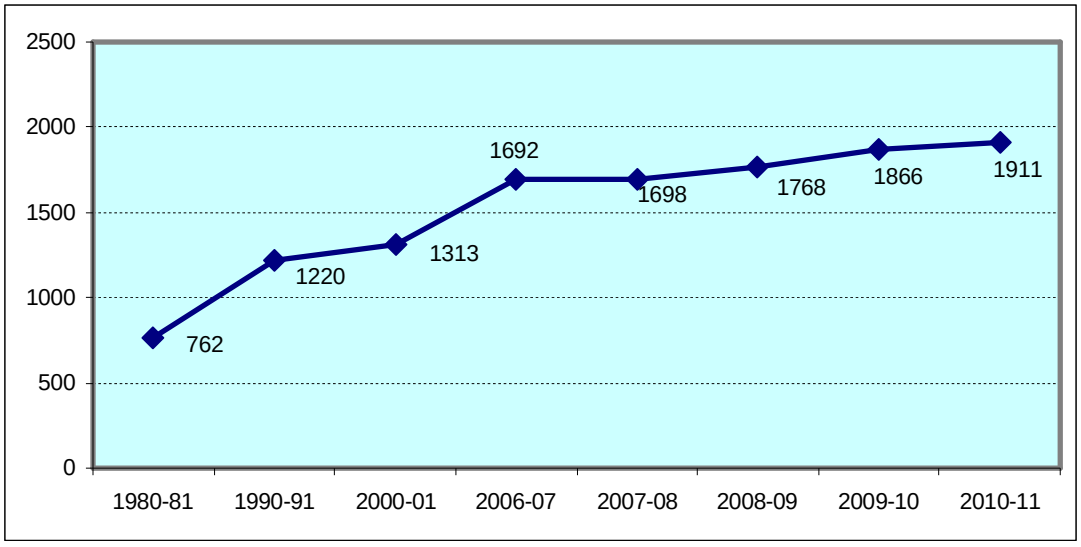


Table No.9.16 District- wise consumption of Fertilizers in Punjab
('000' Nutrient Tonne)

SN	District	2008-09	2009-10	2010-11
1	Amritsar	94	97	105
2	Barnala	66	63	57
3	Bathinda	118	122	125
4	Faridkot	62	65	64
5	Fatehgarh Sahib	47	50	48
6	Firozpur	186	195	199
7	Gurdaspur	105	110	113
8	Hoshiarpur	61	67	69
9	Jalandhar	106	119	120
10	Kapurthala	57	68	66
11	Ludhiana	152	155	167
12	Mansa	80	85	88
13	Moga	94	100	96
14	Shri Mukatsar Sahib	102	110	114
15	Patiala	133	138	141
16	Rupnagar	25	27	30
17	Sangrur	152	160	165
18	SAS Nagar	18	18	23
19	SBS Nagar	40	43	42
20	Tarn Taran	70	74	79
	Total	**1768**	**1866**	**1911**

Source: Director of Agriculture, Punjab.

Table No. 9.17 State-wise consumption of pesticides

(MTs technical grade)

SN	Name of State/ U.T.s	2004-05	2005-06	2006-07	2007-08	2008-09
1	Andhra Pradesh	2133	1997	1394	1541	1381
2	Arunachal Pradesh	17	2	17	16	10
3	Assam	170	165	165	158	150
4	Bihar	850	875	890	870	915
5	Chhattisgarh	486	450	550	570	270
6	Goa	5	5	9	2.3	8.9
7	Gujarat	2900	2700	2670	2660	2650
8	Haryana	4520	4560	4600	4391	4288
9	Himachal Pradesh	310	300	292	296	322
10	Jammu & Kashmir	12	1433	829	1248	269.27
11	Jharkhand	69	70	82	81	85
12	Karnataka	2200	1638	1362	1588	1675
13	Kerala	360	571	545	880	272.69
14	Madhya Pradesh	749	787	957	696	663
15	Maharashtra	3030	3198	3193	3050	2400
16	Manipur	26	28	26	26	30.36
17	Meghalaya	8	6	9	6	-
18	Mizoram	25	25	40	44	44
19	Nagaland	5	5	5	5	18
20	Orissa	692	963	778	NA	1156
21	**Punjab**	**6900**	**5610**	**5975**	**6080**	**5760**
22	Rajasthan	1628	1008	3567	3804	3333
23	Sikkim	-	-	2	6	3
24	Tamil Nadu	2466	2211	2048	3940	2317
25	Tripura	17	14	19	27	38
26	Uttar Pradesh	6855	6671	7414	7332	8968
27	Uttaranchal	132	141	207	270	221
28	West Bengal	4000	4250	3830	3945	4100
29	Andaman & Nicobar Islands	3	3	NA	NA	6.24
30	Chandigarh	0.78	0.78	NA	NA	-
31	Delhi	53	39	NA	57	57
32	Dadra & Nagar Haveli	5	4	NA	NA	-
33	Daman & Diu	1	1	NA	NA	-
34	Lakshadweep	2	1	NA	NA	-
35	Pondicherry	42	41	40	41	39
	All-India	**40672**	**39773**	**41515**	**44773**	**43860**

No cons as organic State.

Source : Directorate of Plant Protection Quarentine & Storage, Ministry of Agriculture, CSO Compendium of Environment Statistics India.

Table No. 9.18 Production and consumption of pesticides in India

Year	Total Production (Rs. crore)	Domestic consumption (Rs. crore)	%age of Col.3 to 2
1	2	3	4
2005-06	10049.5	8013.2	79.7
2006-07	10435.1	8364.8	80.2
2007-08	11758.6	9518.4	80.9
2008-09	15557	12338.2	79.3

Source: Pesticides of all Types , CMIE, 2011 Industry, Market Size and Shares, April 2011

Table No. 9.19 Increase in farm machinery in Punjab (in thousands)

SN	**Agricultural Implement/ Machinery**	**1980**	**1991**	**2001**	**2005**
1	Tractors	110	265	405	407
2	Tillers/Cultivators	10	195	295	348
3	Disc Harrows (T.Driven)	71	215	245	191
4	Speed cum Fertilizer Drills	19	100	175	158
5	Spray Pumps	NA	NA	565	650
6	Tractor Drawn Combines	NA	NA	5.2	6.4
7	Self-Propelled Combines	NA	NA	3	7.9
8	Threshers	25	297	250	92
9	Cane Crushers	NA	NA	25	5

Source: Department of Agriculture, Punjab.

Table No. 9.20 Number of suicides and suicide rate for cultivators, non-cultivators and total population in Punjab (1991-2005)

Item	1991	1994	1997	2000	2001	2005
Cultivator Farmers:						
No. of Suicides	24	57	84	12	12	3
Suicide Rate	1.28	3.05	4.49	0.63	0.63	1.15
Non-cultivators:						
No. of Suicides	104	163	334	397	401	333
Suicide Rate	0.57	0.89	1.82	2.16	2.18	1.49
Total Population:						
No. of Suicides	128	220	418	409	413	336
Suicide Rate	0.76	1.08	2.06	2.02	2.04	1.38

Source: Punjab State Council for Science & Technology, State of Environment of Punjab 2007.

Chapter-10

NATURAL DISASTERS

This chapter covers the aspects related to natural disasters causing damage to population of state and the ultimate impact on it. This chapter covers the damages due to natural disasters like floods in state of Punjab and the country as a whole. The damage to crops due to flood and drought in the state with the number of villages and towns effected with heavy rain and earthquakes in the whole country with reference to Punjab state.

Table No. 10.1 Damage caused to crops, houses and public utilities during rainy season in Punjab

Year	Damage caused to area under crops (hect.)	%age of damaged area to total cropped area	Value of crops damaged (Rs. 000)	Houses damages (private)		Damage to public utilities (Rs. 000)	Total damage caused to crops houses and public utilities (Rs. 000)
				No.	Value (Rs. 000)		
1980	48930	0.72	6559	31940	4391	201	11151
1990	47078	9.75	251086	11062	53428	29000	333514
2000	12620	0.16	77116	9	800	2700	80616
2007	70407	0.67	582995	81	3425	-	586420
2008	70488	0.9	645084	12253	67909	925	713918
2009	17599	12.56	279475	6450	50573	209411	539459
2010	78645	1.00	2065182	2176	7016	321218	2393533

Source: Financial Commissioner (R), Punjab

Table No. 10.2 Number of villages/ towns affected due to floods during rainy season in Punjab

Year	No. of Villages/Towns affected	Area affected (in sq km)	Population affected (No.)	Human lives lost (No.)	Cattle heads lost (No.)
1980	1191	489	85724	44	117
1990	755	471	90465	13	275
2000	81	127	319	5	88
2007	1033	1035	405911	7	3
2008	2001	5004	389116	34	104
2009	545	14967	118796	15	74
2010	1081	1608	62318	37	109

Source: Financial Commissioner (R), Punjab.

Table No. 10.3 District-wise number of villages/ towns affected due to floods during rainy season in Punjab-2010

SN	District	No. of villages/ towns affected	Area affected (sq km)	Population affected (No.)	Human lives lost (No.)	Cattle heads lost (No.)
1	Amritsar	-	-	-	-	-
2	Barnala	1	-	-	-	-
3	Bathinda	-	-	-	-	-
4	Faridkot	-	-	-	-	-
5	Fatehgarh Sahib	-	-	-	-	-
6	Firozpur	105	954	-	2	29
7	Gurdaspur	44	16	-	-	-
8	Hoshiarpur	45	18	4603	5	1
9	Jalandhar	53	26	1284	5	52
10	Kapurthala	2	128	13	-	5
11	Ludhiana	-	-	-	-	-
12	Mansa	20	22	-	3	-
13	Moga	79	13	-	-	-
14	Shri Mukatsar Sahib	47	121	-	-	4
15	Patiala	590	291	56331	65	-
16	Rupnagar	32	10	-	1	3
17	Sangrur	10	1	10	-	-
18	SAS Nagar	53	-	69	12	-
19	SBS Nagar	-	-	-	-	-
20	Tarn Taran	-	8	-	3	10

Source: Financial Commissioner (R), Punjab.

Table No. 10.4 State -wise details of damage due to flood/heavy rains in India (up to 31.10.2008)

Name of the State/UTs	Area Affect-ed	Popula-tion Affect-ed	Damage to crops	Damage to house	Cattle lost	Hum-an lives lost	Damage to public utilities	Total damages to crops, houses & public utilities
			Area	Nos.	(Nos)			
	(M.Ha)	(Million)	(M.Ha)	('000')	('000')	(No.)	(Rs. Crore)	(Rs. Crore)
Andhra Pradesh	0	4.43	0.43	47239	6692	148	514.81	948.82
Arunachal Pradesh	0	0.07	0	75	8	0	0.1	0.1
Assam	0	2	0.14	51272	4257	35	97.47	218.83
Bihar	0	4.83	0.34	387189	873	262	97.71	216.42
Chhattisgarh	0	0	0	0	0	0	0	0
Goa	0	0	0	216	2	10	0.03	0.38
Gujarat	0	1.76	0	852	240	93	0	0.33
Haryana	0	0.02	0.02	379	3	5	0.66	1.43
Himachal Pradesh	0	0.06	0.02	1	147	46	57.99	68.24
J & K	0	0.03	0	1411	1	1	0	1.14
Jharkhand	0	0	0	0	0	0	0	0
Karnataka	0	0	0	2589	166	56	0	3.1
Kerala	0	0.09	0.01	9360	8	72	2.77	30.79
Madhya Pradesh	0	0	0	10039	1138	16	0	0
Maharashtra	0	0	0	0	0	0	0	0
Manipur	0	0.08	0	0	0	94	0	0
Meghalaya	0	0	0	0	0	0	0	0
Mizoram	0	0	0	0	0	0	0	0
Nagaland	0	0	0	0	0	0	0	0
Orissa	0	3.04	0.12	45190	53	47	0	0
Punjab	**0**	**0.2**	**0.21**	**13161**	**90**	**38**	**0**	**0**
Rajasthan	0	0.01	0	3834	18	68	0	0
Sikkim	0	0	0	0	0	0	0	0
Tamil Nadu	0	0	0	30	28	27	0	0
Tripura	0	0	0	0	0	0	0	0
Uttar Pradesh	0	2.58	0.42	340761	3490	1056	322.49	724.56
Uttarakhand	0	0	0	0	0	0	0	0
West Bengal	0	0.01	0	653	0	69	0	0
Andaman & Nicobar	0	0	0	0	0	0	0	0
Chandigarh	0	0	0	0	0	0	0	0
Dadra & Nagar Haveli	0	0	0	0	0	0	0	0
Daman & Diu	0	0	0	0	0	0	0	0
Delhi	0	0	0	0	0	0	0	0
Lakshadweep	0	0	0	0	0	0	0	0
Puducherry	0	0	0	0	0	0	0	0
Total		19.21	1.7	914251	17214	2143	1094.02	2214.41

Sources: Central Water Commission (FMP Directorate) (as per the report received from Stare Revenue Authorities and MHA) and CSO Compendium of Environment Statistics India.

Chapter-11

WATER

Water is the main source of life. By the time the demand for water has increased several folds but the source of water are limited and the level of ground water is going down day by day. In the tables it is clearly illustrated that the gross irrigated area in Punjab has increased from 1981 to date. With change in technology, by using new techniques more and more area has come under irrigation with tubewells and other means of irrigation. Number of tubewells has increased from 6 to 12.76 lakhs from 1981 to date. The means of water are over exploited for irrigation, household activities and industrial activities as well.

11.2 A high cropping intensity has also led to heavy requirement of water for irrigation purposes. The demand for water is increasing day by day and this deficit is met through over-exploitation of underground water reserves through tube wells, resulting in rapid decline of water table in the entire state. To promote water conservation and recharge of ground water several watershed development projects are being implemented in the state especially in kandi area. The Department of Irrigation has also been making efforts to control water logging in south western Punjab and provide adequate canal irrigation in other areas. Wetland conservation and restoration of village ponds to promote ground water recharge is also being promoted.

Table No. 11.1 Crop-wise gross irrigated area in Punjab ('000' Hectare)

Year	Rice	Wheat	Cotton	Other	Total
1980-81	1157.5	2566.9	642.6	1411.3	5778.3
1990-91	1997.9	3144.3	713	1199.6	7054.8
2000-01	2590.3	3333.4	471.9	1268.2	7663.8
2006-07	2608.8	3415.5	606.5	1035.2	7666
2007-08	2592.4	3437.1	604.8	1055	7689.3
2008-09	2721.8	3474.8	527.3	999.7	7723.6
2009-10	2783.5	3474.0	508.8	588.1	7714.6
2010-11	2814.2	3466.9	482.8	592.8	7723.8

Source: Statistical Abstract of Punjab: Various Issues

Table No. 11.2 Net irrigated area in Punjab

SN	Year	Total (000' hectare)	% of Net area irrigated	Irrigated area by canals (000' hectare)
1	1980-81	3382	81	1430
2	1990-91	3909	93	1669
3	2000-01	4038	95	962
4	2010-11	4070	97.9	1116

Source: Director of Land Records, Punjab
and Statistical Abstract of Punjab; Various issues.

Table No. 11.3 Number of tubewells operated in Punjab

Year	During the Year	Cumulative No. of Tubewells operated as on 31st march
1990-91	44193	600982
2006-07	38930	970139
2007-08	11018	981157
2008-09	51459	1032616
2009-10	72901	1105517
2010-11	37750	1143267
2011-12	14909	1158176

Source: Punjab State Power Corporation Ltd. and Economic Survey of Punjab 2011

Figure No. 12.3

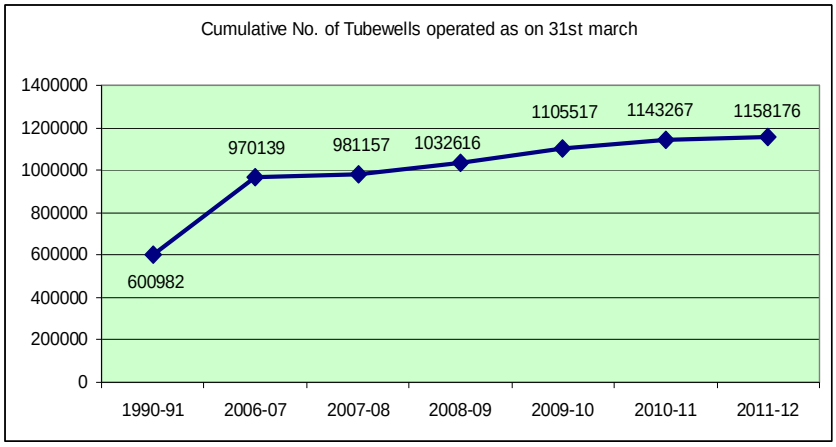


Table No. 11.4 Land utilization and source wise irrigated area in Punjab 2010-11

('000' hectare)

SN	District	Repor-ting area for LUS	Net cro-pped area	Gross cro-pped area	Canal irri-gated area	Tube-wells & wells irri-gated area	Tanks & other	Total irri-gated area
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**6+7+8**
1	Amritsar	264	217	424	54	163	-	217
2	Barnala	141	124	261	27	97	-	124
3	Bathinda	337	296	556	219	76	-	295
4	Faridkot	147	127	254	108	18	-	126
5	Fatehgarh Sahib	115	102	187	11	91	-	102
6	Firozpur	526	473	888	162	308	-	470
7	Gurdaspur	351	286	503	54	194	-	248
8	Hoshiarpur	339	200	357	21	164	-	185
9	Jalandhar	266	236	407	4	232	-	236
10	Kapurthala	167	134	270	1	133	-	134
11	Ludhiana	368	301	599	10	291	-	301
12	Mansa	214	190	366	96	92	-	188
13	Moga	223	198	383	6	192	-	198
14	Shri Mukatsar Sahib	264	226	436	200	25	-	225
15	Patiala	332	263	519	6	257	@	263
16	Rupnagar	139	79	146	4	66	-	70
17	Sangrur	361	313	620	19	294	-	313
18	SAS Nagar	111	78	127	-	69	-	69
19	SBS Nagar	127	97	183	@	88	-	88
20	Tarn Taran	241	218	396	114	104	-	218
	Total	**5033**	**4158**	**7882**	**1113**	**2954**	**-**	**4070**

Source: Director of Land Records/Agriculture Punjab

Table No. 11.5 Area under water bodies in Punjab

(in year 2007)

Category	Area (sq km)	%age of total geographical area of Punjab
Canals	181.7019	0.36
Cooling Pond/ Cooling Reservoirs	0.89648	0.002
Lakes/Ponds	63.26933	0.12
Reservoirs	26.57038	0.05
Water Channel Areas	549.9586	1.09

Source: State of Environment of Punjab, 2007 by Punjab State Council for Science & Technology.

Table No. 11.6 State-wise estimated annual requirement of water for domestic purposes including for cattle in different states

SN	State/UT	Population in Thousand					Water Requirement in BCM				
		1991	2001	2004	2006	2025	1991	2001	2004	2006	2025
1	Andhra Pradesh	66508	75728	78527	80430	94276	2.50	3.20	3.45	3.63	4.91
2	Arunachal Pradesh	865	1091	1139	1170	1429	0.03	0.05	0.05	0.05	0.07
3	Assam	22414	26638	28050	29009	36766	0.84	1.13	1.23	1.31	1.91
4	Bihar	86374	82879	87810	90830	114845	3.25	3.50	3.86	4.09	5.98
5	Chandigarh	642	901	969	1013	1642	0.02	0.04	0.04	0.05	0.09
6	Chhattisgarh	@	20796	22011	22859	29513	@	0.88	0.97	1.03	1.54
7	Goa	1170	1344	1451	1537	2703	0.04	0.06	0.06	0.07	0.14
8	Gujarat	41310	50597	53195	54814	67402	1.55	2.14	2.34	2.47	3.51
9	Haryana	16464	21083	22296	23040	28941	0.62	0.89	0.98	1.04	1.51
10	Himachal Pradesh	5171	6077	6294	6425	7345	0.19	0.26	0.28	0.29	0.38
11	Jammu & Kashmir	7719	10070	10935	11603	21767	0.29	0.43	0.48	0.52	1.13
12	Jharkhand	@	26909	28303	29173	35730	@	1.14	1.24	1.32	1.86
13	Karnataka	44977	52734	54824	56137	65879	1.69	2.23	2.41	2.53	3.43
14	Kerala	29099	31839	32862	33569	38360	1.09	1.34	1.45	1.51	2
15	Madhya Pradesh	66181	60385	64237	66801	88062	2.49	2.55	2.82	3.01	4.58
16	Maharashtra	78937	96752	101275	104104	127719	2.97	4.09	4.45	4.69	6.65
17	Manipur	1837	2389	2499	2561	3128	0.07	0.10	0.11	0.12	0.16
18	Meghalaya	1775	2306	2411	2472	3021	0.07	0.10	0.11	0.11	0.16
19	Mizoram	690	891	932	955	1167	0.03	0.04	0.04	0.04	0.06
20	Nagaland	1210	1989	2090	2132	2606	0.05	0.08	0.09	0.10	0.14
21	Orissa	31660	36707	38139	39053	45763	1.19	1.55	1.68	1.76	2.38
22	**Punjab**	**20282**	**24289**	**25336**	**25976**	**30609**	**0.76**	**1.03**	**1.11**	**1.17**	**1.59**
23	Rajasthan	44006	56473	60127	62431	80005	1.66	2.39	2.64	2.81	4.16
24	Sikkim	406	540	566	579	708	0.02	0.02	0.02	0.03	0.04
25	Tamil Nadu	55859	62111	64019	65261	73569	2.10	2.62	2.82	2.94	3.83
26	Tripura	2757	3191	3326	3421	4180	0.10	0.13	0.15	0.15	0.22
27	Uttar Pradesh	139112	166053	176765	183856	245772	5.23	7.01	7.77	8.29	12.79
28	Uttaranchal	@	8480	8925	9216	11506	@	0.36	0.39	0.42	0.6
29	West Bengal	68078	80221	83585	85780	103194	2.56	3.39	3.68	3.70	5.37
30	A. & N. Islands	281	356	377	394	606	0.01	0.02	0.02	0.02	0.03
31	D. & N. Haveli	138	220	237	248	429	0.01	0.01	0.01	0.01	0.02
32	Lakshadweep	52	61	64	66	97	0.00	0.00	0	0.00	0.01
33	Pondicherry	808	974	1013	1042	1427	0.03	0.04	0.04	0.05	0.07
34	Delhi	9421	13783	15128	16065	28394	0.35	0.58	0.67	0.72	1.48
35	Daman & Diu	102	158	170	178	301	0.00	0.01	0.01	0.01	0.023
TOTAL		**846303**	**1027015**	**1079887**	**1114200**	**1398861**	**31.84**	**43.38**	**47.49**	**50.23**	**72.81**

BCM : Billion Cubic Meters

Source: Central Water Commission, CSO Compendium of Environment Statistics India.

Chapter-12

HUMAN SETTLEMENT

The Punjab State has registered about 45% increase in its population during the last two decades. It is among the most urbanized state in the country with increasing urban population. The state has two cities with more than one million populations. The urban areas of Punjab are managed by 5 Municipal Corporations (population 0.3 m and above), 25 Class-I Cities/Municipal Councils (population 50,000-0.3 m), 45 Class-II Municipal Councils (population 30,000-50,000), 29 Class-III Municipal Councils (population 15,000-25,000) and 29 Nagar Panchayats (population below 15,000).

12.2 Punjab state also bears a large number of populations from other states like Bihar, Uttar Pradesh, Rajasthan and Andhra Pradesh due to better employment opportunities and labour wage rate. Most of these labourers settle down in the suburbs or slum areas thus adding to urban pressure. All the 137 Municipal Bodies (including Towns and Cantonments) are collectively generating 2944.4 tons/day of municipal solid waste per day out of which 73% is being generated in 5 Municipal Corporations (i.e. Ludhiana, Jalandhar, Amritsar, Bathinda and Patiala) alone. Further, change in life style towards 'consume and discard' culture is also responsible for adding to municipal solid waste and changing waste composition. It also adds pressure on the existing municipal solid waste handling infrastructure, as well as, disposal sites.

12.3 However, some efforts are being made by the government to promote better management of municipal solid waste (MSW) in the state. The Punjab Pollution Control Board (PPCB), being the regulatory agency for ensuring proper implementation of Municipal Solid Waste (Management & Handling) Rules, 2000. Over the years it has been observed that the content of plastic waste in MSW has increased considerably which adversely affects the environment. They choke the sewerage channels and drains and cause serious health effects on animals when ingested along with food waste. The Government of Punjab has enacted "The Punjab Plastic Carry Bags (Manufacture, Usage and Disposal) Control Act, 2005". The State has also published public notices and distributed information, education & communication materials about the ecological and public health hazards of plastic carry bags.

Hazardous Waste

12.4 The PPCB is implementing the Hazardous Wastes (Manufacturing & Handling) Rules, 1989, as amended in 2000 & 2003. With increasing of industries in the state, the amount of industrial waste, including that from hazardous industries, has also increased. The increasing quantities and diversity of hazardous waste is a cause of concern. The main driving forces that leads to

the generation of hazardous wastes includes increase in production of industrial goods, use of lead acid batteries and electronic equipments. Furthermore inefficient technologies have also lead to generation of high quantities of such waste. Also the electronic wastes from discarded electronic devices like computers and peripherals, communication equipments, electronic typewriters, nickel cadmium batteries, picture tubes, electronic medical equipments, etc. all are of hazardous in nature. There is no specific data on generation of all types of hazardous wastes and their quantities are not available. Therefore this is a cause of concern and warrants immediate action. Data on health impacts of hazardous wastes is also not available.

Bio-Medical Waste

12.5 Bio-Medical Waste are those originating from hospitals & clinics including veterinary health facilities, research laboratories, etc. during diagnosis, treatment or immunization of humans or animals or research related activities, has a direct environmental consequence. In general, this waste can be categorized as infectious or non-infectious. The Bio-Medical Waste (Management & Handling) Rules, 1998 (amended in 2000), notified under Environment (Protection) Act, 1986, have categorized this waste into ten different types for which specific disposal options have been prescribed under the Act.

12.6 Bio-medical waste is required to be properly segregated at source. As per Rules four recommended colour coded (Yellow, Red, Blue/White translucent and Black) containers are required to be used for segregation and collection of such wastes in the hospitals. But some hospitals/nursing homes/ clinics do not follow these rules causing, management and disposal/treatment problems. This can lead to adverse health effects and spread dreaded diseases like Acquired Immuno Deficiency Syndrome (AIDS).

12.7 The institutions which are producing bio-medical wastes are directed to get it safely transported and properly treated before the disposal as per Bio-Medical Waste (Management & Handling) Rules 1998, either on their own, or through tie-up with any of the Common Bio-medical Waste Treatment Facilities set up in the state. So far four common Bio-medical Waste Treatment Facilities have been established to collect, transport and suitably treat waste as per Rules and are monitored regularly by PPCB and a committee constituted by the government (comprising representatives from the Board and Department of Health and Family Welfare to ensure proper implementation of Rules in the state).

Table No. 12.1 Size of rural & urban population of Punjab in 1991 & 2001

SN	Districts	Population (1991)		Population (2001)	
		Urban	Rural	Urban	Rural
1	Amritsar	853831	1650729	1223275	1872802
2	Bathinda	351133	1208830	351754	831541
3	Mansa	-	-	142429	546329
4	Shri Mukatsar Sahib	-	-	198564	578929
5	Gurdaspur	386412	1370320	535223	1568788
6	Ropar	232317	683286	362407	753701
7	Faridkot	439839	1291037	193571	357321
8	Moga	-	-	178640	716214
9	Firozpur	384400	1223417	450725	1295382
10	Hoshiarpur	222138	1232890	292074	1188662
11	SBS Nagar	-	-	81066	506402
12	Jalandhar	728802	1297985	931983	1030717
13	Kapurthala	166605	480042	246527	507994
14	Ludhiana	1242781	1228813	1693653	1339178
15	Sangrur	417994	1292126	584819	1415354
16	Patiala	566973	1329269	644710	1200224
17	Fatehgarh Sahib	-	-	151091	386950
	Total	**5993225**	**14288744**	**8262511 (37.86% increase)**	**16096488 (12.65% increase)**

Source: Director Census operation, Punjab.

Table No. 12.2 District wise population trend in Punjab Since 1991

SN	Districts	Population			Density per sq km		
		1991	2001	2011	1991	2001	2011
1	Amritsar	2505034	2157020	2490891	492	608	932
2	Bathinda	985301	1183295	1388859	291	350	414
3	Faridkot	455005	550892	618008	310	375	424
4	Fatehgarh Sahib	454919	538041	599814	386	456	508
5	Ferozpur	1448903	1746107	2026831	273	329	380
6	Gurdaspur	1757281	2104011	2299026	492	590	649
7	Hoshiarpur	1298712	1480736	1582793	386	440	466
8	Jalandhar	1649909	1962700	2181753	626	746	831
9	Kapurthala	646647	754521	817668	396	462	501
10	Ludhiana	2428382	3032831	3487882	645	805	975
11	Mansa	574662	688758	768808	265	317	350
12	Moga	777922	894854	992289	352	404	444
13	Shri Mukatsar Sahib	654434	777493	902702	250	297	348
14	Patiala	1528569	1633879	1892282	421	509	596
15	Roopnagar	899587	628846	683349	438	543	488
16	Sangrur	1685449	1473242	1654408	336	399	449
17	SBS Nagar	531253	587468	614362	420	464	479
18	SAS Nagar	-	698317	986147			464
19	Barnala	-	526931	596294			419
20	Tarn Taran	-	939057	1120070			830
	Total	**20281969**	**24358999**	**27704236**	**403**	**484**	**550**

Source: Director Census operation, Punjab.

Table No. 12.3 State-wise status of hazardous waste generation in India

(Metric Tonne)

SN	State/UT	Quantity of hazardous waste generation			
		Landfill-able	**Inciner-able**	**Recycl-able**	**Total**
1	Andhra Pradesh	211442	31660	313217	556319
2	Assam	3252		7480	10732
3	Bihar	3357	9	73	3439
4	Chattisgarh	5277	6897	283213	295387
5	Delhi (unverified)	3338	1740	203	5281
6	Gujarat	1107128	108622	577037	1792787
7	Goa	10763	8271	7614	26648
8	Haryana	30452	1429	4919	36800
9	Himachal Pradesh	35519	2248	4380	42147
10	Jammu & Kashmir	9946	141	6867	16954
11	Jharkhand	23135	9813	204236	237184
12	Karnataka	18366	3713	54490	76569
13	Kerala	59591	223	23085	82899*
14	Madhya Pradesh	34945	5036	127909	167890
15	Maharashtra	568135	152791	847442	1568368
16	Manipur	-	115	137	252
17	Meghalaya	19	697	6443	7159
18	Mizoram	90	Nil	12	102
19	Nagaland	61	Nil	11	72
20	Orissa	74351	4052	18427	96830
21	**Punjab**	**13601**	**14831**	**89481**	**117913**
22	Rajasthan	165107	23025	84739	272871
23	Tripura	0	30	237	267
24	Tamil Nadu	157909	11145	89593	258647
25	Uttar Pradesh	36370	15697	117227	169294
26	Uttrakhand	17991	580	11	18582
27	West Bengal	120598	12583	126597	259777
	Union Territory:				
28	Daman, Diu, Dadra & NH	17219	421	56350	73990
29	Pondicherry	132	25	36235	36392
30	Chandigarh	232	-	723	955
	Total	**2728326**	**415794**	**3088387**	**6232507**

Source: Central Pollution Control Board, Hazardous Waste Management Division Delhi, Feb., 2009, CSO Compendium of Environment Statistics India.

Table No. 12.4 District-wise generation of hazardous waste in Punjab- 2009-10

(Metric Tonne)

SN	District	Storable	Recyclable	Incinerable	Total
1	Amritsar	213.882	830.4	Nil	1044.282
2	Bathinda	91.148	353.75	Nil	444.898
3	Faridkot	23.574	159.48	Nil	183.054
4	Fatehgarh Sahib	747.46	128.1	Nil	875.56
5	Firozpur	42.66	106.32	Nil	148.98
6	Gurdaspur	105.387	423.63	Nil	529.017
7	Hoshiarpur	1252.81	2597.3	65	3915.11
8	Jalandhar	1602.505	147.31	30	1779.815
9	Kapurthala	299.151	2.52	Nil	301.671
10	Ludhiana	4549.017	6428.85	34.9	11012.767
11	Mansa	1.46	50	Nil	51.46
12	Moga	3.175	82.58	Nil	85.755
13	Shri Mukatsar Sahib	59.04	168	Nil	227.04
14	Patiala	303	97	7.55	407.55
15	Ropar	13.2076	161	Nil	174.2076
16	Sangrur	574.151	32331.06	32.78	32937.991
17	SAS Nagar	2283.779	51517.15	14849.02	68649.949
18	SBS Nagar	408.417	1407.65	89.5	1905.567
	Total	**12573.834**	**96992.12**	**15108.75**	**124674.704**

Source: Punjab Pollution Control Board.

Table No. 12.5 Insecticide residue in different food and feed commodities in Punjab during 1976-1996

Commodities	Samples			
	Number analysed	Insecticides Detected	Contaminated	Above Tolerance limits (%)
Cereals	1088	DDT HCH/BHC	87.4 67.6	15.8 1.9
Fruits	183	DDT HCH/BHC	38.3 43.7	Nil Nil
Milk	1110	DDT HCH/BHC	97.7 100.4	41 40
Butter	283	DDT HCH/BHC	100 100	71 Nil
Infant Formula	54	DDT HCH/BHC	100 86.01	8.5 Nil
Animal Feed	228	DDT HCH/BHC	100 100	35 32

Source: Punjab State Council for Science & Technology, State of Environment of Punjab, 2007.

Table No. 12.6 Status of Vermicomposting Units in Punjab 2009-10

SN	Districts	No. of Blocks	No. of Units to be set up in each Block	No. of Units set up
1	Gurdaspur	16	35	Nil
2	Amritsar	16	35	Nil
3	kapurthala	5	35	225
4	Jalandhar	10	35	3
5	SBS nagar	5	35	218
6	Hoshiarpur	10	35	3
7	Roopnagar	7	35	40
8	Ludhiana	12	35	190
9	Firozpur	11	35	3
10	Faridkot	2	35	27
11	Shri Mukatsar Sahib	4	35	6
12	Moga	5	35	34
13	Bathinda	8	35	70+130
14	Mansa	5	35	9
15	Sangrur	13	35	30+483
16	Patiala	9	35	30
17	Fatehgarh Sahib	5	35	94
Total		143	35	1595

Source: Statistical Abstract of Punjab.

Table No. 12.7 Village covered under Vermicomposting Technology in Punjab for the year 2010

SN	Districts	Villages covered under Vermi-composting Technology	Units	Production of Vermi composting (Qtls. Per Annum)
1	Gurdaspur	305	322	17825
2	Amritsar	40	137	37400
3	Taran Tarn	45	77	3150
4	Kaputhala	26	30	884
5	Jalandhar	40	194	5225
6	SBS Nagar	31	151	2100
7	Hoshiarpur	150	1700	31800
8	Roopnagar	24	190	2602
9	SAS Nagar	5	20	11120
10	Ludhiana	18	20	4144
11	Firozpur	36	66	99501
12	Faridkot	10	16	485
13	Shri Mukatsar Sahib	21	50	41086
14	Moga	10	10	1950
15	Bathinda	28	170	1785
16	Mansa	8	18	812
17	Sangrur	35	120	2850
18	Barnala	25	70	385
19	Patiala	33	40	1205
20	Fatehgarh Sahib	20	22	19300
	Total	**910**	**3424**	**571809**

Statistical Abstract of Punjab.

Table No. 12.8 Birth rate, death rate and infant mortality rate per thousand per annum in Punjab

Year	Birth Rate			Death Rate			Infant Mortality Rate		
	Rural	Urban	Com-bined	Rural	Urban	Com-bined	Rural	Urban	Com-bined
1980	30.3	28.3	29.9	9.2	6.6	8.7	96	58	89
1990	28.4	25.6	27.6	8.5	5.8	7.8	66	45	61
2000	22.7	18.6	21.6	7.9	5.9	7.4	56	38	52
2005	18.8	17	18.1	7.2	5.8	6.7	49	37	44
2006	18.4	16.8	17.8	7.4	5.8	6.8	48	36	44
2007	18.3	16.4	17.6	7.7	5.9	7	47	35	43
2008	18	16.1	17.3	8	6	7.2	45	33	41
2009	17.7	15.8	17	7.8	5.8	7.0	42	31	38
2010	17.2	15.6	16.6	7.7	5.8	7.0	37	28	34

Source: Director, Health Services, Punjab

Table No. 12.9 Consumption of Plastic in the World (in 2000)

('000'Metric Tonne)

SN	Country/Region	Consumption
1	Europe W, C, E	40000
2	Eurasia, Russia, Others	4000
3	North America	45000
4	Latin America	11000
5	Middle East, Incl. TR	4000
6	Africa, North & South	2500
7	Other Africa	500
8	China	19000
9	India	4000
10	Japan	11000
11	Other Asia Pacific, Rest	13000
Total World		**154000**

Source: www.envis-icpe.com

Table No. 12.10 Plastic waste management status in India

(In thousand tonnes)

SN	Item	1995	2001
1	Consumption of Plastic	1889	4374
2	Waste available for Recycling	800	2000
	Total	**2689**	**6374**

Source: Parivesh Newsletter, Central Pollution Control Board.

Table No. 12.11 Total populations and slum population in Municipal Corporations with Population above one Million - 2001

SN	Name of Million Plus Municipal Corporations	State/Union territory*	Total popula-tion	Total slum popula-tion	%age of slum population to total population
1	Greater Mumbai	Maharashtra	11978450	6475440	54.1
2	Delhi*	Delhi*	9879172	1851231	18.7
3	Kolkatta	West Bengal	4572876	1485309	32.5
4	Chennai	Tamil Nadu	4343645	819873	18.9
5	Bangalore	Karnataka	4301326	430501	10.0
6	Hyderabad	Andhra Pradesh	3637483	626849	17.2
7	Ahmadabad	Gujarat	3520085	473662	13.5
8	Surat	Gujarat	2433835	508485	20.9
9	Kanpur	Uttar Pradesh	2551337	367980	14.4
10	Pune	Maharashtra	2538473	492179	19.4
11	Jaipur	Rajasthan	2322575	368570	15.9
12	Lucknow	Uttar Pradesh	2185927	179176	8.2
13	Nagpur	Maharashtra	2052066	737219	35.9
14	Indore	Madhya Pradesh	1474968	260975	17.7
15	Bhopal	Madhya Pradesh	1437354	125720	8.7
16	**Ludhiana**	**Punjab**	**1398467**	**314904**	**22.5**
17	Patna	Bihar	1366444	3592	0.3
18	Vadodara	Gujarat	1306227	186020	14.2
19	Agra	Uttar Pradesh	1275134	121761	9.5
20	Thane	Maharashtra	1262551	351065	27.8
21	Kalyan-Dombivli	Maharashtra	1193512	34860	2.9
22	Varanasi	Uttar Pradesh	1091918	137977	12.6
23	Nashik	Maharashtra	1077236	138797	12.9
24	Meerut	Uttar Pradesh	1068772	471581	44.1
25	Faridabad	Haryana	1055938	490981	46.5
26	Pimpri Chinchwad	Maharashtra	1012472	123957	12.2
27	Haora	West Bengal	1007532	118286	11.7
	Total		**73345775**	**17696950**	**24.1**

Source: Slum Population -Census of India, 2001 & CSO Compendium of Environment Statistics India.

Table 12.12 Villages covered under Rural Drinking Water Supply Schemes in Punjab

Year	No. of inhabited villages	Identified water scarcity villages	Water scarcity villages where water supply schemes commissioned	Water scarcity villages where water supply schemes still to be initiated	% age of covered villages
1980	12188	3712	1945	1767	52.4
1990	12342	6287	3898	2389	62.0
2000	12428	8518	7092	1426	83.3
2007	12267	11849	9001	284878	76.0
2008	12267	12267	9689	2578	79.0
2009	12295	12295	10152	2143	82.6
2010	12295	12295	10764	1531	87.5
2011	12258	12258	11755	503	95.9

Source: Statistical Abstract of Punjab: various issues & Punjab Water Supply and Sewage Board.

Figure No.

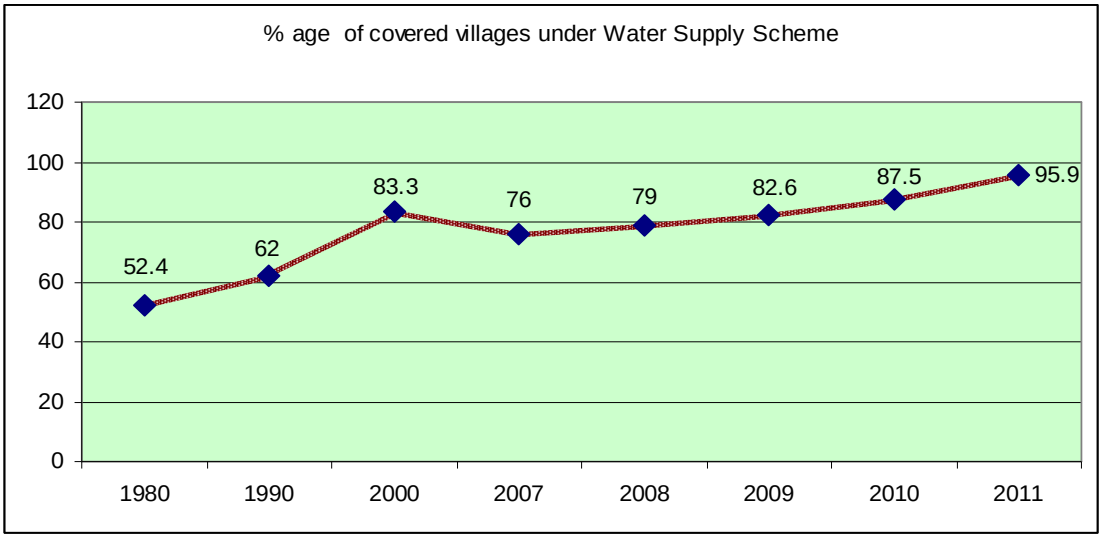


Table No. 12.13 District wise status of Leprosy in Punjab

SN	Name of the District	2009-2010				2010-11			
		Cases bal-ance	PB cases	MB cases	Defo-rmity grade-I	Cases balance	PB cases	MB cases	Defor-mity grade- I
1	Amritsar	85	7	78	0	81	5	76	8
2	Barnala	4	2	2	0	7	4	3	0
3	Bathinda	32	18	14	0	39	23	16	0
4	Faridkot	17	1	16	0	13	2	11	0
5	Firozpur	14	4	10	0	8	0	8	4
6	Fatehgarh Sahib	29	4	25	0	14	2	12	1
7	Gurdaspur	28	3	25	0	20	4	16	1
8	Hoshiarpur	38	6	32	1	18	4	14	2
9	Jalandhar	66	4	62	0	62	10	52	2
10	Kapurthala	30	3	27	1	35	3	32	2
11	Ludhiana	185	32	153	2	178	17	161	14
12	Mansa	11	1	10	0	7	0	7	3
13	Moga	18	3	15	0	13	1	12	0
14	Mohali	51	13	38	0	49	3	46	0
15	Muktsar	9	0	9	0	11	1	10	0
16	Nawan-Shehar	15	6	9	0	13	3	10	0
17	Patiala	42	13	29	0	53	12	41	0
18	Ropar	27	2	25	0	20	0	20	2
19	Sangrur	25	5	20	0	19	3	16	0
20	Tarn-Taran	15	2	13	1	16	0	16	2
Total		**741**	**129**	**612**	**5**	**676**	**97**	**579**	**41**

Source: Health Department of Punjab.

Table No. 12.14 Status of Dengue cases reported in Punjab (2008 to 2011)

SN	District	2008		2009		2010		2011	
		Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1	Amritsar	196	1	18	0	58	0	127	0
2	Bathinda	359	1	6	0	364	1	862	1
3	Barnala	1	1	0	0	24	0	111	2
4	Faridkot	8	0	0	0	30	0	244	0
5	Fatehgarh	62	0	12	0	61	0	19	0
6	Firozpur	23	0	1	0	47	0	85	0
7	Gurdaspur	16	0	1	0	47	0	28	0
8	Hoshiarpur	129	0	29	1	73	0	26	2
9	Jalandhar	453	0	58	0	598		63	2
10	Kapurthala	20	0	7	0	63	0	13	2
11	Ludhiana	2506	13	89	0	2150	4	1662	23
12	Mansa	1	0	0	0	19	0	106	0
13	Moga	81	1	4	0	97	2	54	0
14	Mukatsar	74	0	1	0	100	0	405	0
15	SBS Nagar	8	0	1	0	16	1	4	1
16	Patiala	189	1	1	0	83	1	22	0
17	Ropar	6	0	1	0	9	0	1	0
18	Sangrur	5	1	5	0	84	1	73	0
19	S.A.S. Nagar	211	2	5	0	89	0	16	0
20	Tarn Taran	1	0	0	0	0	0	0	0
	Total	**4349**	**21**	**239**	**1**	**4012**	**15**	**3921**	**33**

Source: Health Department of Punjab.

Table No. 12.15 Month-wise trend of Dengue cases Punjab

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
2010	0	0	0	0	0	0	0	36	298	1651	1818	209	4012
2011	0	0	0	0	11	40	42	181	335	1407	1459	446	3921

Source: Health Department of Punjab.

Table No. 12.16 Estimates of birth rate by residence from 1971 to 2010 in India & Punjab

Year	Birth Rate					
	India			Punjab		
	Total	Rural	Urban	Total	Rural	Urban
1971	36.9	38.9	30.1	34.2	35	31.4
1972	36.6	38.4	30.5	34.6	35.8	30.1
1973	34.6	35.9	28.9	33.4	34.4	29.6
1974	34.5	35.9	28.4	32	33	28.2
1975	35.2	36.7	28.5	31.8	32.5	29.2
1976	34.4	35.8	28.4	31.6	32.4	28.5
1977	33	34.3	27.8	31	31.8	28.2
1978	33.3	34.7	27.8	29.4	30.2	26.5
1979	33.1	34.3	28.3	28.7	28.8	28.1
1980	33.3	34.6	28.1	29.9	30.3	28.3
1981	33.9	35.6	27	30.3	30.8	28.5
1982	33.8	35.5	27.6	30.4	30.9	28.7
1983	33.7	35.3	28.3	30.2	30.7	28.8
1984	33.9	35.3	29.4	30.3	30.9	28.6
1985	32.9	34.3	28.1	28.5	28.8	27.6
1986	32.6	34.2	27.1	28.7	29	27.6
1987	32.2	33.7	27.4	28.7	28.9	27.9
1988	31.5	33.1	26.3	28.5	28.9	27.5
1989	30.6	32.2	25.2	28.3	27.7	27.5
1990	30.2	31.7	24.7	27.6	28.4	25.6
1991	29.5	30.9	24.3	27.7	28.5	25.6
1992	29.2	30.9	23.1	27.1	28.3	24.2
1993	28.7	30.4	23.7	26.3	27.7	22.6
1994	28.7	30.5	23.1	25	26.2	22
1995	28.3	30	22.7	24.6	26	20.8
1996	27.5	29.3	21.6	23.7	25.2	19.1
1997	27.2	28.9	21.5	23.4	24.9	19
1998	26.5	28	21.1	22.4	23.7	18.5
1999	26	27.6	20.8	21.5	22.5	18.6
2000	25.8	27.6	20.7	21.6	22.7	18.6
2001	25.4	27.1	20.3	21.2	22.1	18.7
2002	25.0	26.6	20.0	20.8	21.7	18.1
2003	24.8	26.4	19.8	20.6	21.5	17.9
2004	24.1	25.9	19	18.7	19.3	17.6
2005	23.8	25.6	19.1	18.1	18.8	17
2006	23.5	25.2	18.8	17.8	18.4	16.8
2007	23.1	24.7	18.6	17.6	18.3	16.4
2008	22.8	24.4	18.5	17.3	18	16.1
2009	22.5	24.1	18.3	17	17.7	15.8
2010	22.1	23.7	18	16.6	17.2	15.6

* Sample Registration System Estimates. Source: Health Department of Punjab.

Table No. 12.17 Number of Cancer patients in Cancer affected districts in Punjab 2001-2002

SN	District	Population	No. of cancer patients	No. of cancer patients per lakh population
1	Muktsar	8,27,906	453	54.7
2	Bathinda	12,00,736	711	59.2
3	Faridkot	5,85,500	164	28.0
4	Mansa	7,31,535	420	57.4

Source: Atlas of Cancer.

Table No. 12.18 Trend of Malaria cases in Punjab

Year	Popula-tion	Blood slides collected & examined	Total Malaria cases	Pf case	ABER	API	SPR	SFR	Death
2007	26641163	2723290	2017	41	10.22	0.075	0.074	0.001	0
2008	26959672	2979882	2494	38	11.05	0.09	0.08	0.001	0
2009	27511593	2996929	2955	35	10.89	0.1	0.09	0.002	0
2010	27775465	3138482	3476	70	11.3	0.12	0.11	0.002	0
2011	28340994	3120544	2660	64	11.01	0.09	0.09	0.002	3

Source: Health Department of Punjab

Table No. 12.18a Year/district wise Malaria cases reported in Punjab

SN	District	Total positive cases					
		2006	**2007**	**2008**	**2009**	**2010**	**2011**
1	Amritsar	80	31	297	21	198	149
2	Bathinda	28	33	80	247	170	67
3	Barnala	3	0	5	4	3	5
4	Faridkot	144	241	448	375	280	321
5	Fatehgarh	6	6	7	19	18	12
6	Firozpur	585	518	346	387	259	129
7	Gurdaspur	23	6	14	23	57	23
8	Hoshiarpur	25	28	25	38	58	61
9	Jallandhar	39	39	19	78	154	87
10	Kapurthala	10	2	8	28	25	10
11	Ludhiana	192	75	67	74	319	381
12	Mansa	205	328	366	315	416	377
13	Moga	5	2	2	5	131	19
14	Mohali	104	47	73	42	63	89
15	Mukatsar	64	102	229	439	538	429
16	SBS Nagar	3	3	3	127	22	25
17	Patiala	66	46	63	74	63	90
18	Ropar	9	5	3	1	9	3
19	Sangrur	48	87	69	221	86	69
20	Tarn Taran	249	418	370	437	607	314
	Punjab	**1888**	**2017**	**2494**	**2955**	**3476**	**2660**

Source: Health Department of Punjab

Table No. 12.19 Revised National TB Control Programme (RNTCP) - year wise performance in Punjab

Item	2006	2007	2008	2009	2010	2011
Population in lakhs	260	264	267	270	274	277
Total TB cases put on treatment	34558	35084	36974	38690	40523	39206
Annual/annualized suspects examined per lakh population	573	572	599	701	644	658
Annual/ annualized Total TB case notification per lakh population	133	133	138	143	148	142
Annual/ annualized new smear positive case notification rate per lakh population	52	52	55	59	62	56
Annual new smear positive case detection rate (in% age) (expected at least 70%)	55	55	58	62	65	59
Treatment success rate among new smear positive TB cases (expected at least 85%)	86	85	87	87	88	88
Default rate among new smear positive TB cases (expected below 5%)	6	7	4.9	4.3	3.9	4
Treatment success rate among smear positive re-treatment cases	71	72	74	74	75	73

Annexure-I

Framework for Development of Environment Statistics (FDES)
Information categories

Agenda 21 Issues (clusters)	**A. Socioeconomic activities, events**	**B. Impacts and effects**	**C. Responses to impacts**	**D. Inventories, stocks, background conditions**
ECONOMIC ISSUES	Real GDP per capita growth rate Production and consumption patterns Investment share in GDP	EDP/EVA per Capita Capital accumulation (environmentally adjusted)	Environmental protection expenditure as % of GDP Environmental taxes and subsidies as % of government revenue	Produced capital stock
SOCIAL/ DEMOGRAPHIC ISSUES	Population growth rate Population Density Urban/rural migration rate Calorie supply per capita	% of urban population exposed to concentrations of SO_2, particulates, ozone, CO and Pb Infant mortality Rate Incidence of environmentally related diseases		Population living in absolute poverty Adult literacy Rate Combined primary and secondary school enrollment ratio Life expectancy at birth Females per 100 males in secondary school
AIR/CLIMATE	**Emissions of CO_2, SO_2 and NO_x** **Consumption of ozone**	**Ambient concentrations of CO, SO_2, NO_x O_3 and TSP in urban areas**	Expenditure on air pollution abatement Reduction in	**Weather and climate conditions**

	depleting substances	Air quality index	consumption of substances and emissions	
LAND/SOIL	**Land use Change** Livestock per km2 of arid and semi-arid lands **Use of fertilizers** **Use of agricultural pesticides**	**Area affected by soil erosion** Land affected by desertification Area affected by salinization and water logging	**Protected area as % of total land area**	**Arable land per capita**
WATER Fresh water resources Marine water resources	Industrial, agricultural and municipal discharges directly into freshwater bodies **Annual withdrawals of ground and surface water** **Domestic consumption of water per capita** Industrial, agricultural water use per GDP Industrial, agricultural and	**Concentration of lead, cadmium, mercury and pesticides in fresh water bodies** **Concentration of fecal coliform in fresh water bodies** **Acidification of fresh water bodies** **BOD and COD in fresh water bodies** Water quality index by fresh water bodies Deviation in stock from maximum sustainable yield of marine species	**Waste water treatment, total and by type of treatment (% of population served)** **Access to safe drinking water (% of population served)**	**Groundwater reserves**

	municipal discharges directly into marine water bodies Discharges of oil into coastal waters	Loading of N and P in coastal waters		
OTHER NATURAL RESOURCES Biological Resources Mineral (incl. energy) resources	**Annual roundwood production** **Fuelwood consumption per capita** **Catches of marine species** **Annual energy consumption per capita** **Extraction of other mineral resources**	**Deforestation Rate** **Threatened, extinct species** **Depletion of mineral resources (% of proven reserves)** Lifetime of proven reserves	**Reforestation Rate** **Protected forest area as % of total land area**	**Forest Inventory** Ecosystems Inventory Fauna and flora Inventory Fish stocks **Proven mineral reserves** **Proven energy reserves**
WASTE	**Municipal waste disposal** Generation of hazardous waste **Imports and exports of hazardous wastes**	Area of land contaminated by toxic waste	Expenditure on waste collection and treatment Waste recycling	
HUMAN SETTLEMENTS	**Rate of growth of urban population**	**Area and population in marginal settlements**	Expenditure on low-cost housing	Stock of shelter and infrastructure

	% of population in urban areas **Motor vehicles in use per 1000 habitants**	Shelter index **% of population with sanitary services**		
NATURAL DISASTERS	**Frequency of natural disasters**	Cost and **number of injuries and fatalities related to natural disasters**	Expenditure on disaster prevention and mitigation	Human settlements vulnerable to natural disasters

Annexure-II

Environmental Indicators

A suggestive list of environmental indicators as recommended by Asian Development Bank in its project on institutional strengthening and collection of environment statistics under various heads is as below.

I. FLORA

A. Threatened species as percentage of total native species

Flowering Plants
- (a) Rare
- (b) Vulnerable
- (c) Endangered endemic

Non-Flowering plants
- (a) Rare
- (b) Vulnerable
- (c) endangered ’endemic

B. Extinct species as percentage of total native species.

C. Possibly extinct species as percentage of total native species.

II. FAUNA

A. Threatened species as percentage of total native species

Vertebrates
- (a) Rare
- (b) Vulnerable
- (c) endangered ‘endemic

Non- Vertebrates
- (a) Rare
- (b) Vulnerable
- (c) endangered ‘endemic

B. Extinct species as percentage of total native species.

C. Possibly extinct species as percentage of total native species.

III. CONSERVATION MEASURES

A. Within habitats (*in situ*)
- (a) Bio sphere reserves
- (b) National Parks
- (c) Sanctuaries
- (d) Reserve forests
- (e) Other protected measures

B. Outside habitats (*ex situ*)
- (a) Botanic gardens
- (b) Gene banks
- (c) Others

IV. AIR/ATMOSPHERE

A. Ambient air quality in major cities

	Annual Average Ug/m3	24 hour average Ug/m3
(a) Concentration of SOx		
(b) Concentration of NOx		
(c) Concentration of SPM		

B. Emissions as per WHO National Standard (e.g. ppm. Ppv)
- (a) CO
- (b) HC
- (c) Pb concentration
- (d) CO2
- (e) Others (e.g. CHs, CFCs, etc.)

C. Energy consumption

(a) Percentage of the households using different fuels for cooking
- (i) Cow dung
- (ii) Electricity
- (iii) Coal Coke
- (iv) LPG
- (v) Fuelwood
- (vi) Solar power
- (vii) Biogas
- (viii) Kerosene

(b) Electricity generation
- (i) Renewable (mgw)
- (ii) Non-renewable (mgw)

(c) Meteorological information
- (i) Rainfall
- (ii) Humidity
- (iii) Wind speed
- (iv) Others

V. WATER

A. Fresh water

(a) Surface water
- (i) Rainfall
- (ii) River water quality standard
  - DO level
  - BOD level
  - COD level
  - Total solids
  - Coliform concentration
  - Heavy metal concentration

(b) Ground water
- (i) pH
- (ii) Turbidity
- (iii) Metal concentration
- (iv) Ar, F, Cl, NO3

B. Marine water

- (a) Length of marine coastline (km)
- (b) Area (sq. km)
- (c) Population (m)
- (d) Coastal vegetation
  - (i) Mangroves as percentage of total forest cover
  - (ii) Lagoons
  - (iii) Estuaries
  - (iv) Coral reefs
- (e) Relative fragility, %
- (f) Preservation area, %

VI. LAND/SOIL

A. Land use (million ha)
- (a) Geographic area (sq. km.)
- (b) Reporting area for land utilization

B. Forest areas
- (a) Forests
- (b) Not available for cultivation
  - (i) Non-agricultural
  - (ii) Barren and uncultivated land
- (c) Other cultivated land
  - (i) Permanent pastures and other grazing land
  - (ii) Miscellaneous tree crops and groves
  - (iii) Cultivated wasteland
- (d) Gross cropped area
- (e) Cropping intensity.

C. Wetlands

D. Irrigated area

E. Soil erosion

- (a) Percentage area
- (b) Pesticide level
- (c) Consumption of fertilizers

F. Land area on waste disposal
- (a) Industrial
- (b) Municipal
- (c) Hazardous
- (d) Mining
- (e) Others.

VII. HUMAN SETTLEMENTS

A. Total population
- (a) Urban
- (b) Rural

B. Population below poverty line
- (a) Urban
- (b) Rural

C. Slum population (class-wise)

D. Number and percentage of facilities
- (a) Dwelling units
- (b) Sanitation
- (c) Drinking water
- (d) Others

E. Urban agglomeration

F. Life expectancy and mortality rates and causes.

VIII. NATURAL DISASTERS

	Periodicity	affected population
A. Flood		
B. Cyclones		
C. Drought		
D. Earthquake		
E. Landslides		
F. Avalanche		
G. Typhoon		
H. Others		

IX. OTHER ECONOMIC AND INSTITUTIONAL INDICATORS

A. Total expenditure

B. Expenditure for environmental protection

C. Percentage of national expenditure

Annexure-III

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Basic Statistics of Punjab- 2011

Item	Unit	Value
Area	Sq Km	50362
i. Rural	Sq Km	48265
ii. Urban	Sq Km	2097
Divisions	Number	5
Districts	Number	22
Tehsils	Number	81
Sub-Tehsils	Number	86
Blocks	Number	145
Zila Parishads	Number	20
Municipal Committees	Number	139
Improvement Trust	Number	23
Towns	Number	143
Cities	Number	74
Inhabited Villages	Number	12581
Total Population 2011	Lakhs	277.04
i. Rural Population	Lakhs	173.2(62.51% to total Population)
ii. Urban Population	Lakhs	103.87(37.49% % to total population)
iii. Density	Per sq km	550
Medical and Health		
i. Hospitals	Number	91
ii. Community Health Centre	Number	130
iii. Dispensaries	Number	1412
iv. Primary Health Centres	Number	444
v. Ayurvedic and Unani Institutions	Number	529
vi. Homoepathic Institutions	Number	111
vii. Beds installed in Medical Institutions (Allopathy)	Number	21504

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