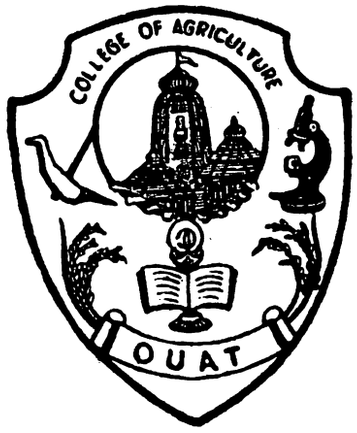
DIMENSIONS OF ENVIRONMENTAL POLLUTION IN THE DIFFERENT FARMING SYSTEMS AS PERCEIVED BY THE FARMERS

A THESIS SUBMITTED TO
THE ORISSA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY, BHUBANESWAR
IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF SCIENCE IN AGRICULTURE
(EXTENSION EDUCATION)

By

Ramakanta Mohapatra



Department of Extension Education
COLLEGE OF AGRICULTURE
Orissa University of Agriculture and Technology
BHUBANESWAR
1995

THESIS ADVISOR

Dr. N. C. RATH

Dedicated

to

FARMERS OF ORISSA

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Bhubaneswar
December 16th 1996

CERTIFICATE

This is to certify that the thesis entitled "**DIMENSIONS OF ENVIRONMENTAL POLLUTION IN DIFFERENT FARMING SYSTEMS AS PERCEIVED BY THE FARMERS**" submitted in partial fulfilment for the award of the degree of **MASTER OF SCIENCE IN AGRICULTURE (EXTENSION EDUCATION)** of the Orissa University of Agriculture and Technology, Bhubaneswar is a faithful record of bonafide research work carried out by **Mr. Ramakanta Mohapatra** under my guidance and supervison.

This research is original and no part of this thesis has been submitted for any other degree or diploma. The assistance received during the course of investigation has been duly acknowledged by him.

(N. C. Rath)

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BY
RAMAKANTA MOHAPATRA
IS APPROVED BY

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Words run short to express my feeling of my heart for my wife (Ranu) whose heart beats for me, whose breadth stops for me and whose scrupulous dedication and sacrifice for me.

I solicit the benediction of **'LORD JAGANNATH'** for my progress and prosperity.

Bhubaneswar
December, 16th 1996

Ramakanta Mohapatra
(**Ramakanta Mohapatra**)

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INTRODUCTION

ABSTRACT

The study entitled "Dimensions of Environmental Pollution in different farming systems as perceived by farmers" was undertaken with the main objectives to identify the different farming systems adopted by the farmers, their awareness about environmental importance and different dimensions of environmental pollution. Further, emphasis was given to find out the perception of farmers of differnet farming systems on different sources of pollution as well as enlisting the different suggestions for the control of environmental pollution. Survey, research design was followed in the study. Four villages were selected randomly from two randomy selected block viz., Salipur and Mahanga of purposively selected Cuttack district of Orissa. Twenty five respondents from each of the farming systems viz., agriculture alone, agril. with animal husbandry, agril. with poultry and agril. with pisciculture, were selected randomly from the sample villages. Altogether 100 respondents constituted the sample for the study. The data were collected through pre-tested structured interview schedule during the year 1996. Appropriate test statistics were used for analysing and interpreting the result.

As regards to the awareness awareness of farmers about the importance of environment, it was found that "clean water is necessary for good health" was known to most of the farmers of different farming systems. The dimensions of water pollution i.e. "Use of pesticides in crops", soil/land pollution i.e., "excess use of nitrogenous fertilizers in crops" and air pollution i.e., through "decomposed animal dead bodies" were mostly aware by the farmers of different systems. The perception of farmers on different sources of pollution indicated that "use of pesticides in crops" was chief source of pollution in intensive method of cultivation. "Manures of dairy animals causes water pollution" was perceived as chief source of pollution by dairy. Pollution of environment by poultry litters, pollution by application of fish-feed to pond and diarrhoea and other diseases in human being through water pollution, were perceived as the chief source of pollution by poultry, pisciculture and health hazard due to pollution respectively. "The enforcement of pollution act and rules" was the important suggestion given by the farmers for control of environmental pollution.

INTRODUCTION

The world is finite, resources are scarce,
Thing are bad and will be worse ,
Coal is burned and gas exploded ,
Forest out and soil eroded ,
Well are dry and air is polluted
Dust is blowing, trees up rooted
Oil is going, ores depleted
Drains receives what is excreted
Land is sinking, seas are rising
Man is far too enterprising
Fire will rage with man to fan it
Soon will have a plundered planet.

Kenneth Boulding's Poem
" A Conservationist ".

To day the cry of " pollution " is heard from all nooks and corners of the globe and pollution has become a major threat to the very existence of man kind on this earth. It is the major challenge of our times. The pollution of various resources has gone to such an extent that we are unable to breath fresh air and drink fresh water. On one hand the advancement of science and technology have added to the human comforts by giving us automobiles, electrical appliances, supersonic jets, space crafts, better medicine, better chemicals to control harmful insects and other pests, etc., but on the

CHAPTER—I

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other hand, they have given us a very serious problem to face pollution.

Most of the environmental pollution come into existence from the imbalanced approaches and behaviours of man. The acute advancement in technological expansion and economic growth through innumerable means and ways are the ultimate sources of environmental degradation. The miracle of modern science and the towering achievements by advanced technology, have provided us measure of mastery over nature. The development has a prime priority and we have got a lesson from our cost that development which destroyed the ecosystem eventually destroys development itself because we are a part of nature. We are nothing but a strand in the single fabric whose warp and weft link together all that is of the earth.

The current threat to the environment stems essentially from past neglect in managing the natural environment resources. Decision maker, scientist and even lay man are becoming increasing conscious of a variety of issues - over population, deforestation, global warming, ozone layer depletion, acid rain, noise pollution, industrial pollution, pollution of air and water pollution, solid waste and sewage pollution, automobile emission etc. which are of global concerned.

The global problem facing man kind found significant expression in U.N. conference on human development held in Stockholm in 1972, where an action plan formulated with series of recommendations for efficient management. The resulting

United Nation Environment Programme (UNEP) operating in Nairobi has reviewed each year the world environment situation in order to ensure that emerging environmental problem of wide international significance receive appropriate and adequate consideration by government. For many developing countries, the 1980 has been a lost decade, economically as well as environmentally. Many of them, have remained pre-occupied with short term economic and political crises. The environmental and natural resource management and conservation have ranked extreamely low on their priority list. The Longkawi Declaration on environmental issued by Common Wealth Heads of Govt. at Langakawi, Malayasia in 1989 express deep concern at the serious deterioration in environment and the threat thus poses to well-being of parent and future generation. In June, 1992, about 20 years after the historic Stockholm Conference, the U.N. Conference on environment and development of the earth summit was held in Brazil to discuss the critical relationship between the environment and economic health of plant and to provide a global frame of work for sustainable development.

India is no exception to global phenomenon of environmental pollution. It share with poorer seventy per cent of world, the major problem of population, over-exploitation of its natural resources and threat to its life support system and bio-product system. The effects of poverty on compounding the problem of environment are many and deserve a closer look.

Dimensions of Environmental pollution :

Precisely it may be said that rapid growth of population, industrialisation, increase in number of motor and other vehicle, various solid wastes burn in air, dumping of raw wastes, the run-off fertilizer, pesticides in the agricultural land, cause various environmental pollution and may devide following categories.

(a) Air pollution

(b) Water pollution

(c) Soil/land pollution

Air pollution :

Air pollution is defined as the pressure of any solid, liquid or gases substances in such concentration as may be or tend to be injurious to human being or other living creature or plants. Sources of air pollution are found due to increase of CO_2 from respiration of man, animal and plant, burning of wood, coal and bi-product of crops, release of carbon monoxide, hydro carbon, nitrous oxide, methane from automobile exhaust, oil burning plant, decay of fruits and vegetables and industrial emissions of fertilizer and pesticides and chemical industries.

Water pollution :

Water is relatively more prone to pollution than air, because it is more viscous having lesser moment of inertia and possessing closer molecular distance than air. The unequal distribution of water on the surface of earth and the fast

declining availability of fresh usable water per capita, per year, due to increasing in population, one of the major causes for concern in terms of the quantity and quality of water of the total amount of about 1500 million km^2 of water in the hydrosphere, about 95% of it is sea water, 4% is frozen as snow in mountains and cold regions and 1% is available for human activity. It is confined in ground water, rivers, lakes, soil profile, atmosphere and biological systems. Out of this, ground water forms 99% of the available water. So water pollution problem is more delicate and severe that of air.

The term pollution may be defined as the deterioration in the chemical, physical and biological properties of water brought about mainly human activities, such as application of fertilizer and pesticides in crop, sewage, and industrial effluent. Pollution can be natural caused by hydrological processes also in which decomposed animal and vegetable materials and weathering products of rocks, mineral and soil ingradients are brought into the main water resources. These characteristics are not independent but are interdependent. It is the reaction product in a particular system at a given time which ultimately decides the nature and extent of pollution.

Soil/land pollution :

Soil sustains innumerable microbes and a large number of plant and animal along with plenty of mineral reserves for purposeful exploitation. Hence, land is valuable but fast depleting resource with increase population. The

problem of soil and land pollution to day assume great importance in the background of huge population growth It results from (i) indiscriminate discharge of industrial effluents on land and in water course, (2) open defecation by animal and human being specially in rural areas of country (3) unscientific disposal of solid waste on land, (4) repeated application of fertilizer in soil for intensive cultivation, and (5) application of pesticides/herbicides in crop and soil and their persistence behaviour in soil and residual toxicity in soil.

Noise pollution :

Noise pollution is often misunderstood by most of the people as sound pollution. Sound is a pure tone, harmonically related having fix frequencies and amplitudes, occuring at regular interval and produces meaningful communication and pleasure in hearing, but noise is unwanted sound having complex mixture of numbers of pure tones of various frequencies and amplitudes. These sound waves fluctuate and repeat themselves in highly haphazard manner. Noise pollution caused due to industrialisation, air horn of vehicles, music from loud-speaker which badly affect the peace, patient and student in both urban and rural areas.

Pollution by farming systems :

Farming system is a complex inter-related matrix of soil, plant, animals, implements, power, labour, capital and other inputs controlled in parts by the farm families

and influence to varying degree of political, economic, institutional and social forces that operates at many levels. Farming system conceptually is a set of elements or components that are inter-related which inter-act among themselves. As the centre of interaction the farmer is excercising the control and choice regarding the type and result of inter-action.

The high yield characteristics of modern intensive farming system reflect man's ability to modify the agro-eco-system in such a way as to remove or diminish natural limitation upon productivity and to provide a more favourable environment for crop growth. These modifications include the introduction of new species or varieties of crop plant and livestock, the elimination of competing plant and other organism by use of pesticides and removal of habitats, the use of high levels of fertilizers, manipulation of soil structural condition by tillage and control of soil moisture by irrigation and drainage. Inevitably, these practices have a fundamental influence on wider environment.

Intensive farming in Agriculture :

With the intensification of agriculture, the use of fertilizer is a major factor contrinuting to higher crop yield but excessive and mismanagement causes pollution such as (a) excess application of nitrogen fertilizer, leached and percolated to ground water in nitrate form causes pollution to drinking water, (b) leaching nitrogen and phosphates to pond

and lake or water reservers causing utrification that leads to growth of algae and other organisms, (c) ammonia gas released from nitrogen fertilizer causing acid rain,(d) there is more release of methane gas from wet land rice,(e) repeated and excessive application of phosphate in terms of rock phosphate and single super phosphate increase the fluoride content of soil causing health hazard to human and animals, (f) many fertilizer contain trace element like F, AS, Cd, Cu, Cr, Hg, MO, Ni, Pb and excess application to crop lead to their accumulation in soil and health problem.

There are more than 1000 agro-chemicals which are being manufactured and used for agriculture as well as public health purposes. About 80% of the total world production is used in developed countries and remaining 20% in developing countries. On global basis herbicide account for highest consumption (45%), followed by insecticide (36%), fungicide (17%) and other 2%. But in India insecticides constitute largest group (80%) followed by fungicide (10%), herbicide (7%) and other 3%. About 1 million people suffer from pesticide toxicity of which 20,000 die every year and almost one person is poisoned every minute. In India, the consumption of pesticide is around 93,720 MT by 1990 and of these 70% are banned in developed countries.

Among the insecticide organo-chlorine, organo-phosphate, carbamate and pyrithrin derivatives are commonly used. When insecticide applied on a crop, the major portion falls

on ground or water standing on field. These unused toxic chemicals or their degraded product known as residue, pollute the surrounding environment, specially water. These may also carried to nearby water sources which contaminate river and even sea. It may contaminate food chain and pass from the lower to higher strata.

The wastes and manure originating from animal farming system, can contaminate water, land and air to such an extent that these becomes detrimental to health and life of biotic environment including man, animals and other living organism.

The litters of poultry produces ammonia gas by microbial decomposition and the gas severely damage respiratory tract of poultry birds and birds die due to long term exposure to ammonia gas. The uncleaned litters of poultry house gives rise to bad odour to the surrounding .

By pisciculture farming system, the ponds are becoming unfit for human uses and due to application of fish feed and nutrients to pond water, it stimulate the growth of algae and others and also gives rise to bad odour in surroundings.

Therefore, keeping the environmental pollution through different farming systems in mind, the researcher has made an attempt to find out the awareness as well as perception of farmers of different farming systems on environmental pollution. The specific objectives identified for the present study were as follows :

SPECIFIC OBJECTIVES OF THE STUDY

1. To find out the nature of different farming systems adopted by the farmers.
2. To find out the extent (degree) of awareness of farmers about the environmental importance and different dimensions of environmental pollution.
3. To find out the different sources of pollution in the farming systems and the effect of pollution on rural life as perceived by the farmers.
4. To find out the relationship of personal and socio-economic profile of farmers with extent of their awareness about environmental pollution.
5. The suggestions/opinions of farmers for control of environmental pollution.

SCOPE AND LIMITATION OF STUDY

In the study, an attempt has been made to delineate different dimensions of environmental pollution as perceived by the farmers of different farming systems such as Agriculture alone, Agriculture + Animal husbandry, Agriculture + Poultry and Agriculture + Pisciculture. The findings of the study will be helpful for the scientist in field of agriculture, pisciculture, animal husbandry and environmental concern. The same will also be helpful to the Extension workers as well as farmers for maintenance of good environment. The policy makers will also be careful in formulating the rules and regulations

for keeping balance of the nature as well as to find out ways for sustainable development that are environmentally sound, equitable and allow respect for individual and social rights as poorely planned development are environmentally destructive.

The result of the study suffer from the following limitations.

1. As it is a research conducted by single student, the time and other resources at the hands of the researcher are limited to some extent. This is the reason the study was conducted only four villages of two blocks.
2. The investigation was purely based on the verbal expression of respondents for which the correctness in getting the information was also limited to some extent.

ORGANISATION OF THESIS

The dissertation includes the chapters, viz., Introduction, Review of literature, Methodology, Results and discussion and Summary and conclusion, Bibliography and Appendices.

The first chapter i.e., " Introduction " deals with the problems objectives, the scope and limitations of the present study. The second chapter is devoted for the Review of literature, which covers the reviews of selected, important and related studies in the area of present

investigation. The third chapter " Methodology " deals with the locale of investigation, research design, selection of respondents, operationalization and method of measurement of the variables, techniques used for data collection, statistical tools used for analysing the data. The fourth chapter is devoted for the " Results and discussion " of the study. The fifth chapter covers the " Summary and conclusion " of the study followed by " Bibliography " and " Appendices ", respectively.

CHAPTER-II

REVIEW OF LITERATURE

REVIEW OF LITERATURE

A perusal of the earlier researches revealed that studies on " Dimensions of environmental pollution in different farming systems as perceived by the farmers " were quite limited. However, in this section, much attempt has been made to present brief reviews of available studies pertaining to environment, environmental pollution ; their importance and their effect on the rural life. These are presented under the following heads.

2.1 Importance of environment .

2.2 Environmental pollution and their effect on rural life.

2.3 Environmental pollution caused by different farming systems.

2.4 Relationship of different socio-economic characteristic of farmers with their awareness about environmental importance and pollution.

2.5 Suggestions of people for control of environmental pollution.

2.1 Importance of Environment :

New Encyclopaedia Britannica (1943-73), " Pollution is caused when a change in physical chemical or biological conditions in the environment harmfully affect the quality of human life, including effects on other animals and plant, industries and cultural and aesthetic assets ". Most pollution may be characterised as a production excess resulting from manufacturing or growing more than is to be consumed or as a result of discarding products after used.

D' Arge (1971) described the pervasive environmental changes accompanying the development of modern societies have wrought doubts regarding the insignificance of uncontrolled interdependencies between man and the natural environment. The economic act of production and consumption not only benefit man through his provision but simultaniously involve the creation of wastes with the potential of degrading his environment.

Thompson (1973) reported that ecological problems are very acute in U.S.A. He revealed this fact in his book that every inhabitant of U.S.A. causes 50 times greater damage to the environment than inhabitant of say India.

Gerasimov (1975) reported that the natural environment in which people pursue their everyday productive, domestic and. recreational activities as an integrated system of inter-connected physical object and natural phenomena, such as the relief, mountains rock formation, air, climate, water, soils, vegetation the animal kingdom which all interact with its technological components created by society.

Chandra Sekhar (1976) is of the opinion that the pollution of human environment is multi-dimensional. The ecological crisis is at once the most local and the most international of all man's concerns. The long struggle between man and nature has resulted in a multitude of both beneficient and harmful life style as well as infinite variety of environmental patterns. Man has tried to conquer environment. To man, the

environment has been a challange, something to alter and change, crush and overcome. He tried to adopt and adjust even partly to the inherent needs of nature. He could have lived in peace without disturbing nature's delicate balance and equilibrium.

Chauhan (1977) mentioned that the environmental problem as we see them today were not always so grave. In fact they illustrate what may be termed as a cumulative result of man's anti-life and adhoc activities over the past. A major chunk of these deeds are attributed to the modern man and his technology.

Mills (1978) is of the opinion that technology also creates environmental problems. Persistent pesticides such as DDT and supersonic air craft are product of modern technological progress whose environmental effects are of great concern. Atomic energy is undoubtedly the product of science and technology whose environmental effect have arosed the greatest anxiety.

Madhab (1982) defined the term environment by saying that the environment is simply, the totality of the world around us, including ourselves and our domesticated animals. It is a foolish mistake to think, as many people seem to that the environment means only rocks, rivers, vegetation, wild animals and industrial pollution the things which have been published. It is everything. The ecological saying that everything is related everything also is the foundation stone of environment studies.

Iyer's and Krishna (1984) comments is worth mentioning in this regard. " The unconscionable industrialization, the unpardonable deforestation and the human extremination of living species betray an exploitative brutality and anti-social apetite for profit and pleasure incompatible with humanism and conservationism. Today a bath in the Yamuna and Ganga is a sin against bodiely health, not a salvation for the soul so pulluted and noxious are these Holly water now ".

Sharma (1988) defined plant earth is sick, very sick. The symptoms of this plantery disease are all round - in our air, water and our food. The most alarming of the problems is man's assults upon the environment by contaminating the air, earth and water with dangerous and even lethal materials. This pollution of our environment is for the most part irrecoverable.

Environmental group, called friends of earth (1989) pointed out that the problem is that carbon dioxide - from burning coal and oil etc. is one of our biggest waste products. Power stations, cars, industry and agriculture all produce it in massive amounts. For more carbon dioxide is getting into the atmosphere than should naturally be there and result the green house effect increasing the earth is getting hotter. Burning of tropical forest as practised in developing country it actually adding more to the problem.

Manivasakam (1989) observed " the industrial revolution and our modern civilisation turns the air we breath into

a waster basket in which dust, noxious fumes, toxic gases, mist, odour and smoke are thrown.

Ansari (1989) stated that poverty is the fundamental cause which makes people over exploitable natural resources of the country like land, forest and water for meeting their basic needs for employment, for shelter, for fuel and fodder for their cattle.

Karpagam (1991) opined " Environmental economics mainly builds its theoretical foundation on welfare economics. Through environmental pollution society incurs significant cost by reducing the assimilative capacity of environment. These costs are external costs because the individuals and firms that use the waste assimilative capabilities of environment, are not changed for this use. They are in essence of the rest of the society. Such external costs are also called as spill over cost. It is in this sense that pollution becomes an externality ".

Nayak (1994) reported a study conducted by him showed that emission from NALCO, Angul have caused pollution of both soil and water of the surroundings areas. The extent of pollution with fluoride (F) decreased with distance from NALCO smelter plant. Fluoride content of leaves of trees, crop plant and paddy straw collected from these areas within 5 kms radius varied from 66 to 330 mg/kg (dry weight basis) compared to fluoride content of 10 to 26 mg/kg similar samples collected Bhubaneswar area.

2.2 Environmental pollution and their effect on rural life :

According to Encyclopaedia Britannica (1943-1973) " it is a form of environmental degradation and has implication for health that may be as serious as air or water pollution. It can change man's physiological sate by speeding up pulse and respiratory rates and it can impair hearing either permanently or temporarily ; millions of industrial workers are threatened with hearing damage ".

Dubes (1968) defined today's problems are different and far more intractable. Erosion of the land, the chemical pollution of air and water, the high level of noise light and other stimuli, the pervasive ugliness of industrial civilization, the inescapable pressures resulting from high population densities and mechanized life, all these phenomena have become critical only during recent decades.

Aschabaker (1973) reported pollution and degradation of ecosystem have assumed more importance owing to increased industrialisation. Industrial process has been directly or indirectly responsible for release of toxic pollutions in the environment of all pollutants which effect farm animals fluorine causes more severe and wide spread damage.

Perkins (1974) opined air pollution means the presence in outdoor atmosphere of one or more or more contaminants, such as dust, fumes, gas mist, odour, smoke or vapour in quantities, of characteristics and of duration such as to be injurious to

human, plant or animal life or to property, or which unreasonably interferes with the comfortable enjoyment of life and property.

Gerasimov (1975) mentioned some pullutants of air by saying that the earth's atmosphere continues to be contaminated with dust carbon dioxide, sulphurous compounds, lead, nitrogen oxides, shoot, pesticides. The carbon dioxide level in the atmosphere are rapidly growing which is likely to lead to great and even catastrophic changes in the earth's climate.

Hodges (1977) classified pollution into natural and artificial pollution. He mentioned some completely artificial pollutant i.e. chlorinated hydrocarbons (DDT and others) lead aerosols and substantially artificial are oil on oceans and phosphates in running water. He further mentioned some substantial contributions from natural sources i.e. hydrocarbon in the atmosphere, radiation and sulpher oxides in the atmosphere.

Hodges (1977) stated that domestic waste in rural areas must also be considered. Generally the waste water are disposed of in the ground through the use of pit privles, cesspool or septic tank. The main concern is to prevent contamination of ground water supplies or atleast to prevent contamination of wells from which drinking water is obtained.

Chauhan (1977) has expressed that it is man's sheer numbers which is the root cause of all pollution problem.

Hodges (1977) defined one of the most worrisome aspect of the increase in pollution is that human have now become a major factor in several of the great bio-geochemical cycles and may be causing irreversible change or irreparable harm without realizing it. These biogeochemical cycles are the circulation of various element through the biosphere (the past of the earth characterised by the existence of plant and animal life). The atmosphere, the hydrosphere (the earth oceans and waters) and the lithosphere (the solid part of the earth's surface). The most important human intervention may be in nitrogen cycle, because nitrogen fixation (the onservation of atmospheric nitrogen into organic nitrogen compound) by human through combustion process, fertilizer productions and cultivation of the nitrogen - fixing legumes may equal to the historical nitrogen fixation from natural sources such as terrestrial marine life and lighting.

Hodges (1977) opined that " Noises that affect a community include construction noises (especially in large cities in which some construction or repairing is usually going on) transportation noises from cars, trucks, motor cycles and air plane. Noise from power lawn mower power saw and noisy appliances.

Mills (1978) stated that both air and water pollution are complex in that many substances are discharged to the media and substances interact in complex and incompletely understood ways among themselves and with substances found naturally in media. People have much more flexibility and

discretion with respect to water. Water pollution is much more complex than air pollution in the sense that society has much more options about the quality and uses of water bodies than have about air quality.

Mohanty et al. (1978) stated as most of the packaging materials are made up of plastic, polythene, coir, nylon, leather materials, they remain undigested in the rumeno-reticulum of the cow causing serious patho-physiological changes and economic loss through fall in production.

Thanase and Sunderason (1980) regarded water pollution as a serious threat to Indian environment and it is due to industrial effluent and municipal sewage.

Crissman et al. (1980) opined although most fluoride emission from smelters is airbone, toxic contamination of soil, water and vegetation could occur not only in the industrial vicinity but upto a fairly distant place from the source of emission. Fluoride contamination of forage (pasture, grass timothy alfa-alfa) near an aluminium plant ranged from 14.9 to 22.5 ppm on dry matter basis. It is influenced by rainfall and distance to the source of pollution.

Madhav (1982) stressed that pollution is responsible for most of the physical problems of the environment and many of the social problem.

Pal (1982) stated " dust storms are a much too familiar recurring feature on the plains of northern India where in the hot summer months, particles of desiccated soil are carried high up in the air by winds and over considerable distances. Some of the best known examples of damage to land are found in north-eastern hill state ".

Khanna (1982) mentioned that with increased urbanisations and rapid industrialisation, the contamination of air poses a big menance. The emission of gases by the automobiles which are growing in number and burning of coal for fire or in factories for power generation, use of fire wood, cowdung etc. have contributed greatly to air pollution.

Dugar (1982) in his study on " Ecological and environmental problem in Rajsthan " quoted the preliminary survey which was conducted by the environmental cell of Gandhi Peace Founcation over fifteen millions liters of water mixed with harmful dye stuff, chemical, and acids, alkalies, metals, solvents etc. of dyeing and printing industry have already polluted quite a bit of ground water and a majority of wells and other water sources inducing the tubewells and hand pumps water of these souces cannot be taken as safe and fit for human consumption.

Jain (1988) reports water technology experts have estimated that large parts of India will go without water by the years 2025 A.D.

Ansari (1989) estimated that nearly 100 million hectares of land, almost one-third of total area have been affected by land degradation caused by soil erosion, salinity, alkalinity and wind erosion.

Pachauri (1989) gave some figure about carbon dioxide emissions produced cumulatively by different groups of countries in the past, he stated that between 1870 and 1986, roughly 65 per cent of the cumulative emissions of carbon dioxide from burning of fossile fuels come from the free market developed countries, while centrally planned economics and developing countries contributed roughly 20 and 15 per cent respectively.

Lag (1990) defined acidification of soil through pollution of atmosphers has been ascribed to deposition of sulphur compound, independent of precipitation. Sulphur contribute as high as 30 per cent in soil acidification.

Singh (1992) observed that the use of thresher create a number of problem (health hazard) in rural village and a large number of people face breathing problem and irritation in throat.

Singh (1992) observed the effect of noise pollution in rural life and found that noise pollution disturbed mental peace, student and patients. This menance has been increased due to technological advancement in the rural area.

Mathur (1993) opined coal mining which covers 3.47 million ha out of 328.8 million ha (0.1%) land area in India causes degradation of 0.38 million ha (0.0006%) land area in country.

Swarup (1995) many of the environmental pollutant undergo transformation to more hazardous forms to living being. Toxic element such as lead, arsenic, cadmum and fluoride and synthetic chemicals such as DDT and organo chlorine tend to accumulate in plants and animals affecting the health and physiology of living being. Similarly some of the pollutants are reported to be biomagnified in plant as a result of which their effect on living being is potentiated.

2.3 Environmental pollution caused by different farming system

Astranin and Blagosklonov (1978) - According to them the soil may be polluted when fertilizer and pesticides are incorrectly used and also by the waste of livestock breeding complexes.

Asogwa (1981) regarded chemicals extensive use in agriculture as posing a threat to human environment. Those at risk are mainly workers who are engaged in the application of chemicals.

Pal (1982) evaluated that effect of environmental pollution on agriculture according to his evaluation, of the direct effects of consequence to the environment, one could talk of pollution of water bodies from the run off of water

used for irrigation farm and field. This pollution is due to residual agricultural chemicals in the water being drain off which have been known to cause fish kills and other kinds of damage to a aquatic life.

Gupta (1988) said it is well know that hundreds of million of living organism including human and animal population exposed significantly to pesticide each year. Roughly 85 to 90 per cent of pesticides applied to crop never reach target organism, but disposed in the environment (air, soil and water) and contaminate both biotic and abiotic system. Several physio-chemical factors influence the persistance of pesticides.

Obian (1986) concluded that recycling of farm wastes through biogas plant relieves the farmer of problem of waste disposal and environmental pollution. According to him it also provides some relief for problems cause by high cost of three major inputs. Fertilizer, feed and fuel. By using integrated farming system that optimise the utilisation of farm wastes, the farmer reduces his production cost and increase his productivity.

Wadhwa and Malhotra (1988) indicated pesticides, the synthetic chemicals occupy a unique position among the many chemicals that man consumes daily unconsciously. Use of these chemicals in land, water management result in health hazard due to careless use, misuse and mishandling of pesticides. Finally, there can be acute and chronic toxicity in

mammales, livestock and wild life. So to maintain ecological balance, toxicological studies of pesticides must consider the problems relating to injurious effect of these chemicals on man and animals and also on environment.

Sharma (1988) revealed the role of agricultural machinary and pesticides. According to him our highly machanised agricultural operations dominated by extensive acreage of one particular crop encourages large no. of insect. As an insurance against damage by insect, vast quantities of insecticides are applied with little regard for what happens to the chemicals once it is on the land. The average use of pesticides in India is low (45 gm/hect) as against 14010 gms/hect in Japan. The CPPTI, Hyderabad, revealed that the various food items tested contained residue above permissible level (use of pesticides in high localised conditions). In another limited survey, it was found that proper care and attention is not given while using pesticides. In the third world, it is estimated that one person dies every minute due to pesticide poisoning.

Ellers (1989) reported acout the over use of fertilizer and manure in West Germany, he stated that the experts harbour no doubts that farmers are the worst polluters of West Germany's water supplies. Some 30,000 tonnes of highly poisonous pesticides and herbicides are sprayed on to the country's field each year. More toxins come from liquid mannure from cattle farms.

Millinship (1989) quoted the leading Soviet Green Professor Alexi Yablakov in his article " Green take root in the Kremlin ". According to Alexi Yablakov, the average for the Soviet Union as a whole is two kilos/hect a year. But are have regions where between 10 to 50 kilos are used. I know of one region where the figure is 200 kilos a year. And there is a strong, direct connection between heavy use of pesticides and ill health, mental and physical.

Khan et al. (1990) on an average methane production is estimated to be 200 lits/day for a 500 kg cow, 30 lits/day for 30 kg sheep, 8 lits/day for a 100 kg pigs. Indian cattle and buffaloes produce less amount of methane because of poor quality feed and fodder available to them. On an average a buffalo at maintenance level of feeding on wheat straw based ration generate only about 150 liters methane in day.

Khoshoo (1991) - The root cause of poverty or India's teeming millions can be traced to land degradation which assumes critical importance on account of the fact that agriculture, animal husbandry and other land based rural vocations are unable to generate and support employment for subsistence and landless farmer in rural area.

Pattnaik (1992) - Fertilizers, particularly rock phosphate and single super phosphate are known source of F which contain 3-4% and 2-4% F respectively. Application 100 lits of single super phosphate per acre increase the F contents of plough layer of soil by 7.5 ppm. Continuous use of single super phosphate also increases the cadmium(cd) content of soil.

Takkar et al. (1993) studies conducted over a period of 5-15 years in Punjab have shown that Cu. status of crops have declined not only because of increasing intensity of cropping but also due to excessive use of Nitrogenous fertilizers.

Web and Archer (1994) - Animal wastes and mannure contain both inorganic and organic pollutants capable of detoriorating water quality by increasing toxic contaminant and biological oxygen demand (BOD). Seepage of livestock waste content or derivatives is generally associated with increasing amount of Nitrate, Phosphate and Sodium Chloride. Animal manure and wastes contain variable amount of nitrogen (N) ranging from 1.5 kg/ton for cattle farm yard manure to 10 kg per ton for broiler and turkey litter.

Radostits et al. (1994) - The animal waste and manure which were considered environmentally safe are no longer regarded without risk or causing pollution and cow dung on pasture barn debris in large compost pile and pumping of slury on to pasture are not acceptable to environment protectionist any more.

2.4 Relationship of different socio-economic characteristic of farmers with their awareness about environmental importance and pollution

Mukherjee (1968) the pioneering human ecologist of India has pointed out the rural habitation, its structure and functions are mostly governed by ecology. He states that

variables of ecological complex or system have very state relationship with magic, worship, religion and change in agricultural pattern which bring change in social value. He also pointed out that ecological balance may be disturbed by the change in physical environment and the number of organism.

Desai (1961) - According to him, so far, no attempt has been made by sociologist in India to study the inter-relationship between ecological and social pattern of a rural community, whatever attempts have been made by the anthropologists and sociologists in the field of rural ecology, open new dimensions and emphasize the importance of taking up detailed studies in the field of rural human ecology.

Singh (1992) revealed that education is a very important factor which influences the mental capability of a person and observed that illiterate and low educated category group were unaware about environmental pollution on the other hand high educated category were fully aware about environmental pollution.

Singh (1992) observed that there is correlation between occupation and awareness about environmental pollution and found that a very large proportion farmer who were fully aware about environmental pollution were engaged in agriculture and business. On the other hand, the largest proportion those were unaware, were under the category of Agricultural labourer.

Singh (1992) observed that there is correlation between caste and awareness about environmental pollution and

found that higher caste people have a better understanding about their environment as compared to the low caste group people.

2.5 Suggestion of people for control of environmental pollution :

Hollingshead (1953) focus in the study of human communities emerged with the use of the ecological approach.

Howley (1968) broadned the scope of environment by covering both social as well as natural components of environment. According to him, the application of the concepts from plant and animal ecology to human community carried with it, the implication what the community was essentially a natural phenomenon.

Platt and Griffiths (1972) stated that modern civilization is already excercising its tremendous potential to alter our environment, too frequently in adverse ways's on regional and even global scales. For the continued development and even survival of civilization man must bend every effort to understand and better use his environment.

Palmer (1974) described the development is likely to involve major changes in the pattern of use and management of land and other resources and an increase in the amount of pollutants released into the environment. The problem is to determine what changes and what amounts of increase in pollutant are acceptable, both in particular instances and on a global scale.

Hodges (1977) stated that environmental pollution is the unfavourable alteration of our surroundings through direct or indirect effects of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organism. These changes may effect human directly or through their supplies of water and of agricultural and other biological products, their physical objects or possessions or their oppertunities for recreation and appreciation of nature.

Khozin (1979) is of the opinion that environment is damaged because of irrational use of our planet's resources and organising production is such way. He further, advanced his opinion that protecting nature, making rational use of scientific advancement and technology for the welfare of mankind.

Pal (1982) stated that it is of the most importance that life support systems embracing air, water and land and the tremendous diversity of life, are preserved even though there is need for undertaking development on a vast scale to satisfy the increasing needs of human being. Erosion of land resources, pollution of air, water and even the soil, deforestation on a scale never before witnessed in history and many other activities are taking place which are severely damaging the environment and its resources. Unless development is so planned as to be sustainable the future appears to be very bleak.

Prasad (1989) stated in his article that Indian faces serious problem of environmental pollution. Water pollution for untreated community and industrial wastes flowing into our river and streams, increasing use of fertilizer and pesticides, dumping of organic wastes and in organic wastes are issues that need to be tackled on priority. Air pollution long regarded as the bane of industrialised nation looms large over our country.

Prasad (1989) postulated that forest play an important role in maintaining environmental stability and in supplying essential requirement of people on a renewable basis. Over the year, the forests have suffered depletion due to relentless pressures arising from increasing demand for fuel wood, fodder and timber, inadequacy of protection measures, diversion of forest land to non-forest uses and the tendency to look upon forest as a revenue earning resource.

Gowda (1992) opined " Development must not be at the cost of nation's life supporting ecosystem comprising soil, water flora, fauna and other natural resources. Environment protection is thus a new dimension of development which can not be overlooked ".

Rath and Mchanty (1994) observed that most important suggestion as expressed by the non-school and school going adolescents in order of rank were teaching about environmental pollution in school, maintenance of gap between residential house and cattle shed, enforcement of anti-pollution law, use

of natural product in lieu of chemicals/pesticides, removal of city slums, encouraging the role of voluntary organisation in checking environmental pollution, banning air horns and loudspeakers, taking a lead role for checking of environmental pollution, construction of drainage channels in village/towns, checking of industrial waste and other debrishes, organisation of environmental protection club in every village lastly through check of automobile emissions. Further, they have stated that " Education is considered as the chief vehicle for maintaining and transmitting the basic values on which the cohesion of our future society depends. Education should also fulfil its role in promoting environmental protection through creating awareness among the adolescents and utilising resources for environmental monitoring. This awareness towards environmental pollution will certainly help to develop comprehensive social and economic objective to ensure the success of environmental programme ".

CHAPTER-III

RESEARCH METHODOLOGY

RESEARCH METHODOLOGY

The procedure in selection of village, sampling, empirical measurement of different concepts and variables, devices used for collection of data and statistical analysis of data are described in this chapter under the following heads.

3.1 Locale of the study :

The present study was conducted in the purposively selected Cuttack district of Orissa State. The selection of district was purposively because, most of the farmers of the district are progressive and adopting intensive method of cultivation of different crops as well as different farming system and prone to high environmental pollution etc.

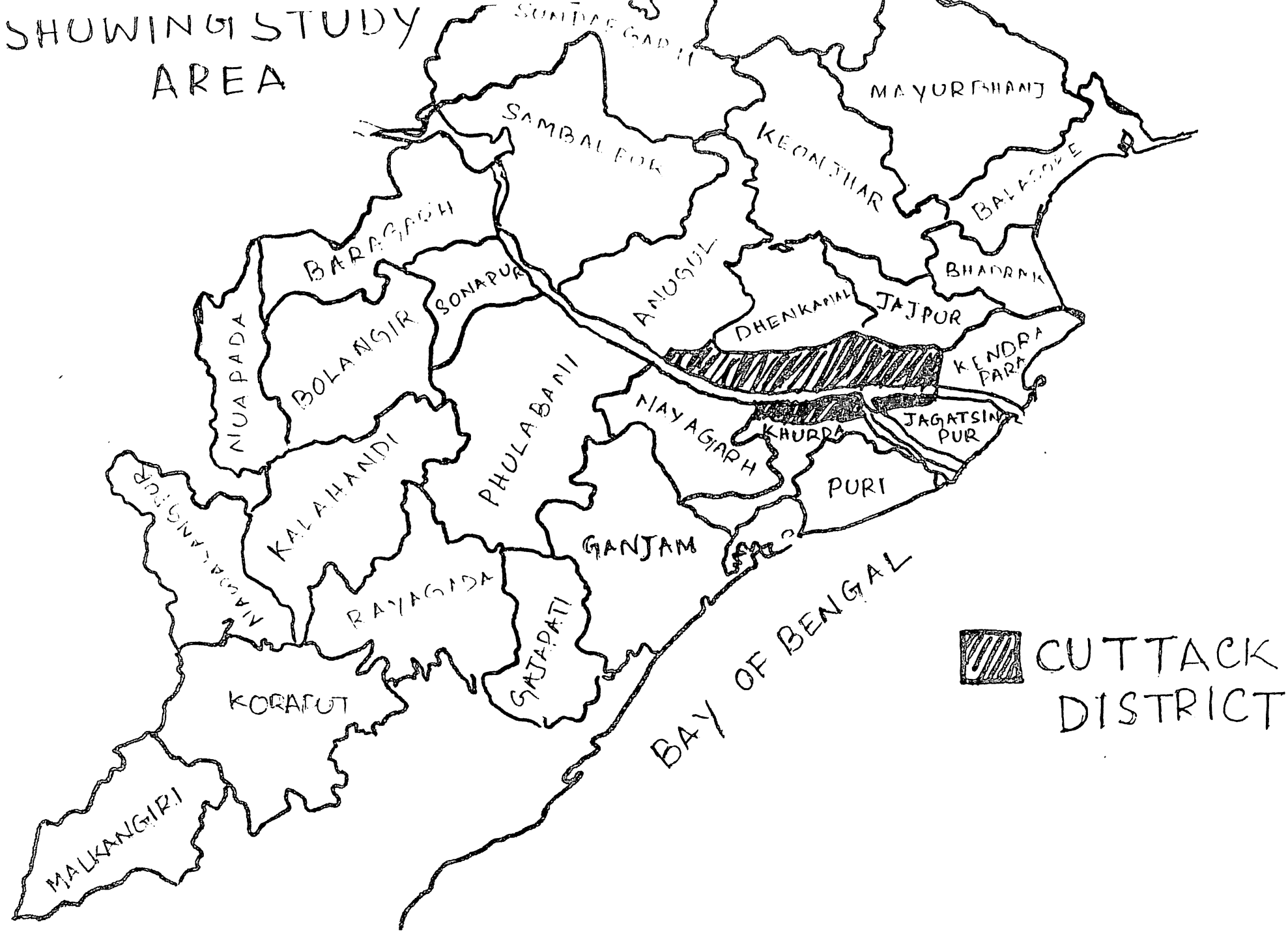
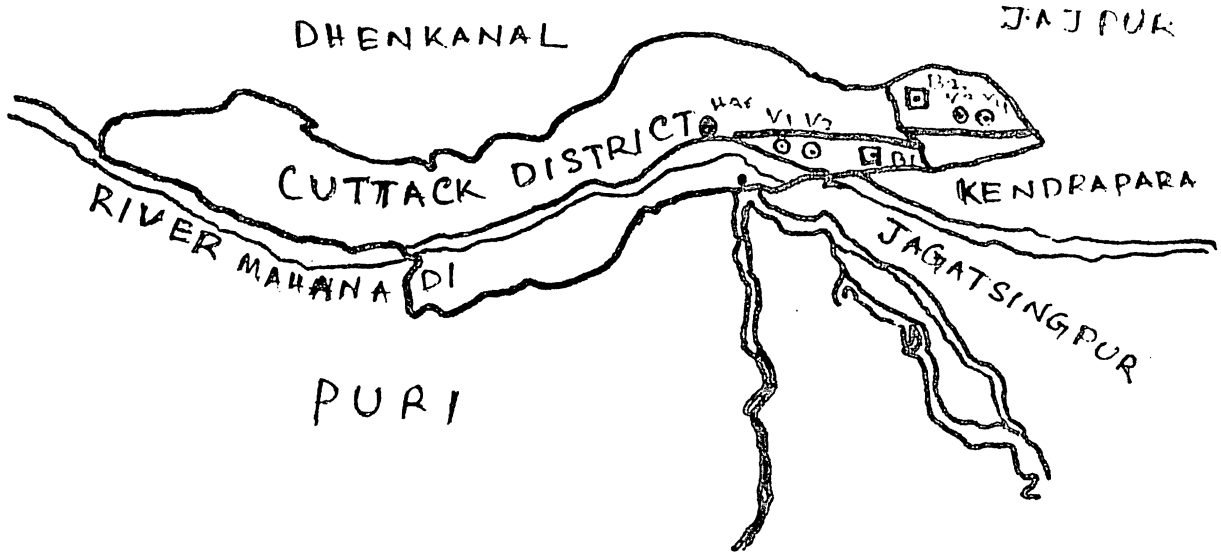

SHOWING STUDY AREA
SUNDARGARH
SAMBALPUR
MAYURBHANJ
KEONJHAR
BALASORE
BARAGARH
SONAPUR
ANUGUL
BHADRAK
DHENKANAL
JAJPUR
NUAPADA
BOLANGIR
KENDRA PARA
PHULABANI
NIAYAGIARH
JAGATSINGH PUR
KHURDA
KALAHANDI
PURI
GANJAM
RAYAGADA
GAJAPATI
KORAPUT
MALKANGIRI
BAY OF BENGAL
CUTTACK DISTRICT

FIG.- 1(b)

MAP OF CUTTACK DISTRICT
SHOWING STUDY AREA



⊡ BLOCK
B1 – SALIPUR
B2 – MAHANGA

⊙ – VILLAGE
V1 – BHAIRIPUR
V2 – GUNJARPUR
V3 – GOTARA.
V4 – OSTAPUR.

Two blocks were selected randomely out of 16 blocks of Cuttack district. The blocks were Salipur and Mahanga. Further, from each of the block, two villages were selected by the method of random sampling technique to avoid biasness. The villages were Bhairipur and Gunjarpur of Salipur Block and Gotara and Ostapur located in Mahanga Block (Fig. 3.1). The basic informations about the village have been given in Appendix - II .

3.2 Population of the study :

A preliminary survey was conducted by the researcher in which it was found that four farming systems viz., Agriculture alone, Agriculture with Animal Husbandry, Agriculture with poultry and Agriculture with Pisciculture were commonly adopted by a majority of farmers of the selected four villages. These farmers constituted the population of the present study.

3.3 Selection of respondents :

Twenty five respondents from each of the four farming systems were selected randomely from four villages. As the number of farmers in four villages were unequal, a proportionately 10% of farmers from each villages were selected keeping four different farming systems in mind. Ultimately seven farmers each from village Bhairipur, 5 farmers each from Ganjarpur and Gotara and 8 farmers each from village Ostapur were selected from four different farming systems.

3.4 Research design :

Survey method design was adopted for the present study. According to Mulay and Sabarathanam (1980), the term survey applied to a wide variety of investigation such as classical poverty surveyes Gallop Polls in United States or social condition of rural poors or fact-finding study of mutrition etc. The survey is concerned with examining the nature of and relationship among demographic characteristics, social condition and activities and attitude of the people. The surveyes are always carried out in a field situation. They could be either descriptive or analytical (diagnostic). It needs a combination of techniques which are standardized and which cover a large representative sample. A good survey design includes information on necessary matching characteristics and a carefully thought out classification of stimulus and effect variables.

3.5 Operationalization of concept used in the study :

Kerlinger (1964) pointed out that operational definitions are indispensable ingredient of scientific research because they enable the researcher to measure the variables and they are the bridge between the Theory-hypothesis construct level and the level of observation. The operational definition of some of the concepts used in the study are as follows :

Environment - Environment is the totality of world around us, including plant and domesticated animals. Environment is environ + ment, the action of environing, the state of being environed. The condition under which any person or things lives or is developed. The sum total of influences which modify and determine the development of life or character.

Environmental pollution - Environmental pollution is caused when a change in physical, chemical or biological condition in the environment, harmfully effect the quality of human and also other animals and plants, industries and cultural and aesthetic assets.

Farming system - The farming systems rerers to the combination of different enterprises viz., crop husbandry, animal husbandry, pisciculture, apiculture, mushroom culture etc. by the farmers for getting higher return.

Major enterprises - Major enterprises are those enterprises which gives major source of income to the farmers.

Minor enterprises - Minor enterprises are those enterprises which gives the income next to the major enterprises to the farmers.

3.6 Measurement techniques :

3.6.1 Identification of different farming systems :

A preliminary survey was conducted to find out different farming systems adopted by people of selected villages. It was observed that four different farming

systems were practised by the farmers. The farming systems were Agriculture, Agriculture + Animal husbandry, Agriculture + Pisciculture and Agriculture + Poultry. Emphasis was given on all the four systems for selecting the sample respondents.

3.6.2 Awareness of farmers about the environmental importance

In order to find out the awareness of farmers of different farming systems about importance of environment, a list of twelve statements on the importance of environment was prepared. The respondents were asked to indicate their awareness about each of the statements. The response categories along with the scoring patterns were as follows :

Sl.No.	Categories	Score assigned
1	Not known	0
2	Known	
	(a) Listen from friends	1
	(b) Reading books	2
	(c) Experienced	3

After getting the response of the respondents of four different farming systems, the total score as well as mean score for each of the statements were computed. Further, the total score and mean score was computed by taking all the

respondents of different systems taken together. Finally each statement were ranked for getting a clear understanding about different aspect of environmental importance.

Further, in order to find out the extent of awareness of farmers about importance or environment the total score for each of the respondent was computed by taking all the statement on environmental importance together. Then, the respondents of different farming systems were categorised into three categories by taking mean and standard deviation. The categories were as follows .

Sl.No.	Awareness categories	Criteria
1	High awareness	More than mean + 1 S.D.
2	Medium awareness	In between mean ± 1 S.D.
3	Low awareness	Less than mean - 1 S.D.

3.6.3 Awareness of farmers about the different dimensions of environmental pollution

In order to assess the awareness of farmers about the different dimensions of environmental pollution, statements were prepared in consultation with experts and specialists on three major dimensions such as water pollution, soil/land pollution and air pollution. The number of statements under each dimensions were 7, 7 and 16 respectively. The respondents were asked to indicate their awareness on each of the statements.

The response categories as well as scoring patterns were as follows .

Sl.No.	Categories	Score assigned
1	Not known	0
2	Known	
	(a) Listen from friends	1
	(b) Reading books	2
	(c) Experienced	3

After getting the response of respondent of different farming systems, the total awareness score as well as mean awareness score of each of the statements were computed. Finally, the total awareness score and mean awareness score was computed by taking all the farmers of different farming systems together. Finally, each of the statements were ranked for getting a clear understanding of different dimensions environmental pollution.

Further, in order to find out the extent of awareness of farmers towards the dimensions of environmental pollution, total awareness score for each of the respondents was computed by taking all the 30 statements together. Then the respondents were categorised into three categories by taking mean and standard deviation. The categories were as follows.

Sl.No.	Awareness categories	Criteria
1	High awareness	More than mean + 1 S.D.
2	Medium awareness	In between mean ± 1 S.D.
3	Low awareness	Less than mean - 1 S.D.

3.6.4 Perception of farmers on different sources of pollution and their effect on rural life

In order to determine the perception of farmers in different farming systems on different sources of pollution and their effect on rural life, five different broad areas on farming systems were identified through reviewing the related literature. The areas were Agriculture - Intensive cultivation, pollution caused by dairy, pollution caused by poultry, pisciculture and health hazard by pollution due to adoption of different farming systems. Further, an exhaustive list of statements under each of the broad areas were identified in consultation with experts and specialist in the related field. Accordingly, 12, 6, 4, 2 and 16 statements were collected in the areas of Agriculture-Intensive cultivation, pollution by dairy, poultry, pisciculture and health hazards, respectively.

The response was collected from the farmers about their perception on each of the statements in the following order.

Sl.No.	Response categories	Score assigned
1	Disagree	0
2	Undecided	1
3	Agree	
	(a) I feel	2
	(b) Listening and reading	3
	(c) Experienced	4

After getting the scores for each item, total perception score (TPS) as well as mean perception score (MPS) for each of the farming systems as well as all the farming systems taking together was computed. Finally, they were ranked on the basis of means perception score for getting clear understanding.

3.6.5 Measurement of personal and socio-economic profile

The Table 3.1 below gives a picture about different personal and socio-economic variables used in the study along with their empirical measurement.

Table 3.1 : Personal and socio-economic variables used in the study and their empirical measurements

Variable No.	Variables	Instruments used
Personal and socio-economic variables		
X_1	Age	Schedule developed for the study
X_2	Educational Status	-do-

Contd....

Table 3.1 Contd.....

Variable No.	Variables	Instruments used
X_3	Sex	Schedule developed for the study
X_4	Caste	-do-
X_5	Family type	-do-
X_6	Occupation	-do-
X_7	Annual income	-do-
X_8	Mass media participation	-do-
X_9	Social participation	-do-
X_{10}	Extension participation	-do-
X_{11}	Extension contact	-do-

X_1 Age :

In the present study age was opertionalised as the actual age of the respondent in completed years at the time of the study i.e. September, 1996. After observing the distribution of the respondents according to their age they were catagorized into four categories as follows.

Sl.No.	Age group
1	Upto 40 years
2	41 - 50 years
3	51 - 60 years
4	Above 60 years

X_2 Educational status :

Educational status refers to the educational attainment of the respondents at the time of the study. The respondents were categorised into four categories according to their educational status. The scoring pattern for each of the categories were as follows .

Sl.No.	Categories	Score
1	Illiterate	1
2	Upto primary	2
3	Upto matric	3
4	Above matric	4

X_3 Sex :

Sex refers to identification of respondent as male and female. The scores assigned to each of the categories are as follows.

Sl.No.	Categories	Score
1	Female	1
2	Male	2

X_4 Caste :

Caste refers to the social position of the respondent by birth. The respondents were categorised in to two categories viz., lower caste and higher caste. The

respondents belonging to Brahmin, kshetriya and karan by caste were considered as higher caste. The respondents other than the above caste were considered as lower caste in the present study. The scoring pattern for the caste were as follows.

Sl.No.	Categories	Score
1	Lower caste	1
2	Higher caste	2

X_5 Family type :

Family type in the present study refers to whether the adult member of family were living in jointly or nuclear family and they were categorised into two catagories according to their family type. The scoring pattern were as follows.

Sl.No.	Categories	Score
1	Nuclear	1
2	Joint	2

X_6 Occupation :

Occupation in the present study refers to from which source the respondents earned and sustain their livelihood and were catagorised into five categories. The scoring pattern for each of the categories were as follows.

Sl.No.	Categories	Score
1	Agril. labour	1
2	Agril. & business	2
3	Agril. & service	2
4	Any other	2
5	Agril. and allied activities	3

X_7 Annual income :

Annual income in the present study refers to the total income of the respondents from all sources in a year. They were categorised into five categories according to their total income in a year. The scoring pattern for each of the categories were as follows.

Sl.No.	Categories	Score
1	Upto Rs. 15,000/-	1
2	Rs. 15,000 to 30,000/-	2
3	Rs. 30,000 to 45,000/-	3
4	Rs. 45,000 to 60,000/-	4
5	Above Rs. 60,000/-	5

X_8 Mass media participation :

Mass media participation in the present study refers to the frequency of listening and reading habit of the respondent to the different mass media like newspaper, farm magazine and literature of environment concern, books on agriculture and environment, radio and television. The scoring pattern of listening and reading habit of respondents to mass media were as follows.

Sl.No.	Frequency of reading/ listening habit	Scoring pattern
1	Regularly	3
2	Often	2
3	Rarely	1
4	Never	0

Finally the total score for mass media participation was computed for each of the respondents by summing up the scores for each of the mass medium. The maximum and minimum possible score for this variable ranges from 15 - 0. After obtaining the total score, the respondents of each of the farming systems were categorised into three categories by taking mean and standard deviation as follows.

Sl.No.	Categories	Criteria
1	High participation	More than mean + 1 S.D
2	Medium participation	In between mean $\pm$ 1 S.D
3	Low participation	Less than mean - 1 S.D

X_9 Social participation :

Social participation in the present study refers to the active-passive involvement of respondent in different organisations present in their locality and were categorised into four categories. The scoring pattern for each of the categories were as follows.

Sl.No	Categories	Score
1	Not member of any organisation	1
2	Member of one organisation	2
3	Member of more than one organisations	3
4	Office bearer	4

Further, the respondents were categorised into two categories depending upon their membership in different organisations. The respondents who are not member of any organisation were included under low social participation category which others were included under high social participation category. The frequency distribution for each of the categories were finally computed.

X_{10} Extension participation :

Extension participation in the present study refers to the frequency of participation of respondents in attending different extension programmes such as short training programmes, training courses, discussion, meetings,

field visits, demonstrations, film shows, field days, exhibitions and study tours etc. The scoring pattern for the frequency of participation in different extension programmes were as follows.

Sl.No.	Frequency of participation	Score assigned
1	Regularly	3
2	Often	2
3	Rarely	1
4	Never	0

The total score for each of the respondents was calculated by adding the frequencies of participation over different extension programmes. The minimum-maximum possible score ranged from 0 - 30. Lastly, the respondents were categorised into three categories for each of the farming systems depending upon their extension participation by taking mean and standard deviation as follows.

Sl.No.	Categories	Criteria
1	High participation	More than Mean + 1 S.D
2	Medium participation	In between mean $\pm$ 1 S.D
3	Low participation	Less than mean - 1 S.D

X_{11} Extension contact :

Extension contact in the present study refers to the frequency of contact of the respondent with the extension personnel like Village Level Extension Officer, Block level Extension Officer, District level Extension Officer and state level Extension Officers. The weightage given for contacting different extension personnel were as follows.

Sl.No.	Extension personnel	Score assigned
1	Village level Extension Officer	1
2	Block level Extension Officer	2
3	District level Extension Officer	3
4	State level Extension Officer	4

Further, the scoring pattern for frequency of contact with extension personnel were as follows.

Sl.No.	Frequency of extension contact	Score assigned
1	Regularly	3
2	Often	2
3	Rarely	1
4	Never	0

Finally, the total score for each of the respondents on their extension contact was computed by multiplying their frequency of contact with the score assigned to different level of extension officers. The minimum-maximum possible score ranges from 0 to 12. The respondents were categorised into three categories as high, medium and low extension contact by taking mean and standard deviation as follows.

Sl.No.	Categories on extension contact	Criteria
1	High	More than Mean + 1 S.D
2	Medium	In between Mean ± 1 S.D
3	Low	Less than mean - 1 S.D

3.6.6 Suggestions of farmers for the control of environmental pollution

A list of thirteen statements with respect to different aspects on control of environmental pollution was prepared in consultation with the experts in the related field. The respondents were asked to indicate the degree of importance to all these statements in a 6 point scale viz., not important, least important, less important, important, more important and most important. The scoring pattern were 0, 1, 2, 3, 4 and 5 , respectively.

After getting the response from the respondents, the mean score for each of the statement was calculated for the four farming systems separately. Finally the mean score for each statements was also computed by taking all the farming systems together after which ranking was done in order to find out the important suggestions in order of degree of importance.

3.7 Construction of interview schedules and data collection

The interview schedule was prepared keeping all the objectives in mind. In the first part of the interview schedule the different personal and socio-economic profile of the respondent viz., age, education, caste, sex etc. were collected. While in the second part, the awareness about environmental importance, dimension of environmental pollution, perception of farmers about different sources of pollution in different farming systems and their effect on rural life was collected. Lastly, the suggestion of farmers in order of degree of importance was collected.

The data were collected by the researcher himself during September, 1996 by personal contact with the farmers. Firstly a good rapport was built up with the farmers which facilitated the researcher to ask question freely and discussed any matter pertaining to the study and to record information received from the respondents. The schedule was retranslated to local language i.e. Oriya to facilitate the researcher for data collection.

3.8 Statistical methods used for analysing the data

The different statistical tests used for analysing data in the present study were as follows.

3.8.1 Percentage :

Percengages of respondent with respect to different character to facilitate for interpretation and comparision.

3.8.2 Mean score :

The mean score was computed in order to draw the inference pertaining to different characters.

3.8.3 Standard deviation :

The standard deviation was computed to categorise the respondents according to their different characters under study.

3.8.4 Ranking :

The rank was assigned to the different dimension of environmental pollution by calculating the mean score. The Ist rank was given to the statement having highest mean score. Similarly, second to the statement having next mean score and so on. It was used in order to rank the different dimensions of environmental pollution as perceived by the farmers of different farming systems.

3.8.5 Spearman rank co-rrelation Test :

The Spearman rank co-rrelation test (r_s) was applied to find out the relationship between the different

personal and socio-economic characteristics with the awareness of farmer of different farming systems. The r_s is a measure of association which requires that both the variables be measure in atleast an ordinal scale so that the objects or individuals under study may be ranked in two ordered series (Siegel, 1956).

3.8.6 Kendall co-efficient of concordance :

The Kendall co-efficient of concordance (W) test was used for determining association among the ranking by farmers of different farming systems.

When we have K- sets of ranking, we may determine the association among them by using the Kendall co-efficient of concordance (W). Such a measure may be particularly useful in studies of inter judge or inter test reliability and also has application in studies of clusters of variables (Siegel, 1956).

CHAPTER-IV

RESULTS AND DISCUSSION

RESULTS AND DISCUSSION

The results of the study have been presented and discussed in this chapter under the following heads.

4.1 Nature of different farming systems adopted by the farmers.

4.2 Awareness of farmers about the environmental importance.

4.3 Awareness of farmers about different dimensions of environmental pollution.

4.4 Perception of farmers of different farming systems on different sources of pollution and their effect on rural life.

4.5 Relationship of personal and socio-economic characteristics of farmers with the extent of their awareness about the environmental pollution.

4.6 Suggestions/opinion of farmers in different farming systems for control of environmental pollution.

4.1 Nature of different farming systems adopted by the farmers

Table 4.1 indicates that mostly four types of farming systems were adopted by the farmers in the selected villages. The farming systems were Agriculture, Agriculture + Animal husbandry, Agriculture + poultry and Agriculture + pisciculture.

Table 4.1 Farming systemsadopted by the farmers

Farming system	Bhairipur		Gunjarpur		Gotara		Ostapur		Total	
	f	%	f	%	f	%	f	%	f	%
a. Agriculture (FS-I)	7	28.0	5	20.0	5	20.0	8	32.0	25	25.0
b. Agriculture + Animal Husbandry (FS-II)	7	28.0	5	20.0	5	20.0	8	32.0	25	25.0
c. Agriculture+ Poultry (FS-III)	7	28.0	5	20.0	5	20.0	8	32.0	25	25.0
d. Agriculture + Pisciculture (FS-IV)	7	28.0	5	20.0	5	20.0	8	32.0	25	25.0
Total	**28**	**28.0**	**20**	**20.0**	**20**	**20.0**	**32**	32.0	**100**	**100.0**

It was found that 28 per cent of total 25 respondents from village Bhairipur, 20 per cent from Gunjarpur, 20 per cent from Gotara and 32 per cent from village Ostapur have been distributed in above 4 types of farming system. Out of total 100 respondents 28 respondents from Bhairipur, 20 each from Gunjarpur and Gotara and 32 respondents from Ostapur have been distributed in four different farming systems.

The possible reason for adoption of different farming systems might be that the difference in the economic condition compels an individual for adopting different systems for getting higher return.

4.2 Awareness of farmers about environmental importance :

In this section, an attempt was made in order to find out the awareness of farmers about the importance of the environment. It was revealed from Table 4.2 that the awareness of farmers with respect to " clean water is necessary for good health" was maximum as indicated by the farmers of farming systems - I which got a mean score of 1.68. The same item also judged as maximum awareness by the farmers of farming systems-II and IV which got a mean score of 2.28 and 1.64, respectively. The awareness was maximum with respect to " maintenance of sanitation leads to healthy environment " as expressed by the farmers of farming systems-III which got the mean score of 2.12 . When all the farmers were taken together, awareness on

Table 4.2 Awareness of farmers about the importance of environment

Sl. No.	Statements on environmental importance	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
		MS	Rank	MS	Rank	MS	Rank	MS	Rank	MS	Rank
1.	Clean water is necessary for good health	1.68	I	2.28	I	1.92	II	1.64	I	1.88	I
2.	Healthy air is required for good health	1.40	II	2.16	II	1.56	III	1.48	I	1.65	II
3.	Maintenance of sanitation lead to health enviornment	1.20	IV	2.04	III	2.12	I	1.24	V	1.65	III
4.	Environment consists of land, air, water, flora and fauna around us	1.40	III	1.64	V	1.36	IV	1.48	III	1.47	V
5.	Good soil condition is required for maintaining good environment	1.00	V	1.72	IV	0.96	VI	0.96	VI	1.16	V
6.	Environmental pollution causes different diseases in human being & animals	0.60	VII	1.56	VI	0.92	VII	1.36	IV	1.11	VI
7.	Planting of trees help in restoration of environment	0.68	VI	1.52	VII	1.08	V	0.92	VII	1.05	VII
8.	Global warming is the cause of environmental pollution	0.52	VIII	0.88	IX	0.40	IX	0.72	VIII	0.63	VIII
9.	About noise pollution	0.24	X	1.04	VIII	0.60	VIII	0.52	X	0.60	IX
10.	Pollution causes ozone layer depletion	0,32	IX	0.52	X	0.40	X	0.64	IX	0.47	X
11.	Soil is degraded due to environmental pollution	0.20	XI	0.12	XI	0.32	XI	0.52	XI	0.29	XI
12.	Impurities in rain water is increasing due to environmental degradation	0.20	XII	0.12	XI	0.08	XII	0.36	XII	0.19	XII
	Total --	**9.44**		**15.60**		**11.72**		**11.84**		**12.15**	

N.B.= M.A.S = Mean awareness score **W = $0.61^{N.S.}$**

environmental importance was maximum on " clean water is necessary for good health " which got a mean score of 1.88 and rank I.

Further, it was observed from the same table that the awareness was minimum on " impurities in rain water is increasing due to environmental degradation" by the farmers of all the four farming systems, which got a mean score of 0.20, 0.12, 0.08 and 0.36, respectively. When all the farmers were taken together the awareness was also low over the same item which got a mean score of 0.19 and rank XII. The same table indicates, the diffrence in awareness about the environmental importance as judged by farmers of diffcrent farming systems separately as well as together.

The result of Kendall co-efficient of concordance (W) indicated that there was no difference with respect to the judgement by farmers of different farming systems over the items of environmental importance. It might be due to the fact that the farmers of diffcrent farming systems know about the diffcrent aspects of environmental importance.

The possible reason for getting such type of result that people use clean water for different purposes. Most of the people know that clean water is very much essential for drinking and cooking purposes. This might be the possible reason for which the awareness is maximum with

respect to item " clean water is necessary for good health " got highest mean score as well as rank. Secondly, the item " impurities in water is increasing due environmental degradation" got the lowest mean score as well rank by the farmers of different farming systems. It might be due to the fact that most of the people do not know about impurities present in rain water due to ignorance.

Again, an attempt was made to find out the extent (degree) of awareness of farmers of different farming systems about the environmental importance. It was revealed from Table 4.3 that out of total farmers of farming system -I, 44 per cent were found to be within medium awareness category. Twenty per cent and 36 per cent of them belonged to high and low awareness categories respectively. In farming system - II, it was observed that 12 per cent, 72 per cent and 16 per cent of the farmers were found to be belonged to high, medium and low awareness categories, respectively. In case of farming system-III, 20 per cent, 72 per cent and 8 per cent were belonged to high, medium and low awareness categories, respectively. Twenty four per cent, 64 per cent and 12 per cent of farmers of farming system - IV, were found to be within high, medium and low awareness categories, respectively. Finally, when all the farmers of different farming systems were taken together, it was observed that a majority of them i.e., 63 per cent belonged to medium awareness category while 19 per cent and 18 per cent of them were belonged to high and low awareness categories, respectively.

Table 4.3 . Extent of awareness of farmers about the importance of environment

Awareness categories	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
High	5	20.0	3	12.0	5	20.0	6	24.0	19	19
Medium	11	44.0	18	72.0	18	72.0	16	64.0	63	63
Low	9	36.0	4	16.0	2	8.0	3	12.0	18	18
Total - -	25	100.0	25	100.0	25	100.0	25	100.0	100	100

4.3 Awareness of farmers about different dimensions of environmental pollution

In order to find out the awareness of farmers about different dimensions of environmental pollution, the respondents farmers were asked about their awareness on broadly three aspects of pollution viz., water pollution, soil/land pollution and air pollution. In case of water pollution, the farmers of farming system - I have high degree of awareness about " pollution water by use of pesticides in crops " which got mean score of 2.2 and got rank I. The awareness about water pollution is highest with respect to the same item as judged by farmers of farming systems II and III. They got a mean score of 2.52 each which also got rank I. " Water pollution by bathing of man and animal " and pollution of water by use of detergents, were considered as mostly known by the farmers of farming system IV which got rank I and mean score of 1.72. Finally, when all the farmers of different farming systems were taken together, it was found that " pollution of water by use of pesticides in crops " was mostly known by the farmers which got a mean score of 2.22 and rank I.

Further, it was revealed from Table 4.4 that " pollution of water by the release of garbages to the ponds and rivers " was least aware by the farmers of different farming systems which got a mean score of 0.56 and got rank VII. The other items occupied the intermediate position which could be revealed from the Table 4.4 .

Table 4.4. Awareness of farmers about the different dimensions of environmental Pollution

Statements on different dimensions of environmental pollution	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	MS	Rank	MS	Rank	MS	Rank	MS	Rank	MS	Rank
1	2	3	4	5	6	7	8	9	10	11
WATER POLLUTION										
1. Water is polluted by excess use of pesticide in crop	2.2	I	2.52	I	2.52	I	1.64	III	2.22	I
2. Bathing of man and animal causes water pollution	1.68	II	2.32	III	1.48	II	1.72	I	1.80	II
3. The excreta of man and animal causes water pollution	1.40	IV	2.48	II	1.32	IV	1.48	IV	1.67	III
4. The detergent used for cleaning, pollute the water	1.52	III	1.72	V	1.48	III	1.72	II	1.61	IV
5. Water is polluted by excess use of chemical fertilizer in crop	0.84	V	1.76	IV	0.84	V	1.48	V	1.23	V
6. Industrial effluents pollute water	0.36	VI	0.72	VII	0.56	VI	0.68	VII	0.58	VI
7. Release of garbages to ponds and river pollute water	0.36	VII	0.76	VI	0.52	VII	0.60	VII	0.56	VII
Total –	**8.36**		**12.28**		**8.72**		**9.32**		**9.67**	
								W =	$0.523^{N.S.}$	
SOIL/LAND POLLUTION										
1. Excess use of Nitrogenous fertilizer in crop pollute the soil	2.8	I	2.16	I	2.32	I	1.8	I	2.27	I
2. Soil borne pathogens, virus bacteria etc pollute the soil	0.64	IV	1.48	II	0.64	III	0.88	II	0.91	II

Contd.....

1	2	3	4	5	6	7	8	9	10	11
3. Sewage material pollute the soil	1.0	II	1.24	III	0.40	IV	0.80	III	0.86	III
4. Pestcide pollute the soil	0.72	III	0.76	IV	0.84	II	0.48	IV	0.70	IV
5. Soil is polluted by industrial and urban waste	0.24	V	0.52	VI	0.28	V	0.48	V	0.38	V
6. Use of herbicides pollute soil	0.12	VI	0.56	VI	0.24	VI	0.08	VI	0.25	VI
7. Excess use of phosphatic fertilizer causes pollution in soil	0	VII	0.20	VII	0.04	VII	0	VII	0.06	VII
Total --	**5.52**		**6.92**		**4.76**		**4.52**		**5.43**	
								W =	$0.483^{N.S.}$	
AIR POLLUTION										
1. Decomposed animal dead bodies causes air pollution	2.0	I	1.96	II	2.84	I	1.88	I	2.17	I
2. Buring of bi-products of different crops causes air pollution	1.80	III	2.76	I	2.12	III	1.84	II	2.13	II
3. Burning of wood, cowdung and other garbages pollute the air	1.84	II	1.84	IV	2.84	II	1.84	III	2.10	III
4. Noises caused by use of loudspeaker pollute the air	1.74	IV	1.84	V	1.92	IV	1.80	IV	1.74	IV
5. Respiration of man and animal that releases Co_2 to the air, causes air pollution	1.40	V	1.28	VIII	1.32	V	1.48	V	1.37	V
6. Emission of automobiles pollute the air	1.32	VI	1.32	VII	1.20	VI	0.88	VII	1.18	VI
7. Use of pesticide/fungicide in crop causes air pollution	0.92	VII	1.40	VI	0.84	VIII	0.96	VI	1.03	VII
8. Industrial emmissions causes air pollution	0.40	IX	1.88	III	1.0	VII	0.60	X	0.97	VIII
9. The noises from automobiles pollute the air	0.60	VIII	1.04	X	0.84	IX	0.72	IX	0.80	IX

Contd.....

1	2	3	4	5	6	7	8	9	10	11
10. Noises produced by industries causes air pollution	0.32	XII	0.76	XIII	0.52	X	0.84	VIII	0.61	X
11. Use of nitrogenous fertilizer in crop causes air pollution	0.20	XIII	1.16	IX	0.08	XIII	0.60	XI	0.51	XI
12. Air is polluted through mining activities	0.36	XI	0.80	XI	0.28	XI	0.52	XII	0.49	XII
13. Decomposed fruit and vegetable pollute the air	0.40	X	0.68	XIV	0.04	XIV	0.40	XIII	0.38	XIII
14. Herbicide application in crops pollute the air	0.20	XIV	0.80	XII	0.12	XII	0.36	XIV	0.37	XIV
15. Agril. mechinery like power thresher causes air pollution	0.16	XV	0.12	XV	0.04	XV	0	XV	0.08	XV
16. Application of phosphatic fertilizer in crop causes air pollution	0	XVI	0	XVI	0	XVI	0	XVI	0	XVI
Total --	**13.32**		**19.68**		**16.0**		**14.72**		**15.93**	

MAS = Mean Awareness score W = $0.72^{N.S.}$

In order to get higher returns, the farmers are mostly using the pesticides for controlling the pest and diseases. As they are using pesticides quite often, they might be knowing its bad effects. Further, a low awareness was observed with respect to " pollution of water by the release of garbages to ponds and rivers ". It might be due to the fact that the farmers usually dump their garbages near their houses for preparation of compost. They rarely release garbages into ponds and rivers for which a low awareness was observed with respect to this item.

Further, non-significant 'W' value indicate that there was no difference with respect to ranking of different dimensions of environmental pollution of farmers of different farming systems. It might be a fact that the farmers of different farming systems live in similar rural situation for which such type of result was obtained.

Further, in order to find out the awareness of farmers of different farming systems, the farmers were asked about awareness about the soil/land pollution. A high degree of response was observed in respect to " excess use of nitrogenous fertilizer in crops pollute the soil " which got mean score of 2.8 and rank I in farming system I and the same excess use of nitrogenous fertilizer in crops pollute the soil had higher response of awareness which got mean score of 2.16 2.32 and 1.8 in the farming system II, III and IV, respectively which also got rank I.

Again, taking altogether the awareness of four farming systems, it was revealed that " excess use of nitrogenous fertilizer in crops pollute the soil " got mean score of 2.27 and also got rank I.

Further, it was revealed that a least awareness score was found in respect to " excess use of phosphatic fertilizer causes pollution in soil " in all four farming systems having mean score of 0, 0.20, 0.04 and 0 in farming system I, II, III and IV, respectively which got rank VII.

Further, it was observed taking all mean awareness score that least awareness was found in respect of excess use of phosphatic fertilizer causes pollution in soil " which got 0.06 and got rank VII. The other items of soil pollution occupied the intermediate position that could be revealed from Table 4.4 .

To get higher returns in crop production, farmers of all four farming systems have higher degree of awareness about role of nitrogenous fertilizer in crop production. It might be a fact that repeated application of nitrogenous fertilizer resulted in high awareness about soil pollution.

Further, the farmers mostly apply phosphatic fertilizer in terms of complex fertilizer (N + P or N.P.K.) as their basal application to the soil and also some farmers have little knowledge about the role of phosphatic fertilizer in crop production and higher returns. It might be a fact that

application of complex fertilizer and little knowledge about role of phosphatic fertilizer, farmers of all four farming systems have least awareness about soil pollution by excess application of phosphatic fertilizer.

Here also a non-significant 'W' value indicated that there was no difference in ranking the different statements by farmers of different farming systems.

In order to find out awareness of respondents about air pollution as one aspect of dimension of environmental pollution, farmers were asked about awareness of air pollution. It was observed from Table 4.4 that in case of farming system I , the " decomposed animal dead bodies causes air pollution " which has high awareness having mean score of 2.0 and also such type of high awareness of air pollution were found in respect to " decomposed animal dead bodies causes air pollution " which got mean score of 2.84 and 1.88 in the farming system III and IV, respectively. But in case farming system II, a higher degree of awareness was found on " burning of bi-products of different crop causes air pollution " which got mean score of 2.76 and got rank I.

Taking altogether the mean awareness score of all four farming systems, it was revealed from Table 4.4 that " decomposed animal dead bodies causes air pollution " have a higher degree of awareness among people of four farming systems which got mean score 2.17 and ranked I.

Further, it was revealed from Table 4.4 that a low awareness was found from the all four farming systems about " application of phosphatic fertilizer in crop causes air pollution " which got mean score of 0 and rank XVI.

People are belonged to rural areas and almost all respondents are residing in a similar condition in rural villages. Very often, farmers though the dead bodies of domestic animals in very proximity to their habitation and quite often come across the bad effects of decomposed dead animals that results a high awareness of air pollution.

But farmers mostly apply complex fertilizer in terms of N.P.K. 28:28:0, 18:46:0, 10:26:26 as their basal application in crops. It might be a fact that due to use of complex fertilizer, most of the respondents have little awareness about air pollution due to application of phosphatic fertilizer, which results of least awareness in all four farming systems. Here also a non-significant 'W' value was obtained which indicated that the ranks given by the farmers of different farming systems were more or less similar.

Again an attempt was made to find out the extent (degree) of awareness towards dimensions of environmental pollution. It was observed from Table 4.5 that in case of farming system I, 48 percent were found to be within medium awareness category and 20 per cent and 32 per cent of total belonged to high and low awareness categories, respectively.

Table 4.5 . Distribution of respondents on the basis of their awareness towards the dimensions of pollution

Extents of awareness towards the dimesnions of pollution	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
High	5	20.0	4	16.0	4	16.0	6	24.0	19	19.0
Medium	12	48.0	16	64.0	14	56.0	14	56.0	56	56.0
Low	8	32.0	5	20.0	7	28.0	5	20.0	25	25.0
Total --	**25**	**100.00**	**25**	**100.00**	**25**	**100.00**	**25**	**100.00**	**100**	**100.00**

In farming system II, it was observed that 16 per cent, 64 per cent and 20 per cent of respondents were found to be belonged to high, medium and low awareness categories, respectively. In case of farming system III, 16 per cent, 56 per cent and 28 per cent were belonged to high, medium and low awareness categories, respectively. Twenty four per cent, 56 per cent and 20 per cent of farmers of farming system IV were found to be within high, medium and low awareness categories, respectively. Finally, when all the farmers of four farming systems were taken together, it was revealed that a majority of total respondents i.e. 56 per cent were belonged to medium awareness category while 19 per cent and 25 per cent of them were belonged to high and low awareness categories, respectively.

4.4 Perception of farmers of different farming systems on different sources of pollution and their effect on rural life

In this section, an attempt was made to find out the perception of farmers about different sources of pollution in different farming systems and their effect on rural life. The respondents were asked about their perception on broadly five aspects of pollution and their effect on rural life viz., Agriculture - intensive cultivation, pollution by diary, pollution by poultry, pollution through pisciculture and health hazard by pollution due to adoption of different farming systems.

It was revealed that in case of pollution by Agriculture - intensive cultivation in farming system I have higher degree of perception about " repeated application of chemical fertilizer in crop field pollute the water " which got mean score of 3.32 and ranked I. While least perception about " power thresher used for harvesting of crop causing air pollution lead to breathing problem and irritation " which got mean score of 0.64 and got rank XVI. In the farming system II, it was revealed from Table 4.6 that the higher degree of perception of farmer was found on " use of pesticides in crop's pest causes air pollution in the surroundings " which got mean score of 3.40 and got rank I while least perception was found on " power thresher used for harvesting of crop causing air pollution lead to breathing problem and irritation" which got mean score of 0.68 and ranked XII. In case of farming system III, higher degree of perception of farmer on pollution by Agriculture - intensive cultivation was about " repeated use of chemical fertilizer in crop field leads to pollution of soil, there by causing loss of micro-organism and other problem in soil " and use of pesticides in crop field pollutes the water " which got mean score of 3.24 and ranked I while least perception of farmers was found about " power thresher used for harvesting of crop causing air pollution lead to breathing problem and irritation " which got mean score of 0.92 and got rank XII. In case of farming system IV higher mean perception score was found on " repeated application of chemical fertilizer in crop field pollute the water " which got mean score

of 3.36 and ranked I while least perception was found on as same as farming system I, II and III which got mean score of 0.72 and rank XII.

Finally, when all four farming systems were taken together the higher perception on pollution by Agriculture-intensive cultivation was about " use of pesticides in crop field pollutes water " which got mean score of 3.10 and rank-I while least perception was found on " power thresher used for harvesting of crop causing air pollution lead to breathing problem and irritation " which has the mean perception score of 0.72 and got rank XII.

Most of the respondents are adopting intensive cultivation and to get higher production and return. Control of pest and diseases is essential part of the farmers and they may be forced to apply pesticides for protection of crop which leads to a high degree of perception about pollution of water by the application of pesticides in crop field. But least perception of farmer about " power thresher used for harvesting of crop causing air pullution lead to breathing problem and irritation " due to least use of power thresher. Most of the farmers harvest the crop manually which might be a fact that they might not feel any breathing problem and irritation" in all four farming systems.

Lastly, a non-significant 'W' value indicated that the ranks given by the farmers of different farming systems were more or less same.

Table 4.6. Perception of farmer of different farming system on different sources of pollution and their effect on rural life

Statement on pollution by different farming system	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	MS	Rank	MS	Rank	MS	Rank	MS	Rank	MS	Rank
1	2	3	4	5	6	7	8	9	10	11
A. AGRIL.-INTENSIVE CULTIVATION										
1. Use of pesticide in crop field pollutes the water	2.92	II	3.12	III	3.24	I	3.12	IV	3.10	I
2. Reapeated use of chemical fertilizer in crop, field pollute the water	3.32	I	3.28	II	2.32	IV	3.36	I	3.07	II
3. Repeated use of chemical fertilizer in crop field leads to pollution of soil, thereby causing loss of micro-organism and other problem in soil	2.56	IV	2.88	IV	3.24	II	3.24	II	2.98	III
4. Use of pesticides in crops pest causes air pollution in surrounding	2.20	V	3.40	I	3.16	III	3.16	III	2.98	IV
5. Use of pesticides causes pollution in surrounding affecting human and animal health	2.84	III	2.40	VI	1.76	VI	2.40	V	2.35	V
6. Indiscriminate us of pesticide pollute the food material leading to residual toxicity	1.76	VI	2.44	V	1.76	VII	1.80	VII	1.94	VI
7. Indiscriminate application of pesticides in crop cuses soil pollution	0.80	X	2.04	XI	1.44	V	1.88	VI	1.54	VII
8. Indiscriminate use of pesticides reduces the pollution of natural enemies of pest	1.08	VIII	2.40	VII	1.24	VIII	1.44	IX	1.54	VIII

Contd.....

1	2	3	4	5	6	7	8	9	10	11
9. Repeated use of chemical fertilizer in crops like nitrogenous and phospetic fertilizer causes air pollution	1.12	VII	2.28	IX	0.72	XII	1.72	VIII	1,46	IX
10. Repeated & indiscriminate use of pesticides causes pollution, thereby leading pest resistant & pest resurgence	0.80	XI	2.36	VIII	1.24	IX	1.20	XI	1.40	X
11. Burning of bi-products causes air pollution which affect health of human and animal	0.96	IX	2.12	X	1.00	X	1.24	X	1.33	XI
12. Power thresher used for harvesting of crop causing air pollution leads to breathing problem and irritation	0.64	XII	0.68	XII	0.92	XI	0.64	XII	0.72	XI
								W=0.95$^{N.S.}$		
B. POLLUTION BY DAIRY										
1. Manures of diary animals contain harmful substances causing water pollution	2.76	I	2.64	II	1.64	V	2.76	I	2.45	L
2. Noxious odour produced from wastes of cattle causes air pollution in the surrounding	1.24	IV	3.32	I	1.80	III	1.80	IV	2.04	II
3. Poisonous gases like Methane releases from cowdung fermentation pollute the air in surrounding	1.52	II	2.00	III	2.40	I	2.04	II	1.90	III
4. Diary wastes contain microbial contaminant leading to health hazards	0.76	VI	1.84	V	1.68	IV	1.64	V	1.48	IV
5. The pollution by dairy causes the outbreaks of diseases in animal and human	0.88	V	1.80	VI	1.32	VI	1.16	VI	1.29	V
6. Repeated use of dairy wastes in crop field causes soil pollution	1.52	III	2.00	IV	2.04	II	2.04	III	1.90	VI
								W=0.27**		

**Significant at 0.01 level

Contd.....

1	2	3	4	5	6	7	8	9	10	11
C. POLLUTION BY POULTRY										
1. The litters of Poultry birds (ammonia gas) polluted the environment	2.16	I	2.04	I	2.08	I	2.96	I	2.31	I
2. Decomposed Poultry litters pollute water in the surrounding	2.16	II	2.00	III	2.08	II	2.96	II	2.30	II
3. Uncleased litters in Poultry shed pollute the surrounding causing the outbreak of diseases in epidemic form	2.16	III	2.04	II	2.08	III	2.28	III	2.14	III
4. The feeds of Poultry birds pollute the surrounding	0.76	IV	1.72	IV	1.24	IV	1.44	IV	1.29	IV
							$W=0.496^{N.S.}$			
D. POLLUTION THROUGH PISCICULTURE										
1. Pond water is polluted due to application of fish feed causing health hazards	1.60	I	2.20	I	1.60	I	2.44	I	1.96	I
2. The fish feed, that used are mostly contaminated and pollute the surrounding	0.96	II	2.12	II	1.52	II	2.12	II	1.68	II
							$W=0.780^{N.S.}$			
E. HEALTH HAZARD BY POLLUTION DUE TO ADOPTION OF DIFFERENT FARMING SYSTEMS										
1. Water pollution causes diarrhoea & other diseases in human being	2.84	III	2.88	I	2.96	II	2.92	I	2.90	I
2. Food poisoning is due to excess use of pesticides	3.00	I	2.60	III	3.00	I	2.92	II	2.88	II
3. Death of aquatic animal (fish etc.) occurs due to use of pesticides, industrial wastes and sewage	2.84	IV	2.64	II	2.84	III	2.12	IV	2.61	III

Contd.....

1	2	3	4	5	6	7	8	9	10	11
4. Health hazard occurs in animals due to use of pesticides	2.88	II	2.28	V	2.28	IV	2.20	III	2.41	IV
5. Noise pollution disturbs the patient, student and mental peace	1.64	V	2.44	IV	1.92	V	1.96	V	1.99	V
6. Water pollution by sewage and toxic chemicals results health hazards in animals	1.24	VII	2.20	VI	1.92	VI	1.80	VI	1.79	VI
7. Health hazards to animal occurs by eating of non-bio degradable articles (like plastic, disposed articles etc.)	1.32	VI	1.92	IX	1.88	VIII	1.56	VII	1.67	VII
8. Pollution makes the life of individual unpleasant	1.12	VIII	1.88	X	1.92	VII	1.40	VIII	1.58	VIII
9. Air pollution causes respiratory diseases such as bronchitis asthma etc.	0.76	IX	2.00	VII	1.48	IX	1.40	IX	1.41	IX
10.Pollution causes irritation including overall discomfort	0.72	X	1.96	VIII	1.48	X	1.20	X	1.34	X
11.Pollution causes heart diseases	0.72	XI	1.00	XV	1.00	XII	0.88	XIV	0.90	XI
12.Air pollutant produces eye and respiratory irritation to animals	0.44	XV	1.04	XII	1.16	XI	0.96	XIII	0.90	XII
13.Retardation of growth of plant is occurred due to air pollution	0.56	XII	1.04	XII	1.00	XIII	1.00	XI	0.90	XIII
14.Damage to plant is possible through the automobiles exhaust (like discolouration, bleaching and other physiological disorder	0.60	XII	0.96	XVI	1.00	XIV	1.00	XII	0.89	XIV
15.Abnormal calcification of bone and teeth called flurosis in cattle which results loss of weight and lameness	0.44	XVI	1.12	XI	0.96	XV	0.68	XV	0.80	XV
16.Development of sterility in animals may be possible due application of pesticides in crop	0.52	XIV	1.04	XIV	0.96	XVI	0.60	XVI	0.78	XVI

MPS =Mean perception score W=0.579$^{N.S.}$

Further, it may revealed from the Table 4.6 that higher perception of farmers about pollution by dairy in farming system I that the " mannures of dairy animals contain harmful substances causing water pollution " which got highest mean score and ranked I, while least perception was found about " repeated use of dairy wastes in crop field causes soil pollution " which got mean score of 0.12 and ranked VI. In the farming system II, high perception was about " noxious odour produced from wastes of cattle causes air pollution in surrounding " which has the mean perception score of 3.32 and rank I, while least perception score was about " repeated use of dairy wastes in crop fields causes soil pollution " which got mean score of 0.24 and got rank VI. In case of farming system III higher perception of respondents was found on " poisonous gases like methane released from cowdung fermentation pollute the air in the surrounding " which got mean score of 2.04 and ranked I, while least perception on pollution by dairy was found on " repeated use of dairy wastes on crop field causes soil pollution " which got mean score of 0.40 and ranked VI. In farming system IV, high perception score was found on pollution by dairy, about " mannures of dairy animals contain harmful substances causing water pollution " which got mean score of 2.76 and ranked I while least perception score was about " repeated use of dairy wastes on crop field causes soil pollution " which got mean score of 0 and ranked VI.

Finally, taking all together the mean score of four farming systems it was revealed from Table 4.6 that higher perception of pollution in dairy was found on " mannures of dairy animals contain harmful substances causing water pollution " which got mean score of 2.45 and got rank I and least mean perception score was about " repeated use of dairy wastes in crop field causes soil pollution " which got score of 0.19 and got rank VI.

Most of the farmers know about mannures and its bad smell and also when mixed with water pollutes water and also know bad effect of pollution of water by dairy waste. It is also regular feature in farming community of rural area. Hence, it might a fact that the farmers have higher perception about " mannures of dairy animals contain harmful substances causing water pollution ". Again, least perception was about " repeated use of dairy wastes in crop field causes soil pollution " which might to be a fact that people could very well know more beneficial role manure of dairy in their field in crop production but least perception about bad effects of manure by repeated application of mannures in crop field. A significant value of 'W' indicated that the ranks given by different farmers are different. It might be due to the reason that the farmers perceived

Again it was revealed from Table 4.6 that higher perception mean score on pollution by poultry was found about " the litters of poultry birds (ammonia gas) polluted the environment ", " decomposed poultry litters pollute the water in the surroundings " and also " uncleaned litters in poultry shed pollute the surrounding causing out break of diseases " which got mean score each of 2.16 and rank I, while least perception score was about " the feeds of poultry birds pollute the surroundings " which got mean score of 0.76 and ranked IV. In farming system II, it was observed that higher degree of perception mean score about " the litters of poultry birds (ammonia gas) polluted the environment " and also " uncleaned litters in poultry shed pollute the surroundings causing out-break of disease in epidemic form " which got mean score of 2.04 and rank I, while the pollution by poultry about " the feeds of poultry birds pollute the surroundings got mean score of 1.72 and rank IV. In the farming system III, the higher mean perception score of pollution by poultry about " the litters of poultry birds (ammonia gas) polluted environment", " decomposed poultry litters pollute the water in the surroundings" and the " uncleaned litters in poultry shed pollute the surrou-ndings causing the out-break of diseases " which got mean score of 2.08 and rank I. The least mean perception score about the " the feeds of poultry birds pollute the surroundings" got mean score of 1.24 and rank VI. In the case of farming system IV,

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higher perception of farmers about pollution by poultry on " the litters of poultry birds (ammonia gas) polluted the environment " and also " decomposed poultry litters pollute the water in the surroundings" which got mean score of 2.96 and got rank I, while least perception score on the " feeds of poultry birds pullute the surroundings " got a mean score of 1.44 and rank IV. Finally when all the farmers were taken together the higher mean perception score was about " the litters of poultry birds (ammonia gas) polluted the environment" got a mean score of 2.31 and rank I, while least perception of farmers about " the feeds of poultry birds pollute the surroundings " got mean score of 1.29 and rank IV. The other items of pollution by poultry occupied the intermediate position that could be revealed from Table 4.6.

The accummulated poultry litters which release ammonia gas polluted the environment that has been most widely felt badly by the most of the respondents. So it might be a fact of getting higher perception score, while least perception was due to most of the farmers might not given poultry feed as sold in market rather than giving own prepared food to their poultry birds.

The ranking by different farmers were similar which was revealed from a non-significant value of 'W'.

Further, it was observed from Table 4.6 that the perception of farmers on pollution through pisciculture in the farming system I, II, III and IV. It was revealed

that the perception about " pond water is polluted due to application of fish feed causing health hazard " got a mean score of 1.6, 2.2, 1.6 and 2.44, respectively and got rank I while least perception about " the fish feed that used are mostly contaminated and polluted the surroundings " got a mean score of 0.96, 2.12, 1.52 and 2.12 in farming system I, II, III and IV, respectively and got rank II. Finally taking all the farming systems together, it was revealed from Table 4.6 that the high perception of respondents about the pond water is polluted due to application of fish feed causing health hazard which got mean score of 1.96 and got rank I while least perception of farmers about " the fish feed that used are mostly contaminated and polluted the surroundings " which got mean score of 1.68 and got rank II. Lastly, it was observed that the ranking by different farmers with respect to different statements were more or less similar as revealed from a non-significant value of 'W'.

Further, it was revealed from the Table 4.6 that the higher perception about health hazard by pollution due to adoption of different farming systems and their effect on rural life. In the farming system I, it was found that " food poisoning is due to excess use of pesticides " which got mean score of 3.0 and got rank I, while least perception was about " air pollutant produces eye and respiratory irrita to animals " and also " abnormal calcification of bone and teeth called flurosis in cattle which results loss of

weight and lameness " got a mean score of 0.44 and rank XVI. It was observed from farming system II, higher perception was about " water pollution causes diarrhoea and other diseases in human being which got mean score of 2.88 and got rank I, while least perception was about " damage to plant is possible through the automobiles exhaust (like discolouration, bleaching and others physiological disorder)" which got mean score of 0.96 and got rank XVI. In the farming system III, higher perception was about " food poisoning is due to excess use of pesticides " which got mean score of 3.00 and also got rank I, while least perception about the " development of sterility in animals may be possible due to application of pesticides in crop " which got mean score of 0.96 and rank XVI.

In case of farming system IV, the health hazard by pollution about " water pollution causes diarrhoea and other diseases in human being " and also " food poisoning is due to excess use of pesticides " which got the higher perception mean score of 2.92 and rank I, while least perception about " development of sterility in animals may be possible due to application of pesticides in crop " which got mean score of 0.60 and rank XVI.

Finally, taking the mean scores together from all farming systems, higher perception of farmers about " water pollution causes diarrhoea and other diseases in human being which got the mean score of 2.90 and rank I, while least

perception was about " development of sterility in animals may be possible due to application of pesticides in crop " which got the mean score of 0.78 and rank XVI. The other items of health hazard by pollution due to adoption of different farming systems occupied the intermediate position that could be revealed from Table 4.6 .

The result of such type in respect to " water pollution causes diarrhoea and other disease in human being " might be a fact that most of the rural people have higher perception about bad effect and also health hazard by water pollution. They might be very often affected by diseases of diarrhoear due to water pollution. The least perception about " development of sterility in animal may be possible due to application of pesticides in crop " might be due to ignorance about such type of bad effect in animal by pesticides.

A non-significant value of 'W' indicated that the farmers of different farming systems have ranked different statements in the same order.

4.5 Relationship of personal and socio-economic characteristic of farmers with the extent of their awareness about the environmental pollution

The different personal and socio-economic characters which were included in order to find out their relationship with the awareness about environmental pollution were age, educational status, sex, caste, family type, occupation,

annual income, mass media participation, social participation, extension participation and extension contact.

4.5.1 Age :

It was revealed from Table 4.7 that 20 per cent of the total respondents were less than 40 years of age. Twenty five per cent, 23 per cent and 32 per cent of them belonged to age category of 40 to 50, 51 to 60 and above 60 years, respectively. The same table indicates the distribution of respondents of different farming system over different age categories.

4.5.2 Educational status :

It was revealed from the same table 4.7 that 22 per cent of total respondents belonged to illiterate. Twenty per cent, 16 per cent and 36 per cent were belonged to educational status of upto primary, upto matric and above matric, respectively. The same table also indicates distribution of respondents of different farming systems over different educational status.

4.5.3 Sex :

It was observed from the Table 4.7 that all the respondents belonged to male category. Because emphasis was given in selecting the male respondents only.

Table 4.7. Distribution of respondents on the basis of their personal and Socio-economic status

Socio-economic status categories		Farming System I		Farming System II		Farming System III		Farming System IV		Total	
		f	%	f	%	f	%	f	%	f	%
A. Age											
(a)	< 40	5	20.0	7	28.0	4	16.0	4	16.0	20	20.0
(b)	40-50	4	16.0	9	36.0	8	32.0	4	16.0	25	25.0
(c)	51-60	6	24.0	2	4.0	12	48.0	3	12.0	23	23.0
(d)	Above 60	10	40.0	7	28.0	1	4.0	14	56.0	32	32.0
	TOTAL --	25	100.00	25	100.0	25	100.0	25	100.0	100	100.0
B. Educational Status											
(a)	Illiterate	6	24.0	6	24.0	2	8.0	8	32.0	22	22.0
(b)	Upto Primary	9	36.0	4	16.0	8	32.0	5	20.0	26	26.0
(c)	Upto Matric	5	20.0	4	16.0	6	24.0	1	4.0	16	16.0
(d)	Above Matric	5	20.0	11	44.0	9	36.0	11	44.0	36	36.0
	TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

		Farming System I		Farming System II		Farming System III		Farming System IV		Total	
		f	%	f	%	f	%	f	%	f	%
C. Sex											
(a)	Male	25	100.0	25	100.0	25	100.0	25	100.0	25	100.0
(b)	Female	0	0	0	0	0	0	0	0	0	0
	TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	25	100.0
D. Caste											
(a)	Higher caste	20	80.0	21	84.0	12	48.0	19	76.0	72	72.0
(b)	Lower caste	5	20.0	4	16.0	13	52.0	6	24.0	28	28.0
	TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
E. Family type										
(a) Nuclear	21	84.0	17	68.0	18	72.0	24	96.0	80	80.0
(b) Joint	4	16.0	8	32.0	7	28.0	1	4.0	20	20.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0
F. Occupation										
(a) Agril. and allied activities	16	64.0	19	76.0	18	72.0	12	48.0	65	65.0
(b) Agril. and Business and others	9	36.0	6	24.0	7	28.0	13	52.0	35	35.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
G. Annual Income										
(a) Upto Rs.15,000/-	10	40.0	8	32.0	11	44.0	8	32.0	37	37.0
(b) Rs.15,000/- to Rs.30,000/-	3	12.0	5	20.0	10	40.0	1	4.0	19	19.0
(c) Rs.30,000/- to Rs.45,000/-	6	24.0	4	16.0	2	8.0	2	8.0	14	14.0
(d) Rs.45,000/- to Rs.60,000/-	2	8.0	4	16.0	0	0	4	16.0	10	10.0
(e) Above Rs.60,000/-	4	16.0	4	16.0	2	8.0	10	40.0	20	20.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
H. Mass Media praticipation										
(a) High	6	24.0	5	20.0	5	20.0	7	28.0	23	23.0
(b) Medium	14	56.0	12	48.0	14	56.0	8	32.0	48	48.0
(c) Low	5	20.0	8	32.0	6	24.0	10	40.0	29	29.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	f	%	f	%	f	%	f	%	f	%
I. Social participation										
(a) Low	7	28.0	8	32.0	3	12.0	8	32.0	26	26.0
(b) High	18	72.0	17	68.0	22	88.0	17	68.0	74	74.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0
J. Extension participation										
(a) High	5	20.0	4	16.0	2	8.0	7	28.0	18	18.0
(b) Medium	17	68.0	16	64.0	19	76.0	14	56.0	66	66.0
(c) Low	3	12.0	5	20.0	4	16.0	4	16.0	16	16.0
TOTAL --	26	100.0	25	100.0	25	100.0	25	100.0	100	100.0
K. Extension contact										
(a) High	4	16.0	5	20.0	3	12.0	3	12.0	15	15.0
(b) Medium	21	84.0	14	56.0	19	76.0	20	80.0	74	74.0
(c) Low	0	0	6	24.0	3	12.0	2	8.0	11	11.0
TOTAL --	25	100.0	25	100.0	25	100.0	25	100.0	100	100.0

4.5.4 Caste :

It was revealed from Table 4.7 that 28 per cent of total respondents belonged to lower caste categories and 72 per cent were high caste categories. The same table also shows the distribution of respondents of different farming systems over the different caste categories.

4.5.5 Family type :

It was revealed from Table 4.7 that 80 per cent of total respondents belonged to nuclear family type, while 20 per cent belonged to joint family type. The same table also indicates the distribution of respondents of different farming systems over different family type either joint or nuclear type.

4.5.6 Occupation :

It was observed from Table 4.7 that 65 per cent of total respondents were belonged to Agriculture and allied activities whereas 35 per cent were belonged to Agriculture and business and other categories of occupation. The same table also indicates the distribution of respondents of different farming systems over different occupation categories.

4.5.7 Annual income :

It was revealed from Table 4.7 that 20 per cent of total respondents were belong to above Rs.60,000/- of annual income group, while 37 per cent, 19 per cent, 14 per cent and 10 per cent were belonged to upto Rs.15,000/-, Rs.15,000/- to

Rs.30,000/-, Rs.30,000/- to Rs.45,000/- and Rs.45,000/- to Rs.60,000/-, respectively. The same table also indicated the distribution of respondents of different farming systems over different annual income groups.

4.5.8 Mass media participation :

It was revealed from the Table 4.7 that 48 per cent of total respondents were belonged to medium group while 23 per cent and 29 per cent were belonged to high and low group of mass media participation, respectively. The same table also indicated the distribution of respondents of different farming systems over different groups of mass media participation.

4.5.9 Social participation :

It was revealed from the Table 4.7 that 74 per cent were belonged to high group of social participation whereas 26 per cent of them belonged to low group of social participation. The same table also indicates the distribution of respondents in different farming system over different group of social participation.

4.5.10 Extension participation :

It was observed from the Table 4.7 that 66 per cent of total respondents were belonged to medium group of extension participation, while 18 per cent and 16 per cent of them were belonged to high and low group of extension participation, respectively. The same table also indicates the distribution of respondents of different farming systems over different group of extension participation.

4.5.11 Extension contact :

It was revealed from the Table 4.7 that 15 per cent and 11 per cent of total respondents were belonged to high and low group of extension contact respectively but 74 per cent were belonged to medium group of extension contact. The same table also indicated the distribution of different respondents of different farming systems over different group of extension contact.

4.5. 12 Relationship of different variables with the awareness

In this section an attempt was made to find out the relationship of different personal and socio-economic variables with the awareness of farmers about the environmental pollution. Spearman's rank co-rrelation test was applied in order to find out the relationship of awareness of farmers of different farming systems with their different characteristics.

It was revealed from Table 4.8 that educational status was positively and significantly related to the awareness of farmers of farming system I and II but the educational status is positively and not significantly related to the awareness of farmers of farming system III and farming system IV. Further the mass media participation was positively and significantly related to the awareness of farmers of farming system I, II and IV. Social participation is positively and significantly related to the awareness of farmers of farming

Table 4.8. Relationship of personal and socio-economic variables with the awareness of farmers about the environmental pollution

Sl. No.	Personal and socio-economie variable	r_s value			
		Farming System I	Farming System II	Farming System III	Farming System IV
X_1	Age	0.310	-0.275	0.178	-0.230
X_2	Educational status	0.468*	0.432*	0.284	0.213
X_3	Sex	0.123	0.003	0.015	0.150
X_4	Caste	0.215	0.130	0.005	0.180
X_5	Family type	0.301	0.270	0.178	0.289
X_6	Occupation	0.275	0.265	0.223	0.023
X_7	Annual income	0.132	0.210	0.178	0.270
X_8	Mass media participation	0.502**	0.468*	0.310	0.490*
X_9	Social participation	0.323	0.453*	0.210	0.178
X_{10}	Extension participation	0.443*	0.510**	0.123	0.460*
X_{11}	Extension contact	0.273	0.010	0.311	0.435*

*Significant at 0.05 level
**Significant at 0.01 level

system II. Extension participation and extension contact were positively and significantly related to the awareness of farmers of farming system IV. The awareness of farmers of farming system I and II are positively and significantly related to their extension participation. The other personal and socio-economic variables were not significantly related to the awareness of farmers of different farming systems, although they were positively related.

A negative relationship was found between awareness and age of farmers of farming system II and IV.

Out of 11 variables mass media participation and extension participation were mostly significantly related to the farmers of most of the farming systems. The contact with different mass media such as radio, television etc. provides opportunities for acquiring knowledge about environmental pollution. Further the participation in different extension programmes also increases the awareness of farmers about the environmental pollution.

4.6 Suggestions/opinions of farmers in different farming systems for control of environmental pollution

In this section an attempt was made to sort out the suggestions of farmers of different farming systems for the control of environmental pollution. Table 4.9 indicates the suggestions/opinions of farmers for control of environmental pollution.

Table 4.9. Suggestions/opinion of farmers for control of environmental pollution

Suggestion/opinion	Farming System I		Farming System II		Farming System III		Farming System IV		Total	
	Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank	Mean score	Rank
1. Enforcement of pollution act and rules	5.00	I	5.00	I	5.00	I	4.96	II	4.99	I
2. Teaching the people about pollution hazards	4.72	III	4.56	III	4.64	III	5.00	I	4.73	II
3. Sanitation in and around the living surroundings	4.56	IV	4.80	II	4.84	II	4.40	III	4.65	III
4. Technological control of automobile pollution	4.80	II	4.16	IV	3.92	V	4.28	IV	4.29	IV
5. Use of bio-pesticide for controlling pest	3.84	VIII	3.88	V	4.12	IV	4.20	V	4.02	V
6. Large scale plantation of trees around habitation	4.12	VI	3.72	VII	3.92	VI	4.20	VI	3.99	VI
7. Reducing wastage and recycling the bi-products	4.40	V	3.88	VI	3.36	VIII	4.20	VII	3.96	VII
8. Adoption of integrated Pest management instead of only using pesticides	3.88	VII	3.56	VIII	3.56	VII	3.84	VIII	3.71	VIII
9. Use of bio-fertilizer instead of chemical fertilizer	3.28	IX	3.36	X	3.24	IX	3.24	X	3.28	IX
10. Encouraging agro-forestry farming system	2.88	XI	3.16	XI	3.04	X	3.36	IX	3.11	X
11. Recycling, control and management of urban and industrial waste	2.96	X	3.40	IX	3.00	XI	2.88	XI	3.06	XI
12. Vermi-culture bio-technology	2.52	XII	3.56	XII	2.36	XII	2.44	XII	2.44	XII
13. Incentives for environmental protection	2.48	XIII	1.92	XIII	1.96	XIII	2.16	XIII	2.13	XIII

W = 0.95^{NS}

It was observed from Table 4.9 that " enforcement of pollution act and rules " as the important suggestions which was given rank I by farmers of farming system - Agriculture alone (farming system I). The " technological control of automobile pollution " was considered as second important suggestion for the control of environmental pollution, which got rank II by the farmers of farming system I. The other suggestions/opinions in order of preference of farmers of farming system I were " teaching the people about pollution hazard ", " sanitation in and around the living surroundings ", " reducing wastage and recycling the bi-products", " large scale plantation of trees around the habitation ", " adoption of integrated pest management in stead of only using pesticides ", " use of bio-pesticides for controlling pest ", " use of bio-fertilizer instead of chemical fertilizer ", " recycling, control and management of urban and industrial waste ", " encouraging agro-forestry farming system", " vermi-culture biotechnology ", and " incentives for environmental protection" which got rank III, IV, V, VI, VII, VIII, IX, X, XI, XII and XIII, respectively.

It was observed from Table 4.9 that " enforcement of pollution act and rules as the important suggestion which was given rank I by the farmers of farming system II. The " sanitation in and around the living surroundings and " teaching the people about pollution hazards " which got rank II and III by the farmers of farming system II. The other suggestions/

opinions in order of preference of farmers of farming system II were " technological control of automobile pollution", " use of bio-pesticide for controlling pest ", " reducing wastage and recycling the bi-products", " large plantation of trees around the habitation", " adoption of integrated pest management instead of only using pesticides ", " recycling control and management of urban and industrial wastes ", " use of bio-fertilizer instead of chemical fertilizer " , " encouraging agro-forestry farming system ", " vermi-culture bio-technology " and lastly " incentives for environmental protection" which got rank IV, V, VI, VII, VIII, IX, X, XI, XII and XIII, respectively.

It was observed from Table 4.9 that " enforcement of pollution act and rules ", " sanitation in and around the living surroundings ", " teaching the people about pollution hazards ", " use of bio-pesticides for controlling pest ", " technological control of automobile pollution " and " large scale plantation of trees around the habitation " which got rank I, II, II, IV, V and VI, respectively as the suggestions/ opinions of farmers of farming system III. The other suggestions/ opinions in order of preference got rank VII, VIII, IX, X, XI, XII and XIII which were " adoption of integrated pest management instead of only using pesticides ", " reducing wastage and recycling the bi-products ", " use of bio-fertilizer instead of chemical fertilizer", " encouraging agro-forestry farming system", " recycling control and management of urban and industrial wastes", " vermi-culture bio-technology and " incentives for environmental protection ", respectively the farmers of farming system III.

It was also observed from Table 4.9 that " teaching the people about pollution hazards " as important suggestion which was given rank I by the farmers of farming system- Agriculture + pisciculture (farming system IV). " The enforcement of pollution act and rules ", " sanitation in and around the living surroundings ", " technological control of automobile pollution " which got rank II, III and IV by the farmers of farming system IV. The other suggestions/opinions in order of preference of farmers of farming system IV were " use of bio-pesticides for controlling pest", " large scale plantation of trees around the habitation ", " reducing wastage and recycling the bi-products", " adoption of integrated pest management instead of only using pesticides", " encouraging agro-forestry farming system, " use of bio-fertilizer instead of chemical fertilizer ", " recycling, control and management of urban and industrial waste", " vermi-culture bio-technology" and " incentives for environmental protection" which got rank V, VI, VII, VIII, IX, X, XI, XII and XIII, respectively.

From the Table 4.9 an attempt was also made to identify the suggestions/opinions of farmers of all four farming systems in order of importance by consolidating their mean score and it was revealed that the " enforcement of pollution act and rules ", " teaching the people about pollution hazards ", " sanitation in and around the living surroundings " and " technological control of automobile pollution " which got rank I, II, III and IV, respectively. The other suggestions/opinions in order of preference were

" use of bio-pesticide for controlling pests ", " large scale plantation of trees around the habitation ", " reducing wastage and recycling the bi-products ", " adoption of integrated pest management instead of only using pesticides", " use of bio-fertilizer instead of chemical fertilizer ", " encouraging agro-forestry farming systems ", " recycling control and management of urban and industrial waste", " vermi-culture bi-technology ", and the last " incentives for environmental protection " which got rank V, VI, VII, VIII, IX, X, XI, XII and XIII, respectively.

Lastly, 'W' test was applied to find out the difference in ranking between the farmers of different farming systems. A non-significant difference was observed which indicated that they were in common agreement in giving ranks to different suggestions.

CHAPTER-V

SUMMARY AND CONCLUSION

SUMMARY AND CONCLUSION

Our environment is defined as a whole set of natural and social system in which man and other organisms live and from which they derive their sustenance (Tbllisi Conference, 1977). The natural environment which is always in a state of the flux consists of four interlocking system of the atmosphere, the hydrosphere, the lithosphere and the bio-sphere. Human activities have gradually interfered with the delicate equilibrium and set in motion a process of degradation that could eventually destroy the very environment from where human kind draws sustenance (UNESCO).

In normal circumstances if environment remains clean, it is enjoyable. Unfortunately, on account of various activities of man, the composition and complex nature of environment get changed. Such activities include industrialization, construction, transportation and high production in agriculture etc. These activities although desirable for human development and welfare, lead to generation and release of objectionable material into the environment, thus turning it foul called as environmental pollution and makes our life measurable.

To day, the world around us, its material sense and in its value system is a product of science and technology. In any sphere of human activity or human endeavour, the most crucial element is science and technology. The use of science and technology to support the ever increasing need of man is termed as development. Human population are now so large that only by the most efficient use of the resources of land and water that these can be adequately supported. It is by the use of science and technology that the development can be effectively occure. Any country and especially a developing country like ours will have to undergo the process of development at a rapid rate, if we are to remove poverty and improve the life style of our people. Development however should not mean an assult on nature and natural resources. We must therefore strike a balance between development and environment.

Two things have largely contributed to the disturbances in our ecological systems. One is the demographic presence on land and on other life sustaining resources and is rapid industrial growth in the country. Out environment is no longer as clean as it used to be and this is the price of we had to pay for the industrial growth. Air, water and land which are the main constituent of environment, have become seriously affected and it is our duty now to ensure that all three components of environment are to be improved as a result of our continuous effort. This has been a change in our thinking during last 15 years and we have become more and more aware about the environment and the price. We have to pay for its degradation.

The world is confronted to day with problem of worsening poverty, hunger, ill health and illiteracy in one hand and the continuing deterioration of the environment as the life support system of human being on the other. The hope of a better and safer future of the human kind lies in the integration of environmental and developmental concern which necessarily requires global co-operation. To arrest any further degradation of the environment, humanity as a whole has to act and act quickly, beginning with individual then local community, nationally and ultimately globally. Ordinary human inter-actions are entering a new stage that calls for extra-ordinary responses.

With the advancement of new technology, discoveries, inventions and the increase in population, the crisis of environmental degradation, both in urban as well as in rural area has become widespread. So the challenge to produce additional food grain and animal protein like fish, poultry etc, to meet out the requirements of fast increasing population has met in the past to some extent by increasing cultivated area and to greater extent by increased agriculture and allied production per unit area per unit time through multiple cropping the larger coverage by high yielding varieties, increased irrigation potential and by adopting intensive fertilizer use, plant protection measures, improved method of keeping with poultry bird and fish in the rural areas are now wide-spread. Hence, the high application of fertilizer, pesticides, use of

fish feed in pisciculture and keeping of poultry bird in an intensive manner have given rise to pollution of air, water and soil in the rural areas. Misuse of the technology in rural areas has enhanced the problem of environmental pollution. Rural people engaged in agriculture and allied fields do not use chemical fertilizer, pesticides, maintenance of fish pond and poultry shed properly which are harmful to their health.

Therefore, in the present investigation an attempt was made to find out the awareness as well as perception of farmers about the different dimensions of environmental pollution in different farming systems. The specific objectives of the study were as follows :

1. To find out the nature of different farming systems adopted by the farmers.
2. To find out the extent (degree) of awareness of farmers about environmental importance and different dimensions of environmental pollution.
3. To find out the different sources of pollution in the farming systems and the effect of pollution on rural life as perceived by the farmers.
4. To find out the relationship of personal and socio-economic profile of farmers with extent of their awareness about environmental pollution.
5. The suggestions of farmers for the control of environmental pollution.

The study was conducted in purposively selected Cuttack district of Orissa State. Out of 16 blocks of the district 2 blocks viz., Salipur and Mahanga were selected randomly. Further, two villages from each of the blocks were selected at random. The villages were Bhairipur and Gunjarpur of Salipur Block and Gotara and Ostapur of Mahanga Block. Twenty five farmers from each of the identified farming systems viz., Agriculture alone, Agriculture with Animal husbandry, Agriculture with Poultry and Agriculture with pisciculture were selected randomly from each of the 4 selected villages. So, altogether 100 farmers were considered as the sample respondents of the study.

In order to find out the awareness of farmers about importance of environment, 12 statements on environmental importance were developed in consultation with scientist, experts in the concerned field. The respondents were asked to indicate their response in a 4 point scale. Finally, total score and mean score were computed and statements were ranked for each of the farming systems separately and together.

The different dimensions/sources of pollution viz., water pollution, soil/land pollution and air pollution were also studied in detail in order to findout the awareness of farmers about the dimensions. Here also the statements were developed in a similar fashion on each of the sources which were then ranked after computing the mean awareness score.

Further, in order to find out the perception of farmers of different farming systems on different sources of pollution and their effect on rural life, five major sources of pollution were identified viz., Agriculture-intensive cultivation, pollution by dairy, poultry, pisciculture and health hazard by pollution. The statements under each of heads were developed and perception was measured on each item on a five point scale. Finally, total perception score and mean score were computed after which they were ranked.

The relationship of awareness about importance of environment with different personal and socio-economic characteristics of the respondents was also studied to find out the significantly related characters with their awareness.

Attempt was also made to list out the different suggestions of farmers for the control of environmental pollution. Here also different possible suggestions were listed out and also open choice was given to the respondents to include more suggestions. Each of the suggestions were judged by the respondents by giving their response in a 6 point scale. Finally, the statements were ranked after calculating mean score of the statements.

The data were collected by using a structured and pre-tested interview schedule during September, 1996. The test statistic viz., mean, standard deviation, Spearman rank correlation test (r_s) and Kendall co-efficient of concordance(W) were used to analyse, interpret and drawing inferences.

The salient findings of the study were as follows.

5.1 It was revealed from the study that four types of farming systems were adopted by the farmers of the selected villages. The farming systems were Agriculture alone, Agriculture with Animal husbandry, Agriculture with Poultry and Agriculture with pisciculture. Keeping these four farming systems in view, 20-32 per cent of sample respondents were selected from the 4 villages.

5.2 Out of several areas of environmental importance, it was observed that the area " clean water is necessary for good health" was mostly known by the farmers of different farming systems which got rank I. A lowest degree of awareness was observed with respect to the area " increasing in impurities in rain water due to environmental degradation " which got a rank XII by all the farmers of the study areas. The other areas of environmental importance in order of awareness were " requirement of healthy air for good health ", " maintenance of sanitation leading to healthy environment", " environment consists of land, air, water, flora and fauna around us", " maintenance of good soil condition for good environment" and " environmental pollution causes different diseases in human being and animals " which got rank II, III, IV, V and VI, respectively. The other areas were " restoration of

environment by planting of trees ", " environmental pollution due to global warming ", " noise pollution", " ozone layer depletion due to pollution ", degradation of soil due to environmental pollution " which got rank VII, VIII, IX, X and XI, respectively.

5.3 Sixty three per cent of the total respondents were found to be within medium awareness category. Nineteen and eighteen per cent of total respondents were belong to high and low awareness categories about environmental importance respectively.

5.4 Broadly three dimensions/sources of environmental pollution were studied. They were water pollution, soil/land pollution and air pollution. It was revealed that awareness of farmers of different farming systems was maximum on " pollution of water by use of pesticides in crop " which got rank I. The other areas of decreasing awareness on water pollution were " water pollution due to bathing of man and animals ", " water pollution due to excreta of man and animals ", " pollution due to use of detergents ", " use of chemical fertilizer in crops ", " pollution due to industrial effluents " and " pollution due to release of garbages to ponds and rivers " which got rank II, III, IV, V, VI and VII, respectively.

5.5 Out of several dimensions of soil/land pollution it was revealed that the awareness was maximum on " excess use of nitrogen fertilizer in crops pollute the soil" which got rank I. The dimension where in a lowest awareness was observed was " pollution of soil due to excess use of phosphatic fertilizer " which got rank VII. The other areas were " pollution of soil due to soil borne pathogen, virus, bacteria etc.", " pollution of soil due to sewage materials ", " use of pesticides", " industrial and urban waste ", and " use of herbicides"which got rank II, III, IV, V and VI, respectively.

5.6 In case of awareness of farmers about air pollution, it was revealed that awareness was maximum with respect to " air pollution due to decomposed animal dead bodies " which got rank I by the farmers of all the farming systems. A lowest/no awareness was observed with respect to " air pollution due to application of phosphatic fertilizer in crop " which got rank XVI. The other dimensions got intermediate positions with respect to their awareness.

5.7 As regards to the extent of awareness of farmers towards the dimensions of environmental pollution, it was observed that 19 per cent, 56 per cent and 25 per cent of the total respondents belonged to high, medium and low awareness categories, respectively.

5.8 The perception of farmers of different farming systems on different sources of pollution and their effect on rural life was also revealed from the study, it was observed that in Agriculture-intensive cultivation, a highest perception was on " pollution of water due to use of pesticides in crop" which got rank I. The perception was lowest with respect to " use of power thresher for harvesting of crop causing air pollution leads to breathing problem and irritation" which got rank XII. The other sources got the intermediate position.

5.9 It was revealed that " water pollution due to manure of dairy animals " was perceived as an important source of pollution by dairy which got rank I by farmers of different farming systems. The perception was lowest with respect to " soil pollution due to repeated use of dairy wastes in crop field " which got rank VI. The other possible sources got intermediate position as perceived by farmers.

5.10 The perception of farmers with respect to" pollution of environment due to litters of poultry bird (ammonia gas)" was highest and got rank I. A lowest perception was observed with respect to " pollution of environment due to feeds of poultry birds " which got rank IV.

5.11 The farmers also perceived that pollution is caused through pisciculture. It was revealed that " pollution of water due to application of fish feed " and " use of contaminated fish feed " were perceived as important sources of pollution as perceived by the farmers.

5.12 The pollution caused due to adoption of different farming systems leads to health hazard was also revealed from the study. The farmers of different farming systems perceived that " water pollution causes diarrhoea and other diseases in human being " as the most important and got Rank I. A lowest perception was observed about " application of pesticides in crops leads to development of sterility in animals" The other dimensions got intermediate position.

5.13 Out of different personal and socio-economic variable it was revealed that mass media participation and extension participation were mostly significant to the awareness of farmers of most of the farming systems.

5.14 The different suggestions/opinions of farmers of different farming systems for control of environmental pollution were " enforcement of pollution acts and rules ", " teaching the people about pollution hazards" " sanitation in and around the living surroundings ",

" technological control of automobile pollution ", " use of bio-pesticides for controlling pests", " large scale plantation of trees around the habitation", " reducing wastages and recycling the bi-products ", " adoption of integrated pest management instead of only using pesticides", " use of bio-fertilizer instead of chemical fertilizer ", " encouraging agro-forestry farming system", " recycling, control and management of urban and industrial wastes", " vermi-culture bio-technology", and " incentives for environmental protection" which got rank I, II, III, IV, V, VI, VII, VIII, IX, X, XI, XII and XIII, respectively.

CONCLUSION

Due to the adoption of different farming systems, the environment is polluted which makes the living of human being miserable. It is mostly because of lack of knowledge and improper use of new technology generated through research. The study revealed that a low awareness and perception on different dimensions of environmental pollution by the farmers of different farming systems. Therefore, the farmers should be properly educated for correct use of technologies to keep the environment pollution free and enjoyable.

SUGGESTION FOR FUTURE RESEARCH

The suggestions for future research over and above this investigation are as follows.

1. Due to time and other limitations, the study was confined to only one district of the state. Therefore, similar type of studies of wider coverage need to be undertaken by the future researcher in order to draw some valid conclusion.

2. A large number of different personal and socio-economic variable should be incorporated and their possible relationship with awareness about environmental pollution should be studied in detail in order to find out a clear and complete picture.

3. The schedule developed for measuring the awareness and perception of farmers about different dimensions/ sources of pollution, should be standardized by the future researcher for development of a standard scale for measurement of above variables.

4. An exhaustive study on each of dimensions needs to be undertaken by the future researcher in order to develop a suitable strategy for control of environmental pollution.

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APPENDICES

APPENDIX -I

INTERVIEW SCHEDULE

1. Name of the farmer .....
2. Fathers name .....
3. Village .....
4. Block .....
5. District .....

SOCIO-ECONOMIC PROFILE

1. Age ..... years (as on September, 1996)
2. Educationai status -
   (a) Illiterate .....
   (b) Upto primary .....
   (c) Upto matric .....
   (d) Above matric .....
3. Sex - (a) Male ..... (b) Female .....
4. Caste - (a) Higher caste ..... (b) Lower caste .....
5. Family -
   (A) Type - (a) Nuclear ..... (b) Joint .....
   (B) Size - (a) Male ..... nos. (b) Female .....
6. Occupation -
   (a) Agril. Labourer .....
   (b) Agril. & allied activities .....
   (c) Agril. & business .....
   (d) Agril. & Service .....
   (e) Any other .....

7. Annual income from all sources -

(a) Upto Rs.15000/- .....

(b) Rs.15000/- to Rs.30000/- .....

(c) Rs.30000/- to Rs.45,000/- .....

(d) Rs.45000/- to Rs.60000/- .....

(e) Above Rs.60000/- .....

8.Mass media participation -

Media	Frequency of Reading/Listening habit			
	Regular	Often	Rarely	Never
(a) News paper				
(b) Farm magazine and Literature of Environmental concern				
(c) Books on Agriculture and Environment				
(d) Radio				
(e) Television				

9. Social participation -

(a) Not member of any organisation .....

(b) Member of one organisation .....

(c) Member of more than one organisation .....

(d) Office bearers .....

10. Extension participation -

Sl. No.	Programmes	Frequency of participation			
		Regularly	Often	Rarely	Never
1.	Short Training Programme	-	-	-	-
2.	Training courses	-	-	-	-
3.	Discussion meeting	-	-	-	-
4.	Field visit	-	-	-	

5.	Demonstration	-	-	-	-
6.	Film show	-	-	-	-
7.	Field days	-	-	-	-
8.	Exhibitions	-	-	-	-
9.	Study tours	-	-	-	-
10.	Any other	-	-	-	-

11. Extension contact -

		Regularly Frequency			
Sl No.	Extension contact	Regularly	Often	Rarely	Never
1.	Village level Extension Officer	-	-	-	-
2.	Block level Extension Officer	-	-	-	-
3.	District level Extension Officer	-	-	-	-
4.	Extension Officer of Volunteer Organisation	-	-	-	-
5.	State level Extension Officer	-	-	-	-

12. I Farming systems

Sl No.	Farming systems	Major	Minor
1.	Field crop	-	-
2.	Vegetable crop	-	-
3.	Fruit/plantation crop	-	-
4.	Dairy	-	-
5.	Goatery	-	-
6.	Duckery	-	-
7.	Fishery	-	-
8.	Apiculture	-	-
9.	Poultry	-	-
10.	Mushroom cultivation	-	-
11.	Any other	-	-

II. Total Area utilised (for crop husbandry) -

(a) For major enterprises ..... Acs.

(b) For minor enterprises ..... Acs.

Total area ..... Acs.

III. Total no of animals/ birds -

	Animal/birds	Numbers
(a)	Dairy	-
(b)	Goatery	-
(c)	Duckery	-
(d)	Poultry	-

IV Total area under pisciculture ..... Acs.

V Total nos. of boxes under Apiculture ..... Acs.

VI Total nos of beds under mushroom cultivation ..... Acs.

13. Awarness about environmental importance

Sl No.	Not Known	Not known	Known		
	Statement		Listen from friends	Reading	Experienced
	DO YOU KNOW THAT,				
1.	Environment consists of land, air, water, flora and fauna around us?				
2.	Healthy air is required for good health?				
3.	Clean water is necessary for good health?				
4.	Good soil condition is required for maintaing good environment?				
5.	Environmental pollution causes different diseases				

in human being and animals?

6. Impurities in rain water is increasing due to environmental degradation?
7. Soil is degraded due to environmental pollution?
8. Pollution causes azone layer depletion?
9. Global warming is the cause of environmental pollution?
10. About noise pollution?
11. Planting of trees helps in restoration of environment?
12. Maintenance of sanitation leads to a healthy environment?

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14. Dimensions of Environmental Pollution -

Sl No.	Statement	Not known	Known		
			Listen from friend	Reading literatures	Experienced
(A) WATER POLLUTION					
	DO YOU KNOW THAT :				
1.	Water is polluted by excess use of chemical fertilizer in crop?				
2.	Water is polluted by use of pesticides in crop?				
3.	Release of garbages to ponds and rivers, pollute the water?				
4.	Industrial effluents pollute the water?				

5. The excreta of man and animals causes water pollution?
6. Bathing of man and animal causes water pollution?
7. The detergents used for cleaning polluted the water?

(B) SOIL/LAND POLLUTION

DO YOU KNOW THAT :

1. Excess use of Nitrogenous fertilizer in crop pollute the soil?
2. Excess use of phosphatic fertilizer, causes pollution in soil?
3. Pesticides pollute the soil?
4. Use of herbicides pollute the soil?
5. Soil is polluted by industrial and urban waste?
6. Sewage materials pollute soil?
7. Soil borne pathogens, virus, bacteria etc. pollute the soil?

(C) AIR POLLUTION

DO YOU KNOW THAT :

1. Respiration of man and animal, that releases co_2 to the air causes air pollution?
2. Emissions of automobiles pollute the air?

3. Buring of wood,cow dung and other garbages pollute the air?
4. Decomposed fruits and vegetables pollute the air?
5. Decomposed animal dead bodies causes air pollution?
6. Air is polluted through mining activities?
7. Industrial emission causes air pollution?
8. Use of pesticides/fungicides in crops causes air pollution?
9. Herbicide application in crops pollutes the air?
10. Use of of Nitrogenous fertilizer in crop causes air polution?
11. Application of phosphatic fertilizer in crop causes air pollution?
12. Burning of bi-products of different crops causes air pollution?
13. Agril. mechinary like power thresher causes air pollution?
14. The noises from automobiles pollute the air?
15. Noises caused by use of loudsspeaker pollute air?
16. Noises produced by industries causes air pollution?

15. Pollution by different farming systems -

(A) AGRICULTURE - INTENSIVE CULTIVATION :

Sl No.	Statements	Disagree	Undecied	Agree		
				I feel	Listen and reading	Expericenced
	DO YOU KNOW THAT					
1.	Repeated use of chemical fertilizer in crop like nitrogenous and phosphatic fertilizer causes air pollution?	-	-	-	-	-
2.	Repeated application of chemical fertilizer in crop field pollute the water?	-	-	-	-	-
3.	Repeated use of chemical fertilizer in crop field leads to pollution of soil therby causing loss of micro organism and other problem in soil?	-	-	-	-	-
4.	Use of pesticides in crops pest causes air pollution in the surrounding?	-	-	-	-	-
5.	Use of pesticides in crop field pollutes the water?	-	-	-	-	-
6.	Indiscriminate application of pesticides in crop causes soil pollution?	-	-	-	-	-
7.	Use of pesticides causes pollution in the surround-					

ing affecting human and animal health?	-	-	-	-	-
8. Indiscriminate use of pesticides pollute the food material leading to residual toxicity?					
9. Repeated and indiscriminate use of pesticides causes pollution, thereby leading to pest resistance and pest resurgence?	-	-	-	-	-
10. Indiscriminate use of pesticide reduces the population of natural enemies of pest?	-	-	-	-	-
11. Burning crop bi-product causes air pollution which affect, health of human and animal?	-	-	-	-	-
12. Power thresher used for harvesting of crop causing air pollution leads to breathing problem and irritation?	-	-	-	-	-

(B) Pollution by dairy -

Sl No.	Statements	Disagree	Undecide	Agree	
				I feel	Listen Experienced and reading
DO YOU KNOW THAT					
1.	Mannures of dairy animal, contain harmful substance causing water pollution?	-	-	-	-

2. Repeated use of dairy wastes in crop field causes soil pollution - - - - -
3. Dairy wastes contain microbial contaminant leading to health hazards? - - - - -
4. Noxious odour produced from wastes of cattle causes air pollution in the surroundings? - - - - -
5. The pollution by dairy causes the out break of diseases in animal and human? - - - - -
6. Poisonous gases like methane released from cowdung fermentation pollute the air in the surroundings? - - - - -

(C) Pollution by poultry -

Sl No.	Statements	Disagree	Undecied	Agree		
				I feel	Listen	Experienced and reading
	DO YOU KNOW THAT					
1.	The litters of poultry birds (ammonia gas) polluted the environment?	-	-	-	-	-
2.	Decomposed poultry litters pollute the water on the surrounding?	-	-	-	-	-
3.	Uncleaned litters in					

poultry shed pollute the surrounding causing the out break of diseases in epidemic form?	-	-	-	-	-
4. The feeds of poultry birds pollute the surroundings?	-	-	-	-	-

(D) Pollution through pisciculture

Sl No.	Statements	Disagree	Undecied	Agree		
				I feed	Listen and Reading	Experienced
DO YOU KNOW THAT						
1.	Pond water is polluted due to application of fishfeed causing health hazard?	-	-	-	-	-
2.	The fishfeed, you used, are mostly contaminated and polluted the surroundings?	-	-	-	-	-

(E) Health hazard by pollution due to adoption of different farming system

Sl No.	Statements	Disagree	Undecied	Agree		
				I feel	Listen and Reading	Experienced
DO YOU KNOW THAT						
1.	Air pollution causes respiratury diseases					

pesticides, industrial wastes and sewage?	-	-	-	-	-
13. Development of sterility in animal may be possible due to application of pesticides in crop?	-	-	-	-	-
14. Health hazards to animal occures by eating of non-biodegradable article (like plastic,disposed article)	-	-	-	-	-
15. Retardation of growth of plant is occured due to air pollution?	-	-	-	-	-
16. Damage to plant is possible through the automobile exhaust (like discolouration, bleacning and other physological disorder)	-	-	-	-	-

18. Suggestion -

Sl No.	Opinion/Suggestion	Degree of Importance					
		Not important	Least important	Less important	Important	More important	Most important
1.	Large scale plantation of trees around the habitation	-	-	-	-	-	-
2.	Teaching the people about pollution hazard	-	-	-	-	-	-
3.	Use of bio-pesticide for controlling the pests	-	-	-	-	-	-

4. Adoption of Integrated pest management instead of only using pesticide	-	-	-	-	-	-
5. Use of bio-fertilizer instead of chemical fertilizer	-	-	-	-	-	-
6. Reducing wastage and recycling the bi-product	-	-	-	-	-	-
7. Encouraging agro-forestry farming system	-	-	-	-	-	-
8. Vermi culture bio-technology	-	-	-	-	-	-
9. Recycling, control and management of urban and industrial waste	-	-	-	-	-	-
10. Technological control of automobile pollution	-	-	-	-	-	-
11. Incentives for environ-mental protection	-	-	-	-	-	-
12. In forcement of pollu-tion act and rules	-	-	-	-	-	-
13. Sanitation in and around the living surrounding	-	-	-	-	-	-

APPENDIX - II
BASIC ENFORMATION ABOUT THE AREA UNDER STUDY

1.	Name of the State	:	Orissa			
2.	Name of the district	:	Cuttack			
3.	Name of Block	:	Salipur		Mahanga	
4.	Name of the villages	:	Bhairipur	Gunjarpur	Gotara	Ostapur
	(A) Population	:	1664	940	1758	2285
	i) Male	:	951	590	998	1322
	ii) Female	:	713	350	760	963
	(B) Area (in acre)	:				
	i) Geographical area	:	792	344	812	920
	ii) Cultivated area	:	592	317	778	890
	(a) Irrigated	:	490	310	772	882
	(b) Non-irrigated	:	10	7	6	8
	(C) Land classification (in acre)	:				
	i) High	:	25	8	36	56
	ii) Medium	:	360	192	571	613
	iii) Low	:	207	127	171	221
	(D) Categories of farm families	:				
	i) Agril labour	:	32	18	25	35
	ii) Marginal farmer	:	149	162	303	328
	iii) Small farmer	:	128	53	180	253
	iv) Big farmer	:	7	15	20	25