Environmental Management

9201-001. Abdul Razak M (Cent Env Edn, Thaltej Tekra, Ahemedabad 380059). **Environmental education through interactive exhibits: an experience**. *Growth Dev Nat Resource Conserv. (Ed SR Verma)*, Nature Conservators, (1990), 69-78 [5 Ref].

The recently held exhibition "Our Environment and Our Future" at the India International Trade Fair, New Delhi in November 1989, was thought provoking and had an educational significance. The present paper while discussing educational and recreational value of exhibitions also discusses as to how exhibitions could be made more interactive and meaningful. The ideas are based on the collection of expectations of the visitors, their reactions and appreciation.

9201-002. Ahmad Afroz, Singh PP (GB Pant Inst Himalayan Env Dev, Kosi, Almora 263643, UP). **Environmental impact assessment for sustainable development: Chittaurgarh irrigation project in outer Himalayas**. *Ambio*, **20** (7) (1991), 298-303 [15 Ref].

This paper analyzes both positive and negative environmental impacts associated with, U. P. Government Chittaurgarh irrigation project, situated in the outer Indian Himalayas. The construction of a dam and canals have had a serious impact on flora and fauna. Agricultural and grazing land6 have been lo6t by utilization of 405 ha Himalayan forestland upstream and 212 ha of cultivated land downstream of the project. Guidelines have been developed to eliminate negative impacts at an early stage to ensure sustainable development, and to protect natural resources.

9201-003. Balagopal G, Subramanian TV (Anna Univ, AC Coll Techno, Madras 600025). **Pollution control and envirohygiene using mixed function oxidases.** *Indzan J Environ Prot*, **11** (8) (1991), 605-607 [8 Ref].

Pollution control becomes necessary to preserve the productive aspect of the individual in a professional atmosphere. In the human being the liver microsomal monooxygenases system contains cytochrome P_{430} as the terminal oxidase and metabolises a wide variety of xenobiotics and endogenous substances. Most of the P_{430} catalyses physiological detoxification for blood treatment to remove poisons. The system could be employed for certain biochemical relevance and also has the potential as an analytical tool.

9201-004. Chandra Praveen (Dy Conservator Forests, Chitradurga Karnataka). **Industrialisation vis-a-vis environmental pollution.** *Growth Dev Nat Resource Conserv. (Ed SR Verma),* Nature Conservators (1990), 103-115 [11 Ref].

Paper deals with the industrial development and various environmental problems related to them. Water pollution, air pollution and noise pollution are the main industrial problems which create a number of abnormalities in abiotic and biotic environment. Some general measures to overcome this problem including public awareness have also been discussed.

9201-005. Dewan 1tL (Himalayas Surakshan Ashram, Ranichauri, 249 199, Tehri Garhwal Dist UP). **Strategy for conservation and development of the Himalayas.** *Encology*, **5**(8) (1991) 29-32.

Socio economic conditions and impact of deforestation in Himalayan mountain region and Himalayan sediment area are discussed. An action plan covering principles and technological tasks to implement strategy for conservation and development of Himalayas by involving voluntary agencies, government and people. Multi disciplinary research programme for holistic development of the region is suggested.

9201-006. Dhir RP, Sharma JR (Centl Arid Zone Res Inst, Jodhpur 392003). **IRS1A application in desertification studies**. *Curr Sci*, **61**(3&4) (1991), 257-259 [5 Ref].

Wind erosion and generation of drift sands, manifested in the degree of stability of land surface and degradation of vegetation cover are the two major desertification processes. The operation of these processes is spatially variable. Results of the study show that IR8 IA data can be very useful tool in monitoring the incidence of desertification. Amongst the various proceedings of IRS data attempted, Soil Brightness Index was the best in separating land surfaces of different degrees of stability and incidence of wind erosion. In the case of pasture land cover, NDVI from the Red and the IR bands of IRS data showed potential in assessing degradation of the otherwise sparse vegetation cover.

9201-007. Ghosh MK, Kundan NK (Indian Sch Mines, Cent Mining Env, Dhanbad 826004). **Soil profile studies as a ‘ part of environmental management in coal mining areas.** *Indian J Environ Prot*, **11**(6) (1991), 413-417 [5 Ref].

A fact finding survey was made in central coal-field areas of Bihar to utilize the overburden dump areas, vacant areas after mining for agricultural afforestation/ plantation purposes for increasing the green belt areas. Various field tests and laboratory tests on the soil were conducted. Classification of the soil is in accordance with unified system of soil classification. Field capacity tests were carried out in different locations. Infiltration tests were carried out for the purpose, and infiltration rates were found in the sequence of Danga land > forest land > agricultural land. The results of various tests have been discussed. For plantation purpose the area has been broadly classified and described in brief.

9201-008. Khan TI (Indira Gandhi Cent. Human Eco, Environ Population Std, Univ Rajasthan, Jaipur 302004). **Sustainable development a goal to be achieved**. *Growth Dev Nat Resources Conserv (Ed SR Verma),* Nature Conservators (1990), 293-297 [7 Ref].

Many of the major environmental trends of the present and of the future e. g. ecological disturbance caused by the pursuit of short-term benefits in the development process, resource impoverishment and ‘environmental degradation as a result of population growth are not new but have long been recognised as serious problems. What is new is the accelerating pace and scale of problems. Development can be sustainable, if it is based on the social foundation’ of equity, mobilization of indigenous resources, use of appropriate technology and full utilization of human capital. Tools of sustainable development of various ecosystems are discussed in the present paper.

9201-009. Shanna P, Kondawar VK (Natl Environ Engng Res Inst, Nagpur 440020). **Application of remote sensing techniques for environmental impact assessment**. *Curr Sci*, **61** (3&4) (1991). 252-256 [9 Ref].

Environmental Impact Assessment (EIA) is potentially one of the most valuable, interdisciplinary, objective decision making tools with respect to alternate routes for development, process technologies and project sites. While elaborating the role of EIA in developmental planning, the paper discusses the role that remote sensing techniques

could play in data collection for vegetation and land use mapping with the help of a case study.

9201-010. Krishna D, Reddy PJ, Reddy RC, Rama Rao KG, Rao PM (Indian Inst Cheml Techno, Hyderabad). **Water quality assessment through statistical models a case study.** *Asian Env*, **13** (3) (1991), 60-69 [4 Ref].

Water samples have been collected from problematic ground water and surface water sources in different villages belonging to nine blocks/taluks of Gulbarga district, Karnataka State. The water samples were analysed for physicochemical properties. Different types of statistical models like correlations and regressions were applied to study the interrelationships between these variables. Significant differences between blocks/taluks and different sources of water obtained using analysis of variance two ways classification technique.

9201-011. Kshira Sagar TVSR (Andhra Univ, Dept Geo, Visakhapatnam 530003). **A simple activation setup for the determination of pollutants.** *Indian J Environ Prot*, **11** (7) (1991), 492-495 [11 Ref].

An attempt has been made to determine the pollutants using instrumental neutron activation analysis (INM) with the facilities available in the Swamy Jnanananda Laboratories for Nuclear Research, Andhra University. The simple activation setup consists of a 500 mc (Ra-Be) neutron source for irradiation and a summing scintillation spectrometer with a 4 x arrangement for counting. The sensitivity for detection is further enhanced by using a specially fabricated cast iron shielding.

9201-012. Lakshmi Ahana (The Environ Soc, Besant Garden, Besant Avenue, Madras 600020). **Approaches to environmental literacy.** *Indian J Environ Prot*, **11** (7) (1991), 481-486 [5 Ref].

Paper discusses about the causes and effects of mans action resulting in the degradation of our environment. Unless people are aware of environmental problems and appreciate the magnitude of the problem, they will not be able to effectively participate in decision making. Paper gives a clear idea on what needs to be actually done and how to go about environmental education.

9201-013. Lunkad SK, Bhall SK (Dept Earth & Kurukshetra Univ, Kurukshetra 132119 Haryana). **Water resources and ecosystem management in Haryana.** *Growth Deu Nat Resource Conserv (Ed SR Verma),* Nature Conservators, (1990), 221-232 [14 Ref].

Irrational management of water resources in Haryana is adversely affecting the economy and utilization of land in the state. Factors causing this problem are over drafting of ground water, excess use of surface water, deforestation and lack of environmental awareness. An attempt has been made to verify the impact of these factors empirically. Simultaneously several suggestions have been made to improve the water resources management.

9201-014. Prakash A, Saxena Ranjana (Lab Fisheries Bio, Dept Zoo, DAV (PG) Coll, Muzaffiarnagar 251001). **Environment, fisheries and fishermen community in western UP.** *Env Eco*, **9** (3) (1991), 678-681 [6 Ref].

The discharge of effluents, use of explosives and poisons in fishing have posed a threat to aquatic ecosystem and to the fishermen community in western UP. The ecological factors coupled with religious dogmas have disrupted fishermen's way of living. The poor nutrition and sanitary conditions have made them prone to a number of infectious diseases and the professional skill appears to be on the decline in the younger generation.

9201-015. Sambasiva Rao M (Dept Geogr, Sri Krishnadevaraya Univ, Anantapur 515003, AP). **Environmental impact assessment and conservation of natural resources of Vaigai, Gundar and Vaippar river basins, Tamilnadu.** *Growth Dev Nat Resource Conserv (Ed: SR Verma),* Nature Conservators (1990), 25-34 [5 Ref].

The Vaigai, Gundar and Vaippar river basins have been studied with a view to assess the environmental impact due to man's interference with the natural ecosystems. The erosion index, intensity of soil removal and sediment yield index have been worked out for various macro-physiographic units of the subbasins. The results showed that the pockets of hilly terrain disturbed for raising plantation crops without adopting soil conservation practices and deforested pockets are subjected to very severe erosion.

9201-016. Sharma HC (2/569, Nagar Marg, Chaube Colony, Raipur 492001). Spill prevention, control and counter resources for hazardous substances. Indian J Environ Prot, 11 (7) (1991), 507510.

Paper discusses about the importance of having a spill prevention, control and counter resources (SPCC) plan for every industry or location where any type of hazardous substance is stored. This includes an SPCC plan for every oil and gas storage tanks, every place where transfer of these and other hazardous chemicals take place.

9201-017. Singh Harjit (Min Env Forests, CGO Complex, Lodi Rd. New Delhi. 110003). **The deteriorating Indian environment: crisis and its solution.** *Employment News*, **16** (31) (1991), 1 & 4.

Environmental problems such as floods and famines caused by overuse of land and soil, deforestation, diseases caused by unsafe water supplies and polluted air, malnutrition among the young and vulnerables, extraordinary pressure on our natural resources caused by our increasing population etc., leads to deterioration of environment and quality of life. Protection and improvement of environment are therefore national imperatives for sustainable development. Paper gives an overview of the deteriorating Indian environment the crisis and its solution.

9201-018. Singh JS, Singh KP, Agarwal M (Dept Bot, Banaras Hindu Univ, Varanasi 221005). **Envirconmental degradation of the Obra-Renukoot-Singrauli area, India and its impact on natural and derived ecosystems.** *The Environmentalist*, **11** (3) (1991), 171-180.

Vast stretches of the Obra-Renukoot, Singrauli region once covered with natural forests are under immense biotic stresses. Signs of desertification are widespread. In these studies, dynamics of plant biomass, productivity and nutrients, and biochemical physiological responses of plants to pollution were emphasised. Environmental perceptions of the native and displaced populations were also studied. The paper outlines a range of recommendations which should help to improve the environmental quality of the region.

9201-019. Sinha Rajiv K (Indira Gandhi Cent Human Eco, Environ Population Std, Univ Rajasthan, Jaipur 303004). **Development without destruction and development with regeneration key to sustainable development and survival of human society.** *Growth Dev Nat Resources Conserv, (Ed SR Verma),* Nature Conservators (1990), 249-259 [3 Ref].

Some of the development projects which brought economic prosperity to mankind have caused immense damage to our life sustaining environment and threatening to upset the ecological balance. Besides, the biosphere has only a limited capacity to absorb the toxic waste and heat generated by developmental activities. Hence, constraints of future developments are severe and options are few. Therefore, all major decisions for technological and economical development must be put to environmental scrutiny and it should be need based and not greed based.

9201-020. Srivastava AK, Gupta BN (Indl Toxico Res Cent Epidemio Div, Mahatma Gandhi Marg, Lucknow 226001). **Climate and human health.** *Indian J Environ Prot*, **11** (5) (1991), 333-336 [12 Ref].

Variations in climate are known to affect health. There has been some scientific enquiry in this field but most of it has been limited to health effects of extremes of temperature and atmospheric pressure. Other aspects have only been cursorily examined and often the findings are not available to experts of health and concerned disciplines. The present article briefly summarises the important findings and concepts on this subject.

9201-021. Tewari Anil Kumar, Srivastava Anupam (Dept Bot, Univ Allahabad, Allahabad). **Eco exploitation and ecodevelopment through peoples involvement.** *Growth Dev Nat Resource Conserv (Ed SR Verma),* Nature Conservators (1990), 187-190 [5 Ref].

Grounds and evidences which prove beyond any doubt that peoples involvement in environmental preservation is a must, specially the role played by the N. G. O's in this regard. A case study with the co-operations of a voluntary organization and certain valuable recommendations for the successful eco-development of the area where exploitation of certain valuable natural resources are in full swing is discussed.

9201-022. Yadav Rama Nand, Singh JB (Dept Civil Engng, MMM Engng Coll, Gorakhpur 273010, UP). **EIA of water sources development projects in Himalayan region.** *Indian J Environ Hlth*, **33** (2) (1991), 237-240.

Himalayan region has a large number of river tributaries with enormous potential of hydropower projects. Impacts of these projects on inhabitants of the region, soil erosion, sedimentation, seismicity, flora, fauna, water logging and salinity have been discussed. Remedial measures for adverse impacts have been suggested.

Socioeconomic conditions of affected people and providing them with basic amenities have been highlighted.

Air Pollution

9201-023. Agrawal GD (Envirotech East (P) Ltd, Flat 3B, 87C, Harish Mukherjee Rd, Calcutta 700026). **Status of air quality in major cities in India.** *Growth Dev Nat Resource Conseru (Ed SR Verma),* Nature Conservator (1990), 329-333.

Under the project of National Air Quality Monitoring Programme, NEERI has monitored 10 major cities of India for the past 15 years or more. As a part of this programme, 3 stations (one each in industrial, commercial and residential areas of the city) in each of the 10 cities are monitored 3 times a month and the data collected is periodically compiled and published. Brief examination of air quality trend is based on the above mentioned data from NEERI for the period of 1978-86.

9201-024. Ajit Kamalakar J (Sch Environ Sci, Jawaharlal Nehru Univ, NewDelhi 110 067). **A study of air pollution in Union Territory of Delhi.** *Encology*, **5** (9) (1991), 10-16 [4 Ref].

An attempt is made to draw attention to steadily growing problems of air pollution in Union Territory of Delhi. The results of ambient air quality measurement showed that around most of the junctions the concentration levels of SPM, C0 and N0 remain far in excess of their safe prescribed limits during day time when there is a greater traffic rush. The thermal power plants contribute 24.32% whereas the industries contribute 9.27% of the total air pollution in Delhi.

9201-025. Mundri SS, Venkat Rao D, Rammohan Rao I, Ravi Shankar V, Reddy MK, Vittal Rao M, Aggarwal AL (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Status of ambient air quality at Hyderabad a metropolitan city.** *Indian J Environ Prot*, **11** (8) (1991), 561-567 [4 Ref].

The need arose to know the status of ambient air quality for proper planning of the future growth of the city. The ambient air quality survey in 15 selected sampling stations in different zones of the city was carried out for a peri4d of one year. The data is discussed as to the status of the ambient air quality and suggestions have been made for improvement.

9201-026. Nath Ravindra (Punjab Agricl Univ, Ludhiana - 141001 Punjab). **Global environmental changes and the green house effect.** *Growth Dev Nat Resource Conserv, (Ed: SR Verma),* Nature Conservator (1990), 211-220 [13 Ref].

The worst effects of a green house induced climate cataclysm can be averted. And sooner the action i8 taken, more effective it will be. Conversely, the longer a policy response is delayed, the greater the warming that will have accumulated "in the bank" and the more radical the measures that will be required to prevent further climate upheaval.

9201-027. Pandey VK, Das NC, Bandyopadhyay M (Dept Civil Engng, IIT, Kharagpur 721302). **Base line air quality survey in Kharagpur - a short term study.** *J Inst Public Hlth Engrs (India)*, **1991** (2) (1991), 17 [4 Ref].

This study deals with monitoring of various air quality parameters in Kharagpur (District Midnapore, West Bengal) for establishing the base line air quality at various zones. The five air pollutants viz. carbon dioxide, carbon monoxide, sulphur dioxide, methane and nitrous oxide were selected and monitored at different locations in Kharagpur. The carbon dioxide level at Gole Bazar area was found to be quite high while the levels of other pollutants were almost within reasonable limits.

9201-028. Pandit VI, Deshpande VA, Rao CSG, Aggarwal AL (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Application of Nemerow's index for air pollution analysis for Cochin region.** *Indian J. Environ Prot*, **11** (5) (1991), 321-324 [4 Ref].

Studies have been carried out for Cochin region to evaluate the ambient air quality. Application of Nemerow's index for the different pollutants taken together for different sites have been estimated. The studies indicate that the index varies with locations and represent the synergistic effect of exposure of different pollutants. Higher index at certain locations though concentrations for individual pollutants were not adverse, highlight the need for control measures.

9201-029. Pandya GH, Bhave VR, Phadke KM (Natl Environ Engng Res Inst Nagpur 440020). **Cost analysis of sulphur dioxide monitoring in the ambient air.** *Indian J Environ Hlth,* **33** (2) (1991) 264-268 (3 Ref].

Paper deals with the review of operation, maintenance and cost effectiveness of sampling and analysis of SO2 in ambient air by wet chemical method and continuous

monitoring analysers. Advantages of automatic analysers over the wet chemical method are discussed.

9201-030. Patel MK (IDL Cheml Ltd, Qlty Contl Lab, Rourkela 769016). **Dust pollution in the Rourkela industrial complex Part III: elemental carbon.** *Indian J Environ Prot*, **11** (8) (1991), 575-577 [10 Ref].

Because of heavy dust fall in the Rourkela industrial complex, this study was undertaken to estimate the percent availability of carbon in the dust of this industrial complex. Dust samples were collected from 13 sampling sites in and around this industrial complex during April 1990 and December 1990. Result of the experiment indicates that percent availability of elemental carbon varies from 0.9 to 4.2 for the samples of April 1990 and 0.8 to 4.1 for the samples of December 1990.

9201-031. Patel MK, Tiwari TN (IDL Cheml Ltd, Qlty Contl Lab, Rourkela 769016). **Dust pollution in the Rourkela industrial complex: Part questionaire survey.** *Indian J Environ Prot*, **11** (5) (1991), 371-374 [18 Ref].

Paper presents the result and analysis of questionaire survey carried out in the Rourkela industrial complex, in connection with dust pollution. The first chapter gives a discussion on the sources of air pollutants and the importance of the study area from environmental study point of view. The paper describes the importance and role of questionaire survey in environmental studies with special reference to dust pollution. The concluding section is the discussion based on the analysis of the survey.

9201-032. Pricilla Priyadarsini L, Nagarajan Prabavathy, Subramanian NS, Selvaraj S, Subbaraman C (Bishop Heber Coll, Tiruchirapalli 620017). **A study on the performance of electrostatic precipitator in a thermal power station.** *Indian J Environ Prot*, **11** (8) (1991), 598-600.

Present study involves stack monitoring of SPM using Thimble Sampling Train in Neyveli Lignite Corporation to study the emission levels during the period January to April, 1991 and the performance of electrostatic precipitator (ESP). The levels of SPM in all these months are below the standard values and the efficiency is of 80-90%.

9201-033. Rajvanshi Asha, Srivastava MM (Dept Bot, DAV Coll, Dehra Dun 248001). **Evaluation of particulate pollution around the lime kilns and its impact on plants.** *Env Eco*, **9** (1) (1991), 141-144 [18 Ref] (Late Recd).

Paper presents the results of the analysis of ambient air quality for particulate pollution resulting from lime kiln operations. The rate of fall in both, settleable and suspended particulates had peak values in summer months. The values for the rest of the period also remained significantly high. The results of the spectral analysis for chemical composition revealed that particulate lime is mainly composed of metallic oxides. Injurious effects of lime deposition on plants growing around the industrial area were recognized.

9201-034. Ravindra P (JNT Univ, Sch Biqtechno, Mahaveer Marg, Hyderabad 500028). **Studies on suspended particulate matter in an industrial area.** *Indian J Environ Prot*, **11** (5) (1991), 358-359.

Air quality survey has been carried out in an industrial development area. The samples were collected from January, 1989 to February 1990 at regular intervals, using air monitoring system. The samples are analysed for suspended particulate matter and the results show that all the samples possess the SPM 3 to 5 times in excess of permissible limit.

9201-035. Rukmangad PP, Phadke KM, Gawalpanchi RR, Aggarwal AL (Natl Environ Engng Res Inst, Nehru Marg, Nagpur 440020). **Particle size distribution and its elemental composition in the ambient air of Nagpur city.** *Indian J Environ Prot*, **11** (6) (1991), 409-412 [9 Ref].

Particle size distribution of SPM in ambient air of Nagpur was carried out using 8 stage Andersen impactor sampler. Trace metals, such as Fe, Mn, Cr, Pb and Zn were determined in two particle size ranges. Trace metal analysis shows that Fe and Mn associates with course fraction of particulates whereas Cr, Pb and Zn associates with fine fraction of particulates.

9201-036. Satyanarayana YVV, Agrawal EM (Visvesvaraya Regl Coll Engng, Environ Engng Div, Dept Civil Engng, Nagpur). **Long term trend analysis of Pasquill stability classes over northeast India.** *Indian J. Environ Prot*, **11** (7) (1991), 502-506 [9 Ref].

Stability categories in north east India were calculated by Pasquill's method at two stations, namely Dibrugarh and Gauhati in north east India. The percentage

occurrence of Pasquill's stability categories were worked out based on the basis of 1230 year period (that is 193960 and 196980). Average meteorological data and the diurnal and monthly variations of stability classes were analysed. This study will have immense practical value for the carrying capacity based sustainable development of the northeast region of the country.

9201-037. Sawant VD, Joshi PV, Nadgir SB, Nair PVN (Environ Assessment Div, Bhabha Atom Res Cent, Bombuy 400085). **Development of an automatic condensation nucleus counter and its application in aerosol studies.** *Indian J Environ Hlth,* **33** (2) (1991), 171-181 [22 Ref].

The paper discusses calibration and use of a condensation nucleus counter (CNC) designed and fabricated for continuous monitoring of atmospheric condensation nuclei (CN). The counter is based on the Cloud Chamber principle and is useful for continuous monitoring of atmospheric CN. The paper gives theory, details of construction and operation and presents data obtained with the counter on diurnal and seasonal variations of number concentration of CN at Anushaktinagar, Bombay.

9201-038. Sengar CBS, Bassin JK, Aggarwal AL (Envirotech Consultants (Pvt) Ltd, A239, Okhla Indl Estate, Phase I, New Delhi110020). **Characteristics of atmospheric suspended particulate matter in Kanpur: Part II source apportionment.** *Indian J Environ Prot*, **11** (5) (1991), 363-367 [14 Ref].

Receptor models like enrichment factor (EF) and factor analysis (FA) were applied to elemental composition data set of atmospheric particulates of Kanpur city for source apportionment of articulates. EF of crystal elements found to be around unity confirming their crystal origin wheres EF of anthropogenic elements were higher as much as 510 (for Pb in industrial zone). Results of varimax rotated factor analysis showed that three to four factors were enough to explain the entire data by accounting approximately 7387% of total variance in the system. Major sources which could be identified were soil, dust, coal/refuse burning, auto exhaust emissions and mixed industrial sources.

9201-039. Sharma Parveen Kumar, Rathore Chinmaya, Singh Gurdeep (Cent Mining Env. Indian Sch Mines, Dhanbad). **An index to measure depreciation in air quality in some areas of the Raniganj coalfield, India.** *Asian Env*, **13** (2) (1991), 11-19 [9 Ref].

Some drawbacks of using national ambient air quality standards for the evaluation of air quality data have been highlighted. As an alternative, an index that measures depreciation in air quality on more realistic terms, has been proposed and applied to air monitoring data collected from some areas of the Raniganj Coalfield in India. Results have been discussed in detail to illustrate the application of the proposed index and utility in bringing out more realistic air quality assessment.

9201-040. Singh Gurdeep, Sharma Parveen Kumar (Cent Mining Env, Indian Sch Mines, Dhanbad 826004). **Ambient air quality status in certain coal mining areas of Raniganj coalfields.** *Energy Env Monit,* **7** (2) (1991) 56-65 [6 Ref].

This investigation presents the assessment of ambient air quality (suspended particulate matter, sulphur dioxide and oxides of nitrogen) in Shankarpur, Haripur and Jambad mining areas of Raniganj coalfield. Ambient air was monitored in each season over a period of one year. Results of the investigation indicate that industrial activities are responsible for the comparatively high concentrations of pollutants during the day. It was observed that sources of pollutants were situated between the sampling stations, and that the contribution due to the dispersal of pollutants into the study area was not very significantly. The levels of suspended particulate matter in the work zones were found to be higher than their corresponding levels in ambient air, which could be attributed to production activities.

9201-041. Subrahmanym W, Subba Rao K, Jayabalon R (Natl Environ Engng Res Inst, Madras Zonal Lab, Madras 600113). **Study on the effects of air pollutants on the air microbes at Madras City (India).** *Asian Env*, **13** (2) (1991), 68-80 [18 Ref].

A study was carried out during 1986-88 for a period of twenty four months covering three zones of the city of Madras, namely, residential, commercial and industrial. The study involved the sampling of total microbes along with air pollutants like SO2, NOX and SPM. From the collected data simple regression analysis was carried out to find out the effect of individual and combined air pollutants on the occurrence of microbes.

9201-042. Tiwari Sanjay, Agarwal SK (Environ Lab, Dept Chem, Engng Coll, Kota324009). **A critical analysis of stack monitoring.** *J Indl Polln Contl*, **7** (1) (1991), 1-9 [14 Ref].

Stack monitoring analysis programme was initiated for the first time at Soyabearl plant in Kota a city situated in southeast Rajasthan, with a view to establishing the extent of atmospheric emissions caused by the stack of the plant. A critical analysis method is discussed and the results so obtained are quite encouraging.

Water Pollution

9201-043. Andhyariyina KB, Salgare SA (Dept Bot, Inst Sci, Bombay 400032 Maharashtra). **Effect of polluted water of Ulhas river on the physiology and rate of growth of its bank vegetation I.** *Growth Delu Nat Resource Conserv (Ed SR Verma),* Nature Conservators (1990), 35-53 [33 Ref].

Polluted water of Ulhas river inhibited green pigments of chlorophyll-a, chlorophyll-b and total chlorophyll, vitamins like C, B_1, B_2, and organic contents of total carbohydrates, proteins and liquids observed in the plant species. Due to inhibition in the contents of chlorophylls, vitamins and organic contents, adverse effects have been created in biosynthetic processes leading to growth performance of the bank vegetation of Ulhas river.

9201-044. Appa Rao BV, Gopal V, Karthikeyan G, Pius Anitha, Meenakshi S (Gandhigram Rural Univ, Chem Dept, Gandhigram 624302). **Ground water pollution due to tannery effluents in certain areas of Dindigul town of Tamilnadu.** *Indian J Environ Prot*, **11** (8) (1991), 568-571 [3 Ref].

An attempt has been made to assess the extent of pollution of ground water sources in and around the tannery units located in the southern side of Dindigul town. It has been found that the amounts of total solids, hardness and chlorides in the ground water sources are several times higher than the tolerance limits for drinking and industrial purposes; fluorides, oxygen, BOD, and pH are within the limits. Remedial measures have been suggested in order to control further ground water pollution and save the people as well as industries of Dindigul town from a big water crisis in the near future.

9201-045. Chandra Harish, Modak DP, Gupta BN, Ray PK (Indl Toxico Res Cent, Water Analysis Lab, Mahatma Gandhi Marg, Lucknow 226001). **Evaluation of drinking water quality during Mahakumbh Mela, January-February, 1989 at Allahabad: a case study.** *Indian J Environ Prot*, **11** (7) (1991), 487-491 [4 Ref].

During Mahakumbh Mela held at Allahabad in the month of January-February, 1989, the monitoring of drinking water quality was done in Allahabad city and the Mela area. 85 drinking water samples from tube wells and hand pumps were analysed for physicochemical and bacteriological parameters to assess their potability for humans. The values of various parameters ranged between desirable and maximum permissible limits; No bacterial contamination was detected in any water samples which had free residual chlorine of 0. 2 mg/1 or above.

9201-046. Ghandrashekar M, Rajagopal S, Balasubramanian S (Dept Environ Sci, Bharathiar Univ, Coinabatore 641046). **Statistical studies on the correlation of dissolved oxygen levels with environmental factors in Amaravathi river (South India).** *Env Eco*, **9** (1) (1991), 77-80 [9 Ref] (Late Recd).

Paper deals with the problem of loading of pollution in a river system with the contribution of various water quality parameters affecting the dissolved oxygen level. A statistical model is evolved to assess the water quality in various points after the pollution loading. The results show that self purification plays a major role in the Amaravathi river water quality.

9201-047. Chauhan Anil (Hydrobio Lab, Govt PG Coll, Chhindwara 480001). **Effect of distillery effluent on river Wainganga.** *Indian J Environ Hlth*, **33** (2) (1991), 203-207 [9 Ref].

Effect of distillery effluent on the characteristics of river Wainganga, before and after closure of the factory was studied. Addition of the effluent to the river caused toxic conditions by increasing BOD, COD, and TSS along with decrease in DO.

9201-048. Chona MK (Dept Zoo, Panjab Univ, Chandigarh 160014). **Physicochemical complexes of a polluted pond at Halomajra (Chandigarh).** *Himalayan J Environ Zoo*, **5** (1) (1991), 42-44 [4 Ref].

Water samples of Halomajra pond, (Chandigarh) were analysed for temperature, pH, DO, free CO2, total alkalinity, phosphates, nitrates, chlorides, TDS, TSS, and BOD. It was observed that the pond was originally polluted due to high values of BOD, nitrates, phosphates and chlorides.

9201-049. Choudhury SK (Dept Bot, TNB Coll, Bhagalpur Univ, Bhagalpur 812007). **Sediment characteristics of the river Ganga in Sultangan - Bhagalpur region, Bihar.** *Env Eco*, **9** (1) (1991), 249-251 [11 Ref] (Late Recd).

Studies on sediment characteristics of the river Ganga at six sampling sites in Sultanganj - Bhagalpur region were undertaken from December 1982 to November 1983. The study reveals the sandy loam nature of the sediment soil, pH being slightly acidic to moderately alkaline and higher mean values of nitrate, phosphate and organic matter content for contaminated sites as compared to control and recovery sites.

9201-050. Dutta A, Chaudhuri M (Consulting Engng Ser (India) Pvt Ltd, 57 Nehru Place, New Delhi 110019). **Removal of arsenic from groundwater by lime softening with powdered coal additive.** *J Water Supply Res Techno Aqua*, **40** (1) (1991), 25-29 [21 Ref].

In a laboratory lime softening test, maximum removal of arsenic from a ground water was 90% at a lime dose of 1250 mg/1 (pH 11. 8). With powdered bituminous coal additive (2 g/l), residual arsenic level below the VVH0 guideline value (0. 05 mg/l) was achieved at a lime dose of 800mg/1 (pH 11. 5). The magnesium-hydroxide precipitate played a more significant role in removing arsenic, particularly As^{3+}.

9201-051. Gadh Ranu, Singh OV, Tandon SN, Mathur RP (Dept Chem, Univ Roorkee, Roorkee 247667). **A study of water quality and metal speciation of Yamuna river.** *Asian Env*, **13** (2) (1991), 3-10 [14 Ref].

A study of the water quality parameters, total metal and metal speciation of the Yamuna river waters from Dakpathar to Agra has been undertaken. An attempt has been made to expound their temporal and spatial variations. The studies indicate that pollutional load increases along its route downstream the river. A larger percentage of cadmium, copper and zinc are in the bound form (particulate and dissolved) while lead is more bioavailable.

9201-052. Gajghate DG, Reddy PJ (Natl Environ Engng Res Inst, Zonal Lab, Hyderabad 500007). **Nitrate problem in ground water resources.** *Polln Res*, **9** (1990), 121-125 [4 Ref] (Late Recd).

A recent study of Musi river water shed in Hyderabad indicates that the nitrate level in water decreased from the year 1988 but potential of water level increased during the same period. Alarming nitrate levels have been observed which exceed excessive

limit of drinking water standard and there is an imperative need for proper control of indiscriminate industrial discharge and sewerage system to safeguard sources.

9201-053. Garg Dinesh K, Goyal RN, Agarwal VP (Dept Chem, Univ Roorkee, Roorkee247667). **Study of physicochemica} and bacteriological factors of tube well water-II Roorkee city (India).** *Adv Bio Sci*, **10** (1) (1991), 73-76 [9 Ref].

Analysis of six tube well water which are the source of drinking water in Roorkee city of Hardwar district was carried out along with physicochemical and biotic analysis. Presence of bacterial community in relation to biotic factors is saught.

9201-054. Halder P, Kole RK, Bhattacharya A, Choudhury A, Adityachaudhary N (Pesticide Residue Lab, Dept Agricl Chem Soil Sci, Fac Agric, Bidhan Chandra Krishi Viswavidyala, Kalyani 741235, Nadia W. B). **Studies on the residues of the BHC isomers (□□□□ accurring in Ganga waters.** *Polln Res,* **9** (1990), 51-56 [4 Ref] (Late Recd).

The results of the amount of BHC isomers (□□□□ occurring in Ganga water from a selected stretch of the river obtained for the first time in West Bengal are discussed. The water samples were collected from both the banks of the Ganga and also from canals linking the Ganga. N-Hexane was used as partitioning solvent for extraction of BHC residues from water samples. It was found that out of the 36 samples so far analysed the BHC residues ranged from 0, 0010. 002 ppm in 21 samples.

9201-055. Hasan SH, Rai Sadhana, Joshi VC, Rupainwar I)C (Dept Ceramic Engng, Inst Techno, Banaras Hindu Univ; Varanasi 221005). **Removal of cadmium (II) from its hydrochloric acid solutions and polluted waters by extraction method.** *Asian Env*, **13** (3) (1991), 48-59 [15 Ref].

An indigenous solvent in tri-iso amyl phosphate (TAP) prepared from a byproduct of Indian Alcohol Industry has been utilised for the extraction and removal of cadmium (II) from hydrochloric acid solutions. The optimum conditions for the extraction of 92.14% of cadmium (II) from its 4.5 M hydrochloric acid solutions are 25% TAP in benzane (vol./vol.) and $1.0x10^3$ M of cadmium (II) concentration. The effect of various parameters and the diluents on the extraction has been investigated and discussed.

9201-056. Israili Abdul Wahid, Nabi Ald, Qadeer Hasan, Naqvi S (Dept Geo, AMU Aligarh). **Heavy metal pollution studies in western Uttar Pradesh.** *Polln Res*, **9** (1990), 57-61 [9 Ref] (Late Recd).

Analytical results of trace metals namely, Fe, Cu, Zn, Ni, Co, Pb and Cd in soil sediments and associated water bodies of the districts of Western Uttar Pradesh reveal that the levels of Cu, Zn, Co, Pb, and Cd are well within the permissible limits as recommended by various organisations, whereas concentrations of Cr, Fe, Mn and Ni exceed much above the recommended values in both water as well as soil sediments of districts Meerut, Ghaziabad, and Saharanpur. Respiratory illness, neurological disorders are common symptoms associated with higher Mn uptake in the districts of Saharanpur and Muzaffarnagar. Development of dermatitis in some workers engaged in electroplating polishing, paint and pigment industries in Saharanpur may be caused by Ni poisoning. Lead in human body may affect skin, gastrointestinal tract, lungs and central nervous system and several cases of these damages are noticed to be reported daily in various hospitals of Meerut district. The symptoms of Cd poisoning such as vomitinga abdominal cramps, headaches and shortness of breath are common among the human beings of districts Meerut and Ghaziabad.

9201-057. Joseph KO (Centl Inst Brackishwater Aquaculture7 120, Leith Castle Street, Santhome, Madras 600028). **Possible role of estuarine sediments in mitigation of mercury loading .in biological systems.** *Indian J Marine Sci*, **20** (4) (1991) 286-288 [15 Ref].

Concentration of mercury was estimated in samples of water? bottom sediments and fish from Ennore estuary during 198283. The uptake of mercury from water by fish is about 400 times. The concentration of Hg in water is 0. 0012,µg ml^{-1} while its level in bottom sediment is 0. 6µg g^{-1}. The higher concentration of Hg in soil substrate is attributable largely to fine particulate organic carbon.

9201-058. Kamraj Pe Jacob Sobha, Sathyamurthi N, Srinivasan D (Dept Cheml lBngng, Alagappa Coll Techno, Anna Univ, Madras 600025). **Sulphide precipitation technique in the removal of heavy metals.** *Indian J Environ Hlth*, **33** (2) (1991), 208-212 [5 Ref].

Results of a study conducted on the application of sulphide precipitation technique on the removal of Pb, Cd, and Ag when they are present together are reported. The effect of pH, sulphide dosage and interference by chelating agents has

been ascertained. The results indicate that the sulphide precipitation technique is effective in simultaneous removal of three or more metals.

9201-059. Kapur R, Sharma Archana, Khan SajJan (Microbio Biotechno Lab, Sch Environ Bio, APS Univ, Rewa, MP). **Bacterial incidents of polluted water and their emerging antibiotic resistance.** *Polln Res*, **9** (1990) 83-90 [43 Ref] (Late Recd).

Paper reviews the bacteriological indicators of polluted waters, suggests criteria for an ideal indicator of polluted waters and discusses sensitivity and resistance among indicator bacteria of polluted waters.

9201-060. Kaveeshwar Rachana, Cherian Lata, Gupta VK (Dept Chem, Ravishankar Univ, Raipur 492010). **A simple method for the detection of mercury in air, water and soil samples.** *Asian Env*, **13** (3) (1991), 37-42 [19 Ref].

A simple method for the detection of mercury is described. The method is based on the ligand exchange reaction. The reaction has been successfully applied for the detection of mercury in polluted water, air, and soil samples. In air at a velocity of 0.25 l/min. of the impinging air and a reaction temperature of ~70° C as low as 0.01µg of mercury (II) could be easily detected after 10 min exposure. In water, the limit of identification and limit of dilution were found to be 0.06µg and 1:8, 30,000 respectively. Development of test papers and indicator tubes for the detection of mercury in air/water have also been done.

9201-061. Kumar Om, Bisht Shashi, Singh Neelu (Environ Res Stn, Forest Res Inst, Dehradun 248006). **Studies on water quality, vegetation and fish of Song river is eastern Doon Valleys forests.** *Uttar Pradesh J Zoo*, **10** (2) (1990) 143-147 [10 Ref].

Present investigation is a preliminary report dealing with influence of water quality on vegetation and fish. It highlights physicochemical and biological characteristics of river water. The changes in vegetation and fish at different sites have also been recorded.

9201-062. Kumar Sheo, Saha LC (Univ Dept Bot, Bhagalpur Univ, Bhagalpur 812 007). **Assessment of drinking water quality of Bhagalpur.** *Biol Bull India*, **11** (1) (1989), 9-13 [11 Ref].

The population of Bhagalpur town is mainly fed by surface water and underground water which are contaminated through seepage from deep sewerage,

septic tanks, drains and domestic outlets. Comparatively, hand pump of underground water source, showed higher concentrations of total solids, free CO_2, HCO_3 alkalinity, total and calcium hardness, chloride, NO_3N, Ca^{++} and Mg^{++} whereas total bacterial density was maximum in well water.

9201-063. Madhusudhana Reddy P, Subba Rao Nj Reddy BRG (Andhra Univ, Hydrogeo Lab, Dept Geo, Visakhapatnam 530003). **Hydrogeochemical studies in Seetammadhara of the Visakhapatnam urban area.** *Indian J Environ Prot*, **11** (8) (1991), 601-604 [6 Ref].

Hydrogeochemical studies have been carried out in Seetammadhara, which is an integral part of the Visakhapatnam urban area. Water samples were collected from both dugwells and bore-wells and analysed for chemical quality studies. The controlling factors of groundwater chemistry and criteria for water uses were discussed.

9201-064. Meenakshi S, Pius Anitha, Karthikeyan G, Appa Rao BV (Gandhigram Rural Inst, Chem Dept, Gandhigram 624302). **The pH dependence of efficiency of activated alumina in defluondation of water.** *Indian J Environ Prot*, **11** (7) (1991), 511-513 [7 Ref].

The pH dependence of defluoridation capacity of activated alumina (neutral) and also the conditioned basic and acidic varieties has been investigated in a wide pH range. A markedly high efficiency of the defluoridation capacity of all the 3 types of activated alumina at pH 3 was observed. Such a marked rise in fluoride absorption at pH 3 has been explained on the basis of a marked increase in the number of active sites of alumina at this pH value. The observed decrease of fluoride adsorption from pH 3 to pH 2 has been interpreted on the basis of greater tendency or fluoride ions at pH 2 than at pH 3 to form complexes like HF and HP with H+ ions.

9201-065. Mittal Sharad, Sengar RMS (Microbio Res Lab, Dept Bot, Agra Coll, Agra). **Studies on the assessment of water pollution in Karwan river.** *Polln Res*, **9** (1990), 91-94 [10 Ref] (Late Recd).

Physicochemical characteristics of water of Karwan river, Agra, U.P, India, were studied at various sampling stations in the stretch of 15 Km towards upstream from its merger into Yamuna to assess the magnitude of pollution. The parameters showed that the river was highly polluted at station III in all the seasons due to the discharge of domestic and industrial effluents into it.

9201-066. Mohan Man (Dept Zoo, Univ Garhwal, SRT Campus, Tehri, TehriGarhwal 299001). **Siltation and lotic entomofauna of river Bhagirath and Bhilangana of Tehri Garhwal Himalaya.** *Polln Res*, **9** (1990), 127-130 [7 Ref] (Late Recd).

Quantitative estimation of silt in the waters of rivers Bhagirathi, Bhailangana and its tributary the Nailchamigad of Tehri Garhwal Himalaya has been done during last two years (198688): Effect of silt pollution on aquatic insects of these waters has been worked out.

9201-067. Naik UG, Neelakantan B (Dept Marine Bio, Karnataka Univ, Kodibag, Karwar 581303). **Hydrological conditions of the surface waters of Kali estuary, Karwar.** *Env Eco*, **9** (1) (1991), 37-46 [15 Ref] (Late Recd).

The hydrographic factors of Kali estuary varied spatially and temporally but the impact of the latter on the biotic community was conspicuous. Change in the weather condition was noticed according to the seasons at this latitude with heavy rainfall, high percentage of relative humidity during the southwest monsoon season. Surface water temperature and salinity registered low and maximum during these seasons.

9201-068. Naryana AC, Pandarinath K (Dept Marine Geo, Mangalore Univ, Mangalagangotri 574199). **Sediments of Nethravati estuary back water environment, Karnataka west coast of India.** *Env Eco*, **9** (3) (1991) 571-579 [7 Ref].

During high tide, the sea water enters into small streamlets and stagnants as back waters adjacent to the Nethravathi estuary. The sedimentation and sediment characteristics were entirely different from that of estuarine environment. The textural and physicochemical studies showed the presence of two distinct sedimentary environments in this back water zone.

9201-069. Nithila P, Jayarama Reddy S (Sri Venkateshwara Univ, Dept Chem, Tirupati 517502). **Speciation studies using differential pulse anodic stripping voltammetry of Tirupati waters.** *Indian JEnviron Prot,* **11** (8) (1991), 587-591 [13 Ref].

A preliminary survey on the physicochemical speciation of water in and around Tirupati has been carried out. Particulate and the dissolved matter are separated using 0.451,lm membrane. Differential pulse anodic stripping voltammetry is employed to calculate ASV liable, total dissolved form and total metal concentration. The parameters,

such as bound metal and particulate bound metal complexing capacity and stability are also evaluated.

9201-070. Panda RB, Sahu BK, Sinha BK, Nayak A, (PG Dept Chem, Sambalpur Univ, Sambalpur 768019). **Charactensation of Brahmani river water.** *Indian J Environ Hlth*, **33** (2) (1991) 252-256 [2 Ref].

Present investigation deals with analysis of organic compounds in Brahmani river near Rourkela industrial complex and quality of drinking water Presence of acidic compounds like benzoic acid, toluic acid, napthoic acids, phenols and aresols are reported near Deogaon site. Whereas upstream samples did not show such impurities. Presence of nitrogenous organic compounds has been detected in all sites during all seasons. Method to purify these impurities is suggested.

9201-071. Paul AC, Pillai KC (Hlth Phys Div, Bhabha Atom Res Cent 400085). **Natural radionuclides in a tropical river subjected to pollution.** *Water Air Soil Polln*, **55** (3/4) (1991), 305-319 [12 Ref].

The radionuclide concentrations in Periyar river at the industrial zone showed significant reduction, by factors ranging form 3 to 5 during the post1980 period as compared to pre1980 due to better effluent treatment practices adopted by industrial units situated on the river bank. The studies revealed that nearly 90% of Po-210 in the river environment was unsupported, showing atmospheric pathway of deposition by decay of Rn-222.

9201-072. Prasad Suresh, Ruganwar DC (Water Polln Lab, Dept Appl Chem, Inst Techno, Banaras Hindu Univ, Varanasi). **Separation of selected heavy metals from bank sediments of river Ganga by solvent extraction.** *Polln Res,* **9** (1990), 15-21 [16 Ref] (Late Recd).

An indigenous solvent tri-isomyl phosphate (TAP) prepared from a byproduct? fusel oil of the Indian alcohol industry has been used for the extraction and separation of Copper (II), Iron (III) and partial extraction and separation of Chromium (III), Manganese (II), Nickel (II), Zinc (II), Lead (II) and Cadmium (II) from its acidic sediments solution in presence of chelating agent salicylic acid. The parameters that affect the extraction and separation of Cu (II) and Fe (III) such as metal concentration, pH variations, TAP percentage and salicylic acid concentration have been studied in detail. Metals concentrations were determined by Atomic Absorption Spectrophotometer.

9201-073. Ram Anirudh, Kadam AN (Regl Cent, Natl Inst Oceanogr, Sea Shell, 7Bunglows, Versova, Bombay). **Petroleum hydroa carbon concentration in surface sediments in continental shelf region along the central west coast of India.** *Asian Env*, **13** (3) (1991), 37 [19 Ref].

Levels of petroleum hydrocarbons in surface sediments at twenty locations from continental shelf along the central west coast of India varied in 0.010.2011g. g l(wet wt., chrysene equivalents). Inspite of heavy inputs through domestic and industrial wastewater, marine operations and atmospheric fallout; no serious buildup of petroleum hydrocarbons was observed in the sediments.

9201-074. Ramasubramanian R, Valsaraj CP, Rao VNR (Cent Adv Std Bot, Univ Madras, Guindy Campus, Madras 600025). **Sewage pollution in the coastal waters of Madras, east coast of India.** *Indian J Marine Sci,* **20** (4) (1991), 259-262 [20 Ref].

The extent of pollution over the coastal waters of Madras due to sewage inflow through the river Cooum was studied. Analyses were carried out at both low and high tides. Monitoring of estuarine and seawater opposite the mouth of the river at short intervals indicated a recovery in water quality with time from low to high tide and the effect appeared to be localized.

9201-075. Ramaswami V, Rajaguru P (Natl Environ Engng Res Inst, Nagpur 440020). **Ground water quality of Tiruppur.** *Indian J Environ Hlth,* **33**(2) (1991), 187-191 [6 Ref].

Water samples from dug and tube wells near the Noiyyal river in Tiruppur Municipal area were analysed for the assessment of chemical quality with reference to Indian Standards for drinking water. It was observed that values of several parameters exceeded the permissible limits pointing out to the necessity of proper treatment, disposal and management of wastes discharged into the river and on open land.

9201-076. Saxena A, Sharma S, Kulshrestha UC, Srivastava SS (Dept Chem, Fac Sci, Dayalbagh Educational Inst, Dayalbgah, Agra 282005). **Factors affecting alkaline nature of rain water in Agra (India).** *Enuiron Polln*, **74** (2) (1991) 129-138 [17 Ref].

Rain water was collected and analysed from a reference site, Dayalbagh and Taj Ganj, near the Taj Mahal in Agra. The ionic components Ca, Mg, Na, K, NH_4, Pb, Fe, Zn, SO_4, NO_3, HCO_3, Cl and F were analysed along with pH, alkalinity and conductance.

The average pH of rain water of both sites is 7.05. There is a dominance of alkaline components, particularly Ca.

9201-077. Shrivastava VS, Bhadana KU, Deshpande PP (GT Patil Coll, Organo Environ Lab, Dept Chem, Nandurbar 425412). **A case study of tribal town, Nandurbar.** *Indian J Environ Prot*, **11** (5) (1991), 337-340 [15 Ref].

Soil and water samples have been collected from the Nandurbar town area and their physicochemical characteristics have been studied. The soil samples were predominantly of non-calcic brown type and sandy in texture. These studies aim at the assessment of the extent of pollution by water extractable solids (WES), TDS, alkalinity, chlorides, sulphates, hardness and some metal ions in different soil and water samples. In addition to above, the amount of organic matter (OM), total organic carbon (TOC), and chemical oxygen demand (COD) in soil and water samples of the area have also been determine.

9201-078. Singh JP, Yadav PK, Singh Sakun, Prasad SC (Motilal Nehru Regl Engng Coll, Dept Civil Engng, Allahabad211004). **BOD contamination in Kali river at Sadhu Ashram in Aligarh.** *Indian J Environ Prot*, **11**(5) (1991), 325-326 [5 Ref].

BOD contamination in Kali river due to discharge of sewage from Bulandsahar city and effluents of industries of Meerut and Muzaffarnagar cities has become a serious problem of water pollution. The high concentration of BOD and lower DO in Kali river is posing the main problem for survival of aquatic life. A study has been undertaken for 3 seasons in a year with respect to colour, pH, turbidity, DO and BOD of the river and it was found that BOD is quite high in the river and presence of low DO forced the aquatic lives to go away. Turbidity is much more than the permissible limit. The pH is also making the water unusable for various uses.

9201-079. Singh P, Roy SP (PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812007). **Seasonal variations in the macrophytic biomass production and its effects on the water chemistry of Kawar lake, Begusarai, Bihar.** *Env Eco*, **9** (1) (1991), 72-76 [11 Ref] (Late Recd).

This study was made on the macrophytic biomass production of Kawar lake during the period January 1988 to December 1989 in relation to its effects on the water chemistry. This maximum biomass of submerged macrophytic community was recorded

in April and minimum in September. The emergent macrophytic biomass was observed higher in September and the minimum biomass was recorded. January.

9201-080. Subrahmanyam MNV (Dept Zoo, Andhra Univ, Waltair Alisakhapatnam 530003). **Pollution and water quality in Visakhapatnam harbour.** *J Environ Bio,* **12** (4) (1991), 363-375 [29 Ref].

The waters of Visakhapatnam harbour were found to be highly turbid with an-euphotic zone of 0.80 to 2.63 m depth. The BOD and dissolved oxygen contents varied in different stations. Extremely high levels of nitrate, phosphate and silicate ranging from 1.37 to 4.61 mg/1 were observed in Station I and the concentration of nutrients decreased gradually from Station II to Station VI. The low nutrient levels observed in Station VI were 2 to 16 times greater than the clear open waters of Visakhapatnam and the concentrations of trace metals in the harbour were higher than those of coastal waters. These hydrographical characteristics indicate that the degree of pollution from sewage and industrial wastes and the eutrophic conditions of water vary from Stations I to VI in the harbour.

9201-081. Sudhakar G, Jyothi B, Venkateshwarlu V (Phyco River Eco Lab, Dept Bot, Osmania Univ, Hyderabad 7). **Metal pollution and its impact on algae in flowing waters in India.** *Arch Environ Contam Toxico*, **21** (4) (1991), 556-566 [31 Ref].

Metal pollution in the river Godavari in India, due to discharges of liquid wastes from a paper mill, has been studied for a period of two years. At the discharge point and 1 km from the point of discharge, iron, manganese, and zinc were recorded in high concentrations, whereas cadmium and chromium were observed in low concentrations. No metal was in detectable concentration in water before the river receives the effluents.

9201-082. Tiwari Navin Chandra, Sagar Gyan, Tiwari Dinesh, Singh HR (Polln Monit Lab, 15th Div, UP Jal Nigam, Gopeshwar 246401). **Monitoring the water pollution in snow fed river Alaknanda at Rudraprayag, Chamoli.** *Env Eco,* **9** (1) (1991), 202-206 [17 Ref] (Late Recd).

Physicochemical and biological parameters of the river Alaknanda were monitored. The quality of water was assessed by comparing with the existing standards for important parameters. The dissolved oxygen exhibited positive relationship with the temperature. The turbidity, total alkalinity, hardness, free carbondioxide, chloride

concentration total dissolved solids, zooplankton and phytoplankton showed marked variation during monsoon and winter seasons.

9201-083. Tripathi BD, Sikander M, Shukla Suresh C (Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Physico chemical characterization of city sewage discharge into river Ganga at Varanasi, India.** *Env Int*, **17** (5) (1991), 469-478 [28 Ref].

The Varanasi city sewage discharged into the river Ganga at six sites, was analysed for its physicochemical properties. An analysis of variance reveals significant variation in most of the parameters with respect to months as well as sites. Furthermore, at Rajghat, sewage was most concentrated with the highest pollution load, whereas sewage at Assi ghat was the least concentrated. The correlation among various parameters is reported.

9201-084. Wadhawan AK, Kumar Devendra, Chacharkar MP Soni NK (Raksha Prayogshala, Jodhpur 342001). **Trace and toxic metal ions in drinking water of Jodhpur.** *Indian J Environ Prot*, **11** (7) (1991), 517-524 [6 Ref].

Water samples collected from various sources used in drinking water supply, were analysed for trace and toxic heavy metals, like Fe, Mn, Cu, Zn, Cr, Pb, Cd, etc., by Atomic Absorption Spectrophotometery. In all the samples, except collected from the hand pumps in Chopasni area of Jodhpur, concentration of Zn was found to be much less than the maximum desirable limit (5 ppm) as laid down by WHO. 30% of the samples collected from hand pumps were found to have more lead and 15% of the samples had more cadmium as compared to WHO/ICMR recommended safe limits.

Noise Pollution

9201-085. De Alak (Dept Civil Engng, Jadavpur Univ, Jadavpur, Calcutta). **SPL combination and separation by indexing.** *J Inst Public Hlth Engrs (India),* **1991** (2) (1991), 13-19 [2 Ref].

Control of noise pollution calls for the understanding of the effect of combination and separation of sources of noise. Graphic procedures available for SPL combination and separation appears not to be of enough convenience and enough flexibility for carrying out all types of SPL calculations. In the paper an indexing method for the combination and separation of SPLs is presented. Such a method permits SPL

combination and separation from simple addition and subtraction from ten index numbers. This method is simple, versatile and dependable as the direct calculation.

9201-086. Rao PR, Seshagiri Rao MG (Andhra Univ, Dept Engng Phys, Coll Engng, Visakhapatnam 530003). **Subjective response to traffic noise and its effects.** *Indian J Environ Prot*, **11** (6) (1991), 430-432 [1 Ref].

Traffic noise measurements and social surveys were carried out in Visakhapatnam city. Dwellings at the selected sites were exposed to noise from freely flowing traffic at levels which ranged from 72 to 78 db (A), measured round the clock. Subjective response to noise exposure obtained on a 7 point scale of dissatisfaction has been correlated with the Leq and Ldn values obtained from measured noise level values. Values predicted from the regression equations obtained are found to be far more reliable compared to those obtained from other studies.

Ecology

9201-087. Agrawal NC Bais, VS, Shukla SN (Environ Bio Lab, Dept Zoo, Dr HS Gour Vishwavidyalaya, Sagar 470003, MP). **Effects of nitrate and phosphate enrichment on primary productivity in the Sagar lake, Sagar.** *Polln Res*, **9** (1990), 29-32 [19 Ref] (Late Recd).

Present study was undertaken during November 1988 and October 1989 to evaluate the effects of nutrient enrichment on primary productivity in the Sagar lake. Nitrate-N and Phosphate-P with the concentrations of 0.5 mg L^{-1} were used separately and combining for enrichment experiment. The phosphate enrichment alone did not increase the productivity in any season but the addition of nitrate showed a slight increase in the productivity in the summer and the rainy seasons. When the nitrate and phosphate were added together,' a sudden enhancement in the productivity was observed.

9201-088. Ahmad Syed H, Singh Arun K (Coll Fisheries, Raiendra Agricl Univ, Dholi 843121). **Diutnal rhythm of zooplankters and their correlations in a freshwater pond of Dholi, Bihar.** *Env Eco*, **9** (1) (1991), 23-28 [20 Ref] (Late Recd).

Diurnal variation of zooplankters was studied in a perennial fish pond at Dholi, Bihar. A distinct diel fluctuation in total zooplankters was recorded. Correlation co-

efficient between the abundance of total zooplankters was significant and positive correlation with the total rotifers and total copepods, whereas the Cladocera showed no significant correlation.

9201-089. Banerjee Meenakshi (Dept Biosci, Barkatullah Univ, Bhopal-462026). **Blue green algal ecology of paddy fields.** *Bionature,* **11** (1) (1991), 45-49 [37 Ref].

An attempt has been made to highlight the ecological importance of blue-green algae in paddy fields. Factors affecting their growth in the field have also been taken into consideration.

9201-090. Banik Sukanta, Datta NC (Fishery Eco Res Unit, Dept Zoo, Univ Calcutta, 700019). **Ecology of sessile rotifers on artificial substrate in a fresh water lake, Calcutta.** *Env Eco,* **9** (1) (1991), 29-32 [11 Ref] (Late Recd).

Sessile rotifers on glass slide were studied both qualitatively and quantitatively in a fresh water lake for two years. The high density of rotifers was recorded in winter. The species recorded were Lacinularia ismailoviensis, Limnias melicerta J Ptygura sp., Sinantherina socialis and Collotheca ornata. The occurrence of total rotifers showed significant correlation only with transparency ($P<0.005$) and pH ($P<0.025$).

9201-091. Chandrasekhar KR, Sridhar KR, Kaveriappa KM (Dept Biosci, Mangalore Univ, Mangalagangotri, Mangalore 574199). **Aquatic hyphomycetes of a sulphur spring.** *Hydrobiologia*, **218** (2) (1991), 151-156 [20 Ref].

Aquatic hyphomycetes of a sulphur spring in the Western Ghat region of Karnataka were investigated by the following methods: leaf litter observations, water filtration, analysis of natural and induced foam. The samples were collected and studied from three sites, the spring proper (site I), the connecting region of the spring and the rivulet (site II) and the spot where the spring joins the rivulet (site III). Paper concludes that the presence of only one species in the spring proper was not due to the higher sulphide content, but to the high temperature.

9201-092. Gajbhuje SN, Stephen Rosamma, Nair Vijayalakshmi R, Desai BN (Natl Inst Oceanogr, Sea Shell,7 Bunglows, Versova, Bombay 400061). **Copepods of the nearshore waters of Bombay.** *Indian J Marine Sci*, **20** (3) (1991), 187-194 [11 Ref].

Variability in copepod population was studied along 2 transects off Mahim and Versova during November 1979 to December 1980 covering eight stations from the

creek towards the offshore area. Contribution of copepods to total zooplankton was 72.7 and 79.79% at Versova and Mahim transects respectively. The mean value of copepod was more at Mahim than at Versova transect. The distribution pattern was influenced by the tidal phase with an increase towards the shore during the flood.

9201-093. Ghosh TK, Konar SK (Fisheries Lab, Dept Zoo, Kalyani Univ, Kalyani 741235). **Effect of dye factory effluent on bottom biota of the river Churni.** *Env Eco*, **9** (1) (1991), 154-162 [15 Ref] (Late Recd).

Dye factory effluents containing acids, alkalies, dissolved solids, caustic soda, nitrate salts and different types of dye colors are discharged into the river Churni. During field survey, bottom biota at different discharge points were found in dead condition. Chironomid larvae, tubifex, molluscs and sludge worm population were greatly reduced at those points. In laboratory, acute toxicity tests on bottom biota were conducted and LC_5, L_{50}, LC_{95} doses were calculated. Worms were found highly sensitive to dye factory effluent.

9201-094. Giri Bandala S (Lab Algal Physio Cytology, Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Silica, sulphur and carbonate ions requirement in freshwater diatoms.** *J Freshwater Bio*, **3** (3) (1991), 193-200 [19 Ref].

Growth response of two diatom taxa viz., Cyclotella striata and Nitzschia palea was studied in different levels and sources of three macronutrients silica, sulphur and 7 carbonate ions. Optimum requirements for maximum growth of taxa under investigation was same in case of silica while it differed in case of sulphur and inorganic carbonate.

9201-096. Govindan VS, Uma TS (Cent Environ 03tud, Anna Univ, Guindy, Madras600 025). **Studies of mycoflora of waste stabilisation ponds.** *J Ecotoxico Environ Monit*, **1** (2) (1991), 95-103 [20 Ref].

About 7435 colonies belonging to 38 species and 18 genera were enumerated from raw sewage and waste waters of ponds I, II and III. Ponds I and III supported luxuriant mycoflora population. The alkaline conditions of the effluent in Pond II had some impact on fungal population. P.D.A. medium supported rich mycoflora whereas the R B A medium restricted the fungal population. Waste waters with rich dissolved solids favoured fungal population.

9201-096. Govindasamy C, Kannan L (Cent Adv Std Marine Bio, Annamalai Univ, Parangipettai 608502 TN). **Rotifers of the Pitchavaram mangroves (south east coast of India): a hydrobiological approach.** *Mahasagar*, **24** (1) (1991), 39-45 [11 Ref].

A total of 35 species of rotifers belonging to 17 genera were identified from the Pitchavaram mangroves. Rotifer population showed two peaks with the maximum density during the mid postmonsoon and late summer seasons. Amongst different environmental parameters, atmospheric and surface water temperatures, pH and salinity were significantly correlated with the total rotifer population.

9201-097. Gupta SL (Microbio Units Botl Surv India, Howrah711103). **Impact of N:P nutrients on cyanobacterial growth in lake water and synthetic medium.** *J Inst Public Hlth Engrs, India*, **1991** (2) (1991), 28-32 [20 Ref].

Bioassays which are conducted with planktonic unicellular cyanobacteria or short filamentous forms as test organisms, can be used for monitoring the nutrient enrichment in polluted water. The present study was undertaken for estimating the impact of N: P ratio on growth of Microcystis In the synthetic medium, when phosphorus (as PO_4P) was supplied as a single nutrient, an increase in yield resulted but the production was less than the yield with phosphorus and nitrogen used together. On the other hand, maximum yield was not reached in the lake water after the addition of both nitrogen and phosphorus applied together which suggests the presence of other factor(s) as limiting or inhibiting.

9201-098. Kaushik S, Saxena MN, Saxena DN (Sch Stud Zoo, Jiwaji Itniv, Gwalior (474011). **Phytoplankton population dynamics in relation to environmental parameters in Matsya Sarovar at Gwalior (MP).** *Acta Botanica Indica*, **19** (1) (1991), 113-116 [5 Ref].

A total of 21 species of phytoplankton were collected from Matsya Sarovar, Gwalior. Maximum number of Chlorophyceae and Cyanophyceae were recorded in the post monsoon and summer season respectively. There was positive correlationship between physicochemical parameters and numerical abundance of phytoplankton. The physicochemical parameters indicate that the tank is of oligotrophic nature with increasing nutrient concentration during summer.

9201-099. Maiti SK (Indian Sch Mines, Cent Mining Env, Dhanbad 826004). **Potentiality of activated algae in domestic wastewater treatment and control of eutrophications.** *Indian J Environ Prot*, **11** (5) (1991), 350-357 [13 Ref].

Study has been initiated to use algae and bacteria in a control manner to remove organic carbon as well as nutrients to treat sewage and control eutrophication problems. Activated algae (60% algae and 4096 bacteria) was developed in a laboratory controlled condition and put it in a model oxidation ditch to study the above problems. It was found that the uptake of nitrogen and phosphorous by activated algae at solid retention time of 623 day was sufficient to removal of COD 96% and removal of both nutrients was 67% and 96%, respectively. A distinct symbiotic relationship between algae and bacteria always exists.

9201-100. Manoj Kumar B, Hanharan V, Katli RJ (Univ Agricl Sci, Coll Fisheries, Mangalore 675002). **Preliminary observations of environmental parameters in Udyavara estuary, Dakshina Kannada.** *Env Eco*, **9** (3) (1991), 733-738 [20 Ref].

Certain environmental parameters of Udyavara estuary, Dakshina Kannada, were studied. Salinity showed wide seasonal fluctuation and the vertical stratification during monsoon and lack of stratification during other seasons is believed to be due to intense mixing perhaps due to the shallowness of the estuary.

9201-101. Murugan A, Ayyalckannu K (Cent Adv Std Marine Bio, Annamalai Univ, Parangipettai 608502). **Ecology of Uppanar backwater, Cuddalore: I physico chemical parameters.** *Mahasagar,* **24** (1) (1991), 31-38 [13 Ref].

The present investigation was carried out for a period of two years (Oct.'86 Sept. '88) in Uppanar backwater of Cuddalore. The range of variation in temperature was 13°C. Temperature was found to be more important as a covariate with other factors than as an individual factor. Station II showed less dissolved oxygen content owing to discharge of wastes from sewage outlets and coconut husk retting grounds. Though the wastes are discharged near Station II, the oxygen level was higher probably due to high photosynthetic activity and high flushing characteristics of the Uppanar backwater.

9201-102. Murugan A, Ayyakkannu K (Cent Adv Std Marine Bio, Annamalai Univ, Parangipettai 608502). **Ecology of benthic macrofauna in Cuddalore -Uppanar backwater, southeast coast of India.** *Indian J Mar Sci,* **20** (3) (1991), 200-203 [13 Ref].

Polychaetes were found dominant in Station I whereas the dominance of crustaceans at Station II was due to the tanaid Apseudes chilkensis and accordingly lower faunal diversity than at Station I. Highly significant correlation was observed between benthic fauna and organic carbon. Station II showed higher organic carbon content owing to the addition of organic substances from sewage outlets and wastes from coconut husk retting grounds.

9201-103. Naik UG, Neelakantan B (Dept Marine Bio, Karnataka Univ, Kodibag, Karwar 581303). **Phytoplankton distribution in the Kali estuary - a seasonal study.** *Polln Res,* **9** (1990), 23-27 [14 Ref] (Late Recd).

Seasonal variations in the population of *phytoplankton* of the Kali estuary were studied for a period of one year. In all, 39 genera were recorded and the primary peak was observed on October with primary fall during July. Annual percentage distribution data shows that the *Bacillariophyceae* was dominant and was followed by the *Dinophyceae* while *Chlorophyceae* and *Myxophyceae* were poor and noticed during certain period of the biological calander.

9201-104. Nath Asim K, Banerjee Samir (Aquaculture Res Unit, Dept Zoo, Calcutta Univ, 35 Ballygunj Circular Rd, Calcutta 700019). **Exploitation of natural resources of fish and prawn seeds in estuarine areas of West Bengal.** *Env Eco*, **9** (3) (1991), 629-634 [4 Ref].

The seeds of *Penaeus monodon* is available throughout the entire r estuarine zone. During collection of P. monod on seeds a large number of seeds of other important culturable prawn and fish species are damaged which is threat to the conservation of natural resources. For collection of a single P. monodon seed about four seeds of other prawn and fish species are destroyed by the catchers noticed in the Matlah river at Canning of West Bengal.

9201-105. Patralekh LN (Dept Bot, Deoghar Coll, Deoghar 814113). **Periodicity of phytoplankton in the river Ganga at Bhagalpur, Bihar, India.** *Env Eco*, **9** (1) (1991), 84-86 [21 Ref] (Late Recd).

Noticeable monthly fluctuations in the population of different classes of phytoplanktonic algae were observed in the river Ganga at Bhagalpur, Bihar. Maximum standing stock of phytoplaniton was recorded in April comprising 4.1% green algae, 68.3% diatoms and 27.6% blue-greens.

9201-106. Patterson Edward JK, Ayyakkannu K (Cent Adv Std Marine Bio, Annamalai Univ, Parangipettai-608502). **Temporal variation in annual production of Tellina nobolis and Tellina cuspis in a tropical estuarine environment.** *Mahasagar*, **24** (1) (1991), 21-29 [18 Ref].

Secondary production of *Tellina nobilis* and *Tellina cuspis* from Coleroon estuary southeast coast of India was investigated between January and December, 1986. The annual secondary production for *T. nobilis* was 5.8553 g/m^2 and for *T. cuspis* 2.2651 g/m^2. The biomass (B) was 5.5281 g/m^2 for the former and 3.06 g/m^2 for the latter.

9201-107. Rao RR (Botl Surv India P-8, Brabourne Rd, Calcutta 700401). **Ethnobiology in the study and conservation of fragile ecosystems: Some issues from the Himalayan region.** *Ethnobotany*, **2** (1&2) (1990), 45-55 [26 Ref].

Paper highlights the role of ethnobiology in the study and conservation of fragile ecosystems in the Himalayan region. It is emphasized that traditional culture and the social restraints developed by certain tribals on resource utilization can greatly help in conservation of ecosystem. Some of the important species that are protected by one or more tribes in the Himalayan region are enumerated.

9201-108. Rodrigues BF (SP Chowgule Coll, PG Dept Bot, Margao 403601). **Changing ecology of Goa's coastline due to human disturbances - causes and control measures.** *Indian J Environ Prot*. **11** (6) (1991), 425-427.

Goa has unique type of coastline classified into 3 zones viz. I open sandy space, lushy green plantation, isolated sand dunes and paddy fields. Today, tragically, in the rush for development and many a times in the greed of profits, the coast is being treated with impunity which can spell ecological danger. The present situation spells danger to the green belt in the near future. Suitable plantations like sand grinders, sand dune stabilizers, has to be multiplied as green belt to control the impending disaster.

9201-109. Satpathy GR, Behera N (Sch Life Sci, Sambalpur Univ, Jyoti Vihar - Burla 768019, Orissa). **Effect of malathion, an organophosphorusticide on soil microbial biomass from a tropical grassland soil.** *Polln Res*, **9** (1990), 69-74 [16 Ref] (Late Recd).

Investigation was carried out to study the effect of field application of malathion 50 E.C. (lml/40 ml distilled water) on microbial biomass in a tropical grassland soil from Oxissa. A comparison of the microfungal biomass in the control and treated plot revealed that malathion treatment exerted an initial adverse effect on microfingal biomass. Further study indicated that malathion application led to increase in dead fungal hyphae in the treated plot.

9201-110. Sharma UP,-Rai DN (Eco Res Lab, PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812007). **Seasonal varistions and species diversity of coleoptera insects in a fish pond of Bhagalpur.** *J Freshwater Bio*, **3** (3) (1991), 241-246 [18 Ref].

The seasonality and periodicity of aquatic insect beetle (Coleoptera: Dytiscidae) in a tropical fish pond of Bhagalpur has been studied. About 18 species of dytiscid beetles were recorded showing their maximum number/haul during October and minimum during January. Statistical data on species diversity do not indicate the presence of any environmental stress in the pond.

9201-111. Singh Damodar, Ali Mohammad (Dept Bot, Nalanda Coll, Biharshari (803101). **Physiochemical factors and phytoplankton of Pawapun pond (Nalanda).** *Env Eco*, **9** (3) (1991), 706-708 [6 Ref].

A survey of Pawapuri pond was undertaken to find out the influence of various physico-chemical factors on the aquatic flora including phytoplankton. The pH, dissolved oxygen, alkalinity, chloride and phosphate depicted irratic seasonal fluctuations imparting profound impact on the phytoplankton.

9201-112. Singh JP, Roy SP (PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812007). **Interaction between macrophytic biomass and macro-invertebrate abundance in Kanwar lake, Begusarai (Bihar).** *J Freshwater Bio,* **8** (3) (1991), 229-234 [2 Ref].

Paper deals with the interaction between monthly macrophytic biomass production and macro-invertebrate abundance (MIA) during the period January 1988 to December 1988. The peak of MIA was observed in the month of maximum microphytic biomass production. Annelids were found to be insignificantly correlated with macrophytic biomass ($P>0.05$) wheres Gastropods, Odonates and Ephemeropterans were found to be positive ($P<0.01$). Dipterans, Hemipterans and Coleopterans were observed less correlated with macrophytic biomass production ($P<0.1$).

9201-113. Singh UN, Pandey Shakuntala (Aquaculture Res Lab, PG Dept Zoo, MS Coll, Motihari 845401). **Water quality of stagnant water bodies of North Bihar.** *Env Eco*, **9** (3) (1991), 770-774 [11 Ref].

During the study of 13 stagnant water bodies of North Bihar, 7 species of Cyclops, 5 species of Daphnia, one Cypris species and 21 species of rotifers besides some protozoans were collected. Nauplius and metanauplius were better in number. Among the phytoplanktons, members of Chlorophyceae were always more in number than Bacillariophyceae.

9201-114. Srinivasan A, Santhanam R (Fisheries Coll, Res Inst, Tamil Nadu Veterinary Anim Sci, Univ Tuticorn 628008). **Tidal and seasonal variations in zooplankton of Pullavazhi brackishwater, southeast coast of India.** *Indian J Marine Sci*, **20** (3) (1991), 182-186 [20 Ref].

Distribution and biomass of zooplankton in relation to tides and seasons were studied in 2 stations mouth of the estuary and backwaters. The tidal study revealed that the peak values in density and only weight biomass were during night high tides in both 4 the stations. Species diversity values were generally high in both mouth and tidal zone and the maxima were 5.3 and 4.5 respectively. Compared to other Indian estuaries, this brackishwater showed abundance of microzooplankton particularly copepod larvae and molluscan veligers which contributed a larger share to the dry weight biomass.

9201-115. Tripathi Brahma D, Srivastava Jaya, Misra Kiran (Cent Environ Edn, Cent Adv Std Bot, Banaras Hindu Univ, Varanasi 221005). **Nitrogen and phosphorus removal capacity of four chosen aquatic macrophytes in tropical freshwater ponds.** *Environ Conserv*, **18** (2) (1991), 143-147 [20 Ref].

The aim of the present investigation was to evaluate the nitrogen and phosphorus removal-capacity of four notable and widespread aquatic plants, namely water hyacinth, water-lettuce lesser duckweed, and round-leafed water-fern, under various ‘field’ and laboratory conditions. The objective was also to evaluate the effects or rainy, summer and winter seasons on the nutrient removal capacity of the plants.

9201-116. Varghese Mathew, Mishra RM (Sch Environ Bio, APS Univ, Rewa 486001). **Some ecological observations on the macrophyte vegetation of Govindgarh Lake, Rewa, Madhya Pradesh.** *Env Eco*, **9** (1) (1991), 234-236 [12 Ref] (Late Recd).

Some analytical characters of the macrophyte community were studied. Twelve species of three vegetational life forms, namely floating, submerged and emergent were found. Submerged community was found dominated. Azolla pinnate was the dominant species in all seasons.

9201-117. Varma MC, Singh NK, Datta Munshi JK (PG Dept Zoo, Bhagalpur Univ, Bhagalpur 812007). **Algal species diversity as an index of water quality of river Subernarekha at Ghatsila.** *J Freshwater Bio,* **3** (3) (1991), 235-239 [20 Ref].

Biomonitoring of water pollution of river Subernarekha at Ghatsila (Bihar) was done which receives industrial effluent from Hindustan Copper Limited. Algal population was estimated quantitatively and qualitatively. The presence of certain species at the effluent mixing zone and their subsequent disappearance at other sites confirm their pollution indicator status. The species diversity value computed at different sites depict the poor quality of water at effluent mixing zone.

9201-118. Vijayakumar R, Ansari ZA, Parulekar AH (Natl Inst Oceanogr, Dona Paula, Goa 403004). **Benthic fauna of Kakinada bay and backwaters, east coast of India.** *Indian J Marine Sci,* **20** (3) (1991), 195-199 [14 Ref].

Quantitative distribution of macro and meiofauna from Kakinada bay and backwaters was studied. Total macrofauna abundance ranged from 67 to 116 and 94 to 186 in the backwaters and near-shore environment respectively. Poly-chaetes and crustaceans constituted the bulk of macrofauna in the backwaters while polychaetes and molluscs in the near-shore bottom deposits Macrofaunal diversity was higher in the near-shore region. Impoverishment of fauna in the backwaters was related to lowering in salinity and poor oxygenation.

Nature and Natural Resources Conservation

9201-119. Bartarya SK (Wadia Inst Himalayan Geo, 33, General Mahadeo Sillgh Rd, Dehradun, UP, 248001). **Watershed management strategies in Central Himalaya, the Gaula river basin, Kumaun, India.** *Land Use Policy*, **8** (3) (1991), 177-184 [Ref].

A survey of villages in the Gaula river basin found that.40% were concerned about the 25-75% diminishing discharge of water supply springs during the past five to 50 years. Flow in the Gaula river has also declined. Rainfall records from the Kumaun Himalaya show reductions ranging from 9.5 to 34.0% in the period 1958-86, which are

not found in rainfall records from the neighbouring plains. New land management strategies are required.

9201-120. Brahmam M, Saxena HO (Regl Res Lab, Bhabaneswar-753013). **Ethnobotany of Gandhamardan hills - Some noteworthy folk-medicinal uses,** *Ethnobotany*, **2** (1 & 2) (1990), 71-79 [16 Ref].

Ethnobotanical studies in Gandhamardan hills of Orissa resulted in the recording of folk-medicinal uses for nearly 200 species. Paper enumerates 77 species in alphabetical order with notes on their local names, uses, method of administration, dosage, etc.

9201-121. Devi Prasad AG (Dept Bot, Karnataka Univ, Dharwad 580 003). **Our natural resources and their conservation in Katnataka.** *Myforest*, **27** (3) (1991), 263-278 [20 Ref].

Karnatka with its rich natural resources give adequate support to the development and economic progress of our country. These natural resources are closely inter linked. Due to the interference of man some of these resources have become extinct and some are threatened to become extinct in the years to come. Practical approach towards the wise utilisation of these natural resources knowing their economic potentiality and implementation of conservation measures are the need of the hour.

9201-122. Gupta RC (Dept Political Sci, DAV Coll, Muzaffamagar 251001 UP). **Natural resources conservation socio-economic and political aspects: an overview.** *Growth Dev Nat Resources Conserv (Ed SR Verma),* Nature Conservators (1990), 63-68 [2 Ref].

The Government of India took a number of steps to preserve natural resources. It assumed wide powers through legislative enactment to protect and promote the environment and natural wealth. A mass movement without coercive methods is the only solution.

9201-123. Java RL (Chief Conservator Forests, Vadodara, Gujarat). **Environment and wildlife conservation in Gujarat state a status paper**. *The Indian Forester*, **117** (10) (1991), 818-842.

The status of wildlife and environment conservation in Gujarat state is detailed in this paper. Wildlife conservation measures/steps to involve the people are also outlined.

Details of important National Parks and Wildlife Sanctuaries in Gujarat have been given along with periodic wildlife census data.

9201-124. Kulshrestha SK (Dept ZGO, Motilal Vigyan Mahavidyalaya, Bh,opal 452008). **Conservation of lakes and wetlands in India Growth Dev Nat Resources Conserv (Ed SR Verma),** *Nature Conservators* (1990), 259-276.

Present review summarises the importance of wetlands and lakes, causes of their degradation, the problems faced by Indian wetlands and strategies for their conservation. The wetlands are highly productive ecosystems supporting a wide biological spectrum. They play significant role in regulating water regime, flood control, treatment of waste water, production of organic material, pollution abatement and reducing sediment load. They also act as natural filters, help in nutrient dynamics and serve as natural habitat and nursery ground for variety of fish and bird species.

9201-125. Meena Kumaxi P, Tirkey P, SinghMP(Dept Forest. Sc, Birsa Agricl Univ, Kanke, Ranchi-834006). **Status of tribal medicinal plants of Hazaribagh**. *New Botanist*, **18** (1-2) (1991), 105-107 [5 Ref].

Paper discusses the ethnobotanical field studies in differant parts of the Hazaribagh district where a large number of people are using wild plants for food, medicine and insecticides etc. The data have been collected either from the tribal medicine men who accompanied there in the field or from old tribals who are very experienced and are actually prescribing these plant materials to cure different diseases. Paper is restricted to medicinal uses of 22 such plants.

9201-126. Mittal Yogesh (Dept Geogr, JVMGRR Coll, Charlrhi Dadri 123306, Haryana). **Environmental hazards and related problem of Himalaya in southern Himachal Pradesh. Growth Dev Nat Resources Corueru, (Ed SR Verma)**, *Nature Conservators*, (1990), 123-130 [3 Ref].

Many problems relating to environmental hazards of Himalayas particularly in south Himachal Pradesh, has been discussed. The ecological system in the Himalayan region is under great stress due to growing human and livestock population and the unscientific measures for tapping the natural resources to meet the increasing demand of timber, fodder and fuelwood. Change in the patterns of energy utilization in these hill villages has been thoroughly analysed and measure to arrest the problem have been identified.

9201-127. Mukherjee Ambarish, Namhata Debashis (Dept Bot, Maulana Azad Coll, 8, Rafi Ahmed Kidwai Rd, Calcutta 700013). **Medicinal plantlore of the tribals of Sundargarh district, Orissa**. *Ethnobotany*, **2** (1 & 2) (1990), 57-60 [18 Ref].

During botanical exploration of Sundargarh district, Orissa, in eastern India, medico-ethno-botanical information concerning 22 plants was collected from tribals, namely, Oraon, Munda, Bhuiyan, Gond, Dhanuar and Routia. The uses along with other details like mode of drug preparation, plant names, etc. are given in the paper.

9201-128. Negi KS, Pant KC (Natl Bureau of Plant Genetic Resources (ICAR) Regl Stn - Bhowali, Niglat Nainital-263121). **Notes on ethnobotany of the Gangwal -A tribe of Garhwal Himalaya**. *Ethnobotany*, **2** (1&2)- (1990), 81-85 [4 Ref].

Present communication deals with the ethnobotany of the Gangwal tribe of Garhwal Hills in northern India.

9201-129. Panwar HS (Wildlife Inst India, Dehra Dun). **Some suggestions for conservation of biodiversity in India**. *The Indian Forester*, **117** (10) (1991), 812-817.

India is richly endowed with a unique biodiversity. This bio-resource has rich economic potential, but needs to be protected from degradation. The paper focuses on the main priority areas in this field which are effective conservation of biodiversity, both natural and domestic; and rapid enhancement of information base and know-how towards harnessing the potential by ourselves.

9201-130. Pardesi Parveen (Collector, Latur, Maliarashtra). **A conservation strategy for Maharashtra**. *Sanctuary,* **11** (5) (1991), 69-74.

Paper advocates the implementation of rational environmental programmes in concert with both, government and NGOs. It put forwards some ideas for the restoration of the land and water systems of Maharashtra, through a positive strategy which has come to be known as ‘ecodevelopment’.

9201-131. Pirta RS, Kumar Palmod, Gadgil Madhav (Dept Psychology, HP Univ, Shimla 171005). **Conservation and management of non-human primates in western Himalayas. Growth Dev Nat Resources Conserv (Ed SR Verma)**, *Nature Conservator* (1990), 89-102 [48 Ref].

Non-human primates living in the temperate zone between the Indian plains and the Great Himalayas have been continuously exposed to intensive agriculture and horticulture, grazing, timber extraction, road construction, and other human disturbances. The presumed effects of such ecological changes on non-human primates have been discussed.

9201-132. Rahmani Asad R, Sankaran Ravi (Bombay Natl Hist Soc, Hornbill House, Shaheed Bhagat Singh Road, Bombay 400023). **Blackbuck and chinkara in the Thar desert: a changing scenario**. *J Arid Env*, **21** (3) (1991), 379-391 [23 Ref].

While the chinkara is present in the whole of Rajasthan State, and especially abundant in the Thar desert, the blackbuck is restricted to areas where surface water is available throughout the year. Development of irrigation canals in the Thar desert will have far-reaching consequences for the distribution and status of these two antelopes.

9201-133. Rajagopalan SP, Raghavendra Prasad PM (Ground water Div, Cent Water Resource Dev Manag, Calicut 673571 Kerala). **Estimation of inundation in open cast limestone mine in Kerala, India**. *J Water Resources Plann Manag*, **117** (5) (1991), 525-535 [3 Ref].

Data on rainfall, runoff, water table fluctuation, and subsurface geology are obtained in an open-cast limestone mine in Kerala, India. These data are analyzed to identify the most critical condition during the full life period of the mine in respect to inundation within the mine pit and to estimate the associated maximum possible inundation rate. The use of design inundation rates less than the maximum value is also studied, and the storage space required to take care of actual inundation rates exceeding the design rate are estimated.

9201-134. Rao PSN, SIiva8tava SK (Andaman and Nicobar Circle, Port Blair 744102). **Wild population of Calamus L in Bay Islands, India**. *Ethnobotany*, **2** (1 & 2) (1990), 87-90 [4 Ref].

Paper gives an account of Calamus L. species in Andaman & Nicobar Islands, emphasising their endemism and ethnobotanical uses gathered from the various aborigins and tribes. The conservational aspect has also been dealt with, as this potential taxon is exploited in the Bay Islands.

9201-135. Sankhala Kailash (Chief Wildlife Warden, Rajasthan). **Future of the national parks of India**. *The Indian Forester*, **117** (10) (1991), 791-798.

The National Parks are under great pressure due to grazing, human population and illicit fellings. The Government Notifications relating to National Parks and legislation with a view to conservation seem to have been done without public debate and in a hurty. The paper contends that the Wildlife function should be separated from the Forestry function at the State-level as it has been done at the Centre. It advocates more people's participation and better scientific management of our natural heritage.

9201-136. Sharma VD, Shmna Sunayana (Chief Conservator Forests, Rajasthan). **The vanishing Siberian Crane**. *The Indian Forester*, **117** (10) (1991), 850-855.

The population of Siberian Crane (Grus leucogranus) a winter migrant to India is decreasing day by day. Studies have been conducted in the Keoladeo National Park from 1974 to 1991 about number of their coming, feed habit and breeding etc. valuable information about their movements have also been recorded to provide authentic information about their speed.

9201-137. Singh RL (Project Tiger, Min Env Forests, Bikaner House, New Delhi-110 011). **Wildlife conservation and eco-development programme a case study.** *The Indian Forester*, **117** (10) (1991), 804-811 [3 Ref].

The preservation of the Protected Areas depends upon the proper management of the buffer areas, which are primarily for meeting the forest-based needs of the people, living around the core areas. The study of the eco-development programme launched in Ranthambhore Tiger Reserve indicates that there are ways to integrate the interests of the wildlife and local people but there is no way to preserve wildlife without integrating the interests of local people.

9201-138. Singh Surendra (Dept Geogr, JVMGRR Coll, Charkhi, Dadri 123306, Haryana. **Need of ecological conservation in the process of economic development. Growth Dev Nt Resource Conserv (Ed SR Verma)**, *Nature Conservators* (1990), 139-151 [37 Ref].

The economic development of the human society is based on the exploitation of natural resources. But it had attained the level of serious effects on the environment which has resulted in severe environmental degradation in some areas. Both renewable and nonrenewable resources are exploited in the same manner. This ideology of

economic development urgently needs sharp changes in attitudes and approaches for the welfare of the human society itself.

9201-139. Sinha Pandey BP, Het Ram, Saxena Ajai. Marine National Park, Wandoor (A&N Islands): **a difficult but novel management challenge**. *The Indian Forester*, **117** (10) (1991), 871-877 [3 Ref].

Management of Marine and Coastal Protected Areas is a comparatively new field as compared to the management of their counterparts i.e. terrestrial ecosystems. This paper deals with the various unique features of marine/coastal protected areas in general and discuss in detail about the management aspects, zonation and related problems; with respect to the Marine National Park, Wandoor.

9201-140. Subba Rao MV, Swamy AWS, Rajasekhar PS, Subba Rao W (Dept Environ Sci, Andhra Univ, Vishakhapatnam-530 003). **Herpetofaunal resources of Easternghats, human impact and their conservation. Growth Dev Nat Resources Conserv (Ed SR Verma),** *Nature Conservators,* (1990), 243-247.

Paper presents the report on the work done at some regions of Eastern-ghats in eleven districts of Andhra Pradesh and delineates the status and abundance of herpetofaunal resources. Status of the individual species was expressed arbitrarily under four categories namely, affluent, threatened, endangered and indetermined. Similarly abundance of the species in each of the district was classified into three groups viz., common, occasional and rare.

9201-141. Thapliyal GS (Chief Wildlife Warden, Manager, Arunachal Pradesh). **Arunachal Pradesh a unique abode of wildlife**. *The Indian Forester*, **117** (10). (1991), 843-849.

The prominent features about wildlife of Arunachal Pradesh have been highlighted. The faunal richness has been illustrated by prominent mammal and bird species. The floral elements including orchids have also been described. The measures taken to conserve this valuable heritage, including creation of protected areas have been dealt with.

9201-142. Venkanna P (Botl Surv India, Western Circle, 7, Koregaon Rd, Pune 411001). **Present status of the estuarine flora of the Godavari and the Krishna**. *J Bombay Natl Hist Soc*, **88** (1) (1991), 47-54 [18 Ref].

Paper surveyed extensively the mangrove forests of the Godavari and the Krishna estuaries and collected a good number of mangroves and their associates. The survey resulted in the identification of Scyphiphora Hydrophyllacea Gaertn. f. (Rubiaceae), a rare mangrove species of the Indian mainland. One very interesting observation is Prosopis chilensis (Molins) Stuntz growing in association with Sonneratia, Acanthus etc.

Health and Toxicology

9201-143. Abbasi SA, Soni R (Salim Ali Sch Eco, Pondicherry (Central) Univ; Pondicherry - 605001). **Studies on the environmental impact of three common pesticides with respect to toxicity towards a lararivore** (channelfish Nuria denricus). *J Inst Public Hlth Engrs* (India), **1991** (2) (1991), 8-12 [16 Ref].

Studies on the environmental impact of pesticides endosulphan, carbaryl and quinolphos were conducted with respect to computer-aided long-term renewal bioassays on an indigenous freshwater insectivorous fish Nuria denricus. The time-dependent median lethal concentrations (LC_{50},), maximum allowable toxicant concentrations (MATC) and 'no adverse effect levels' (NAEL) were determined to evaluate the relative toxicity of the pesticides. A comparison between NAEL values and the prevailing water qualities standards for the corresponding pesticides reveal that the standards are several times lower than NAFL and therefore are adequate.

9201-144 Akela BP, Yadav Jagannath, Thakur YP, Kanti Pranaw (Dept goo, Degree Coll, Supane 852131). **Effect of aldrin on serum cholesterol in comnlon Indian catfish Clarias batrachus**. *Env Eco*, **9** (1) (1991), 183-186 [9 Ref]. (Late Recd).

Serum cholesterol level of Clarias batrachus was estimated in control fish and in fish exposed to 0.5, 1.0, 2.0 and 3.0 ppm of aldrin. LC_{50} of aldrin for this fish was recorded to be 3.5 ppm. Serum cholesterol level was found to rise from control condition upto 1.0 ppm of aldrin and there are a gradual fall upto 3.0 ppm. It was also marked that there was a slight variation in its level due to sex.

9201-145. Andrews MI, George Sanil (Dept Zoo, Mar Thoma Coll, Tiruvalla-689103 Kerala). **Toxic effects of pesticides on tadpoles of frog Rana hexadacty**. *J Ecotoxico Environ Monit*, **1**(2) (1991), 142-147 [13 Ref].

Toxicity of pesticides, endosulfan, malathion and furadan to tadpoles of Rana hexadactyla has been investigated. The values of LC_{50}, lethal and sublethal concentrations were 0.509, 0.7 and 0.12 ppm of endosulfan, 4.44, 6.0 and 0.65 for malathion and 7, 8, 1.0 and 2.14 ppm for furadan, respectively. Endosulfan was the most toxic to tadpoles. Malathion was moderately toxic and furadan, the least toxic to them.

9201-146. Andrews MI, Mathew KK, Oommen Manu, George Sanil (Dept Zoo, Mar Thoma Coll, Tiruvalla 689103 Kerala). **Effect of distillery effluent on the hatching rate and larval survival of frog, Rana hexadactyla Lesson**. *Polln Res*, **9** (1990), 39-43 [15 Ref] (Late Recd).

Effect of the distillery effluent on the hatching rate of eggs and survival of tadpoles of Rana hexadactyla Lesson was studied. The distillery effluent concentrations above 1.2% were lethal to the eggs as well as tadpoles of the frog. The sublethal concentrations of the effluent appeared to stimulate the growth of tadpoles, though they reduced the rate of hatching of eggs to a great extent.

9201-147. Bagwe Aparna N, Bhisey Rajani A (Carcinogenesis Div, Cancer Res Inst. Tata Memorial Cent, Parel, Bombay 400012). **Mutagenicity of processed bidi tokacco: possible relevance to bidi industry workers**. *Mutation Res*, **261** (2) (1991), 93-96 [23 Ref].

The genotoxic potential of bidi tobacco was evaluated by mutagenicity testing of aqueous, aqueous:ethanolic, ethanolic and chloroform extracts of processed tobacco used in the manufacture of ‘bidis’, indigenous forms of cigarettes smoked in India. Present study indicates that workers employed in the bidi industry are exposed to potentially mutagenic and genotoxic chemicals in the course of their occupation.

9201-148. Baigh Md Azahar, Vijay Joseph K, Jayantha Rao K (Div Toxico, Dept Zoo, SV Univ, Tirupati 517502). **Effect of heptachlor on selected biochemical aspects in the functionally different muscles of Channa punctatus**. *J Environ Bio*, **12** (4) (1991), 341-345 [13 Ref].

Organic constituents like carbohydrates, glycogen, proteins, free amino acids, lipids and metabolites like pyruvic acid and t-lactic acid were altered in the functionally

different muscles of heptachlor exposed fish. The changes were more pronounced in 10 days exposed fish than 5 days exposed ones.

9201-149. Baile W, Oberai S (PG Dept Zoo, Nagpur Univ, Nagpur- 400010). **Comparative histo-pathology of methyl parathion and endosulfan treated liver of the catfish Clarias batrachus (Linn)**. *Himalayan J Environ Zoo*, **5** (1) (1991), 23-28 [9 Ref].

The liver of the fish Clarias batrachus when subjected to endosulfan and methyl parathion pesticides shows hypertrophy of hepatocytic nuclei, along with appearance of inter spaces in between the liver lobules accompanied by disturbed orientation of liver cells, dilation of blood vessels and necrosis of cells, besides increased vascularization in the form of grouping of large number of blood cells in endosulfan treated liver. The observations tend to show that the endosulfan is more toxic to the liver of C. batrachus as compared to methyl parathion upon longer duration.

9201-150. Bakthavathsalam R (Dept Zoo, Govt of Arts Coll, Ariyalur 621713). **Hematology of the fish Anabas testudineus exposed to lindane and carbofuran at submerged condition and on exposure to air**. *Env Eco*, **9** (1) (1991), 124-127 [12 Ref] (Late Recd).

The fish Anabas testud ineus at submerged condition and on exposure to air after treated with acetone (control), lindane and carbofuran though caused significant decrease in the blood hemoglobin content at 1 hour and before death over 0-hour control; the reduction observed at 1 hour was relatively less compared to that of before death.

9201-151. Baronia AK, Sharma JD, Sahai YN (Toxico Lab, Zoo Dept, Dr HS Gour Univ, Sagar 470003, MP). **Distribution pattern and accumulation of organo-chloro pesticides (DDT and BHC) in some tissues of Rattus rattus albino**. *Growth Dev Nat Resource Conserv (Ed SR Verma)*, Nature Conservators (1990), **117-121** [9 Ref].

Study was undertaken to investigate distribution pattern and accumulation of organochloro pesticides (DDT and BHC) in liver, kidney, brain with pituitary gland, testis, ovary and adrenal gland of Rattus rattus albino. The pesticides were selected because of their common use and their widespread distribution and accumulation is reported.

9201-152. Baskaran Pandi (Dept Environ Sci, Bharathiar Univ, Coimbatore 641 046). **Use of biochemical parameters in bio-monitoring of pesticide pollution in some freshwater fishes**. *J Ecotoxico Environ Monit*, **1** (2) (1991), 104-109 [23 Ref].

A study on the response of protein, glycogen, SDH and proteases was carried out in some freshwater fishes such as Oreochromis mossambicus. Mystus vittatus and Channa striatus following fenvalerate treatment. It was observed that protein, glycogen and SDH activity in muscle and liver of fenvalerate treated fish decreased whereas the proteases increased.

9201-153. Bhatt AM (Dept Zoo, DAV (PG) Coll, Dehradun 248001). **Relative toxicity of Emisan-6 and BHC 10% dust on the fish, Puntius ticto**. *J Environ Bio*, **12** (4) (1991), 381-384 [7 Ref].

96 h acute toxicity tests of Emisan-6 and BHC 10% dust were carried out on the fish Puntiusticto. Regression equation was established to compare the toxicity of Emisan-6 and BHC 10% dust. The LC60 values of Emisan-6 and BHC 10% dust were 13.2 mg/l and 9.0 mg/l while safe application rate values of these toxicants were found to be 7.92 mg/l and 4.50 mg/l respectively.

9201-154. Bhisey Rajani A, Govekar Rukmini B (Carcinogenesis Div, Cancer Res Inst, Tata Memorial Cent, Parel, Bombay 400012). **Biological monitoring of bidi rollers with respect to genotoxic hazards of occupational tobacco exposure**. *Mutction Res*, **261** (2) (1991), 139-147 [23 Ref].

Smokeless tobacco habits are associated with a high incidence of oropharyngeal cancer in India Hence, the biological effects of occupational exposure to smokeless tobacco used for making bidis were studied in 2 groups of bidi rollers designated BR-K and BR—S and in control subjects with no tobacco habits. Specific tobacco exposure and the electrophilic burden were determined by estimating urinary codtinine and thioethers respectively. Urine mutagenicity was tested with the Atnes assay using Salmonella typhimurium strains TA98 and TA100. The results show that occupational tobacco exposure modulates the glutathione conjugation pathway and increases the mutagenic burden of bidi rollers.

9201-156. Birendra Kumar, Banerjee V (EIaematology Lab, Dept Zoo, Patna Univ, Patna-800005). **Effects of lethal toxicity of sevin (carbaryl) on the blood parameters in Clarias batrachus L.** *Himalayan J Environ Zoo*, **6** (1) (1991), 13-17 [30 Ref].

Exposure in 48-h LC60 concentration of sevin to Claruls batrachus showed anisocytosis, hypochromasia, crenation of erythrocyte membrane, TEG, Hb, M.CH, MCHC, TLC and in small lymphocytes count.

9201-166. Chawla Geeta, Singh Jaswant, Viswanathan PN (Ecotoxico Sec, Indl Toxico Res Cent, Lucknow 226001). **Effect of pH and temperature on the uptake of cadmium by Lemna minor L**. *Bull Environ Contam Toxico*, **47** (1) (1991), 84-90 [19 Ref].

Many aquatic macrophytes have the capacity to take up toxic heavy metals from polluted water and accumulate them. However, uptake of metal ion from water is dependent on concentration, pH, temperature presence of other substances and functional and morphological status of the biotic species. An attempt to understand any correlation between metal bioconcentration, pH and temperature the optimal conditions for the removal of cadmium ions by duckweed, Lemna minor (L.) were studied.

9201-157. Chidambaram N (Zool Surv India, Marine, Biol Stn, 100, Santhome High Rd, Madras 600028). **Do some extrinsic factors influence on nickel accumulation by the mussel, Perna uiridis: a field study**. *Indian J Environ Prot*, **11** (6) (1991), 436-442 [39 Ref].

Mean concentrations of nickel in sediments and mussels Perna viridis, were relatively higher in the samples of fish landing centre, whereas estuarine water contained more level of nickel. Concentration of nickel in mussels showed direct relationship with nickel present in water and sediments as well as concentration of chemical oxygen demand and pH. Inverse relationship was found between nickel content in mussel and BOD in water, and showed significance in all the groups of mussel, except medium size in fish landing centre. Some other significant results were also discussed.

9201-158. (:hidambaramN, Sastry CA (Indian Inst Techno, Cent Biosci Biotechno, Madras 600036). **Toxicity and bioaccumulation of selenate in the teleost fish Oreochromis mossambicus (Peters)**. *Indian J Environ Prot*, **11** (7) (1991), 496-501 [28 Ref].

Acute toxicity tests were conducted using teleost fish, Oreochromis mossambicus (Peters) to assess the toxic potential of sodium selenate as toxicant for the exposure period of 24 - and 96 hr and values of LC_{50}, were 16.3645 mg/l (48 hr) and 11.5718 mg/l (96 hr). To understand the rate of accumulation and elimination of selenium in whole - body and various tissues of fish, chronic toxicity studies were conducted for the exposure period of 50 day at the levels of 2 sublethal concentrations and it was 0.7715 mg/l and 1.1572 mg/l.

9201-159. Chockalingam S, Balaji A (Zool Res Lab, Thiagarajar Coll, Madurai 625009). **Effect of daily effluent on the rate of oxygen consumption and survival of the tadpole larva of Bufo bufo**. *J Environ Bio*, **12** (4) (1991), 377-379 [15 Ref].

Data on the effect of dairy effluent on the oxygen consumption and survival of the tadpole larva of Bufo bufo reveal that a concentration of 30.59to effluent proves lethal to 50% of the population in about 96h of exposure, and the rate of oxygen consumption decreased with increasing concentration of effluent.

9201-160. Dethe MD, Kala VD, Rane SD, Walunj AR (AICRP on Pesticide Residues, Mahatma Phule Agricl Univ, Rahuri-413722). **Hexachlorocyclo-hexane residues in rice**: *J Ecotoxico Environ Monit*, **1** (2) (1991), 91-94 [4 Ref].

Detectable levels of HCH residues were noticed in 7, 12 and 4 out of 12 grain, 15 bran and 10 straw samples of rice-collected from paddy growing area of Western Maharashtra. Residues of gamma HCH was lower than the MRL of 0.25 ppm in most of the contaminated samples, levels of alpha-HCH were higher than other isomers of HCH.

9201-161. Dethe MD, Kale VD, Walunj, AR, Rane SD (AICRP on Pesticide Residues, Mahatma Phule Agricl Univ, Rahuri 413722 Maharashtra). **DDT and HCH residues on milk samples from rural area of Ahmednagar district, Western Maharashtra**. *J Ecotoxico Environ Monit*, **1** (2) (1991) 95-98 [6 Ref].

Out of 62 milk samples studied detectable levels of residues of both DDT & HGH, DDT alone and HCH alone were noticed in 3, 11 and 6 samples, respectively. Residues exceeding extraneous residue limits were noticed in 11 samples contaminated with DDT residues. The level of contamination with gauna HCH was much lower in the samples contaminated with residues of HCH.

9201-162. Dethe MD, Dharne PK, Kala VD (AICRP on Pesticide Residues, Mahatma Phule Agricl Univ, (Ahmednagar) Rahuri 413722, Maharashtra). **Residues of endosulfan and mono-crotophos in pigeon pea.** *Growth Dev Nat Resource Conserv* (Ecl SR Verma), Nature Conservators (1990), 283-285 [8 Ref].

Residues of endosulfan and monocrotophos in grains from green and dried pods of pigeonpea were estimated by GLC and colorimetry, respectively. In grain from green pods, residues level reached Maximum Residue Limit in 1.31 and 14.13 days after second spray with 0.07% endosulfan and 0.05% monocrotophos respectively.

9201-163. Dwarakanath M, Subburam V (Dept Environ Sci, Bharathiar Univ, Coimbatore 641046). **Incidence of fluorosis in a smal village population**. *Indian J Environ Hlth*, **33** (2) (1991), 182-186 [7 Ref].

Studies in Gudalur Village in Tamilnadu showed that about 34% of the population exhibited mild to severe form of dental fluorosis. Only two individuals showed severe form of skeletal fluorosis. The incidence and intensity of fluorosis have been attributed to high fluoride content of drinking water and products from biological sources.

9201-164. Flora SJS, Dhawan Mamta, Tandon SK (Defence Res Dev Establishment, Gwalior). **Effects of combined exposure to aluminium and ethanol on aluminium body burden and some neuromal, hepatic and haematopoietic biochemical variables in the rat.** *Human Expt Toxico,* **10** (1) (1991), 46-48 [30 Ref].

The effects of the daily administration of aluminium (25 mg/kg, orally), ethanol (10%v/v, in drinking water) or both to adult rats, for 6 weeks, on the amount of aluminium present in the tissues and the functioning of brain biogenic amines, hepatic and serum transaminases and some haematopoietic variables were investigated. Ethanol alone was seen to inhibit the activity of 6-aminolevulinic acid dehydratase (ALAD), while aluminium alone elevated the activity of blood ALAD. However, aluminium and ethanol combined produced a more pronounced inhibition of blood ALAD and hepatic glutamic pyruvic transminase (GPT) than either aluminium or ethanol alone. The concentration of aluminium in the blood and liver was significantly-higher in rats exposed to both aluminium and ethanol than in those exposed to aluminium alone. Thus the consumption of alcohol may increase the rat's susceptibility to certain effects of aluminillm.

9201-165. Gaur Abha, Bhattacharjee JW (Div Aquatic Toxico, Indl Toxico Res Cent, PB80, Mahatma Gandhi Marg, Lucknow 226001). **Toxicity of selected chromium compounds in microbial bioassay system.** *Water Air Soil Polln*, **59** (1/2) (1991), 193-197 [14 Ref].

The short term acute toxicity of potassium chromate, potassium dichromate and chromium sulphate has been compared in a simple microbial bioassay. Among the test substances potassium chromate was most toxic and showed no bioaccumulation while potassium dichromate was less toxic but resulted in significant bio-accumulation.

9201-166. Ghosh SK, Gokani VN, Doctor PB, Parikh JR, Kashyap SK (Natl Inst Occupl Hlth, Ahmedabad). **Intervention studies against "green symptoms" among Indian tobacco harvesters.** *Arch Environ Hlth*, **46** (5) (1991), 316-317 [7 Ref].

The use of rubber gloves reduced nicotine and cotinine absorption among 29 tobacco harvesters, as evidenced by the urinary excretion rate of nicotine and cotinine. Approximately 20% (n = 6) of the subjects reported that symptoms disappeared when they used gloves, but the remaining 23 workers complained of an occasional headache even when using gloves. Wearing of boots and socks as well as gloves prevented the symptoms and significantly decreased nicotine and cotinine excretion. This suggests that nicotine is absorbed through the feet.

9201-167. Gowrinathan KP, Rao VNR (Cent Adv Std Bot, Univ Madras, Guindy Campus, Madras 600025). **Physiological responses of some plankton diatoms to heavy metals.** *Asian Env*. **13** (2) (1991), 20-32 [27 Ref].

Physiological responses of a centric diatom Cyclotella meneqhiniana Kutz and a pennate diatom Nitzschia obtusa Wm.Sm. to different concentrations of heavy metals like Hg, Cu, Cd, Zn, Pb and Cr were studied. Heavy metals affected uptake of nitrate, nitrite and phosphate and nitrogen and phosphorus assimilating enzymes in the diatoms.

9201-168. Gupta BN (Indl Toxico Res Cent, Mahatma Gandhi Marg, Lucknow 226001). **Effects of industrialization on the health of population**. *Indian J Environ Prot*, **11** (8) (1991), 583-586.

The toxic chemicals emanating from various industrial units in the form of gaseous, solid or liquid effluents have got serious deleterious effects on the quality of air, water and soil. The social economic and ecotoxicological impact of industrialization on human population are discussed.

9201-169. Haniffa MA, Arul Selvan S (PG Res Dept Zoo, St Xavier's (Autonomous) Coll, Palayankottai 627002). **Relative toxicity of bleaching, dyeing and mixed textile-mill effluents to the freshwater fish Oreochromis mossambicus (Trewaves)**. *J Environ Bio*, **12** (4) (1991), 359-362 [20 Ref].

Oreochromis mossambicus of 6±1g live weight were used for the bioassay studies on the bleaching, dyeing and mixed textile-mill effluents. The experimental results showed that dyeing effluent was found to be more toxic than mixed and bleaching effluents. The 96 h LC_{50} values calculated 5.19% for dyeing, 5.19% for mixed and 6.12% for bleaching effluents.

9201-170. Jani JP, Raiyani CV, Mistry JS, Patel JS, Desai NM, Kashyap SK (Dept Pharmaco, Sch Med, Univ Pittsburgh, Pittsburgh, Pennsylvania 15261 USA). **Residues of organochlorine pesticides and polycyclic aromatic hydro-carbons in drinking water of Ahmedabad city**. *India. Bull Environ Contam Toxico*, **47** (3) (1991), 381-385 [10 Ref].

The ubiquitous environmental pollutants organochlorine pesticides (OCP) and polycyclic aromatic hydrocarbons (PAH) have been extensively studied for their toxicity. Monitoring of OCP and PAH residues has always been considered important for controlling human exposure. This is the first report regarding the residues of OCP and PAH in drinking water of Ahmedabad City.

9201-171. Jha AN, Sharma T (Cytogenetic Lab, Cent Adv Std Zoo, Banaras HIndu Univ, Varanasi 221005). **Enhanced frequency of chromosome aberrations in workers occupationally exposed to diagnostic X-rays**. *Mutation Res*, **260** (4) (1991), 343-348 [26 Ref].

To estimate the level of radiation exposure of personnel handling diagnostic X-ray machines, the yield of chromosomal aberrations was analysed in peripheral blood lymphocyte cultures. These becupationally exposed individuals showed higher frequencies of dicentrics as well as acentrics than normal controls. The increase in the aberration yields in this personnel underscores the need of adoption, measures to avoid or minimise such overexposure.

9201-172. Jindal R, Verma Anuradha, (Dept Zoo Punjab Univ, Chandigarh 160 014). **Effect of interactions amongst heavy metals on primary production**. *Indian J Environ Hlth*, **33** (2) (1991), 249-251 [8 Ref].

Studies on deleterious effects of combinations of lead, nickel, cadmium, zinc and copper on the primary production of freshwater pond in Chandigarh reveal that copper has synergistic effects with nickel on cell growth and photosynthesis by algae. Antagonistic effects of copper + cadmium and copper + lead were observed. The effect of cadmium was almost double than that of lead.

9201-173. Kamat SR, Patil JD, Gregrat Janki, Dalal Neepa, Deshpande JM, Hardikar Pratima (Dept Respiratory Medicine, KEM Hosp Seth GS Medl Coll, Bombay 400 012). **Air pollution and related chest morbidity in central and north-eastern Bombay**. *Encology,* **5** (9) (1991), 1-9 [10 Ref].

In a study of 4 comparable communities in central and north eastern Bombay (2 each) among randomly matched 349 (Parel), 430 (Dadar), 421 (Maravali) and 397 (Deonar) subjects done in 1988-9, along with ambient SO_2, NO_2, and SPM air monitoring. The levels in winter were higher particularly for SO_2 in Pasl and Maravali and for NO_2, SPM in Maravali; Deonar showed lowerpollution. There were inter area differences for housing, income, residential history but age-sex differences were small; these were reduced by matching. Despite lower SO_2 pollution, Maravali residents suffered equally as in Parel. This may be due to added effect of diesel exhausts (NO_2, SPM) or other unmeasured chemicals.

9201-174. Kaviraj A, Das BK (Dept Zoo Univ, Kalyani, Ralyani 741235, West Bengal). **Bioaccumulation and toxicity of cadmium to aquaic organisms - a review**. *Growth Dev Nat Resource Conserv. (Ed SR Verma),* Nature Conservators (1990), 177-186 [68 Ref].

Cadmium is a notorious aquatic pollutant. Concentration of this metal in many natural water bodies often crosses the maximum permissible limit (0.01 mg/l) in drinking water. As high as 13.6µg/g cadmium has been detected in fish inhabiting natural lakes. Provisional tolerance of human consumption of cadmium is 0.4-0.5 µg/g/g/person/week. Toxicity of cadmium varies with species, age and sex of the organisms as well as with water quality.

9201-175. Khadse VR, Jotani KL, Raval YB (Gujarat Fisheries Aquatic Res Inst, Port Okha 361 350 Gujarat). **Toxicity of zinc to two marine water fishes Aphinus dispar (Nardo) and Mugil spp**. *Polln Res*, **9** (1990), 131-132 [2 Ref] (Late Pub).

Acute toxicity test (static bioassay) on maximum tolerance limit of zinc metal to two marine fishes, Aphinus dispar (Nardo) and Mugil spp. was studied. The 96 hrs. Lc-50 values were 4.0 mg/l and 30 mg/l for Wugil spp. and Aphinus dispar respectively. This shows that Mugil spp. in more succesptible to zinc than Aphinus dispar. Maximum tolerance limit were 10 mg/l and 40 mg/l respectively for mugil and Aphinus.

9201-176. Khan Sikandar, Ali S, Rahman Q (Indl Toxico Res Cent, PO Box 80, Mahatma Gandhi Marg, Lucknow 226001). **Diminution in phase I and phase II drug metabolizing enzymes of rat lung by asbestos: An In vitro study**. *Bull Environ Contam, Toxico*, **47** (5) (1991), 660-667 [23 Ref].

Studies on three varieties of asbestos viz. chrysotile, crocidolite and amosite and tetanium dioxide on the enzymes of phase I and phase II drug metabolism in isolated rat lung microsomes and post-microsomal fraction were conducted. Conclusions of the study suggest that diminution of these drug metabolizing enzymes in pulmonary tissue by asbestos may increase the retention time of the reactive metabolites of the carcinogenic chemicals of cigarette smoke in lungs which might contribute to some extent increased risk of development of lung cancer in smokers, occupationally exposed to asbestos.

9201-177. Khangarot BS, Tripathi DM (Fish Immunotoxicity Proj, Indl Tosico Res Cent, Mahatma Gandhi Marg, PB No.80, Lucknow 226001). **Changes in humoral and cell-mediated immune responses and in skin and respiratory surfaces of catfish Saccobranchus fossilis following copper exposure**. *Ecotoxico Enuiron Safety*, **22** (3) (1991), 291-308 [60 Ref].

Immunologic responses and stereoscan analysis of the skin and gill surfaces were performed in the air-breathing catfish. Saccobranchus fossilis (Bloch) following sublethal exposure to copper. At 0.056, 0.1, and 0.32 mg/ litre of cu, a dose-dependent decrease in red and white blood cell counts, hemoglobin content, and packed cell volume values were observed at the end of experiment, i.e., 28 days. Fish exposed to Cu concentrations had lower antibody titer values, reduced numbers of splenic and

kidney plaque-forming cells, and higher counts of splenic lymphocytes when compared to the control group.

9201-178. Khanna SK, Das Mukul (Dyes'& Food Adulterant Toxicol Lab, Indl Toxico Res Cent, Lucknow 226001). **Toxicit, carcinogenic potential and clinico-epidemiological studies on dyes and dye intermediates**. *J. Scientific Indl Res*, **50** (12) (1991), 965-974 [167 Ref].

Paper gives an exhaustive review of toxicity, carcinogenic potential arkiclmico-epidemiological studies on dyes and dye intermediates. Growth of dyestuff industry and export statistics, health hazards -and animal toxicity studies in related areas are covered in the review.

9201-179. Kulkarni BG (Dept Zoo, Inst Sci, Bombay 400032). **Physiological and biochemical responses of the crab Scylla serrata (Foskal) to mercury exposure.** *Growth Dev Nat Resources Conserv (Ed SR Verma),* Nature Conservators (1990), 153-158 [20 Ref].

The impact of sublethal levels of mercury chloride on physiological and biochemical parameters in crab Scylla serrata of Bombay coast has been studied. The levels of glycogen depleted in hepatopancreas and muscle following 4 weeks exposure of crabs to 0.14 and 0.5 mg/l of mercury. Significant elevation of glucose, lactic acid, sodium, potassium were observed in blood of mercury treated crabs.

9201-180. Kumar S, Gopalani Deepak, Rao MVN, Ramaseshu P, Nagaratnam A (Defence Lab, Jodhpur 342001). **Estimation of radon levels in environment**. *Indian J Environ Prot*, **11** (5) (l991), 375-377 [3 Ref].

Paper discusses the radon levels measured in various buildings and mines of Rajasthan using the solid state nuclear track detectors (SSNTDs). The lower values are observed in the newly built houses with good ventilation, whereas in the case of mines, these are observed in gypsum mines. A comparison of the measurements carried out using the SSNTD method is made with that using the filter paper method. The consistent lower values in the later technique are attributed to the self absorption of alphas in the dust cake.

9201-181. Maheswari Devi K, Gopal V, Rathna Gopal (Dept Enuron Sci, Bharathiar Univ, Coimbatore 641046). **Liver-somatic index of Channa striatus as a biomonitoring tool of heavy metal and pesticide toxicity**. *J Ecotoxico Environ Monit,* **1** (2) (1991), 135-141 [26 Ref].

When compared to a liver-somatic index (LSI) of 1.92 the normal fish Channa striatus exposed to sublethal concentration of various toxicants (Cu, Cd, Hg, Pb DDT & metacid) showed an index of 1.12, 0.84, 0.77, 1.07, 0.56 and 0.9 respectively at the end of 5th week.

9201-182. Maleeka Begum SF, Subburam V (Dept Environ Sci, Barathiar Univ, Coimbatore 641046). **Impact of industrial city sewage on the level of chemical and microbial, contamination in the teleost fish Sarotherodon mossambicus and its habitat (Singanullur Tank).** *Polln Res*, **9** (1990), 1-13 [36 Ref] (Late Recd).

The level of chemical and bacteriological pollution due to the discharge of untreated waste water into Singanullur irrigation tank situated south east of Coimbatore city was investigated. The concentration of chloride, phosphate, nitrate, iron, manganese and copper were found to be above the tolerance limit fixed for inland surface water. The concentration of sodium, potassium, calcium, zinc and mercury showed a significant change. The order of mean concentration of metals were found to be the same in water and sediment, however in the fish S. mossambicus, the highest concentration was recorded for calcium and the positions of zinc and manganese were interchanged.

9201-183. Malla Rao B, Vikram Reddy M (Environ Bio Lab, Dept Zoo, Kakatiya Univ, Warangal 506009). **Impacts of effluents of the disperse-dye factory on some aquatic and terrestrial fauna particularly arthropods**. *Env Eco*, **9** (3) (1991), 621-623 [3 Ref].

Investigations on the impact of the effluents of a new disperse-dye factory located in the outskirts of Warangal, on both the aquatic and terrestrial fauna particularly the arthropods revealed that the effluents when discharged outside killed arthropods. Individuals belonging to Coleoptera, Pseudoscorpionidae, Acarina, Blattidae and Thysanoptera were recorded on the adjacent unpolluted soil having no access to the effluents.

9201-184. Martin RE, Sarojini R, Nagabhusanam R (Dept Zoo, Marathwada Univ, Aurangabad 431 004). **Effect of organophosphorus pesticide, methyl parathion on the histopathology of the ovary of the freshwater prawno Caridina weberi.** *Polln Res*, **9** (1990), 107-117 [11 Ref]. (Late Recd).

The exposure of freshwater prawn, Caridina weberi exposed to pesticide methyl parathion resulted in rupture of the germinative zone. Most of the ovarian tissues showed degeneration, vacuolisation and damage to the proliferating zones. The degeneration and regression of the ovarian tissues may be due to oocyte breakdown which is caused by the phagocytic action possibly by nutritive phagocytes.

9201-185. Mishra Anil, Dwivedi Premendra D, Verma Ashish S, Mishra Jaya, Sinha M, Dutta KK, Ray PK (Inhibition Toxico Div, Indl Toxico Res Cent, Lucknow 226 001). **Modulation of microsomal membrane associated detoxication enzymes activity by methyl isocyanate (MIC) exposure**. *Bull, Environ Contam Toxico*, **47** (5) (1991), 675-681 [24 Ref].

Studies on biochemical basis of MIC intoxication in male albino rats showed non-significant changes in glutathione s-transferase, aniline hydroxylase, aminophyrine de-methylase and sulphydryl contents to 355 ppm sign exposure of MIC whereas significant decrease in glutathione content. Alteration in the activities of pulmonary mixed function oxidase system shows that lung tissue has been the primary target organ affected by exposure to MIC.

9201-186. Mishra Anil, Dwivedi Premendra D, Verma AS, Sinha M, Mishra Jaya, Lal K, Pandya KP, Dutta KK (Inhalation Toxico Div, Indl Toxico Res Cent, Lucknow 226001). **Pathological and biochemical alterations induced by inhalation of furfural vapour in rat lung**. *Bull-Environ Contam Toxico*, **47** (5) (1991), 668-674 [15 Ref].

Studies on evaluation of toxic responses of furfilral vapour exposed rats showed patho-biochemical changes in the form of muscus membrane irritation, hepatocyte necrosis, and hampered oxidative metabolites and substantial injury in biological systems.

9201-187. Mohan Rao N, Saiyed HN, Kulkarni PK, Kashyap SK (Natl Inst Occupl Hlth, Meghani Nagar, Ahmedabad 380 016). **Pulmonary ventilatory capacity in slate pencil cutters with normal chest radiogram.** *Indian J Environ Prot*, **11** (8) (1991), 578-582 [13 Ref].

Pulmonary ventilatory function tests were evaluated in 167 slate pencil workers. The findings revealed that smoking and respiratory symptoms have synergestic effect over dust exposure in causing airway obstruction. It appears from this study that physiological impairment in pulmonary function shows earlier than chest radiogram abnormality in a considerable number of slate pencil workers.

9201-188. Mukherjee AK, Bhattacharya SK, Ahmed S, Rajan BK, Roy S, Thakur S, Ganguly PK (Regl Occupl Hlth Cent (Southern), Ground Floor, Centl Library Block, Bangalore Medl Coll, Bangalore-560002). **An environmental survey in jute processing industry**. *Indian J Indl Med*, **37** (3) (1991), 123-128 [8 Ref].

Dust level and thermal parameters like dry-bulb temperature, relative humidity, VVBGT and wind velocity were studied in 4 different jute mills in West-Bengal during the period 1984-87. The results shows that there are two distinct dust zones, high and low, persisting within the mills. Dust levels in the processes like softening, teasing, carding have been found to exceed the TLV prescribed for nuisance dust in most of the mills. The study on thermal parameters in the mills shows that the condition during the period, February-April may not be comfortable at all to workerss particularly because of very poor air movement.

9201-189. Mullick Suparna, Konar SK (Fisheries Lab, Dept Zoo, Kalyani Univ, Kalyani 741235). **Combined effects of zinc copper, iron and lead on plankton**. *Env Eco*, **9** (1) (1991), 187-198 [33 Ref] (Late Recd).

Acute 48-hour toxicity for different binary, tertiary and quaternary mixture of four component metals, namely, zinc (Zn), copper (Cu), iron (Fe) and lead (Pb) was found for the zooplanktons Dzaptomlls forbesi to assess the safe disposal rate of metal mixture. Zinc and copper were mixed at ten times greater rate of their individual LC_{50}, while iron and lead were mixed at their individual LC_{50} levels. Among six different tested combinations of binary metal mixture Zn-Cu, Cu-Fe and Pb-Fe combinations behaved antagonistically while Zn-Fe, Zn-Pb and Cu-Pb acted synergistically.

9201-190. Nair A, Dureja P, Pillai MKE (Dept Zoo, Univ Delhi, New Delhi 110002). **Levels of aldrin and dieldrin in environmental samples from Delhi, India**. *The Sci Total Env*, **108** (3) (1991), 255-259 [6 Ref].

Aldrin and dieldrin residues in soil, earthworms, water, fish and clams from different sites in Delhi were monitored. Concentrations of aldrin and dieldrin were found

to be higher in earthworms than in soil. Concentrations of dieldrin were higher in fish than the ambient water but the concentration of aldrin in the ambient water was the same as that in fish and clams.

9201-191. Nair Sudha, Krishnamurthi VS (Bacterio Lab, Centl Leather Res Inst, Adyar, Madras 600020). **Accumulation of chromium by Pseudomonas aeruginosa**. *Indian J Environ Hlth*, **33** (2) (1991), 230-236 [13 Ref].

Cells of Pseudomonas aeruginosa grown in chromium free culture, accumulated chromium when resuspended in aqueous solutions of trivalent and hencavalent chrornium salts. The rate and extent of accumulation were subject to pH, additives like sodium chloride and tannic acid and to cell age and concentration of the metal. Roughly ten times more of chromium was found from basic chromium sulphate solution (trivalent form) than that of potassium dichromate (hexavalent form) by the bacteria.

9201-192. Nanda Kumar NV, John Bull EO, Prabhakar E, Nagaraju C, Naidu MSR (Dept Zoo, Sri Venkateswara Univ, Tirupati 517502). **A colorimetric method for standardising biological activity of some new organophosphorus compounds.** *Polln Res*, **9** (1990), 130-140 [13 Ref] (Late Pub).

The biological activity of new organophosphorus heterocyclic compounds is assayed in terms of their esterase inhibitory activity. The degree of esterase inhibition is discussed in relation to the leaving of various organophosphorus compounds tested. A standard calibration curve is also evolved for standardising biological activity of new organophosphorous compounds. The biological activity or esterase inhibitory activity is expressed as universal Methyl Parathion Units (MPU) deduced from standard calibration curve which can be employed for determining biological activity of new organophosphorous compounds.

9201-193. Pamila D, Subbaiyan PS, Ramaswamy K (Dept Zoo, Govt Arts Coll, Coimbatore 641018, Tamil Nadu). **Toxic effects of chromium and cobalt on Sarotherodon mossambgells (Peters).** *Indian J Environ Hlth*, **33** (2) (1991) 218-224 [18 Ref].

The effects of chromium and cobalt on oxygen consumption and blood parameters of Sarotherodon mossambicus were investigated. Based on the results obtained, it is concluded that S. mossambicus showed adaptive increase in oxygen

uptake, probably to meet the energy demand, during early periods (5 days) of exposure to chromium and cobalt.

9201-194. Patil PS, Gadkari MP, Kulkarni KM (Ensiron Physio Lab, PG Dept Zoo, Govt Vidarbha Mahavidyalaya, Amravati 444604). **Toxicity of organochlorine pesticides to the crab Paratelphusa jacquemontii (Rathbun).** *Env Eco*, **9** (3) (1991), 804-806 [20 Ref].

Toxicity of aldrin, hilden BHC and DDT was studied to the crab Paratelphusa jacquemontii (Rathbun). Aldrin was found to be more toxic amongst the used pesticides.

9201-195. Patil SG, Hugar Parameshwar (Coll Agricl, Raichur 584 101). **Ecological impacts of pesticides on wildlife**. *Myforest*, **27** (3) (1991), 244-247 [5 Ref].

Most of the chemicals that are used to control unwanted insect pest, disease remain in environment even after their mission is over. The indirect effects of a pesticides on wild species is through their effect on non-target species including beneficial insects. Paper suggests for the scientific investigation to assess the impacts of pesticides on wildlife in India and for this purpose establishment of ecology centres in the areas where-pesticides are intensively used.

9201-196. Patnaik HK, Dash MC (Sch Life Sci, Sambalpur Univ, Jyoti Vihar 768019; Orissa). **Toxicity of monocrotophos and fenitrothion to four common Indian grassland earthworm species**. *Polln Res*, **9** (1990), 95-99 [12 Ref] (Late Recd).

The study reveals the LC_{50} values calculated from graph (10g dose v/s Probit mortality) to be in order of Limpito mauriti>Drawida willsi >Drawida calebi > Octochaetona surensis for monocrotophos and Lampito muaritii > Drawida calebi > Octochaetorza surensis>Drawida willsi for fenitrothion suspension. LC_{50} values range from 14.1 ppm to 18.2 ppm for monorotophos and 12.6 ppm to 15.9 ppm for fenthrothin suspension.

9201-197. Pingole VS, Rale VB (Dept Microbio, Univ Poona, Pune 411007). **Effect of residual pesticides on microflora during fruit development in Mangifera indica**, *Indian J Environ Hlth*, **33** (2) (1991), 198-202 [11 Ref].

Effect of residual pesticides on microbial isolates from various stages of fruit development in Mangifera indica, L was studied. It was observed that, yeast species

were more sensitive to pesticides than the bacterial isolates and they showed no qualitative reduction in microflora though quantitative reduction was observed.

9201-198. Plaha RS, Sahai YN (Dept Zoo, Dr Harsingh Gour Vishwavidyalaya, Sagar-470003). **Qualitative detection of BHC in some organs of a fresh water teleost Heteropneustes fossilis (Bloch) as assessed by thin layer chromatography:** *Adv Biosci,* **10** (1) (1991), 47-51 [17 Ref].

Paper deals with the qualitative detection of BHC in the liver, kidney, intestine and gills of a fresh water teleost Heteropneustes fossilis (Bloch). The study was made after the exposure of fish to 10, 15 and 30 days to a sub-lethal concentration of 2.0 ml/litre. The study revealed accumulation of BHC in the liver, gills and intestine of Heteropneustes fossilis, but no spot could be detected in case of kidney for all exposures.

9201-199. Prakash A, Rao Jagadiswari, Tewari SN, Gupta SP (Centl Rice Res Inst, Cuttack 753 006, Orissa). **Rice agroecosystem management by pesticides and its consequences.** *Growth Dev Nat Resource Conserv (Ed SR Verma),* Nature Conservators (1990), 131-137 [7 Ref].

Paper deals with the problems of the usage of pesticides under different situations of tice cultivation with special reference to socio-economic condition of Indian farmers in eastern states of the country. Kinds of pesticides used in rice cultivation and their toxic effects, adulteration of pesticides and their misuse and unawareness of residues contamination in paddy grains/straws etc., have been discussed along with the view as how to overcome these problems.

9201-200. Pundir Rekha, Saxena AB (Dept Zoo, Holkar Sci Coll, Indore MP). **Studies on acute toxicity of water containing ammonium molybdate to a fresh water fish Puntius ticto (Ham.).** *Polln Res*, **9** (1990), 101-105 [3 Ref] (Late Recd).

Acute toxicity of water containing ammonium molybdate to fish Puntius ticto was determined. The LC_{50} value, LC_{100}, value, 95% confidence limits and slope function were worked out. The LC_{50} values were computed to be 650, 620, 600, 650 mg/l for 24, 48, 72 and 96 hr respectively. The LC_{50}values were found to be 650 ml/l for 96 hr period. The safe concentration worked out was 178.8 mg/l. Symptoms produced by molybdenum poisoning included fin erosion, impaired swimming ability, dark colour and surfacing behaviour.

9201-201. Rajan MT, Banerjee TK (Dept Zoo, Banaras Hindu Univ, Varanasi 221005). **Histo-pathological changes induced by acute toxicity of mercuric chloride on the epidermis of freshwater catfish - Hetero-pneustes fossilis (Bloch*).*** *Ecotoxico Enuiron Safety*, **22** (2) (1991), 139-152 [45 Ref].

The toxic effects of 0.3 ppm (96-hr LC60 value) of mercuric chloride solution on the epidermis of Heteropneustes fossilis at different time intervals have been studied. The epidermis reacts instantaneously by secreting a profuse amount of slime, especially due to hyperactivity of the goblet mucous cells which subsequently degenerate and get lost. Later, all other cell types also get entangled in the degenerative process.

9201-202. Rajkumar R, Manohar Das S Sam (Dept Zoo, Scot I Christian Coll, Nagercoil 629003). **Effect of copper intoxication on muscle glycogen levels in Oreochromis merssarnbica.** *Env Eco*, **9** (1) (1991), 1-3 [9 Ref] (Late Recd).

In the present investigation 120 hour LC_0 and 24 hour-LC_{100} of copper to Oreochromis mossambica have been analyzed to be 0.01 and 1.1 mg/liter respectively. Body muscles of fish subjected to these two concentrations were analyzed to estimate their glycogen levels. Glycogen level dropped significantly in the muscles following heavy metal exposure.

9201-203. Ramamurthy K, Jayantha Rao K (Dept Zoo, SV Univ, Tirupati 517502**). Toxic impact of heptachlor on carbohydrate metabolism in the tissues of a fresh water edible fish, Channa punctatus (Bloch).** *Growth Dev Nat Resources Conserv, (Ed SR Verma),* Nature Conservators (1990), 287-291 [19 Ref].

The toxic effect of organochlorine pesticide viz. heptachlor at their sublethal (SL) level on biochemical parameters of blood, liver, gill and muscle and enzyme activities in gill, liver and muscle of a fresh water edible fish, Channa punctatus was studied after 5 and 10 days exposure. The alterations produced by the pesticide are more pronounced after 10 days exposure. The results suggested that the aerobic oxidation through Kreb's cycle was adversely affected by the heptachlor.

9201-204. Ramanaiah P, Ravi Shankara C, Indira K, Rajendra W (Dept Zoo, Sri Venkateswara Univ, Tirupati 517502, AP). **Effect of carbontetrachloride on arginine metabolism of Lamellidens marginalis.** *Indian J Environ Hlth*, **33** (2) (1991), 213-217 [17 Ref].

Ammonia detoxification potential in different tissues of freshwater mussel under CCl_4 toxicity has been studied. CCl_4 exposure for 7 days depleted proteins followed by concomitant rise in free amino acids and ammonia resulting in hyperammonemia in the tissues. Hyperammonemia was combated by elevated arginase catalysis leading to increased urea and ornithine.

9201-205. Rao JV, Swamy AN, Yamin S (Toxico Unit, Bio Div, Indian Inst Cheml Techno, Hyderabad 600073). **In vitro brain acetylcholinesterase response among their inbred strains of mice to monocrotophos**. *J Environ Sci Hlth*, **B26**(4) (1991), 449-458 [21 Ref].

The strain differences in the neurotoxic potential of monocrotophos (MCP) were assessed by determining the inhibition of brain acetylcholinesterase (AchE) in BALB/cAnN, DBA/2J and C57BL/6J in vitro. MCP being a competitive inhibitor for AChE, alters the Km values widely among these inbred strains.

9201-206. Rastogi SK, Gupta BN, Tanveer Husaill, Seema Srivastava (ITRC, PO Box 80, MG Marg, Lucknow 226001). **Pulmonary function evaluation in traffic policemen exposed to automobile exhaust.** *Indian J Occupl Hlth*, **34** (2) (1991), 67-71 [17 Ref].

Pulmonary function tests were performed on 65 traffic policemen with defined exposure to assess the changes in respiratory status and the prevalence of pulmonary impairment in relation to personal and occupational factors. The study showed significantly higher prevalence of overall respirator) impairment in the exposed workers in comparison to that noted in the reference group (15.3% Vs 3.5% (p 0.001).

9201-207. Rastogi SK, Husain Tanveer (Indl Tounco Res Cent, Epidemio Div, Mahatma Gandhi Marg, Lucknow 226001). **Role of respiratory functions in the evaluation of pulmonary impairment caused by toxic chemicals in the fertilizer plants.** *Indian J Environ Prot*, **11** (6) (1991), 406-408 [4 Ref].

The toxic chemicals, gases and vapours present in the work environment in the fertilizer industry on acute or chronic inhalation are the environmental health hazards. Respiratory irritants and chemical asphyxiants from the fertilizer plants cause pulmonary toxicity. Assessment of various pulmonary abnormalities viz., ventilatory disorders, obstructive,-restrictive and mixed pulmonary pattern, small airways obstruction, diffusion abnormalities, decrease in O_2 carrying capacity, abnormalities on oxyhaemoglobin

dissociation curve, hypoxaemia in the exposed workers are described in the present study.

9201-208. Ray A, Chatterjee S, Ghosh S, Kabir SN, Pakrashi A, Deb C (Dept Physio, Univ Coll Sci Techno, 92 Acharya Prafulla Chandra Rd, Calcutta 700009). **Suppresive effect of quinalphos on the activity of accessory sex glands and plasma concentrations of gonadotrophins and testosterone in rats.** *Arch Environ Contam Toxico*, **21** (3) (1953l), 383-387 [27 Ref].

Biochemical estimation of prostatic acid phosphatase and fructose content in accessory sex glands, along with radioimmunoassay of plasma gonadotrophins (FSH and 1H) and testosterone were performed in Wistar rats following 8 treatment with quinalphos, an organophosphorus insecticide, for 13 and 26 days. Prostatic acid phosphatase activity and fructose content of the accessory sex glands, and plasma levels of testosterone and FSH were significantly lower in all rats treated with quinalphos.

9201-209. Roy Ajay Kumar, Talukdar Geeta, Sharma Archana (Cent Adv Std Cell Chromosome Res, Dept Bot, Univ Calcutta, 35, Ballygunge Circular Rd, Calcutta 700019). **Similar effects in view of two aluminium salts on the liver, kidney, bone and brain of Rattus noruegicus.** *Bull Environ Contam Toxico*, **47** (2) (1991), 288-295 [18 Ref].

The present work was undertaken to observe the effects of different concentrations of aluminium following oral ingestion for various durations on various organs of rats and also to compare two different A1 salts at doses having the same amount of A1. The findings can be of relevance owing to the widespread use of aluminium compounds by oral route either as medicines or unintentionally through utensils and cookwares.

9201-210. Roy Chowdhury A, Venkatkrishna Bhatt H (Natl Inst Occupl Hlth, Meghani Nagar, Ahmedabad). **Toxicology of formaldehyde-a focal review.** *Indian J Occupl Hlth*, **34** (3) (1991), 115-122 [19 Ref].

Over several decades, results of scientific research have lead to review for assessing the HCHO hazard and accepted regulatory measures in different countries. The policies will be based on the principles that hold valid from animal data and presumptive carcinogenecity in humans. Indeed it appears that EPA possibly be

changing their policies regarding safety measures of HCHO Moreover, the present status of arts in our country should be adopted where huge HCHO products are being widely used.

9201-211. Rupa DS, Reddy PP, Reddi OS (Environ Toxico Programme, Univ California, Riverside CA 92521 USA). **Clastogenic effect of pesticides in peripheral lymphocytes of cotton field workers**. *Mutation Res*, **261** (3) (1991), 177-180. [16 Ref].

Paper studied clastogenic effects in peripheral lymphocytes of cotton-field workers who were exposed to different pesticides. All the cells were grown in RPMI 1640 medium for 48 and 72 h. The type of aberrations observed in the exposed group are gaps, breaks, dicentrics, exchanges, rings and polyploidy.

9201-212. Sahasrebude Anjali, Pande Anita, Modi Vinod (Dept Microbio Biotechno Cent, Fac Sci, Univ Baroda, Baroda 390002). **Dehalogenation of a mixture of chloroaromatics by immobilized Pseudomonas Sp. USI ex cells**. *Appl Microbio Biotechno,* **35** (6) (1991) - 830-832 [7 Ref].

Pseudomonas sp. USI ex entrapped in calcium alginate could dehalogenate a mixture of isomeric monochlorobenzoates and 2, 4-dichlorophenoxyacetic acid. Conditions for optimum dehalogenation of chloroaromatics by immobilized cells and their reusability were investigated. Preliminary attempts were made to set up a continuous system for dehalogenation of chloroaromatics using a fluidized bed column reactor.

9201-213. Sakthivel M, Sampath K, Pandian TJ (Zoo Dept, Kamaraj Coll, Tuticorin 628003). **Sublethal effects of textile.dye stuff effluent on selected oxidative enzymes and tissue respiration of Cyprinus cazpio (Linr L)**. *Indian J Exptl Bzo*, **29** (10) (1991), 979-981 [16 Ref].

Toxic effects of sublethal concentration of dye stuff effluent on succinic dehydrogenase (SDH) and lactic dehydrogenase (LDH) activities and tissue respiration were studied in Cyprinus carpio. While the sublethal exposure significantly reduced SDH activity and tissue respiration, LDH activity increased in gill, brain, liver, muscle and kidney.

9201-214. Samuel Thomas, Pillai MKK (Dept Zoo, Univ Delhi, Delhi 110007). **Impact of repeated application on the binding and persistence of [^{14}C]-DDT and [^{14}C] HCH in a tropical soil**. *Environ Polln*, **74** (3) (1991), 205-216 [25 Ref].

An Indian sandy loam soil was initially treated with 1kg a.i.ha^{-1} of either [^{14}C]-p,p'-DDT or [^{14}C]-gamma-HCH during winter. The results demonstrate that pre-treatment of tropical soils with DDT or HCH enhances their rate of dissipation and significantly reduce the formation of their soil-bound residues.

9201-215. Sarojini R, Yadav BS, Nagabhusanam R (Dept Zoo, Marathwada Univ, Aurangabad 431004). **Changes in ascorbic acid levels in tissues of freshwater prawn, Caridina weberi after lethal exposure to endosulfan**. *Uttar Pradesh J Zoo*, **10** (2) (1990), 137-139 [7 Ref].

Changes in ascorbic acid levels after exposure to lethal doses of pesticide-endosulfan was carried out in hepatopancreas, ovary and muscle of freshwater prawn, C. weberi. After lethal exposure to concentration of 0.0288, 0.0204, 0.0173 and 0.0141 ppm of endosulfan for 24, 48, 72 and 96 hours respectively, the ascorbic acid level in C. weberi was found to be increased in hepatopancress, ovary and muscle.

9201-216. Sastry KV, Shukla Vineeta (Dept Biosci, MD Univ, Rohtak). **Effect of cadmium on the intestinal absorption of some nutrients in the teleost fish Channa punctatlw**. *Palln Res*, **9** (1990), 141-146 [19 Ref] (Late Pub).

The effect of four concentrations (0.1, 1.0, 10 and 100 ppm) of cadmium on the rate of uptake of glucose, fructose and an aminoacid tryptophan by the intestine of the freshwater teleost fish, Channa punctatus has been studied after 1 hr at 23°C. Intestinal transport was also assessed in fish exposed to a sublethal concentration (1.12 ppm) of cadmium for 15, 30, 60 and 120 days. All four concentrations of cadmium decreased the rate of transport of these three nutrients significantly. The decrease was more marked in fish exposed to cadmium for 120 days than those exposed for other stages of chronic exposure.

9201-217. Sharif AKM, Mustafa AI, Mirza AH, Safiullah S (Inst Nuclear Sci Techno, Atom Energy Res Establishment, Savar, P.O. Box 3787, Dhaka Bangladesh). **Trace metals in tropical marine fish from the Bay of Bengal**. *The Sci Total Env*, **107** (1991), 135-142 [24 Ref].

Concentrations of potassium, calcium, magnesium, manganese, iron, nickel, copper, zinc, lead, cadmium, strontium and rubidium were determined in the flesh of six marine fish species from the Bay of Bengal. Analytical quality was determined by analysis of standard reference material MA-A-2(TM), Fish Flesh Homogenate, from International Atomic Energy Agency. In most cases the results are similar to data published on fish from other marine environments.

9201-218. Sharma HA, Naga-bhusanam R, Sarojini R (Dept Zoo, Marathwada Univ, Aurangabad 431004). **Effect of organo-phosphate insecticide on the oogenesis of the edible crab, Scylla serrata.** *Uttar Pradesh J Zoo*, **10** (2) (1991), 158-162 [13 Ref].

Two organophosphorous pesticide, methyl parathion and phosalone, were exposed to the marine crab, Scylla serrata, for acute and chronic studies. Both tike pesticides brought several abnormalities in the ovary of immature and maturing crabs. The overall observations made were, derangement of oocytes, vacuolization and degeneration of tissue, lack of nuclei and nucleoli, atretic follicles followed by chromatolysis. However, phosalone treatment brought a recovery in the ovary during long term exposure with the development of phagocytes and follicular cells.

9201-219. Singh Narendra N, Srivastava Anil Kishore, Srivastava Anil K (Dept Zoo, Kamla Nehru Inst Physical Socl Sci, Sultanpur 228118). **Effect of sublethal concentration of aldrin on some haematological parameters of freshwater Indian catfish. Heteropneustes fossilis**. *J Freshwater Bio*, **3** (3) (I991), 223-227 [26 Ref].

Exposure to Heteropneustes fossilis at sublethal concentration of 0.051 ppm of aldrin for seven days induced a significant decrease in total erythrocyte and leucocyte counts, haematocrit, haemoglobin concentration and clotting time. A significant increase was noticed in the abundance of thrombocytes.

9201-220. Srivastava AK, Gupta BN, Mathur AK, Mathur N, Mahendra PN, Bharti RS (Epidemio Div, Indl Toxico Res Cent, Mahatma Gandhi Marg, Lucknow 226001). **The clinical and biochemical study of pesticide sprayers**. *Human Exptl Toxico*, **10**(4) (1991), 279-283 [23 Ref].

Clinical, haemoatological and biochemical studies of 34 subjects, occupationally exposed to different types of pesticides were conducted. The findings have been compared with those observed in 14 control subjects. Inhibition of cholinesterase activity was observed in the exposed group. Serum alkaline phosphatase was also found to be

raised. Radiological examination revealed pneumonitic patches in the chest skiagrams of three exposed subjects. Paraesthesia with hyporefexia was also found in 8.8% of exposed subjects. The findings suggest that exposure to multiple pesticides over many years affects the normal functioning of different organ systems and may produce characteristic clinical effects.

9201-221. Tandon Rashmi, Seth Prahlad K, Srivastava Satya P (Indl Toxico Res Cent, Lucknow 226001). **Effect of in utero exposure to DI (2-ethylhexyl) phthalate on rat testes.** *Indian J Exptl Bio*, **29** (11) (1991), 1044-1046 [21 Ref].

In utero exposure to di(2-ethylhexyl) phthalate (DEHP; 1000 mg/kg/body weight) significantly decreased activities of testicualr sorbitol dehydrogenase and acid phosphatase and increased glutamyl transpeptidase, lactate, dehydrogenase and, glucuronidase activities at early ages. A decrease in the sperm count of the epididymal spermatozoa was also observed in the segually matured animals of DEHP exposed group. The data suggest that in utero exposure to DEHP may affect the normal development of testes.

9201-222. Trehan Keshav, Maneesha (Lab Microbial Genetics Biochem, Dept Bot, Kurukshetra Univ, Kurukshetra 132119). **Effect of lead on nitrogenase and enzymes of nitrogen assimilation in a cyano-bacterium Nostoc muscorum**. *Indian J Expt Bio*, **29** (12) (1991), 1116-1119 [25 Ref].

Lead decreased the growth rates, total cell mass, heterocyst frequency, total cell protein, nitrogenase activity, glutamine synthetase (GS) and glutamate synthase (GOGAT) activities in Nostoc muscorum. However, lead at 0.01 and 10 µg/ml conc. enhanced nitrogenase as well as GS activity of the cells. On transfer to excess lead (100 R), nitrogenase and GS activities ceased almost after 24 hr in the cyanobacterium.

9201-223. Tripathi RD Prakash Chandra (Aquatic Bot Lab, Natl Botl Res Inst, Lucknow 226001). **Chromium uptake by Spirodela polyrrhia (L) Schleiden in relation to metal chelators and pH**. *Bull Environ Contam Toxico*, **47** (5) (1991), 764-769 [12 Ref].

Influence of metal chelators viz. ethylenediaminetetra acetic acid (EDTA) and salicylic acid and pH on the accumulation of chromium by Spirodela polyrrhiza has been studied both in the laboratory and field. The results indicate that the fronds of S. polyrrhiza can accumulate Cr from polluted waters where metal chelators and variable

pH conditions exist. The studies can be useful in reducing the level of Cr in closed water bodies usine S. polyrrhiza plants.

9201-224. Tuyen BC, Bhargava DS (Univ Roorkee, Dept Civil Engngn Roorkee 247667). **Dispersion of herbicides and related impacts on the environment**. *Indian J Environ Prot,* **11** (8) (1991), 608-613 [13 Ref].

Like other agrochemicals, herbicides play an important role in modern agriculture, although their indiscriminate use has led to many side-effects to the environment including air, soil, water, and organisms. To eliminate the aquatic weeds in Asian rice fields, herbicides, such as Diquats Paraquat and 2, 4-D are widely used without any realization of the impacts. Paper attempts to discuss the environmental pathways and the impacts of these herbicides on the environment.

9201-225. Varadarajan K, Kannan K, Patiwal K, Mani A, Balasubramanian VS, (School of Biol Sci, Madurai Kamaraj Univ, Madurai 625021). **Effect of sewage pollution on the health status of sewage farm workers.** *Bull Environ Contam Toxico*, **47** (5) (1991), 646-652 [17 Ref].

Studies on effect of sewage pollution on occupational wealth of sewage fawan workers revealed relatively high eosinophilx count, chronic respiratory-infection or hookwarm infestation. Evaluation of the immunological status of the farm workers indicated elevation in serum immunoglobulin levels, as well as increase in total protein and albumin levels.

9201-226. Vatsala S, Rehina K, Ramakrishna T (Dept of Chem, Providence Women Coll Dept of Life Sci, Univ of Calicut, Calicut). **Toxicity of aluminium.** *Indian J Environ Hlth,* **33** (2) (1991) 257-259 [12 Ref].

Amount of aluminium leached out from utensils made of different types of aluminium/alumitnium alloys, during cooking processes has shown considerable higher level when compared to permissible level of aluminium in drinking water. The health effiects of excess levels of aluminium are discussed in the light of available literature and a studies on toxicological and epidemiological aspects are suggested.

9201-227. Vijayram K, Loganathan P, Janarthanan S (Res Dept Zoo. Periyar EVR Coll, Tiruchirapalli 620023). **Liver dysfunction in fish Anabas testudineus exposed to sublethal levels of pulp and paper mill effluent**. *Env Eco*, **9** (1) (1991), 272-275 [14 Ref] (Late Recd).

A decrease was observed in the biochemical profiles of liver of the fish Anabas testudineus after 3, 10, 30 and 60 days of exposure to sublethal concentrations of pulp and paper mill effluent. Symptoms of jaundice were noted in fish exposed for 60 days. In recovery phase fish showed revival of some biochemical parameters.

Wastes

9201-228. Das NV, Bandyopadhyay (Civil Engng Dept, Indian Inst Techno, Kharagpur 721302). **Selective sequence of adsorption of heavy metals by vermiculite**. *Asian Env,* **13** (3) (1991). 13-20 [15 Ref].

Paper deals with the selectivity sequence of absorption of Pb^{2+}, Cu^{2+} and Cd^{2+} onto vermiculite. pH_{50} values have been taken as a relative measure of the selectivity of the above three metals for the absorption sites. Among the three metals, Pb^{2+} has exhibited the greater affinity towards vermiculite. The presence of chloride in the system has change the selectivity sequence showing preference for Cu^{+2} followed by pb^{+2} and then Cd^{2+}.

9201-229, Deshpande VP, Kaul SN, Deshpande CV (Natl Enuron Engng Res Inst, Nagpur 440020). **An evaluation of a simple kinetic model for the treatment of domestic sewage by means of an anaerobic relating biological contactor.** *Bioresource Techrto*, **38** (1) (1991), 31-38 [21 Ref].

The application of the mathematical model proposed by Andreadakis and Cailas to experimental data obtained in the treatment of domestic sewage is examined. The results demonstrated that a simple Monod-type expression can satisfactorily simulate the performance of an aerobic rotating biological contractor and the model maintains its validity even with high-strength domestic waste-water.

9201-230. Dhaneshwar RS, Gupta RK, Routh T, Kaul SN. Gadkari SK (Natl Environ Res Inst, Nagpur -440020). **Characterisation of waste waters from opium and alkaloid works.** *Indian J Environ Prot*, **11** (6) (1991), 445-451.

Government Opium and Alkaloid Works Undertaking located on the bank of river Ganga at Ghazipur, processes 10 kg opium/day and extracts semi refined morphine (SRM), iodine, narcotine, finished drugs and semi-refined drugs. Waste waters generated during production, washing during methylation and ethylation, caustic washings and alkaline discharges contribute substantial organic loads. The present

investigation carried out by National Environmental Engineering Research Institute, Nagpur proposed a treatment scheme includes equalisation basin, primary settling tank, extended aeration activated sludge followed by secondary settling tank and sludge drying beds.

9201-231. Gadgil K, Sarkar MK (Indian Inst Techno, Dept Cheml Engng, New Delhi-110016). **Control of particulate emission below 150/mg/Nm^3 by wet scrubbing.** *Indian J Environ Prot*, **11** (8) (1991), 572-574.

Combustion generated pollution is one of the principal sources of air pollution where particulate, smoke and dangerous gases may co-exist in different degrees. In many cases, such emissions can be controlled to the desired extent by proper design and careful operation of the system itself. The options available for control of particulate emissions and bring down the level to below 150 mg/Nm^3 are Electrostatic precipitators (ESP), Bag House, and West scrubber. Paper discusses about these instruments.

9201-232. Gautam DD, Bishnoi S (Lab Environ Bot, Dept Bot, Dungar (Autonomous) Coll, Bikaner 334001). **Characterisation of Urmul dairy effluent.** *Oikoassay*, **7** (1 & 2) (1990), 13-15 [6 Ref].

An attempt was made to assess the physico-chemical characteristics and fertilizing efficiency of dairy effluent. The results revealed that stagnant effluents was highly alkaline and contained large amount of suspended and dissolved solids resulting in high BOD 3892 mg/l and COD 4684 mg/l. Metallic components were found nil or if present were in traces. The fresh effluent was slightly alkaline and contained lesser amount of total solids.

9201-233. Gomathinayagam P, Lakshmanaperumansamy P (Bharathiar Univ, Dept Environ Sci, Coimbatore 6410463). **Effect of tannin on soil bacteria**. *Indian J Environ Prot*, **11** (8) (1991), 592-594 [7 Ref].

The investigation is aimed to find out the effect of tannin on soil heterotrophic bactena which are the backbone for fertility of soil At lower concentrations tannin, number of soil bacteria increased gradually upto fifteenth day exposure and later decreased, but at higher concentrations rapid decrease was noticed. The genetic wise studies revealed that members of Bacillus could thrive very well in tannin treated soil.

9201-234. Hosetti BB, Patil HS (Water Polln Res Lab, Dept Zoo, Karnataka Univ, Dharwad 580003). **Effect of detention period on the BOD removal capability of sewage oxidation ponds.** *Env Eco*, **9** (1) (1991), 240-243 [12 Ref] (Late Recd).

Impact of detention period (DT) on the efficiency of sewage oxidation pond performance at laboratory conditions was studied. Four laboratory model ponds with varying detention periods exhibited different performance in terms of BOD and bacterial removal. The ponds with 10-15 days DT were more effluent in reducing the BOD when compared to shorter DT ponds.

9201-235. Iyengar Leela, Prabhakara Rao AVS (Dept Civil Engng, Indian Inst Techno, Kanpur 208016). **Effect of sulphate on methanogenesis in fixed film anaerobic digesters.** *Asian Env*, **13** (3) (1991), 70-78 [11 Ref].

Studies with fixed film anabrobic digests with glucose as organic carbon source, showed that the presence of sulphate resulted only in a marginal decrease in methanogenesis. The performance of molasses and distillery wastewater fed digesters receiving similar COD/sulphate levels, however, were significantly affected as compared to glucose digesters.

9201-236. Joshi BD, Pathak JK (Dept; Zoo, Gurukula Kangri Univ, Hardwar-249404). **A relative study of some physico-chemical parametres of sewage water at Uttarkashi.** *Himalayan J Environ Zoo*, **6** (1) (1991) 53-56 [5 Ref].

Studies were made on some selected physico-chemical parameters of sewage water at Uttarkashi and the values compared for the water at confluence and dilution zone of river Bhagirathi. The sewage water showed maximum vanation round the year, while among the parameters observed COD and pH showed maximum annual variation, respectively.

9201-237. Kannan N (Ayya Nadar Janaki Ammal Coll, PG Dept Chem, Sivakasi 626124). **A study on removal of nickel by adsorption on flyash**. *Indian J Environ Prot*, **11** (7) (1991), 574-578 [10 Ref].

The percentage removal of nickel depends upon the contact time and dose of adorsbent; increases with increase in contact time and increase in amount of flyash. Adsorption of nickel on flyash obeys Freundlich isotherm. In order to understand the absorption behaviour of nickel a number of batch experiments are conducted at various pH values with different amounts of adsorbent. The results show that, the absorption is

maximum at pH3. Flyash is found to be a good and less expensive adsorbent for the removal of nickel from adqueous solutions.

9201-238. Kaur Amrit, Malik AR, Verma Neelam, Rao ALJ (Punjabi Univ, Dept Chem, Patiala 147002). **Removal of copper and lead from wastewater by adsorption on bottom ash.** *Indian J Environ Prot*, **11** (6) (1991), 433-435 [8 Ref].

A method has been developed for the removal of trace metals, such as lead and copper, present in synthetic as well as in wastewater samples by adsorption on bottom ash at different pH ranges. The percentage removal of individual metals was found to be 99.8% for copper and 92.3% for lead.

9201-239. Khageshan P, Padaki Snnivasa Ran, Patil Shivraj (Dept Civil Engng, PDA Coll Engng, Gulbarga 585102). **Colour removal studies on textile dye waste using activated carbons and bleaching powder**. *J Inst Public Hlth Engrs-India*, **1991**(2) (1991), 20-27 [6 Ref].

An attempt has been made to compare the efficacy of commercial activated carbon, indigenously prepared activated carbons from sawdust of different impregnation ratio and bleaching powder in removing colour and COD from dye waste. It was observed that though all of them removed the colour almost completely, the COD removal varied widely. Indigenously prepared activated carbons showed higher affinity to remove COD than commercial activated carbon and bleaching powder.

9201-240. Dishnakumar V, S;astry JS, Naryana Swamy G (Natl Inst Oceanography Dona Paula 403004, Goa). **Implication of thermal discharges into the sea-a review.** *Indian J Environ Prot*, **11**(7) (1991). 525-527 [6 Ref].

The adverse effects of thermal discharges into coastal waters have been discussed. Organising cannot be acclimatised to temperatures beyond normal survival levels or to changes greater than those encountered within normal seasonal fluctuations. Paper suggests for careful planning in power plant design to ensure that technological; progress does not cause a loss of the food and recreational facilities essential to the population attached to the area.

9201-241. Maitra Pradeep K (Res Contl Lab, Bharat Aluminium Co Ltd, P.O Balco Township, Korba, Dist Bilaspur MP). **Effluents from k the integrated aluminium industry: characterisation and possible uses.** *UNEP Ind Env,* **14** (1) (1991), 13-21 [19 Ref].

Attempt is made to characterise the various wastes generated by an integrated aluminium complex. It is imperative to identify and regularly monitor the main effluents, not for getting the possibilities for recovering valuable materials from these wastes.

9201-242. Manonmani K, Chitrarasu G, Swaminathan K (Dept Bot, Kongunadu Arts Sci Coll, Coimbatore 641029). **Effect of alcohol and chemical industry effluents on physico-chemical and biological properties of soil.** *Polln Res*, **9** (1990), 79-82 [12 Ref] (Late Recd).

Alcohol and chemical industry effluent was dark brown in colour with alcoholic odour and pH 7.5. BOD and COD values of the effluent were high. The effluent was rich in organic carbon, total nitrogen, phosphates and sulphates. Metalic ions like iron, calcium, potassium, sodium, copper and zinc were also present in significant amounts.

9201-243. Mishra Ganga Prasad (Govt HS School, Bhad 484336). **Effect of cement dust pollution on soil quality parameters at Kymore**. *Env Eco*, **9** (1) (1991), 13-17 [9 Ref] (Late Recd).

The effect of cement dust on soil quality at Kymore was studied. The penalization index was recorded maximum (0.4200) at factory premises and minimum (0.0472) at Vijayaraghawagarh, 9.7 km from the factory. The dust fall-out was measured maximum 6.576 g/m^2 perday in the vicinity of the factory, while it was minimum as 2.034 g/m^2 per day from the factory (12.2 km).

9201-244. Mohanty RK, Padhan S, Sarangi B (Ispat Coll, Dept Bot, Rourkela 769003). **Assessment of some metal pollutants and physico-chemical quality of steel plant effluent.** *Indian J Environ Prot*, **11** (5) (1991), 327-332 [20 Ref].

Some physico-chemical and metal pollutants of the steel plant effluent have been studied. Correlation coefficient (r) were calculated among the various parameters of the effluent analysed. Interesting correlations were found among certain parameters. The annual averages of the metals tested are in order of Ca> K> Mg> Cu> Fe> Cr> Zn> Cd. Complete absence of phyto-plankton in the effluent through out the investigation is an interesting finding.

9201-245. Murthy BSA, Sihorwala TA, Tilwankar HV, Killedar DJ (Sri GS Inst Techno Sci, Dept Civil Engng, 23, Park Rd, Indore 452003). **Removal of colour from pulp and paper mill effluents by sorption technique- a case study**. *Indian J Environ Prot*, **11** (5) (1991), 360-362.

The applicability of activated charcoal powder, fuller earth and bottom ash in removal of colour from paper mill wastewaters imparted by dye used in colour paper production has been investigated. The variables investigated are dose, pH and particles size. The times to attain equilibrium of reaction were observed. Activated charcoal is found to be the best material for colour removal among the three material tried. Colour removal efficiency improved with higher doses in case of bottom ash and fuller earth.

9201-246. Nirmal Kumar JI, Rita Nirmal, Rana BC (Dept Biosci, Sardar Patel Univ, Vallabh Vidyanagar 388120). **Physico-chemical properties of certain industrial effluents of central Gujarat, India.** *J Indl Polln Contl*, **7** (1) (1991), 17-24 [16 Ref].

Effluents from fifteen industrial units of Central Gujarat were sampled for its physico-chemical properties and variation of chemical concentrations. A multi-factorial correlation analysis of the data was done to highlight the inter-relationship among various physico-chemical properties.

9201-247. Oberoi GK, Paul Brij (Himachal Pradesh Agricl Univ, Dept Chem Biochem, Palampur 176062). **Estimation of paraquat from aqueous solution; using inorganic gel membranes.** *Indian J Environ Prot*, **11** (6) (1991), 428-429 [6 Ref].

Studies have been made on the use of zinc ferrocyanide and copper ferrocyanide gel membranes for estimating the concentration of paraquat (2.2' dimethyl-4,4'-dipyridilum dichloride) in aqueous solution. The membranes can be used for estimating paraquat in the concentration range of $3x10^{-7}$ to $2x10^{-4}$ M.

9201-248. Pandey SN, Chadha Ajanta (Dept Bot, DAV Coll, Kanpur). **Algal flora of tannery effluent polluted water of Kanpur**. *Polln Res*, **9** (1990), 45-49 [26 Ref] (Late Recd).

Studies on the periodic occurrence of algae in the water supplemented with tannery effluent discharge was made. In all 19 taxa were collected and identified. Myxophycean forms dominated the course of investigation followed by Chlorophyceae. In general, both the quantitative and qualitative growth of algae was poor.

9201-249. Patel MK, Tiwari TN (Quality Contl Lab, IDL Cheml Ltd, Rourkela 769016). **Sample statistics in environmental appraisal reference to BOD value in the effluent water of Rourkela (India)**. *Himalayan J Environ Zoo*, **5** (1) (1991), 5-8 [4 Ref].

Papers describes the usefulness of graphs in interpreting the long tables of BOD data to focus on such things as long term trends. BOD of effluent water of Rourkela has been estimated and tabulated for a period of 160 days on a daily basis. These tabulated data have been utilised to plot simple graphs to see the trend of BOD in the study period.

9201-250. Prasad Bably, Singh Gurdeep (Cent Mining Env, Indran Sch Mines, Dhanbad 826004). **Characterisation on coke oven liquid effluents**. *Indian J Environ Hlth*, **33**(2) (1991), 192-197 [5 Ref].

Effluents from four coke plants of Jharia coalfields have been characterised for pH, TDS, TSS, DO, COD, BOD, phenol, ammonia, cyanide and oil & grease, and values are reported.

9201-251. Raghuveer S, Sastry CA (Indian Inst Techno, Dept Cheml Engng, Madras 600036). **Biological treatment of pulp and paper mill waste water and study of biokinetic constants.** *Indian J Environ Prot*, **11** (8) (1991), 614-621 [13 Ref].

Studies were conducted on treatment of combined pulp and paper mill wastewater by activated sludge using laboratory model units by varying aeration time from 4-24 hr and MLSS concentration from 1000-4000 mg/l. During the usage of bamboo, eucalyptus, subabul plus hardwoods and bamboo and hardwoods as raw materials for pulp and paper making, combined wastewater samples were collected and experiments were carried out to determine biokinetic constants in laboratory bench scale continuous activated sludge unit.

9201-252. Raju, N Janardhan, Kotaiah B, Krishna Reddy frv, (Dept Civil Engng, SV Univ, Tirupati 5 17502). **Bio geochemical aspects in and around a sewage farm at Tirupati, Andhra Pradesh, India**. *Environ Conserv,* **18** (3) (1991), 267-269 [6 Ref].

Studies on quality of wastewater entering and leaning a sewage farm ground water from dug and tube wells around the farm as well as soil samples collected from the farm were carried out for one year. Comparision of the influent and percolated water characteristics indicates significant reduction in BOD, suspended solids, total nitrogen and total phosphates. The ground water quality in the vicinity of the sewage farm showed higher level of pollution.

9201-253. Ramachandran KN; Gupta VK (Dept Chem, Ravishankar Univ, Raipur 492010). **Use of phenol-NLS reaction in determination of total nitrogen in environmental samples.** *Asian Env*, **13**(3) (1991), 43-47 [6 Ref].

A sensitive and highly reproducible method for determination of total nitrogen is described. The colour reaction is based upon the reaction, of ammonia, formed during Kjedahls digestion, with phenol and N chlorosuccinirnide, in the presence of catalytic mixture consisting of manganese dioxide and sodium nitroprusside to form indophenol dye. The colour system obeys Beer's law over a concentration range of 0.009-0.072 ppm of-nitrogen and has max at 635 nm. The method has been applied for nitrogen determination in various environmental and steel samples.

9201-254. Rao ESM, Shrivastava A, Wate SR, Sarin R (Natl Environ Engng Res Inst, Nagpur). **Predictions of produced water discharges from offshore oil producing installations**. *Asian Env*, **13** (3) (1991)? 21-27 [2 Ref].

Actual field measurements and monitoring of routine discharges from a offshore platform are limited in the extent to which data can be obtained. The need for a model to quantify the distribution of pollutants in space and time in the marine eco-system is felt. Hydrodynamic model and steady state model described here predicts approximate concentrations of produced water discharged from oil producing platform in marine ecosystem as a function of distance.

9201-255. Sammaiah P, Sastry CA (Indian Inst Techno, Dept Cheml Engng, Madras 600036). **Dairy wastewater treatment using rotating biological disc contactor**. *Indian J Environ Prot,* **11** (5) (1991), 341-346 [17 Ref].

Effect of substrate removal, rotational speed, hydraulic loading rate and validity of mathematical models for the treatment of dairy wastewater using rotating biological contractor (RBC) are presented. The RBC used in this study is a laboratory scale 4 stage unit with a retention capacity of 25 lit with discs in place. The RBC system successfully treated dairy waste water of COD 448 to 1386 mg/l used in this study. The percentage removed achieved by the unit varied from 66 to 89.9%.

9201-256. Sammaiah P, Sastry CA, Murty DVS (Indian Inst Techno, Dept Cheml Engng, Madras 600036). **Dairy wastewater treatment using an anaerobic contact filter**. *Indian J Environ Prot*, **11** (6) (1991) 418-424 [14 Ref].

A laboratory-scale study was conducted to examine the effectiveness of the upflow anaerobic contact filter (ACF) process for the treatment of synthetic dairy wastewater. Anaerobic contact filters were operated at ambient temperature at loading rates ranging from 0.85 to 6.8 kg COD/m^3 d, and an influent substrate concentrations ranging from 800 to 4800 mg/1 COD. On the whole this process was operated satisfactorily and smoothly, as Reflected by the constant effluent pH and gas production rate and the consistent high reduction of COD.

9201-257. Sandhya S, Joshi SR, Parhad NM (Natl Environ Engng Res Inst, CSIR Madras Complex, Targnani, Madras 600113). **Fungal protein production in fermenter using waste cellulose**. *Asian Env*, **13** (3) (1991), 28-32 [9 Ref].

The pulp and paper mill cellulose wastes were converted into protein enriched animal feed using the cellulolytic culture Myrothecium verrucaria. The experiments were, conducted in laboratory fermenter. Batch cultivation of organism showed that 38-56to of available cellulose was utilised in 48-69 hr. The maximum biomass efficiency obtained was 0.25 g of dry mycelium/ L/hr with specific growth rate of 0.058/hr at 30° C.

9201-258. Satyanarayana Raju MV (Civil Engng Dept, VR Siddhartha Engng Coll, Vijayawada 520007). **Dispersion characteristics of pollutant through porous media.** *Indian J Environ Hlth*, **33** (2) (1991), 161-170 [11 Ref].

Attempt has been made to evaluate longitudinal and lateral dispersion coefficients by experimental studies. The coefficients have been calculated using dispersivities in both directions. These dispersion coefficients govern the variation of concentration of tracer or pollutant with time and distance while passing through a porous media.

9201-259. Satyanarayan Shantae Kaul SN, Daryapurkar-R (Natl Environ Engng Res Inst, Nehru Marg, Nagpur). **LTC wastewater treatment by anaerobic methods**. *Asian Env*, **13**(2)(1991), 47-67 [40 Ref].

The wastewater emanating process is highly toxic in nature. The wastewater constitutes organics like phenol, cyanide, thiocyanates and ammonia exerting high COD load. Anaerobic treatment seems to be economically viable and feasible solution for treatment of such aromatic wastes. An attempt has been made to review characteristics of the waste water, pollutional effects and work done on anaerobic treatment of LTC

wastewater. Possible pathways for anoxic as well as methanogenic anaerobic degradation of phenol are also discussed.

9201-260. Sekhar Himanshu, Kumar Shankar, Mazumdar NB (Sulabh Inst Techl Res Dev, Buddha Marg, Patna 800001). **Study of COD and BOD changes during anaerobic digestion of human excreta in a biogas plant**. *Indian J Environ Prot*, **11** (5) (1991), 347-349 [11 Ref].

The strength of pollution of human excreta in terms of COD and BOD of influent as well as effluent is measured, and a considerable reduction in COD and BOD of effluent with respect to influent is found. At the same time the other operational parameters, like TS, VS, pH and digester temperature are correlated with gas production, monitored after the digestion of feed slurry.

9201-261. Seshadri KS, Anandbabu C, Lal KB, Amalraj RV (Bhabha Atom Res Cent Centralised Waste Manag Facilities, Fuel Reprocessing Nuclear Waste Manag Gr, Kalpakkam 603102). **Electro-chemical treatment of printed circuit board effluent containing chromium (VI).** *Indian J Environ Prot*, **11** (8) (1991), 595-597.

A comparative study of the electrochemical reduction of hexavalent chromium by conventional anodic dissolution of iron was attempted. It was found that packed bed system reduces chromium more effectively than the conventional system. Also mild steel sited was found to be better than cast iron as electrode material in both the conventional and bed electrode system.

9201-262. Sethumadhavan R, Vasudevan R (Sch Energy, Bharatidashan Univ, Tiruchirapalli 620023). **Fluid bed incineration for disposal of industrial wastes**. *Indian J Environ Hlth*, **33** (2) (1991), 225-229 [1 Ref].

A fluid bed incinerator system has been designed and developed for the disposal of industrial wastes. Trial runs with ten different industrial wastes have proved that the unit was fairly versatile. The incineration efficiency exceeded 99.9 percent while the combustion efficiency was more than 97 percent, resulting in drastic reduction of weight and volume of the waste.

9201-263. Sharma Archana, Naik ML (Dept Biosci, Ravishankar Univ, Raipur- 492010). **Effects of steel mill effluent irrigation on physico-chemical characteristics of Kanhar soil.** *J Indl Polln Contl*, **7** (1) (1991), 11-16 [16 Ref].

Physico-chemical characteristics of Kanhar soil, not being irrigated or being irrigated with a steel mill effluent, for one or many years have been investigated. pH of the soil was not affected significantly by irrigation. Ferric and ferrsus iron were found to be maximum for an uncultivated soil receiving the effluent for many years. The calcium, however was found to be maximum for one of the unirrigated and uncultivated soils.

9201 -264. Shivaraman N, Chatterjee SK (Natl Environ Engng Res Inst, Nagpur 440020). **Biodegradation of some phenolic constituents of coal carbonization waste**. *Encology* **5** (8) (1991), 33-37 [11 Ref].

Studies were carried out using a synthetic wastewater of alkaline and neutral pH, containing mono and di-hydric phenolics, in a continuously fed completely mixed aerobic system seeded with appropriate microbial sludge to find the extent of phenolics removal and the level of intensificaton of colour. The results indicated that the biological system removed total phenolics to the extent of 99.33 and 86.32 per cent at an influent concentration of 924 and 1140mg/1 when operated with the waste neutral pH (6.9-7.0) and alkaline pH (85-9.0) respectively.

9201-265. Shukla Nandita, Pandey GS (Ravishankar UnivS Dept Chemt Rawpur 492010). **Micropollutants in effluents of copper ore concentrate plant**. *Indian J Environ Prot,* **11** (6) (1991), 443-444 [3 Ref].

The genesis of effluents of copper ore concentrate plant at Malanjkhand in Madhya Pradesh, and the macro and micro constituents of the effluents along with other physico-chemical characteristics have been studied and described.

9201-266. Singh AR, Singh DP, Singh VN (Inst Techno, Banaras Hindu Univ, Varanasi 221005). **Flyash for the treatment of Zn (II) rich effluents.** *The Environmentalist*, **11** (3) (1991), 217-224 [38 Ref].

The ability of fly ash to remove Zn(II) from water by adsorption has been tested at different concentrations, temperatures and pH of the solution. It was found that low adsorbate concentration, small particle size of adsorbent and higher temperature favoured the removal of Zn(II) from aqueous solution. The maximum removal was noted at pH 7.5.

9201-267. Trivedy RK, Kirpekar MG (Dept Polln Stud, YC Coll Sci, Karad 415 110). **Import of dairy waste irrigation on growth and mineral composition of Glycine max and Phaseolus mungo and post harvest effects on soils**. *J. Indl Polln Contl*, **7** (1) (1991), 31-40 [13 Ref].

A study was carried out in laboratory to find out the feasibility of utilization of dairy waste. An evaluation of the diary waste for their suitability as irrigants showed that 75to and 100% came under moderate to high salinity class. The dairy waste appreciably increased the ash, calcium, nitrogen and phosphorus content of both the crops. The dairy waste irrigation slightly increased the pH, organic matter and conductivity of the soils. In case of Glycine maxi the phosphorus content increased in 10%, 25% and 50% but actually declined in 100%.

9201-268. Varadarajan K, Paliwar K, Rajamanickam C, Manickavel KR Jeyapaul G Logasundari (Sch Biol Sci, Madurai Kamaraj Univ, Madurai 625021). **Impact of sewage disposal on the hematological and biochemical parameters of dairy cows**. *Bull Environ Contam Toxico*, **47** (5) (1991) 653-659. [15 Ref].

Effects of sewage pollution on the hematological and biochemical parameters of the cattle grazed on the pasture land irrigated with sewage water or fed by fodder grown on sewage water or sludge were studied, in a sewage disposal area of Madurai City. Variations in mean TLC in experimental cows appeared to be affected by sewage pollution whereas lymphocytes showed physiological adaptation. Decrease in level of different hematological parameteres and significant increase in lympocytes and total proteins are attributed to impact of sewage pollution on cows.

Forestry and Environment

9201-269. Gadgil Madhav (Cent Ecol Sci, Indian Inst Sci, Bangalore 560012). **Restoring India's forest wealth**. *Nature Resources,* **27** (2) (1991), 12-20 [28 Ref].

Ecosystem people, ecological refugees and omnivores are the major segments of Indian population in terms of its relationship to natural resources. As far as India is concerned the long term, broader environmental concerns would be best served by managing the forests in the interests of its ecosystem people who depend on biomass gathered from their surrounding. Present paper describes the erosion of Indian forest

wealth and its adverse effects on the patterns of resource use of Indian society, resource flow in India.

9201-270. Madhavan Unni NV, Roy PS, Jadhav RN, Tiwari AK, Sudhakar S, Ranganath BK, Dabral SL (Forestry Eco Div, Natl Remote Sensing Agency, Dept Space, Balanagar, Hyderabad 500037). **IRS-1A applications in forestry**. *Curr Sci*, **61** (3&4) (1991) 189-192 [10 Ref].

Application of IRS data in-forest type mapping, monitoring changes, habitat assessment and biomass estimation has been discussed. Feasibility of the operational use of IRS-1A data and the need for the development of techniques to meet certain problems of immediate concern are indicated.

9201-271. Narain Pratap, Dadhwal KS (Centl Soil Water Conserv Res Trng Inst, 218, Kaulgarh Rd, Dehra Dun 248001, UP). **Agro forestry practices and land use planning. Growth Dev Nat Resource Conserv, (Ed SR Verma)**, *Nature Conservators* (1990), 191-199 [16 Ref].

Agroforestry has been declined and various agroforestry practices in vogue and their outcome has been reviewed in the paper. For designing agroforestry land use, it is advisable to keep in mind Diagnostic and Design exercise widely advocated by International Council Research in Agroforestry (ICRAF), Nairobi. Constraints of Agroforestry landuse have to be overcomed by systematic research. Agroforestry may prove boon for production per unit area as well as protection from water and wind erosion.

9201-272 Patro SN (Oriss Environ Soc, D-39, Black 7, Jayadev Bihar, Bhubaneswar 751013). **Simplipal massif :the pride of our forest heritage.** *Encology,* **6** (8) (1991), 11-28 [60 Ref].

Similipal forest terrains is the rare mixed tropical forest heritage in Orissa, India. It has many distinctive features and is of strategic importance influencing the ecology of the northern and eastern parts of the country. Its forest features, flora and fauna, destructive forces, protection measures, etc., are highlighted.

9201-273. Rao DP, Gautam NC, Sahai Baldev (ISRO Satellite Cent, Airport Rd, Vimanpura, PO, Bangalore, 560017). **IRS-1A application for wasteland mapping.** *Curr Sci*, **61** (3&4) (1991), 193-197 [3 Ref].

The second phase of wasteland mapping project of 84 critically affected districts in various states in the country has been initiated with the help of IRS-1A LISS-II geocoded data. Outlining the classification system and the methodology, it is concluded that the spatial information on wasteland at a village level can be utilised for various reclamation measuries and subsequent are under social forestry, agroforestry, fuel and fodder farm forestry and afforestation programmes.

9201-274. Sharma RA, McGregon MJ (Office of the Principal Chief Conservator of Forests, Saheed Nagar, Bhubaneswar 751001, Orissa). **The socio-economic evaluation of agroforestry in Orissa (India).** *Forest Eco Manag*, **45** (1-4) (1991), 237-250 [25 Ref].

The paper evaluates agroforestry in the State of Orissa within the framework of its stated socio-economic objectives. The estimated values of socio-economic parameters such as elasticity of social marginal utility of consumption, social discount rate, marginal productivity of capital, marginal productivity of labour, and inter-temporal-consumption weight are -1.4,2.05%, 0.1.42, 0.33 x wage rate and 6.77, respectively. The intra-temporal consumption weights for the society, the main workers and the subsidiary workers are 1.005, 0.573 and 2.204 respectively.

9201-275. Singhal RM (Socl Forestry Div, Forest Res Inst, Dehradun 248006, UP). **Technology for suitability assessment under various forest management systems. Growth Dev Nat Resources Conserv, (Ed SR Verma),** *Nature Conservators* (1990), 233-242 [5 Ref].

Paper deals with the necessity of carrying out soil study for raising plantation of tree under various forest systems such as protected wild forests, exploited forests, regulated forests and domesticated forests. A simple but effective technology for assessing soil suitability to plant different forest species under matching conditions has been suggested together with a set of simpler, in expensive equipment.

9201-276.Sinha Rajiv K (Indira Gandhi Cent Human Eco, Environ Population Std, Univ Rajasthan, Jaipur 302003). **Afforestation a boon, deforestation a bare for mankind.**

Growth Dev Nat Resources Conserv. (Ed SR Verma), *Nature Conservator* (1990), 317-327 [5 Ref].

Forest sustains life on earth; work as a "natural sink" for the heat and pollutants generated by the civilization; operates the "hydrological" & "Oxygen cycles" of the biosphere; and maintains the ecological balance. They are storehouse of valuable "gene proof for the agriculture and silviculture. Deforestation leads to a chain reaction-drought, deluge, soil erosion and desertification. Sustainable forestry with the involvement of tribals and unemployed youth and with a pragmatic policy of its management by giving it a status of an "industry" is needed.

9201-277. Verma DPS (Community Forestry Proj, Baroda, Gujarat 390001). **Evaluation of agro-forestry practices in Gujarat State, India**. *Forest Eco Manag*, **45** (1-4) (1991), 325-335 [S Ref].

One of the factors impeding the continuing development and adoption of agroforestry systems worldwide is a lack of data on the types of agroforestry already being practised and their efficacy. This paper is an attempt to respond to this by describing the agroforestry systems found in the Indian State of Gujarat. The survey revealed that peripheral and mixed planting are both popular all over the state, but agroforestry tends to be marginally more accepted under irrigated than rainfed conditions.

Wildlife

9201-278. Chauhan BS (Addl Chief Conservator Forests (Wildlife) Shimlat Himachal Pradesh). **Wild-life management in Himachal Pradesh.** *The Indian Forester*, **117** (10) (1991) 896-900.

Concentrated efforts are being made of scientific management of wildlife in Himachal Pradesh. These include protection of wildlife and its habitat, creation and extension of protected areas, studies on typical western Himalayan fauna, captive breeding and rehabilitation of endangered species, training of staff and a well organised publicity campaign.

9201-279. Dey SC (Chief Wildlife Warden, West Bengal). **Depredation by wildlife in the fringe areas of North Bengal forests with special reference to elephant damage.** *The Indian Forester*, **117** (10) (1991), 901-908.

The article analyses the cause of man-elephant confrontation on the background of population dynamics and the high density of human population in the State. This also highlights the various recommendatiohs made for control of this depredation as well as the action programme already taken by the State Govt to reduce the man-elephant confrontation. The necessity of launching eco-development programme for elevation of economic standard of local people to reduce their dependence on forest and forest produces for daily sustenance has been identified as one of the major steps in control of this depredation in addition to normal preventive and remedial measures enlisted in the article.

9201-280. Fox Joseph L, Nurbu Cheling, Chandawat Raghunandan S (Dept Eco, Univ Tromso, N-900 Tromso, Norway). **The moutain ungulates of Ladakh India**. *Biol Conseru*, **58** (2) (1991), 167-190 [39 Ref].

Eight species of wild ungulates occur in India's elevation steppe and mountain regions of Ladakh, with six listed as endangered and protected in India's or other international conservation laws. Two species are still quite common, with perhaps 11 000 blue sheep Pseudois nayaur and 6000 Asiatic ibex Capraibeuc sibirica present today in Ladakh.

9201-281. Indukar RN, Gogate MG (Chief Conservator of Forests, (Wildlife) Maharashtra). **An enigma of eco development for human settlers in protected areas-Melaghat Tiger Project case study**. *The Indian Forester*, **117** (10) (1991), 856-870 [8 Ref].

Protecting wildlife and its habitat from human interference is a alarming subject. The villages situated in and around the Sanctuary and National Parks solely put their right on rich forest resources, fuel, fodder and grazing. To save the degradation of vegetation etc., protective and eco-development programme have been suggested.

9201-282. Pandit AK (Cent Res Dev, Univ Kashmir, Srinagar 190006). **Conservation of wildlife resources in wetland eco-systems of Kashmir, India**. *J Environ Manag*, **33** (2) (1991), 143-154 [22 Ref].

A large number of diversified types of freshwater wetlands, spread all along the flood plains of river Jhelum and Sind at the base of Kashmir Himalaya provide overwintering resorts to about 0.2 million migratory waterfowl and breeding grounds to a segment of other birds in summer, besides the table fish (cyprznus carpio). However, the carrying capacity of these socio-economically important wetlands as wildlife resources has of late been greatly altered because of various ecological stresses. Considering the overall ecology of these biotopes, a number of adaptive measures for the proper management of these typical ecosystems are recommended.

9201-283. Rice Clifford G (Wildlife Conserv Int, New York Zool Soc, Bronse, NY 10460, USA). **The status of four-horned antelope Tetracerus quadricornis**. *J Bombay Natl Hist Soc*, **88** (1) (1991), 63-66.

The four-horned antelope (FHA) Tetracerus quadricornis is a diminutive antelope, standing 65 cm at the shoulder. Usual trait of having two pairs of horns, it has attracted little scientific attention. There have been no investigations focusing specifically on this species, and it is generally given only brief treatment in accounts of multi-species studies. In order to assess the current status of this unique Indian antelope, a mail survey was carried out in 1986-87 for information on FHA densities, group size and composition.

9201-284. Saxena Ajai (Dy Conservator Forests (wildlife), Port Blair, Andaman & Nicobar Islands). **Management of elephant camp8 and elephant care**. *The Indian Forester,* **117** (10) (1991), 926-934 [2 Ref].

Study deals with the current management of captive elephants in Kanha National Park, in particular and at other places specially Burma and Andaman & Nieobar Islands, in general. Various aspects of proper captive management of elephants, their breeding and veterinary care, keeping of proper records about captive elephants etc. have been discussed.

Energy and Environment

9201-285.Anand V, Chanakya HN, Rajan MGC (ASTRA, Indian Inst Sci, Bangalore 560 012). **Solid phase fermentation of leaf biomass to biogas**. *Resources Conserv Recycling*, **6** (1) (1991), 23-33 [11 Ref].

Paper describes a simple technique for the fermentation of untreated or partly-treated leafy biomass in a digester of novel design without incurring the normal problems of feeding, floating and scum formation of feed, etc. The solid phase fermentation studied consists of a bed of biomass frequently sprinkled with an aqueous bacterial inoculum and recycling the leachate to conserve moisture and improve the bacterial dispersion in the bed. The decomposition of the leaf biomass and water hyacinth substrates used in this study was rapid, taking 45 and 30 days for the production of 250 and 235 l biogas per kg total solids (TS) respectively, for the above mentioned substrates at a daily sprinkled volume of 26 ml cm^{-2} of bed per days sprinkled at 12 h intervals.

9201-286. Babu KR, Pande SP (Natl Environ Engng Res Inst, Nagpur 440 020). **Upper limits of methane and biomass in an aerobic digestion**. *Asian Env*, **13** (3) (1991), 33-36.

The degradation of organic matter to produce methane relies on the complex interaction of three different groups of bacteria. The first group consists of a mixture of fermentative bacteria, sometimes called acid formers, which hydrolyse the complex organics to simple compounds such as short chain fatty acids and alcohols. The second group, also acetogenic produces acetate and hydrogen. The third group, known as methanogens convert the intermediate products to methane and carbon dioxide.

9201-287. Chaturvedi AN (Tata Energy Res Inst, 101, Jorbagh, New Delhi-110003). **Technology for energy plantations on wastelands**. *Energy Env Monit*, **7** (2) (1991), 66-70 [9 Ref].

Attempt is made to provide accurate definitions of terms commonly used to describe wasteland8. Measures such as intensive firewood forestry and agro-silviculture are suggested for wasteland development The article discusses the choice of species and clones, rotation and spacing, weed control and mulching practices necessary for a successful plantation and sustained production.

9201-288. Singh J, Pandey ND (Sah Indl Res Inst, Sarnath Varanasi). **Energy and environmental impact of Gulfwar on SAARC and developing countries**. *Indian J Environ Prot,* **11** (5) (1991), 368-370.

There are plausible circumstances in which the soot of Gulf war fire would rise many kilometers into the air and may be carried great distances across South Asia. It is

clear from the analysis, forecast and estimate of this episode that for majority of developing countries including India, the Gulf war will have a detrimental impact from energy, environment and economic point of view. Hence all over the world there has to be a serious concern about the fate of the planet. That is why we must think of devoting our remarkable ingenuity for halting the war. Only as prudent stewards carefully nurturing the earth, would be able to flash it into a better place for us and other living creatures to dwell on.

Plant and Pollution

9201-289. Agarwal SB, Madhoolika, (Dept Bot, Banaras HZindu Univ, Varanasi 221 006). **Effect of sulphur dioxide exposure on chlorophyll content and nitrogenase activity of Vicia feba L. plants.** *Bull Environ Contam Toxico,* **47** (5) (1991), 770-774 [16 Ref].

Studies on potential effects of episodic and exceptionally high intermittant concentrations of sulphur dioxide on total chlorophyll contents of nitrogenase activity of Vicia faba (broad bean) plants have been carried out. V. faba fumigated with varying concentrations of SO_2 revealed interveinal chlorosis on both leaf surfaces, and significant decrease in total chlorophyll as well as decrease in nitrogenase activity in the root nodules of SO_2 exposed plants.

9201-290. Awasthi Ajay K, Nagam Ramesh, Shukla RN (Sch Environ Bio, APS Univ, Rewa 486003). **Vegetational studies in and around lime stone mine sites**. *Env Eco*, **9** (3) (1991), 624-628 [5 Ref].

The degraded and undulated lands created by increased mining and quarying activities are left uncared. The present study on qualitative and quantitative composition of vegetation in the four lime stone mine sites revealed that there had been little difference in the number of vegetation families.

9201-291. Ayer Saraswati K, Bedi SJ (Eco Environ Res Lab, Dept Bot, MS Univ Baroda, Baroda 390002). **Effect of artificial fumigation of sulfur dioxide on growth anil yield of Zea mas L. Var American sweet corn**. *Polln Res*, **9** (1990), 33-37 [9 Ref] (Late Recd).

The effect of different concentrations (0.1, 0.5, 0.10ppm) of sulfur dioxide was investigated by exposing potted maize plants in fumigation chamber. Various growth

parameters were recorded at a periodic interval of 20 days. The reduction in root length, shoot length, number of leaves, leaf area, biochemical parameters and yield was recorded maximum in 1.0 ppm SO_2 exposure.

9201-292. Gupta Rajeev (Dept Plant Sci, Rohilkhand Univ, Bareilly 243005). **Toxic effects of mercury on seed germibation of bean and mustard**. *Comp Physio Eco*, **16** (1) (1991), 43-45 [9 Ref].

Higher concentration of mercuric chloride treatment caused inhibitory and toxic effects on seed germination of crop plants. However, very low concentration somewhat increased the rate of germination.

9201-293. Lal Chaman (Sch Environ Sci, Jawaharlal Nehru Univ, New Delhi 110067). **Effect of sewage on the growth of five aquatic macrophytes.** *J Fresh water Bio*, **3** (3) (1991), 201-207 [22 Ref].

The effect of domestic sewage in different concentrations has been studied under laboratory conditions on the growth and chlorophyll content of five common aquatic namely Azolla pinnata, Hydrilla verticillata, Lemna paucicostata, Spirodela polyrhiza and Salvinia molesta for four weeks. Growth of all these species decreases at higher concentration of sewage but is promoted at low concentrations. Chlorophyll concentration also decreases at higher concentration of sewage. Among five species exaniined. Sal vinia molesta is least tolerant to sewage pollution whereas the other four species grow well in 50 to 75No sewage.

9201-294. Moitra JK, Pandey GS (Dept Chem, Ravishankar Univ, Raipur 492010). **Toxicity of integrated steel plant waste water to true minnows (Barbus dorsalis).** *J Enuiron Bio*, **12** (4) (1991), 329-333 [8 Ref].

The toxicity of the waste water of an integrated steel plant to true minnows (Barbus dorsalis) was studied after determining the physico-chemical characteristics and selected toxic metals in the waste water. 96 h LC_{50} values for the two discharge-streams of the waste water were found to be 50% and 75%. The values by the probit analysis were found to be 46% and 71% respectively.

9201-295. Pagvi Seema, Farooq Mohd, Venkateshwar C, Beg UM (Indl Toxico Res Cent, PB 80, Lucknow 226001). **Physiological and biochemical effect of sulphur dioxide on wheat varieties**. *Env Eco*, **9** (3) (1991), 760-765 [20 Ref].

Twenty varieties of wheat Triticum aestiuum developed for disease resistant, improvement in yield and quality were studied for adaptability towards SO_2 pollution. It was observed that varieties K-816, K-7402, K-7915 andUP-368 seemed to be sensitive to SO_2 while Sonalika, HI-1077, K-8565, K-7410, HUW-206 were tolerant.

9201-296. Pande PC, Jain DK (Dept Bot, Meerut Colls Meerut 250001). **Effect of SO; and NO_2 pollution on the growth of Puum satgrum CV phaltham first**. *Acta Botanica Indica*, **19** (1) (1991), 123-125 [10 Ref].

Seedlings of Pisum satiuum were exposed to 267μgm^{-3} SO_2 and 191μgm^{-3} NO_2 both singly and in mixture. Fumigation continued for 30 days. The SO_2 + NO_2 treatment reduced the number of leaves and leaf area by approximately 34 and 46 per cent respectively. Reduction in photosynthetic area significantly reduced the dry Yveight fractions. Visible injury symptoms also appeared much earlier in SO_2+NO_2 treatment than in individual gases. The mature leaves were much more sensitive to fumigants than young ones.

9201-297. Pandey DD, Sinha CS (Eco Res Lab, Dept Bot, SPM Coll, Biharsharif 803101). **Effect of coal dust pollution on biomass chlorophyll and grain characteristics of maize.** *Env Eco*, **9** (3) (1991), 617-620 [9 Ref].

The study area. was situated in the coal field area of Dhanbad district of Bihar, especially Jharia coal field to know the effect of coal dust pollution on biomass, chlorophyll and grain characteristics of maize. Biomass was found higher at each sampling date of the control maize plant than the polluted one.

9201-298. Pramod kumar B Patel, Ramesh Kumar KT (Bot Dept, Univ Sch Sci, Gujarat Univ, Ahmedabad 380009, Gujarat). **Effects of pharmaceutical factory effluent on germination, dry matter accumulation and crop productivity of mustard plant Brassica juncea L.** *Var. Polln Res*. **9** (1990) 113-119 [18 Ref] (Late Recd).

Paper reports the effect of pharmaceutical factory effluent on growth behaviour of Brassica juncea L. Var. T. 59. It was observed that the root and stem length, total plant dry weight increased considerably upto 40% of the effluent concentration. In higher concentrations of the effluent the growth of the plant was retarded and dry weight of

plant was also affected adversely. It is suggested that this effluent can be used as an additional source of fertilizer after proper dilution.

9201-299. Salgare SA, Acharekar Chandarani (Dept Bot, Inst Sci, Bombay 400032). **Effect of ambient air Owl t he leaf anatomy of some wild plants-l.** *J Environ Bio*, **12** (4) (1991), 347-352 [15 Ref].

Effect of ambient air at Chembur in Bombay (India) was studied on the anatomy of leaf of some wild plants, namely Amaranthus spinosus, Alternanthera sessilis, Ageratum conyzoides. Blumea eriantha Cassintora, Euphorbia hirta) Eclipta alba, Meliotropium indicum, and Malachra capitata. The ambient air affected 'the leaf anatomy of the species studied. However, the samples collected from Collector's colony exhibited more damages than those collected from Ghatala and Chembur colony.

9201-300. Salgare SA, Swain Sabita Dept Bot, Inst, Sci, Bombay 400032). **Effect of auto-exhaust pollution at western express highway near national park, Borivli (east), Bombay on the growth performance of some weeds (1 harvest)-1.** *Adv Bio sci,* **10** (1) (1991), 77-86 [16 Ref].

Paper deals with the effect of auto-exhaust pollution, on the growth performance of Malchra capitata, Alteranthera triandra and Xanthium strumarium. The effect of auto-exhaust pollution on the said species were evaluated through the parameters such as length of 4th internode, number of branches, total length of different branches, diameter of the stem, number of leaves, etc. A comparative study was carried out between the polluted area species to show the effect of auto-exhaust pollution. All the parameters studied were inhibited by auto-exhaust pollution.

9201-301. Sharma HC (Natl Environ Engng Res Inst, Nagpur 440020). **Effects of ascorbic acid on phytotoxicity of sulphur dioxide**. *Indian J Environ Hlth,* **33** (2) (1991), 241-247 [14 Ref].

Amelioration effect of ascorbic acid against the phytotoxicity of SO_2 was tested in wheat plants. It was observed that the plants sprayed with ascorbic acid exhibited better growth, yield, and less foliar indury in comparison to those exposed to SO_2 only.

9201-302. Shrivastava GK, Singh VP (Dept Bot, Govt PG Coll, Datia 475661). **Effect of municipal waste water on yield and heavy metal contents of Abelmoschus esculentus (L).** *Moeunch. Oikoassay*, **7** (1&2) (1990), 5-7 [12 Ref].

Abelmoschus esculentus was grown in sewage irrigated soil. Yield and heavy metal contents were found to increase with increase of sewage concentration in soil. Uptake, accumulation and translocation of Zn was higher than Cd. Zn accumulation was more in fruits than roots and Cd accumulation was more in roots. Dry matter yield of plant was also found positively correlated with sewage concentration.

9201-303. Singh Prem Pal, Singh Paminderjit Battu, Singh Balwinder, Kalra Rajinder Lal, (Dept of Entom, Punjab Agricl Univ, Ludhiana -141004). **Fate and inter conversion of endosulfan III and sulphate on gram crop (Cicer arietinum Linn.) in subtropical environment**. *Bull Environ Contam Toxicol*, **47** (5) (1991), 711-716 [11 Ref].

Investigation on fate of endosulfan I, II and sulfate on gram-a major pulse crop under subtropical field conditions at Ludhiana, showed selective persistence of these compounds as revealed by their half life values. Results on residues of these compounds on leaves of gram crop have been discussed in the light of available literature.

9201-304. Srivastava PN, Aditya Prakash (Bot Dept, Jodhpur Univ, Jodhpur). **Bioaccumulation of heavy metals by algae and wheat plants fed by textile effluents.** *J Indl Polln Contl,* **7** (1) (1991), 25-30 [14 Ref].

The effluents from large number of textile processing units -around Jodhpur situated in the semi arid area of western Rajasthan in the river Jojari, the well water both contaminated by the effluents and uncontaminated ones, the soils contaminated by the effluents, the algae growing in the effluents and the when crop irrigated by the contaminated wells by the seepage of the effluents have been analysed for over three consecutive years 1985, 1986 and 1987. It has been found that the concentration of these metal ions in the soils, algae and the wheat plants has regularly increased during the study of the three year period and it has reached a region bordering to the toxicity limits.

9201-305. Swaminathan K, Vaidheeswaran (Dept Bio Techno, Bharathiar Univ, Coimbatore 641046). **Effect of dyeing factory effluents on seed germination and**

seedling development of groundnut (Arachis hypogea). *J Environ Bio*, **12** (4) (1991), 353-358 [21 Ref].

Physico-chemical analysis of the dyeing factory effluents revealed high amounts of total, suspended and dissolved solids. Sodium, potassium, sulphate, nitrate and phosphate were also present in significant amounts. The physiological components of the groundnut seedlings were also altered by dyeing factory effluents. While diluted effluents increased the chlorophyll carbohydrate and protein content of the seedlings, the pure effluent decreased the amount of these physiological parameters.

9201-306. Vyas Devina, Krishnayya NSR, Bedi SJ (Bot Dept. MS Univ, Baroda 390002). **Foliar injury of trees due to atmospheric pollution**. *Indian J Environ Hlth*, **33** (2) (1991), 260-263 [9 Ref].

Foliar injury depicted through physiological changes due to pollution from petro-chemical complex in Mangifera indica L, Eucalyptus sp and Casurina equisetifolia L has been studied. Samples from polluted locality showed reduction in leaf area, chlorophyll, iron, magnesium and carbon when compared to control, while an increase was recorded for lead, sulphur, nitrogen and hydrogen contents of leaves. Leaf damage due to chloride was a less symptom.