Chapter II
Urban Environment

From the findings of the studies included in this chapter, the following conclusions can be made.

1. Solid Waste Management: A serious issue in urban environmental injustice concerns solid waste management. Most of the studies and reports deal with the growing problems related to disposal of solid waste. However, these literatures do not indicate in what way and to what extent this problem is proportionately shared by different sections of society. It is clear that squatters and poorer neighborhoods are more adversely affected, since most of the squatter settlements are located near the places where solid wastes are dumped. Similarly dumping sites exist in urban fringe area, adversely affecting the rural communities. As a result these communities have been bearing the brunt of urban solid waste disposal problems. The resistance of people from Gokarna on the outskirts of Kathmandu is reported in many of the reports.

   This is also the focus of most studies in Pokhara. Pokhara Municipality had obtained a dumping site but due to protests of the neighboring villages and due to political reasons, it has not been operationalized. This land was occupied by squatters for a brief period, but later on army forced them to leave the place. Pokhara's solid waste is now thrown into Seti river, and no one knows its consequences on the people living downstream. Dumping sites or other suboptimal ways of disposing of the solid waste like incineration eventually harm the poor and the

environment. The alternative of reducing the waste has not been forcefully implemented by urban planners and politicians even though they claim that experts are working on environmentally friendly ways of disposing solid waste. Their main strategy has been to put pressure on or entice through some incentives the rural people to provide the dumping site for the urban solid waste.

2. Water Pollution: The literatures reveal that pollution of drinking water and rivers is another crucial issue. Biological pollution is the main problem with regard to water pollution. Contamination due to heavy metal is relatively low, i.e., within the accepted limit. As in the case of solid waste, studies do not deal with the impact of the problem on different sections of the society. It appears that pilgrims and poor people and their children suffer most. The former are exposed to this for a short time. But the studies report that children of poorer people bathe in these waters regularly. It is also revealed that gastro-entritis is mainly prevalent in poorer neighborhoods. The rivers flowing through Kathmandu become polluted while passing through the city, and regenerate again after some distance from the city. From reports and studies of Pokhara, the main problem there seems to be the contamination of drinking water.

3. Air Pollution: The literature indicates the severe condition of air pollution (due to mainly dust) in Kathmandu, affecting primarily those who are constantly exposed to such air. Roadside hawkers, shopkeepers and drivers are among those who suffer most from air pollution. These again form the bulk of the urban poor. Because of the rise in air pollution, the incidents of respiratory diseases are increasing generally in Kathmandu. Poorer people were found to spend more on medicine because of the growing incidence of air pollution.

4. Chemical Pollution: Growing pesticide problem in food is reported in the literature.

Solid Waste Management

Adhikari, Bipin. 1993. "Environmental Disputes: What *Locus Standi* is not?" *The Kathmandu Post.* June 6, 1993.

Caroll, A. 1989. *Summary of Legal Authority for Urban Planning in Nepal.* Kathmandu: Ministry of Housing and Physical Planning.

Dahal, Lab. 1994. "Kathmandu is Decaying". *The Kathmandu Post*, Sep. 16, 1994.

Dhakal, Som Nath. 1995. "A Case Study on Solid Waste Management in the Context of Urbanization of Bhaktapur Municipality". M. Ed. thesis (Health Education), T.U., Kathmandu.

Lack of inner city cleaning is the main cause for the dissatisfaction with municipalities' solid waste management according to all respondents of an inner city area. However in the slum areas, only 60% respondents felt the same.

K.C. Mohan. 2000. "Environment and Mankind's Survival". *The Rising Nepal.* 23 April 23. p.4.

Pollution levels in the rivers of Kathmandu have increased due to growing effluence and sewerage. No deterrence is in place. Voices have been raised to keep the environment clean but not translated into action. Pollution is a source of worry to both environmentalists and local people.

Koirala, Arjun. 2001. "Squatters' Perception towards Resettlement and Rehabilitation: A Case Study of Banshighat Squatter Settlement Area in Kathamndu". M.A. thesis (Sociology), T.U., Kathmandu.

Rana, K. 1990. "Water Pollution Assessment of Phewalake, Pokhara, Nepal". M.Sc. thesis, AIT, Bangkok.

Shrestha, Alka. 1993. "A Case Study of the Social Aspect of Solid Waste Management in Kathmandu". M.A. thesis (Sociology-Anthropology), T.U., Kathmandu.

Improper handling of solid wastes creates potential hazards to health and environment. Risk to health for general public arises indirectly from breeding of disease vectors, caused by improper storage and dispersal of waste. There are conflicts between KMC (Kathmandu Metropolitan City) and SWMRMC (Solid Waste Management and Resource Mobilization Center) for the disposal of waste. The problem of waste disposal leads to urban litter and bad smell. Inhabitants of Gokarna, where waste had been dumped, oppose dumping of untreated waste by the government. KMC and SWMRMC haphazardly discard the waste in Gokarna and do not take any precautionary measures safeguarding the local people's health or environment. This neglect must be redressed quickly.

Spotlight. 2001. "World Environment Day: Unmet Challenges". 8-14 June. P. 24.

Even after making many efforts, the environment of the Kathmandu valley is yet to improve.

The Kathmandu Post. 2000. "Can't Business and Environment Gel?" March, 10.

The Kathmandu Post. 1995. "Dumping Site Issue: Locals Stage Sit in". Aug 7. P. 1.

Around 200 locals from Gokarna staged a sit in outside the Local Development Ministry here on Sunday, demanding an end to garbage disposal and police vigil at Gokarna. Angry locals later held talks with the Local Development Secretary. The talks were inconclusive. "If the police are our protectors why have they injured us?

Why doesn't government just bulldoze all the locals down?" Jamuna Aryal, a protester says. On Friday, the local waved black flags at the Home Minister who was visiting the dumping site. "He told us that the 4,000 people of this area would have to be sidelined for the sake of 5 lakh people." Bharat Rawal, member of Jorpati VDC ward no. 4. said "why don't those who say garbage is not harmful, come and stand here for an hour. The police who stand guard here wear masks. What about us locals who live here permanently?" The dumping site controversy has also led to the resignation of Badri Bahadur Bhandari from membership of the UML (then ruling party), on the ground that he could not go against public sentiment.

The Kathmandu Post. 1995. "Politicians Sling Mud on Each Other over Gokarna". August 13.

The Kathmandu Post. 1995. "Garbage Politics (Editorial)". July 22.

The Kathmandu Post.1995. "Polluted Water Sickens Over 50 in Bhaktapur". July 5.

Bhaktapur city and its surrounding areas are facing an outbreak of gastro-enteritis since the past 4-5 days. 50 cases of the disease are currently under treatment at the hospital and inflow of such patients is continuous. The main cause of the outbreak is attributed to polluted water and the state of food.

The Rising Nepal. 2000. "Garbage Row Talks Fail: Police Baton-charge Local Rioters". 16 July 16.

Water pollution

Dhamala, Jeetnath. 1990. "The Problems of Water and Environmental Pollution: A Study in the Pashupatinath Temple Area". M.A. thesis (Sociology and Anthropology), T.U., Kathmandu.

The beauty of the Pashupati area has been degraded by different polluting elements. Water pollution is one of

the polluting factors of this area. Religious people believe that bathing in the Bagmati river washes their sins, even though the river is very dirty. Drinking water is polluted affecting residents and pilgrims.

HMG, MOPE. 1998. *State of the Environment Nepal.* Kathmandu: HMG, Ministry of Population and Environment (MOPE).

HMG/MOPE concluded that the Bagmati river which drains the Kathmandu valley is highly polluted in different stretches and its water is unfit for human use. Water quality monitoring record of the Bagmati River indicates high level of discharge and disposal because of high-level oxygen demanding wastes in the river.

HMG/MOHPP. 1994. *The Bagmati Basin Water Management Strategy and Investment Program.* Kathmandu: HMG/Ministry of Housing and Physical Planning (MOHPP) with assistance of the World Bank. Final Report.

The study scrutinizes water quality of different parts of the river, industrial and domestic sewage. It categorizes the sources of water pollution in the Bagmati river as domestic waste water, storm water, industrial waste water and agricultural runoff. The key findings of this analysis are: (a) maximum organic pollution, (b) mostly low dissolved oxygen (DO) (c) heavy metal concentrations but within acceptable limits, and (d) extremely high coliform bacteria counts. The impact of the deteriorating environment is on health, tourism, and culture. Though the river is directly used in urban areas, ritual uses involve some consumption; children bathe in the river and may catch shigella or some other diseases, which are then introduced to the community. Tourism may be adversely affected by environmental decay if left unchecked. Hindu rituals have had to account for the deterioration of water quality since many people are unwilling to bathe in or drink river water.

Khadka, R. B. *et al.* 1981. *The Effluent Impact of Bansbari Tannery on Local Fresh Water Ecology.* Kathmandu: National Council for Science and Technology.

The study investigates the physico-chemical and biological parameters of the Bansbari leather and shoe factory effluent. It was reported that the rate of discharge of Bansbari effluent was estimated to be 140 m^3/day to the river. The effluent was characterized by hazy to dark colour and the pollution load was considerably high.

Khatri, Top Bahadur. 1986. "The Study on Water Pollution of River Bagmati and Vishnumati of Kathmandu Valley". M.Sc. thesis (Zoology), T.U., Kathmandu.

Contamination of water resources due to discharge of organic and industrial wastes affects mainly urban areas. Rivers have become the dumping station of various effluents. In Kathmandu, two small rivers which pass through the valley have become polluted especially by sewage. The chemical pollutants were high in both the rivers. Both the rivers are faecally contaminated throughout the station on all seasons, indicating the poor quality of river water in Kathmandu.

NPC/IUCN. 1991. *Environmental Pollution in Nepal: A Review of Studies.* Kathmandu: NPC/IUCN NCS Implementation Program.

This publication reviewed the studies made in the past, particularly on water pollution problems in the Bagmati and its tributaries. It also covered the environmental pollution in Nepal regarding the air, water and noise as well.

Pant, Ambar Prasad. 1994. "Prevention and Control of Water Pollution: A Comparative Legal Study of India and Nepal with Special Reference to their Common Environmental Problems". Ph.D thesis (Law), University of Delhi, New Delhi.

The prevention and control of common environmental problems like water pollution, floods and inundation in international watercourses could be best achieved by concerted legal action by governments at the national, bilateral, sub-regional, regional and global levels as well as with public awareness and participation of the general public.

Poudel, A and N. P. Upadhyaya. 1995. "River Water Quality in Kathmandu and it's Environmental Implications" in A. Poudel and N. P. Upadhyaya (eds) *Research in Environmental Pollution and Management Series*. Kathmandu: A publication of NESS (Pvt.) Ltd.

The authors analyzes surface water quality of different three sections of the Bagmati and Manohara river including 34 parameters including the physical, chemical and biological. The study concluded that most pollution in the Bagmati river and its tributaries is organic, and heavy metal concentration is found to be at the marginally acceptable limits. The major impact on the river water quality in Kathmandu is from human activities. The river water has become unfit for many uses *viz.* drinking, aquatic life, recreation, cleaning and agriculture, due to direct discharge of domestic and industrial wastes. The study recommended treatment of all sewage before it goes into the river.

Pradhan, B. K. and M. S. Pradhan . 1972. "Water Pollution Control". *Journal of Nepal Engineering Association*. 3 (1): 1-15.

The study indicated that industrial wastes did not pose much problems because there were very few industries in Kathmandu.

RONAST (1988). *Pollution Monitoring of Bagmati River*. Kathmandu: Royal Nepal Academy of Science and Technology.

The study divided the river water in four sections by monitoring the pollution level of the Bagmati river according to the difference in water quality and biological features. Its divisions were zone of good ecological conditions (from source of the river to near of Guheshwori temple), zone of slightly polluted condition (from the side of Pashupatinath to inlet of Dhobikhola), zone of severe pollution (from Patan bridge to Chobhar) and zone of pollution (from Chobhar to Khokana). This study also indicated that the destruction of aquatic ecosystem is due to direct discharge of untreated waste water into the river that results in low grade water quality and disappearance of the most of the organisms found upstream.

Sah, Upendra Prasad. 1997. "Pollution of Drinking Water in Kathmandu Metropolitan City: A Case Study of Asan, Baghbazar, Dillibazar and Kalimati". M.A. thesis (Sociology). T.U., Kathmandu.

Shrestha, T. K. 1980. "The Biological Indicator of Pollution in the River Bagmati". *Journal of T. U.* 11 (1). (Research Division, Rector's office, T. U., Kathmandu).

This study studies the biological indicators of pollution in the river Bagmati and the results of a toxicity test on a fish species(*Puntis sophore*). The zonation of the river was on the basis of biological indicators belonging to broad spectrum of river biota such as phytoplankton, zooplankton, pedon, periphyton and macrophytes. The zonation includes healthy zone (at upstream of Sundarijal), moderately polluted zone (from Sundarijal to Gaurighat), polluted zone (from Gaurighat to Sundarighat), recovery zone (from Chobhar gorge to Kulekhani - Bagmati confluence) and clean zone (downstream of Piutar).

Yadav, Rajeshwor Prasad. 1998. "Peoples' Awareness of the Environmental Issues Regarding Agriculture and Water Resources". M.Ed. thesis, T.U., Kathmandu.

Air Pollution

Giri, Neru Prasad. 1998. "Pesticide Pollution in Vegetable Crop in Kathmandu Valley". M.Sc. thesis (Zoology), T.U., Kathmandu.

An attempt has been made to study the pesticide pollution in vegetable crops in Kathmandu valley. Hazards of pesticide poisoning for human beings and types of pesticide used by farmers of the valley were also studied. The results indicated that there are many complex problems pertaining to the awareness among the farmers of the Kathmandu valley. In laboratory residue analysis of 14 vegetable samples from the market, 28% were found to contain excessive pesticide. The study also found incidents of pesticide poisoning of farmers. Others problems regarding pesticide pollution concern pesticide resistance development among various pests, hazard to non-targeted organisms, rise in production costs and environmental pollution through excessive spraying and improper disposal of empty containers.

Koirala, Kedar. 1995. "Study on Effect of Air Pollution on Urban Climate of Kathmandu Valley". M.Sc. thesis (Meteorology), T.U., Kathmandu.

Air pollution in the Kathmandu valley is increasing. Visibility is also deteriorating rapidly in the valley due to human activities like urbanization, improper location of industries and the influx of population in the city. Temperature is slightly higher in the city area than the airport station due to the creation of a heat island. From the field study, maximum temperature was found in Sahid-gate bus station due to the concentration of pollutants emitted by vehicles and greenhouse gases in the city area. Precipitation clears air pollution because after monsoons visibility rises. Pollution emissions from petroleum products are increasing rapidly. The concentration of the pollutants emitted by the vehicles make the mornings and evenings hazy.

Larssen, Steiner; Jitendra Shah and Janvi Vegpal (eds). 1997. *URBAIR: Urban Air Quality Management Strategy in Asia: Kathmandu Valley Report.* Washington D.C.: The World Bank.

Sabuj Kamaluddin, 2000. "Kathmandu – Curbing Vehicular Pollution" in Quamrul Islam Chowdhury (ed) *Air Pollution in Asian Cities.* Dhaka: Forum of Environmental Journalists of Bangladesh. pp 89-92.

It is a journalistic account of vehicular pollution in Kathmandu valley. The consumption of automobile fuel and coal has increased with the numerical growth of vehicles and industries in the city. Studies have shown that in the valley (three districts) the TSP (total suspended particles) emission per year amounts to 16,500 tons, and particulate matter (PM10) emission to 4,700 tons per year. The main sources of particulate pollution are the brickfields, domestic fuel combustion, some cement plants, vehicle exhaust and the stirring up and consequent resuspension of the road dust. Vehicular pollution comes from buses, trucks, tempos and motorcycle with 2-stroke engines. It is estimated that around 56 tons of carbon monoxide, 18 tons of hydrocarbons, 7 tons of nitrogen, 0.4 tons of Sulpher dioxide and 0.69 tons of particulate matter are discharged daily through the exhaust-pipes of these vehicles in Kathmandu. 3,156 air polluting industries produce about 76,400 tons of TSP annually. Doctors and medical experts believe that some of the key health problems faced by those living in Kathmandu valley are directly related to the high level of air pollution. Problems like eyesores, asthma, common cold and slow growth in children are due to overexposure to polluted air. According to WHO, the level of Kathmandu's air pollution exceeds the acceptable standard by four times. Nearly half of some 200,000 vehicles in the city do not meet the emission standard. Higher level of leads can be lethal.

Shrestha, Aditya Man and Purna Hari Amatya. 2000. "Curbing Air Pollution in Kathmandu" in Quamrul Islam Chowdhury (ed). *Air Pollution in Asian Cities.* Dhaka: Forum of Environmental Journalists of Bangladesh. pp 85-88.

It is a journalistic account of the air pollution in Kathmandu valley, which states that roadside air is by far the worst as it is full of fume, dust and other elements harmful to health. A study has established that the worst is the dust pollution that is found to be almost five times more than the accepted level set by WHO. The study attributed as much as 60 % of the pollution to this factor and the remaining 40 % to vehicular emission. Poor road conditions, traffic load and piled-up solid wastes are responsible for the major pollution. The presence of carbon mono-oxide, sulfur dioxide and nitrogen oxides is on the higher side. However, there is growing concern over its impact on public health. Doctors have come up with records of increasing respiratory diseases, chest and throat infection and heart complaints. Newborn babies and children have been the worst victims of air pollution.

Shrestha, Minu. 1998. "Air Pollution Study of Kathmandu Valley". MSc thesis (Hydrology and Meteorology), T.U., Kathmandu.

Shrestha found that the large concentration of TSPM, SO_2, NO_2, generated in Putalisadak at morning and evening time proved that the place is extremely dangerous for human beings. The residential area, Kirtipur, is the best place to live. The relation of temperature and visibility with the pollutants were found to have a negative correlation. In Kathmandu city, the pollutants are mainly due to vehicles since there are no industries around the area of the study. Hence, people are more exposed to air pollution when they are in the vicinity of roads during the traffic peak hours.

Siddiqui, Abdul Hye. 2000. "Worsening Air Pollution Scenario" in Quamrul Islam Chowdhury (ed). *Air Pollution in Asian Cities.* Dhaka: Forum of Environmental Journalists of Bangladesh. pp 94-96.

Kathmandu is often ranked as one of the most polluted cities of South Asia. Some environmental observers even tend to equate Kathmandu with Mexico-City.

Other Issues

Adhikari, J. and Bohle, H.-G. 1999. "Urbanization, Government Policies and Food security in Kathmandu Metropolis". *Studies in Nepali History and Society.* 4(1):191-246.

The article shows that poor and food insecure households were adversely affected by the city's air pollution, as they are the ones whose work directly exposes them to pollution. As a result, pollution-related illnesses are particularly high in this class.

ICIMOD.1993. *Economic and Environmental Planning for Bagmati Zone (3 vols.). Vol. 1: Regional; Vol. 2: District-level report (Part 1 to Part VIII of 8 districts); Vol. 3: Kathmandu valley urban region. Kathmandu: ICIMOD.* Prepared by Bagmati zone study team.

IUCN. 1994. "Draft: Hetauda Industrial District (HID): Pollution Control Study". HMG/NPC, NCS Implementation Project, IUCN, Nepal, Kathmandu.

The waster water from HID has an adverse impact on the surrounding environment, especially the 0.5 km stretch of Kana Khola immediately downstream from HID. The people living alongside the river, downstream from HID, and the aquatic ecosystem of Kana Khola are the main victims of this pollution. Currently air pollution, solid waste and noise are not major problems at HID, however they may become problems in the future.

Koirala, Hridaya Lal. 1998. *Issues of Urban Environment in Kathmandu Valley: A Case Study of Kathmandu Municipality.* Dehradun: Center for Science and Technology Education in Asia and Pacific, India.

Increasing population pressure, changing socio-economic conditions and physical infrastructure together with lack of amenities have collectively contributed to the degradation of the urban environmental condition. The analysis of land-use indicates that the urban areas have increased at the cost of productive agricultural land and depletion of forest areas deteriorating the ecosystem. Moreover the growth rate of population in 1981-91 is truly alarming at 4.52% per annum against the national growth rate of 2.08%. Facilities provided such as road accessibility, park/gardens and hospitals to the municipal inhabitants are concentrated only along the central part. Most of the inhabitants in the periphery do not avail of these benefits. Likewise river odor, industrial pollution, dust pollution and airport noise adversely affect nearly one third of the total population in the Kathmandu municipality.

Nepali, Babu Ram. 1998. "Assessing the Impacts of Cement Factory Pollution on the Vegetation and Soil: A Case Study of Hetauda Cement Factory, Nepal". M.Sc. thesis (Botany), T.U., Kathmandu.

The research deals with the impact of Hetauda Cement Factory emissions on the vegetation around the factory. The soil characteristics of the study area indicate that cement dust accumulation on soil was enormous leading to a high pH range causing higher calcium uptake in plants.

Pandey, Mrigendra Raj, Buddha Basnyat and R.P. Neupane. 1988. "Chronic Bronchitis and Cor Pulmonale in Nepal: A Scientific Epidemiological Study". Mrigendra Medical Trusts. Kathmandu.

Shrestha, Ira. 2001. "Health Effects of Vehicular Noise Pollution on Traffic Police Personnel in Kathmandu". B.Sc. (Env. Sc.), Thesis, St. Xavier's College, K.U., Kathmandu.

Average noise levels in Kathmandu during rush hours rise beyond the safety mark. The hearing level of traffic police has been affected by this noise pollution. As the case of traffic police personnel, it must be affecting the health of other citizens living or using these areas.

Subba, Minerva. 1993. "Functional Relationship Between Urban Agencies: A Case Study of KMC And SWMRMC". M.A. thesis (Public Administration), T.U, Kathmandu.

The ambiguous relationship between KMC and SWMRMC is one reason for problems of solid waste management in Kathmandu city. Problems of Kathmandu city as identified by the study include high population pressure-due to internal and external migration, lack of effective coordination between urban agencies and lack of training and development opportunities of employees, leading to mismanagement of the city.

Thapa, D.B.S. 1983. *Institutional and Legislative Framework on Environment in Nepal. A Country Monograph in Nepal.* Kathmandu: Ministry of Law and Justice.

Thapa, Sita Maiya Singh. 1998. "Protection and Preservation of Environment by Labor: A Comparative Study of Legal Scene of India and Nepal". Ph.D. thesis, University of Delhi. New Delhi.

The study is concerned with the examination of existing labor and environmental laws for the protection and preservation of the environment in Nepal and India, with particular emphasis on health or occupational

hazards. The findings of the field observation of 8 industrial establishment located at different parts of Nepal have been analyzed viz. Gorkha Brewery, Himal Cement Factory, Godavari Marble Factory, Heavy Repair Center, Bhrikuti Paper and Pulp Factory, Biratnagar Jute Mill and Tokla Tea Estate. The results of the study are:

- the employers in almost all industries have not fulfilled the responsibilities with respect to health, safety, and welfare of the employees;
- existing laws are not sufficient to protect environment within the industrial establishments;
- there is no effective institutional mechanism for protection and preservation of environment;
- due to inadequate laws and enforcement mechanism the health of the employees working in the industrial establishment and inhabitants of surroundings areas have been adversely affected.

The study recommends that the industrial sites of the industrial establishments should be selected properly in both the countries for conservation of the environment. There is an urgent need for the installation of a single pollution control treatment plant for the entire industrial area. The haphazard growth of industries should be checked by granting licenses to the employers in both countries (in case of joint ventures). Not only the management, but the workers and employees also should be responsible for the protection of the environment so as to avert health or occupational hazards caused by water, air, soil, or land and noise pollution within the industrial establishments in both the countries. Specific and general right to health, safety, and welfare of the workers should be defined and enforced in line with international statutes. Since the environmental pollution does not respect political borders, government of India and Nepal have begun joint ventures. The legislative measures adopted in India are more comprehensive

compared to legislative measures initiated in Nepal. The only specific legislation enacted in Nepal is the Environmental (Protection) Act, 1997. The study concludes that both India's and Nepal's courts have played an important role in the conservation of the environment from the industrial outdoor and indoor air, water, soil or land and noise pollution within or beyond the industrial establishments. It has been found that overall courts have been focused on the industrial outdoor pollution instead of indoor pollution control.