

---

# INDUSTRIAL POLLUTION

---

*Unfortunately, our affluent society has also been an effluent  
society  
-Hubert H. Humphrey*

## **INDUSTRIAL POLLUTION**

**Current Status**

**Problems and Causes**

**Impacts**

**Prioritisation**

**Action Plan**

## ■ CURRENT STATUS

Karnataka is home to many industries, specifically in the sectors of iron and steel, pulp and paper, cement, chemicals, fertilizers, silk, textiles, mining, machine tools, and pharmaceuticals. The environmental problems that arise due to industrial activities are water pollution, air pollution, generation of hazardous waste and noise pollution. The nature of emissions and effluents from industries are varied and industry specific.

Among the various industrial sectors, a substantial portion of effluents containing heavy metals are generated from electroplating (nickel, zinc, copper), tanneries (chromium), textiles, and chemical industries, while organic pollutants are mainly generated from distilleries, sugar, pulp and paper, food processing, textile, pharmaceuticals, dye and dye intermediates and tannery industries. The contribution to air pollution from the industries in Karnataka is mainly from cement, thermal power units, pulp and paper, sugar, stone crushing, foundries, lead acid batteries manufacturing units, refinery, fertiliser, basic drugs and pharmaceuticals, and chemical industries. The main pol-

### Charter on corporate responsibility for environmental protection

Industrial activities should comply with the regulatory norms for prevention and control of pollution. Alongside, it is also imperative to go beyond compliance through adoption of clean technologies and improvement in management practices. Commitment and voluntary initiatives of industry for responsible care of the environment will help in building a partnership for pollution control. With this in view, a series of industry-specific interaction meetings were organised by the Ministry of Environment and Forests during December 2002 and January 2003 to formulate the Charter on Corporate Responsibility for Environmental Protection for the seventeen category of industries. The action points enlisted in the Charter are addressed to corporate bodies as well as regulatory agencies and thus, the Charter is a commitment for partnership and participatory action of the concerned stakeholders towards progressive improvement in environmental management systems. The charter is not necessarily limited to compliance of end-of-the-pipe effluent and emission standards but also sets targets ahead of effluent and emission standards for a number of industrial sectors.

lutants from these industries are particulate matter, oxides of sulphur and nitrogen which are emitted due to burning of fuels. Though these pollutants are also generated from vehicular sources, specific pollutants such as hydrogen sulphide, volatile organic compounds, hydrocar-

### Salient features of Water, Air and Water Cess Acts

Realizing the role of rapid industrialization in deteriorating water and air quality, the Government of India introduced the Water (Prevention and Control of Pollution) Act, 1974 and the Air (Prevention and Control of Pollution) Act, 1981, with the primary objective of prevention and control of water and air pollution. The Central Pollution Control Board and the State Pollution Control Boards administer the Water and Air Acts. An investor intending to set up an industry, operation or process or any treatment and disposal system is required to apply in the prescribed form and fees to the concerned State Pollution Control Board and obtain the consent to establish as well as the consent to operate the industry after its establishment. While granting the consent, the State Pollution Control Board stipulates specific conditions relating to the temperature, volume, composition, rate and point of discharge of emission and effluents. This consent is granted for a specific period. The State Pollution Control Boards are authorized to carry out random checks on any industry to check if the standards prescribed are being complied by the industry. In case the standards are not being met, the State Pollution Control Board is authorized to serve a notice to the concerned industry. In the event of non-compliance of the standards, the State Pollution Control Board may issue directions for disconnecting electricity and water supply or any other services to the industry, in extreme cases even to close down the unit. Stringent penalties are prescribed in these Acts for those who operate their industry without a valid consent or in violation of consent conditions. Any persons aggrieved by an order of the State Pollution Control Board in the above context may appeal to the Appellate Authority constituted by the concerned State Government as per the provisions under the Water and Air Acts. No civil court has jurisdiction to entertain any suit or proceedings in respect of any matter, which an Appellate Authority constituted under Water and Air Acts is empowered to determine.

The Water (Prevention and Control of Pollution) Cess Act, 1977 was introduced to provide for adequate funds to the State Pollution Control Boards. A cess is levied on local authorities which are entrusted with the duty of supplying water and certain specified industries. The cess levied is based on the amount of water consumed and is collected by the State Government and paid to the Central government. After due appropriation, the Central government rolls back to the State Government 80 percent of the money collected by it. Apart from utilising the cess fund for its administrative purposes, the Boards also use it for training purposes. The local authorities or the industries liable to pay cess should furnish cess in the prescribed form at definite intervals to the Pollution Control Board, failing which action against the erring party can be initiated. Where the local authorities or industries liable to pay cess, installs any treatment plant for effluents, it is entitled to a rebate of 25 percent of the cess. However in case where the local authorities or industries consume water in excess of the maximum quantity prescribed or fails to comply with the prescribed discharge standards, they would not be entitled for the rebate.

**Industries registered under the Department of Industries and Commerce, November 2002**

Districts	Industries
Bagalkote	162
Bangalore Rural	445
Bangalore Urban	4036
Belgaum	554
Bellary	687
Bidar	268
Bijapur	131
Chamarajnagar	21
Chitradurga	195
Dakshina Kannada	666
Davangere	303
Dharwad	414
Gadag	31
Gulbarga	631
Hassan	217
Haveri	32
Kodagu	109
Kolar	296
Koppal	138
Mandya	213
Mysore	671
Raichur	291
Shimoga	363
Tumkur	193
Udupi	294
Uttar Kannada	327
<b>Total</b>	<b>11688</b>

bons, lead, etc., are emitted from the industries like pulp and paper, refineries and lead acid battery units. Most of the industries generate hazardous waste in the form of waste oils and solvents. Oil refineries, fertilisers and pharma industries generate spent catalysts that are hazardous. A substantial portion of the hazardous waste is generated in the form of process dust from iron and steel industries.

Certain categories of industries like power looms and

tiny fabrication units which are in large numbers in the State pose serious problems of noise pollution to the surrounding areas as these are located in residential areas. The use of diesel generator sets with inadequate acoustic measures by a large number of industries is also a major source of noise pollution.

In the recent past, the growth of industries in Karnataka has been oriented towards information technology, biotechnology and related industries. Though less polluting, the use of captive diesel generators in these industries contribute to increased air pollution loads and centralised air conditioning is a major cause for indoor air pollution.

In Karnataka, there are 160 industries that are classified under the 17 category of highly polluting industries as on March 2003. The Karnataka State Pollution Control Board has categorised 118 types of industries as highly polluting in nature. Industries such as electroplating, foundries, paints, enamels and varnishes, etc., are identified under as 'Red' irrespective of their investment levels. Of the total industries registered with Karnataka State Pollution Control Board, about 39 percent fall under red category. About 51 percent of these industries are located in four districts, namely Bangalore Urban, Belgaum, Bellary and Mysore. The remaining industries are scattered in other districts.

**Pollution control status of 17 categories of Industries as of March 2003**

Category	Industries		Districts where industries are located
	Total No	Closed	
Aluminium smelter	1	-	Belgaum
Caustic Soda	1	-	Uttar Kannada
Cement	10	3	Gulbarga, Bijapur, Chitradurga, Tumkur
Distillery	28	1	Bangalore, Belgaum, Bellary, Bidar, Bijapur, Chitradurga, Dharwad, Haveri, Kolar, Mandya, Mysore, Shimoga, Tumkur
Dyes & Dye Intermediate	6	4	Bangalore, Dakshina Kannada, Mysore, Raichur
Fertilizer	2	-	Dakshina Kannada, Raichur
Integrated Iron & Steel	1	-	Bellary
Tanneries	4	2	Bangalore, Bidar
Pesticides	4	3	Bangalore
Petro chemicals	1	-	Koppal
Bulk Drugs & Pharmaceutical	33	10	Bangalore, Bangalore (Rural), Belgaum, Bidar, Mandya, Dakshina Kannada, Mysore, Raichur
Pulp & Paper	5	1	Dharwad, Mandya, Uttar Kannada
Oil Refinery	1	-	Dakshina Kannada
Sugar	60	4	Belgaum, Bellary, Bidar, Bijapur, Chitradurga, Dakshina Kannada, Dharwad, Gulbarga, Hassan, Kolar, Mandya, Mysore, Raichur, Shimoga
Thermal-Power Plant	3	-	Bellary, Gulbarga, Raichur
<b>Total</b>	<b>160</b>	<b>28</b>	

### Industries registered with the Karnataka Pollution Control Board as on 27/01/2003

Industries	Red	Orange	Green	Total
Large	563	104	310	977
Medium	527	235	595	1357
Small	3991	1993	5390	11374
<b>Total</b>	<b>5081</b>	<b>2332</b>	<b>6295</b>	<b>13708</b>

*Inclusive of hospitals and hotels*

The Karnataka State Pollution Control Board has identified 51 types of industries as moderately polluting in nature and has categorised these as Orange. Orange industries constitute a small percentage (18 percent) of the total industries and almost half the Orange industries are located in three districts of Bangalore Urban, Gulbarga and Dharwad.

The Karnataka State Pollution Control Board has identified 111 types of industries as being less polluting in nature and has categorised these as Green. Green industries constitute 43 percent of the total industries and are predominantly located in Bangalore-Urban, Dakshina Kannada, Bellary and Mysore districts.

No data is available on unregistered/informal small & tiny scale units in Karnataka. Based on an all India average, it is estimated that about 77271(27 percent of total industries) of such units are present in Karnataka. These informal industries could be a source of environmental

### Procedure for Environmental Clearance

- The project proponents of red/orange/green category industries will have to submit an application to the Karnataka State Pollution Control Board.
- 30 Categories of projects listed in the Schedule I of Environmental Impact Assessment Notification, 1994 have to apply in the prescribed application form given in Schedule II. The industries listed in Schedule I with an investment above 100 crores will have public hearing. The industries listed in Schedule I with an investment between 5 crores and 100 crores and red category industries have to apply for environmental clearance to the State Government.
- Site clearance is required from the the Ministry of Environment and Forests, Government of India for site specific projects.
- Environmental Impact Assessment / Environmental Management Plan is required for red category projects.
- Based on the internal arrangements, the Karnataka State Pollution Control Board head office or regional office will issue consent for the orange and red category industries.

### Siting Guidelines for Industries

#### For Red category industries

Industries should be located:

- At least 25 kilometers from ecologically and/or otherwise sensitive area
- At least 500 meters from flood plain or modified flood plain affected by dam in the up-stream or by flood control systems
- Atleast 500 meters from highway and railway
- Atleast 25 kilometers from the projected growth boundary of the settlement

Projects require to follow the coastal regulatory zone notification issued by the Government of India

No forest shall be converted into non-forest activity for the sustenance of the industry

No prime agricultural land shall be converted into industrial site.

#### For Orange category industries

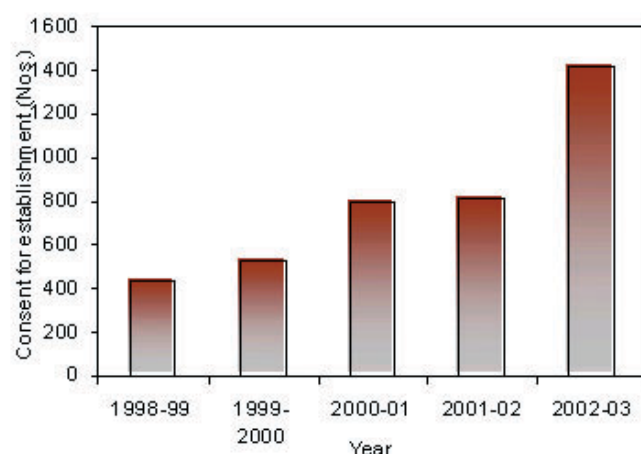
No industry shall be permitted

- within city/municipal limits
- within 500 meters from the riverbanks/reservoirs/major tanks
- within 75 meters of national and state highways, 50 meters of main district roads, 17.5 meters of other district roads and 15 meters of village roads
- within 12 kilometers from notified archeological monuments
- within declared biosphere reserves and eco sensitive zones.

#### For green category industries

For green category industries the siting guidelines would be minimal.

### Consent for establishment issued by the Karnataka Pollution Control Board in last five years



pollution, which presently go unnoticed. A census of both registered and unregistered industries is now being carried out by Department of Industries and Commerce to update the inventory of industries in Karnataka.

### Water Pollution

To ascertain the problem of water pollution in the State river water quality monitoring is being carried out at 55 stations for different stretches of rivers under the Global Environmental Monitoring Stations, Monitoring of Indian National Aquatic Resources and Karnataka State Pollution Control Board's programmes. Some of the sampling spots are located adjacent to highly polluting industries/industrial areas and the quality of water in these stretches is being monitored every month and designated with classes from 'A' to 'E' ('A' being the best and 'E' the least) by the Karnataka State Pollution Control Board. The analysis is based on key parameters such as pH, dissolved oxygen, biological oxygen demand and total coliforms.

As per the Karnataka State Pollution Control Boards 2002-2003 annual report stretches of Bhadra river at Kudremukh and Bhadravathi, Tungabhadra river at Harihar and Kali river at Dandeli receive treated trade effluent directly.

Certain highly water polluting industries like distilleries, that are in large numbers in Karnataka, currently adopt technological options such as bio-methanation and

composting for the treatment of wastewater. However, these technologies have their limitations.

### Air Pollution

The Karnataka State Pollution Control Board as well as the industries monitor stack emissions periodically for various parameters depending on the type of industry. In Karnataka as of 2002-03, 9003 (75.22 percent) industrial units of the 11968 industries brought under the Air Act were found to have air pollution control systems and the Karnataka State Pollution Control Board has identified 718 defaulting industries for not implementing air pollution control systems.

The Karnataka State Pollution Control Board has also been monitoring ambient air quality in industrial locations of Bangalore, Belgaum, Bidar, Davangere, Dharwad, Hassan and Mangalore. The ambient air quality concentrations in industrial areas of these cities for three parameters namely, oxides of sulphur and nitrogen, and respirable suspended particulate matter in 2002-03 have remained below the permissible limits. The suspended particulate matter concentrations have also remained below the permissible limits for all cities excepting Hassan during 2002-03. However, the monitoring is not representative of all industrial areas and has not been carried out according to guidelines laid down by the Central Pollution Control Board.

#### Options And Limitations Of Effluent Treatment For Distilleries

Available Technologies	Limitations
Biomethanation followed by Secondary Biological treatment systems	Colour removal – not effective
	High Operating cost for secondary biological treatment system
	Tertiary treatment for the colour removal to meet the specified BOD limits and color removal are yet to be commercially established
	High spent wash (wastewater) generation
Composting	Land requirements are high
	Regular availability of press mud is difficult as the sugar industry (producer of press mud) operation is seasonal
	Operation during the monsoon period is very difficult
	The process is laborious and slow
	Operation during intermittent rains (other than monsoon) poses problems
Incineration	Higher capital & operating costs
	Sensitive operation & maintenance required

The stack samples are collected by regional offices of the Karnataka State Pollution Control Board using bulky and cumbersome equipment and are then sent to regional laboratories for analysis. The whole process is time consuming making it difficult for the Karnataka State Pollution Control Board to cover all industries.

The large and highly air polluting industries such as cement in

## Ambient Air Quality Monitoring in Industrial Locations, 2002-03

City	Location of sampling station	Total No. of samples collected	Air Quality (average values of the air pollutants monitored) in $\mu\text{g}/\text{m}^3$			
			SPM	RSPM	SO <sub>2</sub>	NO <sub>x</sub>
Standards for industrial areas		Annual Average*	360	120	80	80
		24 hours	500	150	120	120
Bangalore	Amco Batteries	365	119	55	12	26
Bangalore	Graphite India	365	111	52	16	16
Belgaum	KSCP Building Autonagar	60	18.75	27.08	---	---
Belgaum	SSI Association Udhyambhag	60	27.08	85.41	---	---
Bidar	Regional office building	50	116.19	---	---	---
Davanagere	M/s,HPF Ltd	57	131	---	5.3	3.21
Dharwad	Hinduatan Lever Ltd	86	108.6	73.29	2.18	7.85
Dharwad	Office building, Lakamanhalli	123	153.59	---	3.33	3.98
Hassan	B.Katihally Indl.Area	45	96	---	6	9.3
Hassan	KIADB Indl.Area	45	128	---	7.4	5.5
Hassan	HSSK Ltd.	45	477	---	12	19
Mangalore	Regional office building, Baikampadi	45	111.6	---	---	---

\* Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval

--- means data not available

Source: KSPCB

Gulbarga, thermal power plant in Raichur, drugs and pharmaceuticals in Bangalore (urban and rural), fertiliser, chemical and refinery units in Mangalore could cause high ambient air pollution due to their clustering despite the fact that these industries have air pollution control systems. Scientific ambient air quality monitoring in these locations needs to be carried out to assess the effect of such industrial clusters on ambient air quality.

A serious problem in clusters of small highly air polluting units such as puffed rice industries is that they use low grade fuels such as rice husk and used tyres. There are about 5500 such industries which are located in clusters in Davanagere, Hubli-Dharwad, Haveri, Bellary, Gulbarga, Belgaum, Mysore and Bangalore rural districts. In these labour intensive units, a large number of workers are directly exposed to dangerous pollutants such as dioxins from tyre burning apart from other pollutants.

### Noise Pollution

Under the Air Act, the Noise Pollution (Regulation and Control) Rules, 2000 have been formulated under which the Karnataka State Pollution Control Board carries out

ambient noise monitoring only in cases of complaints against industries for noise pollution and no regular monitoring is done. In work environment, noise levels are specified in the Factory Act, 1948.

During the period 2000-01, about 15 percent of the 280 complaints received by the Karnataka State Pollution Control Board pertained to noise pollution from industries such as power looms, engineering units and D.G sets located close to residential areas. The high noise levels are attributed to the absence of adequate acoustic measures to keep the noise levels within the prescribed limits. Many small scale industries, are reluctant to install noise abatement systems due to the additional cost burden.

The ambient noise measurements conducted by Dr. S.R. Chandrasekhar Institute of Speech and Hearing in 1999 for five small scale industries in Bangalore (which are mainly engineering and machine tool units) revealed that noise levels were above the prescribed standards (75 dBA) in daytime in three industries. The noise measurement studies conducted in the work environment of six small scale units (flour mill, engineering and machine tools units)

indicated very high noise levels exceeding 90 dBA in four units. In the other two units, the noise levels varied between 75-90 dBA. The study also revealed that workers in the small scale units were not provided with ear protection devices indicating occupational noise health problem due to noise.

### Ozone Depleting Substances

A study carried out by the Karnataka Cleaner Production Centre in 2003 identifies that there are no industries which manufacture ozone depleting substances in the state. However, about 122 industries in Karnataka consume ozone depleting substances in their manufacturing processes. These units are located in Bangalore (56.6 percent), Belgaum (18.8 percent), Mysore (5.7 percent), Mangalore (8.2 percent), Hubli (8.2 percent) and Tumkur(2.5 percent). Out of the total 122 industries, 83.6 percent of the industries belong to refrigeration and air conditioning sector and the rest 16.4 percent of the units constitute sectors of foam, fire extinguishers, solvents and aerosols. In 2003, 122 units have been identified as using ozone depleting substances as against 521 during year 2000-01 indicating decreasing trend. This is a reduction

of about 75 percent in terms of number of ozone depleting substances consuming industries. Of the 122 industries consuming ozone depleting substances during manufacturing process that are identified, 51 percent are registered units by the Karnataka State Pollution Control Board, 37 percent are unregistered, and no information is available on the registration of 12 percent of the units. The inventory has not taken into consideration of ozone depleting substances in old air-conditioning and refrigeration units that are still in use, which could be of significant quantity.

### Corporate responsibility for environmental protection

The action points enlisted in the Charter call for a commitment for partnership and participatory action of the concerned stakeholders towards progressive improvement in environmental management systems. The charter does not limit to compliance of end-of-the-pipe effluent and emission standards but also sets targets ahead of the standards for a number of industrial sectors.

### Responsibility of air polluting industries

All air polluting industries including cement, fertilizers, petrochemical, pesticides, thermal power plants, pulp and paper, oil refineries should

- continuously monitor for operation parameters as well as specific parameters in the tail / flue gas
- continuously control fugitive emissions through leak detection and repair programme, especially for solvents
- continuously carry out stack monitoring as well as regularly monitor ambient air quality for sulphur dioxide, oxides of nitrogen, particulate matter, fluoride, acid mist, hydrocarbons, benzene, etc.
- install efficient scrubbers with best technology for control of hydrogen chloride, chlorine, methyl

**Substitutes for Ozone depleting substances being used in Karnataka**

Sectors	Name of ODS	Year since substitute is being used	Substitute being used in Karnataka
Air Conditioners	CFC-11, CFC-12, HCFC-22, CFC-113, CFC-114, CFC-115, HCFC-123	1998	HCFC-134a
Refrigerator	CFC-11, CFC-12, HCFC-22, CFC-115	1987	HCFC-134a
Solvent Cleaning (PCB's & Metal parts)	CFC-113, CFC-13, CCL4, Methyl chloroform, CFC-12	1992	Trichloroethyl and Isopropyl Alcohol
Foam production	HCFC-22, CFC-11, CC-12, CFC-113, CFC-114	1992	HCFC-141b(rigid PUF insulation) Liquid CO <sub>2</sub> (Flexible PUF), Methylene chloride
Fire extinguishers	halon-1301, halon-1211, halon-2402	1998	HFC-122ea, NFS-3
Aerosols	HCFC-22, CFC-11, CC-12, CCL4, Methyl chloroform	1995	LPG (deodorised)



chloride, phosphorus pentoxide, ammonia, hydrogen sulphide, etc.

- control use of hazardous air pollutants like benzene, carbon tetrachloride, 1-4 dioxane, methanol, toluene, methyl chloride
- control odorous compounds like mercaptan, hydrogen sulphide, etc., by installing odour control system
- install sulphur recovery unit, especially in refineries
- route all hydrocarbon and halogenated organic to the incineration system having end-on pollution control facility.
- not send, under any circumstances, halogenated organic to the flares as flaring leads to formation of persistent organic pollutants

### **Responsibility of water polluting industries**

All water polluting industries including distilleries, dye and dye intermediate, fertilizer, oil refineries, pesticides, petrochemicals, pharmaceuticals, paper and pulp, sugar, tannery should

- conserve water and reduce wastewater generation
- install water meters and flow meters to measure actual consumption and wastewater discharged
- not discharge effluent arising from process plants and associated facilities in any water polluting industries to the storm water drain. The industries, where waste water/effluent flows through the storm water drains should install continuous systems for monitoring the storm water quality and route the storm water through effluent treatment plant before discharging.
- segregate waste streams into high COD waste, toxic waste, low COD waste, inorganic waste etc. for the purpose of providing appropriate treatment.
- select appropriate unit operations for detoxification of effluent in order to control high COD and persistent organic pollutants including toxic constituents before sending to the biological treatment systems or thermally destroyed in incinerator.
- install automatic monitoring instruments, separate energy meters, replace open anaerobic lagoons with cleaner technology options and in all common effluent treatment plants and effluent treatment plants implement guidelines developed by Central Pollution Control Board for health and safety of workers employed.
- submit pollution load, concentration of final discharge along with water balance to state pollution control board for formulation of strategy for giving consents based on pollution load and concentration of pollutants.
- regularly monitor ground water quality.

- carry out monitoring of environmental parameters, audit it at regular interval and submit the same to state pollution control board.
- start the operation of effluent treatment plant atleast one month before starting of process to achieve the desired biomass so as to meet the prescribed standards from day one of the operation in case of season based industries like sugar, distilleries.
- ensure proper and complete nitrification and denitrification, wherever such process is used for effluent treatment

### **Responsibility of industries for safe disposal**

- Proper facilities should be provided for handling and storage of hazardous waste.
- Before final disposal of hazardous waste, recycling and reuse should be given priority, either within the premises or outside with proper manifest system.
- In case of incinerable waste, properly designed incinerator should be installed within the premises or outside as a common facility.
- The non-incinerable hazardous waste should be disposed of in properly designed secure-landfill either within the industry's premises or in a common facility

### **Responsibility of industries for resource recovery and reuse**

- All industries to prepare and implement action plan for conservation of water resources and maximizing reuse/ recycling of treated effluent
- Resources such as spent catalyst, solvents, chromium, salts, by-products in process sludge and waste streams, other chemical should be recovered by installing proper recovery systems.
- Biogas from process sludge and effluent treatment plant sludge to be recovered as a resource.
- Reuse of flyash for ash based products, charge of tar sludge to coke oven, steel melting shop / blast furnace slag, are some of the uses where waste can be utilised.

### **Responsibility of Central/State Pollution Control Board**

The Central/State Pollution Control Board has been given the following responsibility of revising and setting new guidelines and standards.

- Development of guidelines / standards for mercury and other toxic heavy metals emissions for thermal power plants
- Development of sulphur dioxide, oxides of nitrogen emission standards for coal based plants
- Reviewing of stack height requirement and guidelines

- for power plants based on micro meteorological data
- Evolving load based standards for sulphur dioxide, oxides of nitrogen emission standards for the cement Industry
- Finalize the guidelines for groundwater monitoring

## ■ CAUSES

The main causes of industrial pollution include

- unregistered small scale units
- lack of pollution control systems
- lack of common treatment facilities
- lack of economically viable treatment technologies
- lack of awareness

### *Unregistered small scale units*

It is very likely that most of informal/unregistered units do not have any treatment facilities. Discharges from most of the small and tiny scale industries are let into municipal drainages or into other receiving bodies with minimal or no treatment leading to surface and ground water pollution.

### *Lack of pollution control systems*

The overall status of effluent treatment plants in operation set up by large, medium and small scale industries does not indicate any significant increase during the last three years. Lack of effluent treatment plants in a large number of industries in Karnataka is a cause for concern with regard to both surface and ground water pollution. Proper operation and maintenance of the effluent treatment plants is critical for ensuring that the effluents are treated to desired levels. However, most of the industries do not give due importance to operation and maintenance as it involves significant expenditure.

### *Lack of common treatment facilities*

A large number of small scale and tiny industries do not have individual effluent treatment plants as it is not an economical proposition for them. Common treatment facilities that cater to a cluster of homogeneous/

heterogeneous industries are the only viable alternatives for such industries. At present only three common effluent treatment plants have been established and are in operation namely, Lidkar Tanners Enviro Control Systems for tannery wastewater, M/s Pai & Pai Chemicals Pvt. Ltd., Kumbalagod for Electroplating wastewater and Bangalore Golf club for Municipal sewage.

Additional cost in the form of initial investment and recurring operating expenses that would have to be incurred by the industrial units are the possible cause for non establishment of common effluent treatment plants. The Karnataka Industrial Area Development Board has no policy on the allocation of land for establishment of common effluent treatment plants and none of the 78 industrial areas developed by them have a common effluent treatment plant.

In addition to this, annual operation and maintenance charges would be in the range of 10-20 percent of investment. Though common effluent treatment plants can address this problem, for clusters of small and tiny scale industries, isolated industries cannot be connected to common effluent treatment plants. Because of space constraints and high operation and maintenance costs, small scale industries in isolated locations pose problems

### Sector specific environment friendly technologies

Type of industry	Environmentally Sound Technologies	Anticipated benefit
Textile Industry	Recovery of ethyl acetate (solvent) from the print blanket wash waste by distillation method	Recover of print paste, reduced chemical pollution and less water requirement
Paper and pulp industry	Pulping technologies based on alcohol solvent, bio-pulping and ozone bleaching	Recovery of lignin, enhanced machine life and better product quality
Leather industry	Chrome recovery from effluent	Reduced heavy metal pollution
Foundry	Heat recovery system for furnaces	Reduced suspended particulate matter in stack and recovery of heat energy from flue gas
Rice Mills	Gasifier to convert biomass wastes into energy	Captive power generation and self-sustaining on energy requirement
Agro Industries	Bio-gas generation and vermi-composting of biomass residues	Captive power generation and on-site heat generation

in so far as water pollution is concerned.

#### **Lack of economically viable treatment technologies**

Most of the treatment facilities available are too costly and beyond the capacity of small scale industries. Added to this is the fact that most of the industries have space constraints and treatment facilities need substantial area.

#### **Lack of awareness**

Most of the industries do not have or cannot afford to have dedicated personnel for treatment facilities. The lack of education and motivation has led to industries not being aware of state of art technologies. Further, there is no centralised database where industries can get information.

### ■ IMPACTS

The common chemical pollutants harmful to human health found in ground water due to industrial discharges are chlorides, nitrates, heavy metals and organic matter. The common health problems caused by ground water pollution include miscarriage, low birth weight, birth defects and premature infant death. Adults and children suffer from skin problems, eye irritation and neurological problems like dizziness, seizures, fainting, *etc.*

Surface water streams are also affected by industrial effluents and organics. Most of the treated industrial effluents are disinfected with chlorine which reach the receiving bodies and react with organic compounds to form chlorinated organics. The presence of these compounds in the water can cause cancer. Nitrates and nitrites are common inorganic pollutants that are released from fertiliser industries and excess nitrite levels are fatal to infants (blue disease) and also lead to eutrophication of water bodies.

Human health is affected by industrial air pollution mainly due to release of particulate matter and gases such as sulphur dioxide, hydrogen sulphide, carbon

disulphide, *etc.* The major pollutant from the cement and thermal power industries is particulate matter, that cause diseases. The people of Gulbarga, Mangalore, Raichur, Shimoga and Davanagere are likely to experience pneumoconiosis (respiratory allergies, asthma and lung diseases).

Prolonged exposure to intense noise causes permanent hearing loss. There is fairly consistent evidence that noise level of 80 dB or more for more than 8 hours a day increases tension, changes in breathing patterns and causes deafness. As towns and cities become more densely populated as a result of industrial growth, the problem of unwanted noise is bound to increase both during the day and night.

### ■ PRIORITISATION

The priorities for industrial pollution in Karnataka are based on socio-economic and ecological impacts of each issue. The predominant issues arising out of industrial activities are surface water pollution, ground water contamination, air pollution and disposal of hazardous waste.

The priority issue in Karnataka is surface and ground water contamination. The use of poor quality ground water for drinking purposes in the vicinity of highly polluting industries and industrial areas have impact on public health and vulnerable groups. The contamination of the surface water can be reversed, while that of ground water can be

**Prioritisation Matrix**

Problem	Socio-economic / Ecological impacts							TOTAL
	Impact on public health	Loss of biodiversity	Impact on vulnerable groups	Productivity loss	Impact on critical ecosystems	Irreversibility / reversibility	Urgency of the problem	
Surface Water Pollution	5	3	5	3	5	3	5	29
Ground Water Contamination	5	1	5	3	1	5	5	25
Air Pollution	3	1	3	3	1	3	5	19
Disposal of hazardous waste	3	1	3	1	1	3	5	17
Noise Pollution	3	1	5	1	1	1	5	17
Consumption of Ozone Depleting Substances	1	-	-	-	1	1	1	4

Scale: 1= low, 3 = medium, 5= high

reversed with great difficulty by controlling the pollution at source.

Air pollution assumes priority due to human settlements in the vicinity of industrial areas or group of highly air polluting industries. However the impact of the air pollution can be reversed by appropriate control measures at source and also land zone planning.

The disposal of hazardous waste is a priority issue in Karnataka as it impacts the public health especially, the handlers (poor) can get affected due to handling of hazardous waste without safety precautions. As the scientific common disposal facilities does not exist in the state, considering potential impacts which can be caused by hazardous waste has increased the urgency of the problem.

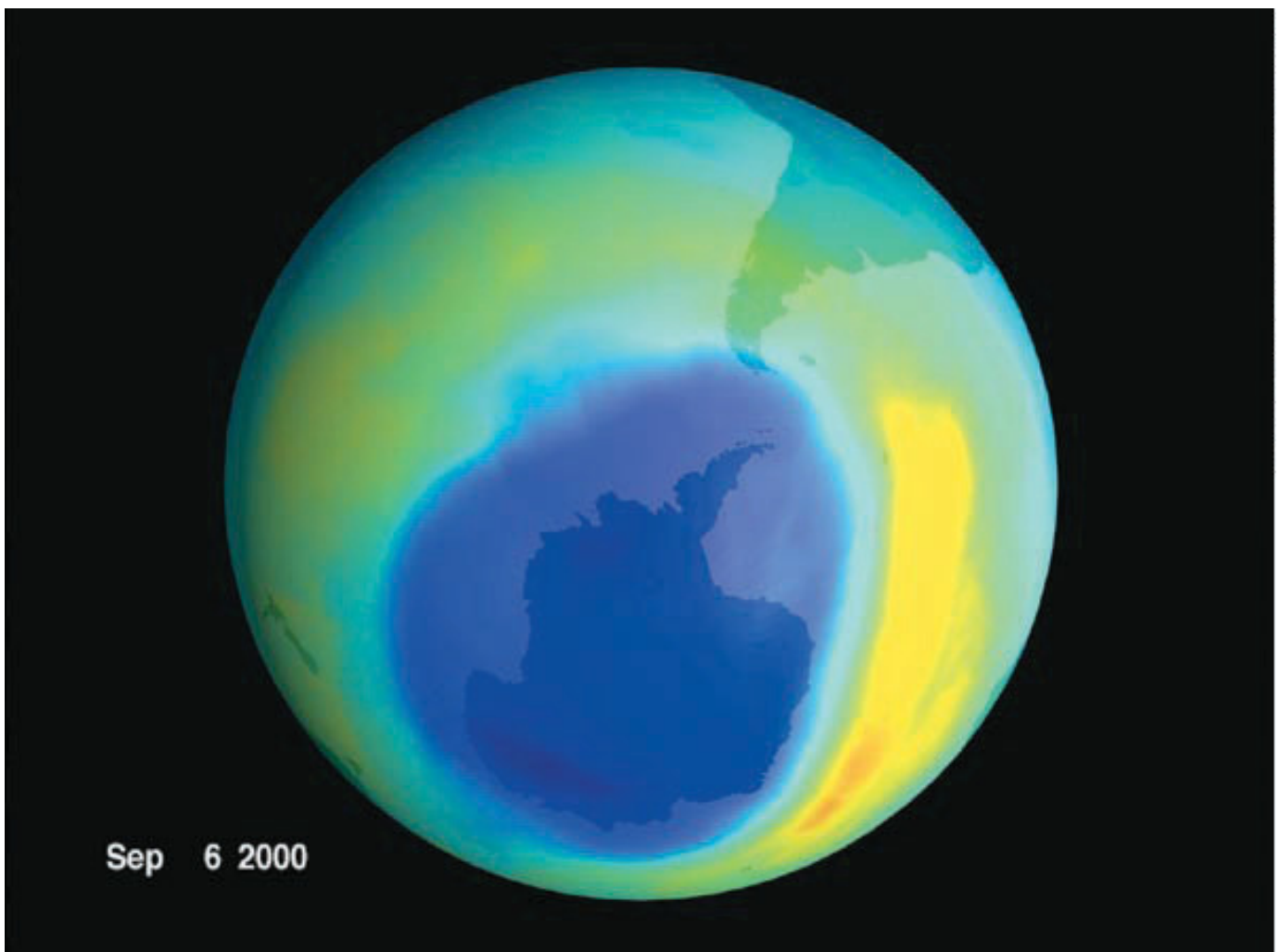
The consumption of ozone depleting substances and noise levels in the vicinity of industrial areas have assumed low priority as their magnitude and impacts are minimal and can be reversed with low cost interventions.

#### ■ ACTION PLAN

- Commerce and Industries department and Pollution Control Board should take action to promote cleaner production technologies. Allocation of funds for research to develop cleaner production technologies related to 17 categories of highly polluting industries and polluting small scale and tiny units and implementation of the same should also be included.
- Environment audit has to be made mandatory for all red and orange category industries.
- Statutory status needs to be given for the 'Zoning Atlas' for siting of industries.
- Encourage industries to take up a proactive role for the protection of the environment, Karnataka State Pollution Control Board may institute an annual green award.
- The option of outsourcing monitoring activity should be considered.
- Monitoring for air quality should be as per the CPCB procedure of 104 measurements in a year taken twice a week 24 hourly at uniform interval.
- Ambient Air Quality Monitoring Systems to be set up in areas where there are clusters of highly air polluting industries such as cement (Malkhed, Gulbarga district) and thermal power (Raichur). Ambient Air Quality Monitoring Systems should be situated in the downwind direction of industrial areas. Monitoring of additional industry specific pollutants such as Mercaptans (Pulp & Paper), Ammonia (Fertiliser unit at Mangalore) and Hydrocarbons (Near Refinery at Mangalore) etc. should be done.
- Karnataka State Pollution Control Board should impose stricter norms for existing industries or should not allow any new air polluting industries in any area where ambient air quality parameters exceed the prescribed standards in the downwind direction of industrial areas.
- Suitable amendment is required to include Electronic Waste (E-Waste) under Hazardous Waste (Management & Handling) Amendment Rules, 2000.
- River water quality monitoring should cover all watercourse stretches adjacent to large industries/ industrial areas.
- Additional chemical and heavy metal parameters specific to the location, which would indicate the source of pollution, need to be analysed. This needs to be done by the Department of Mines and Geology. For example, concentration of chlorides, lignin and absorbable organic halides (AOX) can be indicators of pollution from pulp and paper industries.
- Categorisation of monitoring stations into industrial or residential requires to be done to help the assessment of ground water quality.
- KIADB/Karnataka Small Scale Industries Development Corporation should mandatorily set aside land for establishment of common ETPs, for their industrial areas either in or around the industrial areas in partnership with the industries. These common facilities can be developed on a Build, Own, and Operate basis by the industries.
- The Industries department should promote setting up of industries such that the waste of one industry

becomes the raw material for another and recycling industries are set up in close proximity of existing industries.

- Environment Cells should be set up in the offices of the Industries Department.
- Tradable Permit system: This is a system of accounting for pollution loads by the industries. Depending upon the extent of actual emissions, all polluting industrial units get a credit or debit card showing the extent of pollution loads they are responsible for (as against the standards). Any unit polluting less than the standards gets a credit, in terms of pollution loads below the standard (e.g., tons of carbon per unit of production, and hence the total credit). A unit polluting above the standard will have a deficit in its pollution load account. Units having a credit for low pollution loads have an advantage of selling or trading their credits, and units exceeding the limits can buy these credits and make up for the debit in their own account. The underlying principle is to maintain pollution loads at the established standards. This would be the bubble system and useful in industrial estates.

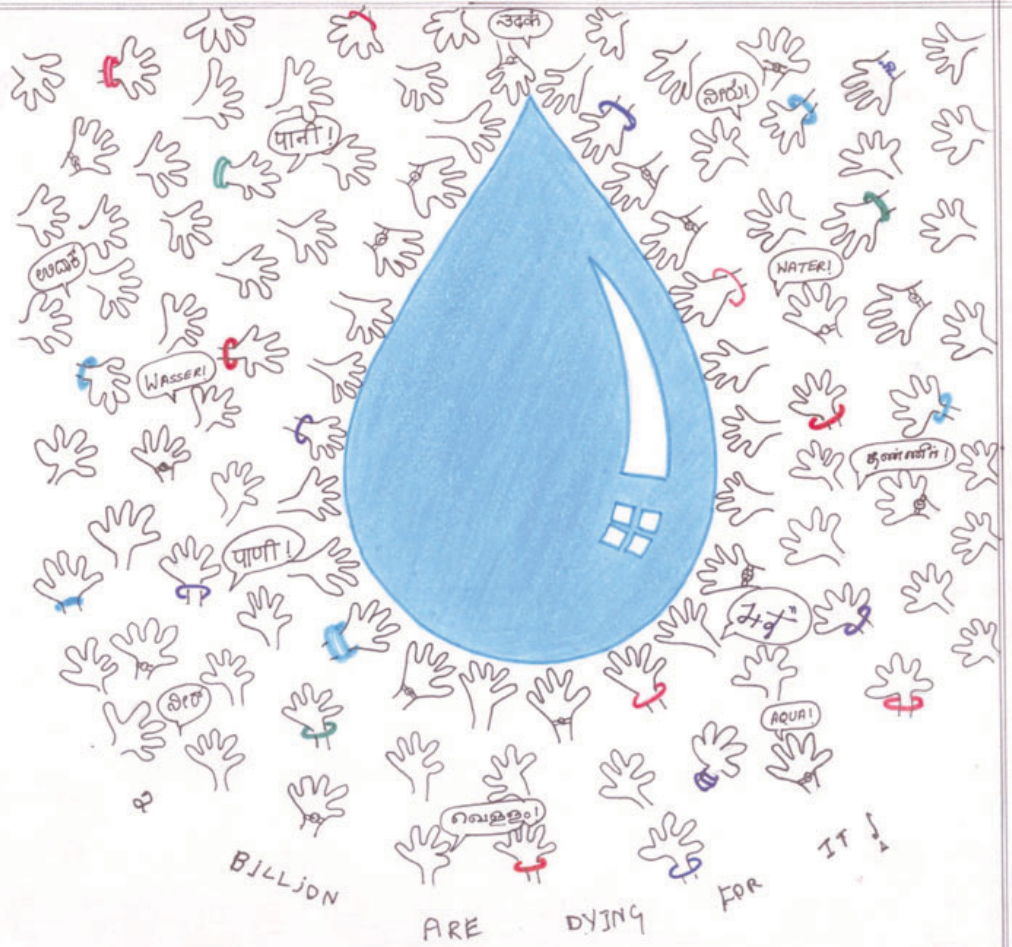


The ozone hole reached a record size in September 2000 — 28.3 million km<sup>2</sup>, three times the size of the United States. Dark blue areas denote high levels of ozone depletion

Source: NASA 2001

## FIRST PRIZE

WATER  
THE  
ELIXIR  
OF  
MOTHER EARTH  
DONT WASTE IT!



RANJAN.D.A AGE: 6 Years