



01C  
The South Indian Association's  
The S. I. A. College of Higher Education  
Affiliated to the University of Mumbai  
Accredited B+ by NAAC  
P-8, MIDC Residential Area Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East), 421203

Ref. No. SIAC/104/22-23

Date: 18/07/2022

To,  
The Director,  
Soliton NetLink Private Limited  
Unit 40, GNP Solitaire, MIDC,  
Phase I, Dombivli (E), Dist. Thane,  
M.S., India, PIN 421 201

**Sub.:** Submission of Minor Research Project Proposal for financial Assistance.

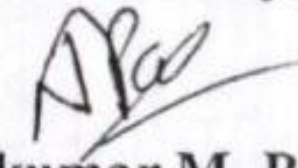
Respected sir,

I am forwarding herewith two copies (one as O/C) of the minor research project proposal titled, "Pollution Prevention and Mitigation Measures: A Case Study of Dombivli, District-Thane, Maharashtra" submitted by the Department of Commerce of our college for the financial assistance.

I shall be thankful to you if you could sanction the proposal and provide financial support.

Thanking you in anticipation,

Yours Sincerely,

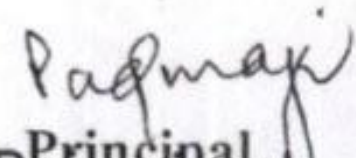
  
(Dr. Nitinkumar M. Patil)

**Forwarded through:**

The principal,  
The S.I.A. College of Higher Education  
P-88, MIDC, Residential Area, Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East), 421 203.

Encl: 1. Two copies of the research proposal



  
Principal  
The S.I.A. College of Higher Education  
Dombivli (E)



Ref. No. CSR/007

Date: 30/07/2022

To  
The Principal  
The S.I.A. College of Higher Education  
P-88, MIDC, Residential Area,  
Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East),  
Tal. Kalyan, Dist. Thane, PIN 421 203.

Sub: Financial assistance to college teachers for undertaking Minor Research projects,

Ref: 1. Your letter no. SIAC/104/22-23/ Dated 18.07.2022  
2. Your proposal for the sanction of a grant for the completion of the Minor Research Project

Sir/Madam.

With reference to the subject and reference cited above We, Soliton NetLink Pvt. Ltd. (CIN: U74990MH2015PTC263459) Unit 40, GNP Solitaire, MIDC, Phase I, Dombivli (E), Dist. Thane, M.S., India, PIN 421201 have approved the minor research project titled **Pollution Prevention and Mitigation Measures: A Case Study of Dombivli, District-Thane, Maharashtra**, to be undertaken by **Dr. N. M. Patil**, in the subject of Environmental Studies, Department of Commerce, The S.I.A. College of Higher Education, P-88, MIDC, Residential Area, Dombivli Gymkhana Road, Near Balaji Mandir, Dombivli (East), PIN 421 203. The financial assistance would be limited to 10,000/- (Rs. Ten thousand only) for the period of six months.

Sr. No.	Particulars	Amount (Rs)
1	Travel/Field Work	2030
2	Stationary	1910
3	Photocopying and typing	2020
4	Miscellaneous	4040
	<b>Total (Rs)</b>	<b>10,000</b>

Total amount sanctioned for the project: Rs. 10,000/- only.

The grant is subject to the terms and conditions mentioned below.

1. The amount of the grant shall be drawn by The Principal, The S.I.A. College of Higher Education, P-88, MIDC, Residential Area, Dombivli Gymkhana Road, Near Balaji Mandir, Dombivli (East), PIN 421 203 and shall be disbursed to and credited to the account of Dr. N. M. Patil.
2. The sanctioned amount is valid for the financial year 2022-23 only.
3. The sanctioned amount is subject to adjustment on the basis of the utilization certificate in the prescribed proforma.

NOTE:

1. Date of implementation will be 1<sup>st</sup> August 2022.



*Handwritten signature*





The South Indian Association's  
The S. I. A. College of Higher Education  
Affiliated to the University of Mumbai  
Re-accredited B+ by NAAC  
P-8, MIDC Residential Area Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East), 421203

Ref. No. SIA/C/14/23-24

Date: 31/03/2023

To,  
The Director,  
Soliton NetLink Private Limited  
Unit 40, GNP Solitaire, MIDC,  
Phase I, Dombivli (E), Dist. Thane,  
M.S., India, PIN 421 201

Sub.: Submission of Final statement of Expenditure and Final Report of the Minor Research Project.

Respected sir,

I am herewith forwarding the Final Statement of Expenditure and final report submitted by Dr. N. M. Patil of our college on completion of the Minor Research Project entitled "Pollution Prevention and Mitigation Measures: A Case Study of Dombivli, District-Thane, Maharashtra" awarded to him by Soliton NetLink Pvt. Ltd. Dombivli (E).

Kindly consider it and do the needful

Thanking you,

Received.  
Soliton Netlink Pvt. Ltd.  
Director / Directors



Yours Sincerely,

Padmaja  
(Dr. Padmaja Arvind)  
Principal  
The S.I.A. College of Higher Education  
DOMBIVLI (E)

Encl: 1. Utilization Certificate  
2. Copy of Minor research Project conducted







WI-FI THAT GOES THE DISTANCE

## Soliton NetLink Private Limited

(Registration No. CIN: U74990MH2015PTC263459)

Non-government Agency (NGA)

Unit 40, GNP Solitaire, MIDC,

Phase I, Dombivli (E), Dist. Thane M.S., India, PIN 421 201

Ref. No. SIAC/14/23-24 | SNPL | 72 | HD

Date: 16 /06/ 2023

To  
The Principal  
The S. I. A. College of Higher Education  
P-88, MIDC Residential Area Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East), 421203

**Sub: NOC/ Completion of Minor Research Project of Dr. N. M. Patil in Environmental Studies**

**Sir/Madam**

Please refer to your letter no. SIAC/14/23-24 dated 31.03.2023, regarding the Minor Research Project awarded to Dr. N. M. Patil in the subject of "Environmental Studies" of your college, I am to inform you that the Minor Research Project titled "**Pollution Prevention and Mitigation Measures: A Case Study of Dombivli, District-Thane, Maharashtra**" sanctioned by Soliton NetLink Private Limited, may be treated as finalized and settled as per final report/utilization certificates submitted by the college.

Item	Soliton Allocation (Rs.)	Total grant released (Rs)	Total Exp. incurred
Travel/Field Work	2030.00	2030.00	2030.00
Stationary	1910.00	1910.00	1910.00
Photocopying and typing	2020.00	2020.00	2020.00
Miscellaneous	4040.00	4040.00	4040.00

Yours Sincerely,  
For Soliton NetLink Pvt. Ltd.

(Mr. Manish Ratnaparkhi)  
Director / Directors

**Copy to:**

- Dr. Nitinkumar Murlidhar Patil  
The S. I. A. College of Higher Education  
P-8, MIDC Residential Area Dombivli Gymkhana Road,  
Near Balaji Mandir, Dombivli (East), 421 203





# Soliton NetLink Private Limited

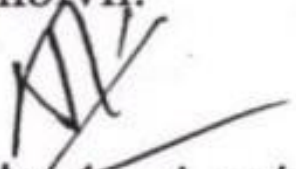
Dombivli (E), Tal. Kalyan, Dist. Thane

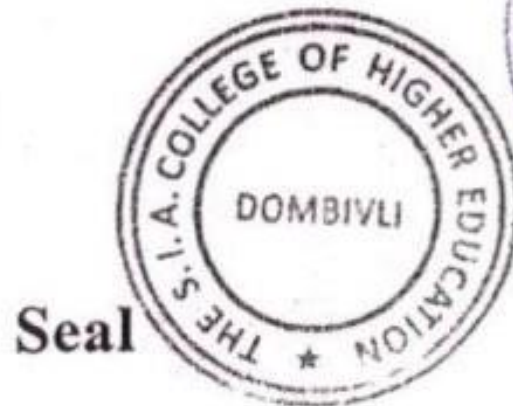
## STATEMENT OF EXPENDITURE IN RESPECT OF MINOR RESEARCH PROJECT

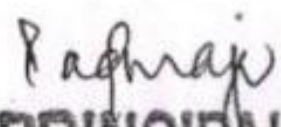
1. Name of Principal Investigator- Dr. Nitinkumar M. Patil
2. Department of Principal Investigator- Commerce  
Name of College- The S.I.A College of Higher Education, Dombivli
3. Project approval Letter No. and Date- CSR/007 dated 30/07/2022
4. Title of the Research Project- Pollution Prevention and Mitigation Measures: A case study of Dombivli, Dist.- Thane, Maharashtra.
5. Effective date of starting the project- 1<sup>st</sup> August 2022
6. Details of Expenditure:

S. No.	Item	Amount Approved (Rs.)	Expenditure Incurred (Rs.)
1	Travel/Fieldwork	2030.00	2092.39
2	Stationary	1910.00	2357.00
3	Photocopying and typing	2020.00	2087.00
4	Miscellaneous	4040.00	4085.00
	<b>Total</b>	<b>10,000.00</b>	<b>10,621.00</b>

7. It is certified that the grant of Rs. 10,000/- (Rupees Ten Thousand only) received from Soliton NetLink Private Limited in support of Minor Research Project entitled Pollution Prevention and Mitigation Measures: A case study of Dombivli, Dist- Thane, Maharashtra. vide S N P L letter No. CSR/007 dated 30/07/2022 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by Soliton NetLink Pvt. Ltd. Dombivli.

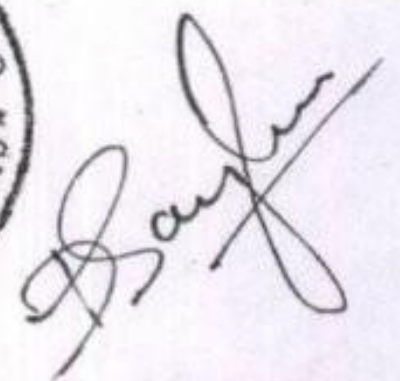
  
(Dr. Nitinkumar Patil)  
SIGNATURE OF PRINCIPAL  
INVESTIGATOR



  
PRINCIPAL  
PRINCIPAL  
The S.I.A. College of Higher Education  
DOMBIVLI (E)

UDIN - 23186763BG1WARW3952







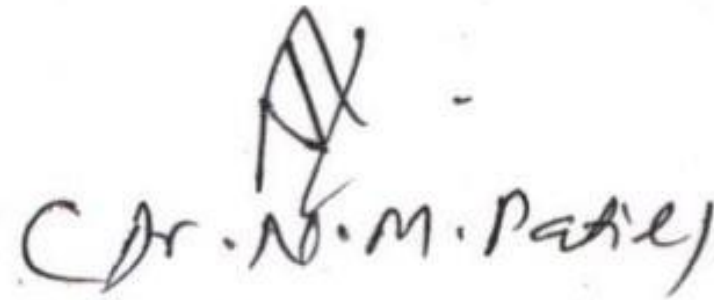
# Soliton NetLink Private Limited

Dombivli (E), Tal. Kalyan, Dist. Thane

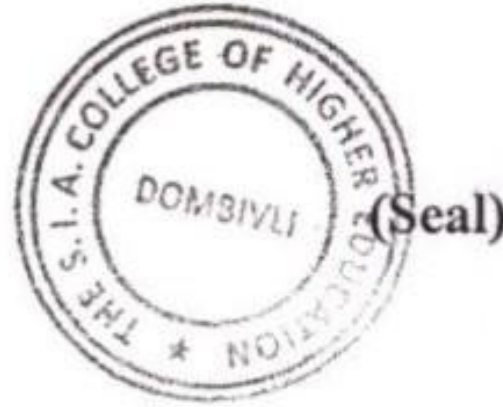
## Utilization Certificate

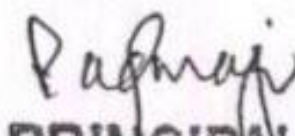
Date: 10 February 2023

Certified that the grant of Rs. 10,000/- (Rupees ten thousand only) received from Soliton NetLink Private Limited for a Minor Research Project entitled **Pollution Prevention and Mitigation Measures: A case study of Dombivli, Dist- Thane, Maharashtra** Vide SNLPL letter No. CSR007 dated 30/07/2022 has been fully utilized for the purpose for which it was sanctioned and in accordance with the terms and conditions laid down by soliton NetLink Private Limited.



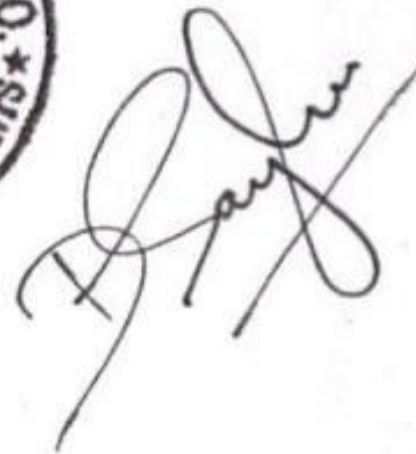
SIGNATURE OF THE  
PRINCIPAL INVESTIGATOR



  
PRINCIPAL  
Principal  
The S.I.A. College of Higher Education  
DOMBIVLI (E)

UDIN - 23186763BGWARW3952









**The SIA College of Higher Education**

P-88, MIDC Residential Area,  
Dombivli Gymkhana Road,  
Near Balaji Mandir,  
Sagarli, Dombivli East  
Thane

**Pollution Prevention & Mitigation Measures**

Cost Centre Account

1-Apr-2022 to 28-Feb-2023

Page 1

Date	Particulars	Vch Type	Vch No./Excise Inv.No.	Debit	Credit
8-9-2022	Dr <b>Printing &amp; Stationary</b> <i>Being Invoice no CIP1488 Purchases Stationary for Minor Research Project</i>	Purchase	136	2,357.00	
12-9-2022	Dr <b>Travel/ Field Work</b> <i>Being Bill no 1609 for buy petrol 10 ltr for Travels Vehiucle no MH05AE5088</i>	Purchase	138	1,063.31	
22-9-2022	Dr <b>Travel/ Field Work</b> <i>Being Bill no 4505 for buy petrol 9.68 ltr for Travels Vehiucle no MH05AE5088</i>	Purchase	142	1,029.08	
	Dr <b>Punjab National Bank PNB Pay</b> <i>Being NEFT Paid to Nitinkumar Patil for Minor Research Project Payment</i>		143		10,000.00
25-11-2022	Dr <b>Photocopying &amp; Typing</b> <i>Being Invoice no MRZEXIM/22-23/022 Photocopy and Typing of Minor Research Project</i>	Purchase	198	2,087.00	
	Dr <b>Miscellaneous (Minor Research)</b> <i>Being Ref 301479230912 towards UGC Care Publication</i>	Purchase	199	2,500.00	
21-1-2023	Dr <b>Miscellaneous (Minor Research)</b> <i>Being Ref No 300755478600 towards Conference fees 29 th jan-2023</i>	Purchase	247	1,500.00	
	Dr <b>Miscellaneous (Minor Research)</b> <i>Being bill date 13-9-2022 purchases Notes books for Minor Research Project</i>	Purchase	248	85.00	
				10,621.39	10,000.00
Dr	<b>Closing Balance</b>				621.39
				<b>10,621.39</b>	<b>10,621.39</b>

*Padmaji*  
PRINCIPAL  
The S.I.A. College of Higher Education  
DOMBIVLI (E)



*[Handwritten Signature]*

UDIN - 23186763BGWARW3952



The SIA College of Higher Education  
P-8, MIDC Residential Area,  
Dombivli Gymkhana Road,  
Near Balaji Mandir,  
Sagarli, Dombivli East  
Thane  
E-Mail : sia.college@yahoo.com

**PNB Pay Voucher**

No. : 143

Dated : 22-Sep-2022

Particulars	Amount
<b>Account :</b>	
ELEGANT STATIONERS Agst Ref CIP1488 2,357.00 Dr	2,357.00
GULATI SERVICE CENTER Agst Ref 4505 1,029.08 Dr Agst Ref 1609 1,063.31 Dr	2,092.39
MRZ EXIM Advance 144 2,087.00 Dr	2,087.00
Nitinkumar Mpatil Foe UGC Care Publication Advance 144 3,463.61 Dr	3,463.61
<b>Through :</b> Punjab National Bank	
<b>On Account of :</b> Being NEFT Paid to Nitinkumar Patil for Minor Research Project Payment	
<b>Bank Transaction Details:</b> Cheque 22-Sep-2022 10,000.00	
<b>Amount (in words) :</b> Indian Rupees Ten Thousand Only	
	₹ 10,000.00 continued ...





The S.I.A. College of Higher Education

P-1 MIDC Residential Area,

Dombivli Gymkhana Road,

Near Balaji Mandir,

Sagarli, Dombivli East

Thane

E-Mail : sia.college@yahoo.com

**PNB Pay Voucher**

(Page 2)

No. : 143

Dated : 22-Sep-2022

Particulars	Amount
-------------	--------

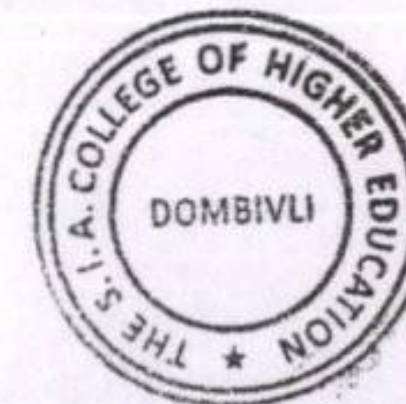


A handwritten signature in black ink, appearing to be "Raj" or similar.

Receiver's Signature:

A handwritten signature in black ink, appearing to be "H" or similar.

Authorised Signatory



**PRINCIPAL**  
The S.I.A. College of Higher Education  
DOMBIVLI (E)





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M/s S. I. A. COLLEGE OF HIGHER EDUCATION

P.88 MIDC RESIDENTIAL AREA,  
NEAR BAJAJI MANDIR,  
DOMBIVALI ( E )

Invoice No :

CIP1488

Date:

08/09/2022

Order No.

Date:

GST NO: .

STATE CODE 27

CH.NO	PARTICULARS	HSN	QUANTITY	GST %	RATE	AMOUNT
	BOX FILE	48191010	3 NO	18	65.00	195.00
	A/4 REAM RED 70 GSM PAPER	4802	3 PKT	18	210.00	630.00
	RUBBER BAND	40169920	1 PKT	18	200.00	200.00
	STAPLER NO 10	84729010	1 NO	18	25.00	25.00
	LONG BOOK 200PGS	48201020	5 pcs	18	45.00	225.00
	PEN	9608	6 NO	18	5.00	30.00
	PERMANANT MARKER PEN	96082000	1 NO	18	17.00	17.00
	WHITENER PEN	9608	2 NO	18	20.00	40.00
	PENCIL	96091000	6 PKT	18	5.00	30.00
	ERASER	40169200	2 NO	5	3.00	6.00
	PEN DRIVE	8471	2 NO	18	300.00	600.00

For ELEGANT STATIONERS  
Proprietor/Authorised Signatory



GST TIN NO.: 27ADPPD9762N1ZP

Total

1,998.00

%	SGST Amt.	CGST Amt.	IGST Amt.	Total Amount		
GST 0 %	0.00			0.00	Discount	0.00
GST 5 %	6.00	0.15	0.15	6.30	Packing & Forward	0.00
GST 12 %	0.00			0.00	ADD CGST	179.43
GST 18 %	1,992.00	179.28	179.28	2,350.56	ADD SGST	179.43
GST 28 %	0.00			0.00	ADD IGST	0.00
					Other (+/-)	0.00
					Round Off(+/-)	0.14
					<b>Grand Total</b>	<b>2357.00</b>

Rs. Two Thousand Three Hundred Fifty Seven Only

1. Goods once sold will not be taken back or exchanged under any circumstances.
2. Payment after due date 24% interest will be charged.
3. We take every care in packing the goods but we are not responsible for any damage , shortage or theft in transit.
4. Payment must be made by payees A/C cheque only.
5. Cheque return charges
6. Any dispute Subject to Mumbai Jurisdiction only

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A/C: 99420400000007  
IFSC: BARB0DBGHTW  
Branch: BANK OF BARODA  
GHATKOPAR (W)

For ELEGANT STATIONERS

Authorised Signatory



CASH MEMO @ : 2517 52 27  
2517 12 20

### GULATI SERVICE CENTRE



DEALERS : INDIAN OIL CO. LTD.  
L.B.S. Marg, Vikhroli (W), Mumbai - 79.

No. 4505 Date 8/8/22

PARTICULARS	AMOUNT	
	Rs.	P.
Xtra Premium		
Petrol 9.68	1029	08
Diesel		
Servo Oil & Accessories		
C.N.G.		
Thank You!	TOTAL	1029 08

VAT TIN : 27070001219 V w.e.f. 01/04/06 E.& O. E.

Vehicle No. MH105 AE 5088

CASH MEMO @ : 2517 52 27  
2517 12 20

### GULATI SERVICE CENTRE



DEALERS : INDIAN OIL CO. LTD.  
L.B.S. Marg, Vikhroli (W), Mumbai - 79.

No. 1609 Date 12/9/22

PARTICULARS	AMOUNT	
	Rs.	P.
Xtra Premium		
Petrol 10.0	1063	31
Diesel		
Servo Oil & Accessories		
C.N.G.		
Thank You!	TOTAL	1063 31

VAT TIN : 27070001219 V w.e.f. 01/04/06 E.& O. E.

Vehicle No. MH105 AE 5088















To KISHOR MANIKRAO ...



₹1,500

Dr Nitin kumar Patil The  
SIA college Dombivli  
conference fees 29th jan

Split with friends

Completed

Jan 7, 2023 1:45 PM

 Bank Of Maharashtra XXXXXXXX3337	
UPI transaction ID 300755478600	
To: KISHOR MANIKRAO WAGHMARE 7276894561@ybl	
From: Mrs RANJANA JAGDISH MHALGI (Bank Of Maharashtra) rjmhalgi@okaxis	
Google transaction ID CICAgJCp_N-nUQ	



Powered by



G Pay





To RAJAMANICKAM T

₹2,500

Nitinkumar M. Patil foe UGC Care  
publication

Split with friends

✓ Completed

14 Jan 2023 15:40



Union Bank of India  
XXXXXXXXXXXX5796



UPI transaction ID  
301479230912

To: RAJAMANICKAM T  
rajamanickamthangavel@sbi

From: MUKUL SATISH KULKARNI (Union Bank  
of India)  
kulkarnimucool@okaxis

Google Transaction ID  
CICAgJDZnvmwlg

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G Pay



**POLLUTION PREVENTION AND MITIGATION  
MEASURES: A CASE STUDY OF DOMBIVLI,  
DISTRICT- THANE, MAHARASHTRA**

A Report on  
**Minor Research Project**

Submitted  
To



**Soliton NetLink Pvt. Ltd., Unit No. 40, GNP Solitaire, MIDC, Phase I,  
Dombivli (E), Dist. Thane, M.S., India PIN 421 203**

In  
**Environmental Studies**

By  
**Dr. Nitinkumar M. Patil**  
(Assistant Professor)



**Department of Commerce**  
**The S.I.A. College of Higher Education**  
P-88, MIDC, Residential Area, Dombivli Gymkhana Road  
Near Balaji Mandir, Dombivli (East), 421 203

**March 2023**





## DECLARATION

I hereby declare that the research work embodied in the present report entitled "**Pollution Prevention and Mitigation Measures: A Case Study of Dombivli, District Thane- Maharashtra**" has been carried out by me for the minor research project, funded by Soliton NetLink Pvt. Ltd., Unit No. 40, GNP Solitaire, MIDC, Phase I, Dombivli (E), Dist. Thane, M.S., India PIN 421 203. Neither the report nor any part of it has been submitted to any other agency for funding. The help taken during the conduct of this project has been duly acknowledged.



**Dr. Nitinkumar M. Patil**

Department of Commerce  
The S.I.A. College of Higher Education,  
Dombivli (E)





*DEDICATED TO THE RESIDENTS OF DOMBIVLI,  
TAKING EFFORTS TO COPE WITH THE PROBLEM  
OF ENVIRONMENTAL POLLUTION*





## ACKNOWLEDGEMENT

*With great pleasure and a deep sense of gratitude, I express my sincere and heartfelt thanks to Mr. Manish Ratnaparkhi, Director, Soliton NetLink Private Limited, Unit 40, GNP Solitaire, MIDC, Phase I, Dombivli (E), Dist. Thane, M.S., India, PIN 421 203 for providing financial assistance for this Minor Research Project (MRP).*

*I wish to express my sincere thanks to Hon. Shri. K. V. Ranganathan sir, President, Hon. Shri. M. Gopalakrishnan sir, Secretary and the managing committee of The South Indian Association, Dombivli for encouraging me to undertake this project. I am very grateful to the principal Dr. Mrs. Padmaja Arvind, and vice principal Mrs. Booma Halpeth, the S.I.A. College of Higher Education, Dombivli for giving constructive suggestions while working for the project. Thanks, are also due to Mrs. Hema Iyengar, Convenor, Department of Commerce, all my colleagues and non-teaching staff of the department for their constant support.*

*I convey my thanks to the concerned authorities and staff of the Kalyan Dombivli Municipal Corporation (KDMC) for providing essential data and having fruitful discussions on the topic selected for the research. I am also thankful to the authorities from various institutions and departments viz. Maharashtra Pollution Control Board (MPCB), Kalyan, Maharashtra Industrial Development Corporation (MIDC), Dombivli, India Meteorological Department (IMD) Pune, Gokhale Institute of Politics and Economics, Pune and Department of Environmental Science, Savitribai Phule Pune University, Pune for making available the relevant literature.*

*I am thankful to Mr. Abhinav Kurkute, Pune for helping me in the completion of cartographic work for this project. I am thankful to Mrs. Bharti Rao, librarian of the SIA college of higher education for her help in searching for the references. I am thankful to all the office, non-teaching and supporting staff of the SIA college of higher education. It was impossible for me to complete this work without their support.*

*Very heartfelt thanks are due to all my family members for their support during the period of this research work and for relieving me of my family responsibilities. Finally, I am thankful to all those who have directly or indirectly helped me at various stages of the completion of this work.*



**Dr. Nitinkumar M. Patil**





# CONTENTS

## ACKNOWLEDGEMENT LIST OF TABLES AND FIGURES

	Page No.
<b>CHAPTER I INTRODUCTION</b>	
1.1 Introduction	09
1.2 Objectives	11
1.3 The study area	11
1.4 Methodology	12
1.5 Arrangement of the Text	12
1.6 Scope of the Study	12
<b>CHAPTER II PHYSICAL ENVIRONMENT OF DOMBIVLI</b>	
2.1 Introduction	14
2.2 Location	14
2.3 Geology	18
2.4 Physiography	18
2.5 Drainage	18
2.6 Climate	18
2.6.1 Temperature	19
2.6.2 Rainfall	19
2.6.3 Humidity	19
2.6.4 Cloudiness	19
2.7 Soils	19
2.8 Natural Vegetation	20
2.9 Ground truth Information	20
<b>CHAPTER III SOURCES OF POLLUTION</b>	
3.1 Introduction	21
3.2 Sources of Air Pollution	21
3.2.1 Industrial Emissions	21
3.2.2 Brick Kilns	21





3.2.3	Auto Vehicles	22
3.2.4	Paddy Fields	22
3.2.5	Construction Industry	23
3.2.6	Domestic Activities	24
3.2.7	Refrigeration and Air conditioning (RAC)	24
3.2.8	Rabbing	25
3.2.9	Cattles	25
3.3	Sources of Water Pollution	25
3.3.1	Industrial Effluents	25
3.3.2	Domestic sewage	26
3.4	Sources of Noise Pollution	26
3.4.1	Auto Vehicles	26
3.4.2	Industries	27
3.4.3	Market Places	27
3.4.4	Domestic Noise Pollution	27
3.5	Sources of Soil Pollution	27
3.5.1	Industries	27
3.5.1	Auto vehicles	28
3.5.2	Agriculture	28

#### **CHAPTER IV EXISTING EMISSION CONTROL MEASURES**

4.1	Introduction	29
4.2	Air Pollution	29
4.2.1	Use of Liquefied Petroleum Gas (LPG)	29
4.2.2	Use of local trains	30
4.2.3	Use of e vehicles for private and public transportation	30
4.2.4	Low level of energy consumption	31
4.2.5	Optimum use of auto vehicles	32
4.2.6	Use of renewable energy resources	33
4.3	Water Pollution	34
4.3.1	Wastewater treatment	34
4.3.2	Water Purification at domestic level	35





4.3.3	Water conservation	35
4.4	Noise Pollution	36
4.4.1	Declaration of silent zones	36
4.4.2	Use of low noise making vehicles	36
4.4.3	Tree plantation	37
4.4.4	Time limits for using loudspeakers	37
4.5	Soil Pollution	37
4.5.1	Implementing water management practices	38
4.5.2	Controlling industrial pollution	38
4.5.3	Promoting organic farming	38
4.5.4	Remediation of contaminated sites	38
4.5.5	Educating people	38

#### **CHAPATER V CONCLUSION AND SUGGESTIONS**

5.1	Introduction	39
5.2	Suggestions	39
5.3	Conclusion	40
5.4	Future line of Research Work	40

**REFERENCES  
QUESTIANNNAIRE  
PHOTOGRAPHS**





## LIST OF TABLES

Table No.	Title of the table	Page No.
2.1	Mean monthly temperature at Dombivli	19
2.2	Monthly rainfall at Dombivli	19

## LIST OF FIGURES

Table No.	Title of the figure	Page No.
2.1	Location map of Dombivli	15
2.2	Satellite image of Dombivli	16
2.3	Land use Pattern of Dombivli City	17
2.4	Built-up area of Dombivli City	17
3.1	Factors Affecting Production and Emission of CH <sub>4</sub> and N <sub>2</sub> O from Irrigated Paddy Fields.	23





## APTER I INTRODUCTION

*Present chapter includes the Introduction, objectives and a short information about the study area. A brief methodology, arrangement of the text and scope of the study is also given in this chapter.*

### **1.1 Introduction**

Any undesirable change in the Physico-chemical and/or biological properties of the environment which may cause harm to living organisms including human beings is known as environmental pollution. It is the release of harmful substances into the environment due to the natural and anthropogenic activities. Today, the negative impact of man's activities on our environment globally cannot be over-emphasized. This is because the explorations, innovations and modern technology which have to do with the use of materials are now threatening the earth as a planet and hence demand urgent attention (Gulumser, T. et. al. 2009). Human interference in the environmental composition alters the ecology and imbalance are imposed in the ecosystem. Concern for the environment has been a global issue for the last few centuries now, as early as the 13<sup>th</sup> century in the United Kingdom when responding to the burning of coal in the city of London as it was proved hazardous to the environment. In the year 1273; the King banned the burning of coal in London. The innovations and economic growth have posed a great challenge to changes in our environments especially industrialized nations (Harris B. -Roxas and Harris 2011). With this background, most of the developed and developing countries across the world have strengthened their efforts and adopted suitable strategies to cope with the problem of environmental pollution by taking special efforts and conducting campaigns which includes the appropriate waste management, changing lifestyle, implementation of legislation on waste disposal. But as pollution is an outcome of input and output, managing the aspect of usage and disposal alone cannot successfully control the arrival of these possible hazards, therefore plan for the environment and waste management approach seems to be hopeful and inexpensive. Henceforth the awakening challenge to academicians, scholars, scientists, engineers and technocrats to be equipped with the knowledge of anthropogenic activities that alters the natural environment and how they can be managed to ensure eco-friendly initiatives is very important.

Environmental pollution refers to making the environment unfit and incompetent for survival of all living organisms. Once the pollutants entered into the atmosphere, they could directly be harmful form the potential hazards. Primary pollutants such as soot and carbon





monoxide or form potential hazards due to their reaction with chemicals in the form of secondary pollutants in the atmosphere. Environmental pollution can be classified into four types viz. (1) Air pollution (2) Water pollution (3) Noise Pollution and (4) Soil Pollution.

#### **(1) Air pollution**

It is the result of pollutants released into the air such as smoke from industrial boilers, auto exhaust and the burning of organic substances. Particulate dusts released from mining, sawmills, construction industries and cement industries are also responsible for air pollution. Gaseous emission from industrial wastes is also responsible for air pollution. Air pollution has serious and severe effects on human health and is also responsible for environmental degradation. It is a serious problem encountered mostly in industrial zones and populated urban areas across the world. Respiratory problems among humans, greenhouse effect, global warming-induced climate change, acid rain, depletion of ozone layer and formation of photochemical smog are some of the consequences of air pollution.

#### **(2) Water Pollution**

Water pollution occurs when harmful substances contaminate a stream, river, lake, ocean, aquifer and other water bodies on the earth's surface degrading water quality and rendering it toxic to humans and living organisms in the environment. Water is a universal solvent. It is able to dissolve more substances than any other liquid on the earth. Groundwater pollution, surface water pollution and ocean water pollution are the types of water pollution.

#### **(3) Noise Pollution**

Noise pollution is the propagation of noise with ranging impacts on the activity of human or animal life. The sources of noise pollution can be classified into natural and anthropogenic. Torrential rain and thunderstorms are the natural sources while auto vehicles, aircraft, industries, firecrackers, television, transistor, radio and loudspeakers are the anthropogenic sources of noise pollution. It results in hearing loss in humans and animals.

#### **(4) Soil Pollution**

This type of pollution refers to the contamination of soil with anomalous concentrations of toxic substances. It is a serious environmental concern since it results in many health hazards. Agriculture, industries, mining, domestic waste and military activities cause soil pollution. Soil pollutants enter into the human body through food chain causing illness to appear. When soil pollution takes place in fertile soils, it reduces soil fertility and results into the lowering of soil fertility.





As most of the cities across the world are becoming centers of environmental pollution, an attempt has been made in this study to understand the status of pollution prevention and mitigation measures in the city of Dombivli.

## **1.2 OBJECTIVES**

The present study is aimed to know the sources of environmental pollution and pollution prevention measures adopted by the residents of Dombivli. This has been achieved with the help of following objectives.

1. To identify the existing sources of air, water, noise and soil pollution.
2. To understand the existing methods to reduce emission of pollutants.
3. To suggest possible measures to reduce the emission of the pollutants.

## **1.3 THE STUDY AREA**

The present study on pollution prevention and mitigation measures, Dombivli, deals with the identification of existing sources of environmental pollution and suggests feasible measures for the reduction of pollutants being emitted from different sources. Dombivli, one of the census towns and suburbs of Mumbai, is selected for the present study. The city is situated in Kalyan tehsil of Thane District, in the Maharashtra State of India. It is located about fifty kilometers far from the city of Mumbai and about twenty kilometers away from Thane to the south of river Ulhas. Dombivli enjoys a tropical climate with a mean annual temperature of 24.30°C (min) to 32.9°C (max). The hottest and driest part of the year is obtained from April to May, during which the atmospheric temperature rises up to 38°C. Humidity usually ranges between 58 to 84%. The city experiences sea breezes in the evening which is helpful to combat high temperature during the summer months. The southwest monsoon is the main source of fresh water for the city. The city of Dombivli typically receives 2024.57 mm of precipitation and has 133 rainy days annually. The population of the city has over the years been subject to dynamic influences. The city's population is predominantly Maharashtrian but people from various states of the country viz. Gujarat, Uttar Pradesh, Bihar Karnataka, Tamil Nadu, Kerala, and Punjab have settled in this city. The unique culture of Dombivli is reflected in the '*Navavarsha Swagat Yatra*' organized on the first day of the Hindu New Year. Youths from Dombivli take part in this event to welcome the New Year. Dombivli has a unique and diverse culture. People celebrate festivals like Diwali, Ganpati, Navratri etc.





#### **1.4 METHODOLOGY**

The present study is one of the attempts to understand people's perception of environmental pollution and the measures adopted by them to overcome this problem. Information on the physical setting of the city is obtained from satellite images and SOI (Survey of India) sheets. The government publications viz. Action plan for Industrial cluster, Dombivli published by the Maharashtra Pollution Control Board (MPCB), Socio-Economic Review and District Statistical Abstract published by the government of Maharashtra are referred to obtain the data on land use, population and the type of economic activities being practiced. Climatic data is obtained from secondary sources of information.

A questionnaire schedule, personal interviews, discussions and ground observations were made to obtain first-hand information. The obtained information was verified, Processed, computed and presented in the form of suitable cartographic techniques.

#### **1.5 ARRANGEMENT OF THE TEXT**

The current chapter deals with the introduction to the present research work and presented in the project report. It also refers to the objectives and methodology adopted. It discusses about the chapter scheme and scope of the study. As the physical environment has a substantial impact on natural phenomena and economic activities, the information on geographical location, geology, physiography, Drainage, Climate, Soils and natural vegetation is given in the second chapter. The information obtained through questionnaires, personal interviews and discussions held with the local residents and concerned authorities is also given in the end of chapter II.

Before giving suggestions on the existing situation and knowing the causes of environmental pollution an attempt has also been made to find out the sources of environmental pollution in the city. Chapter III is devoted to know about the existing sources of pollution.

Chapter IV is aimed at understanding the practices adopted to control environmental pollution. It also deals with the methods implemented and measures undertaken at various levels.

Chapter V deals with the conclusion, suggestions and future line of the research work.

#### **1.6 SCOPE OF THE STUDY**

Environmental pollution has now become one of the major issues across the world. Growing population, rapid industrialization, urbanization and expansion of transportation network are the main causes of environmental pollution observed in urban areas of the world. Thus, the prevention of environmental pollution and implementation of mitigation measures have got immense importance today. Global warming, acid rain, spread of waterborne diseases, loss of hearing





capacity, and depletion of the ozone layer are some of the common effects of environmental pollution.

Today, there are a lot of discussions and debates being held on the prevention of environmental pollution. Experts, Scholars and scientists are suggesting different measures to be undertaken at various levels. Now, the time has come to implement all these suggestions and measures of pollution control at the grass root level. With this background, today, the city-level study of environmental pollution has got an immense importance.

Such a city-level study to know about the causes of environmental pollution and implementation of remedies to control the same will definitely yield some output in the direction of coping with the problem of this environmental issue.





## CHAPTER II PHYSICAL ENVIRONMENT OF DOMBIVLI

*An attempt has been made in this chapter to evaluate the information on physical setting of Dombivli. It also consists of the information on location, geology, drainage, climate, soil, natural vegetation and geographical setting of Dombivli. The ground truth information obtained through questionnaires and personal discussions with the natives, industrial workers, experts and farmers is also incorporated in this chapter.*

### 2.1 INTRODUCTION

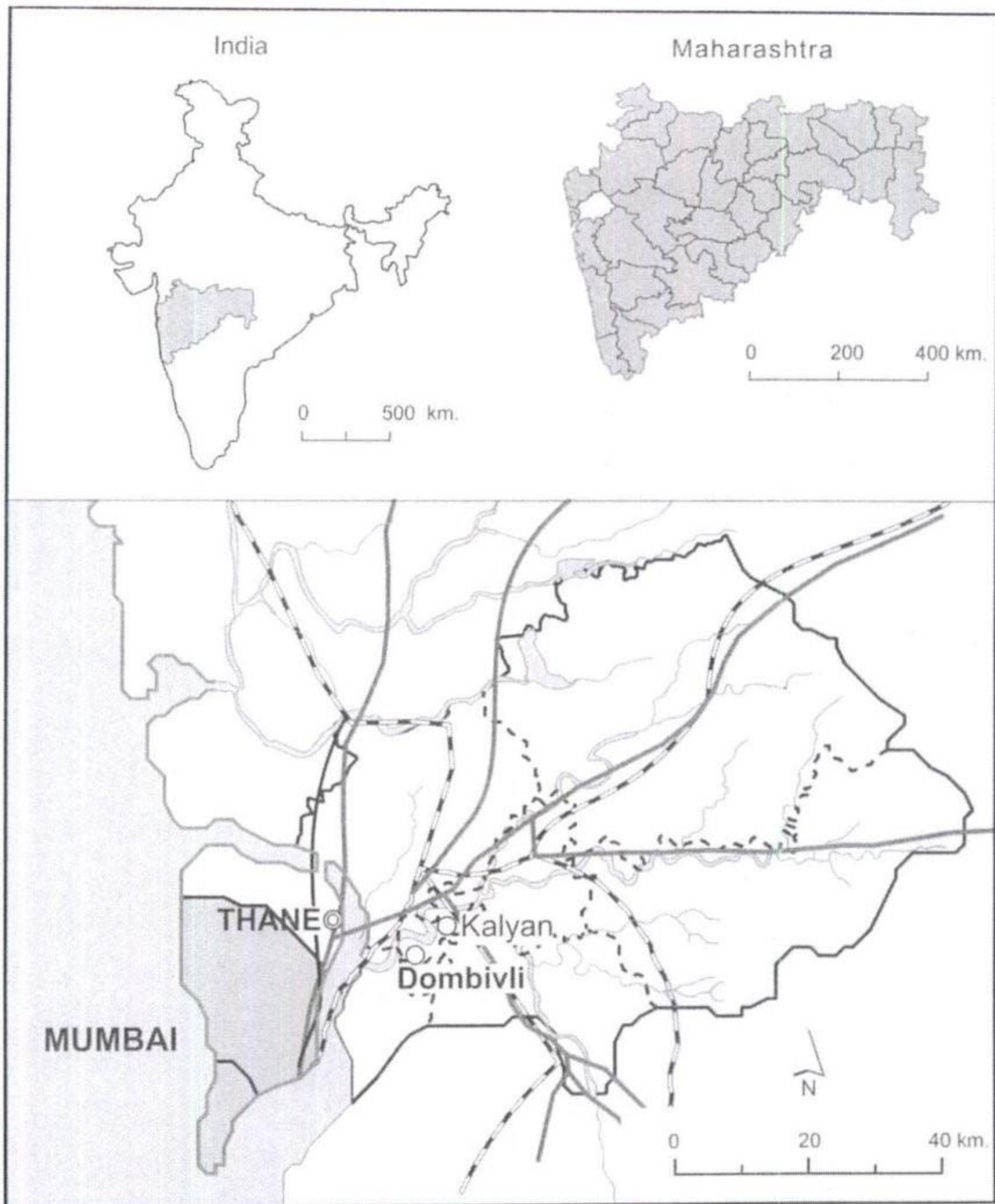
Dombivli, a suburban industrial city is located in the northern part of Konkan region in the state of Maharashtra. Geographically, it lies in the Ulhas River basin and located on the southern banks of river Ulhas. The city is a part of Mumbai Metropolitan Region. Dombivli is served by Mumbai sub-urban railway network. Built in 1886, Dombivli is one of the busiest railway stations on central line of Indian Railway. Though none of the long journey express trains halt here, it is well connected to Mumbai and Navi Mumbai through Thane. Distance between Mumbai and Thane is 15 km. While the distance between CSMT (Chhatrapati Shivaji Maharaj terminal) and Dombivli is 48 km. It takes 1 hour to reach via fast local train. As an industrial settlement, various anthropogenic activities are being carried out at this place. These activities are making the environment risk prone. Soils of Dombivli are not much productive. Cultivation of paddy is a common agricultural practice at some places around the city. With this background the present chapter is committed to understand the physical setting of Dombivli.

### 2.2 LOCATION

The location of any place reflects the environmental condition and quality of the environment of that place; thus, it has a great significance in the geographical study of any city. The city of Dombivli is located in the north Konkan region of Maharashtra at 19° 21' North latitudes and 73° 08' East longitudes (Fig. 2.1). It is located in the western coastal plain of India at 13.534 mt. asl (above mean sea level). Dombivli is one of the important towns on the Mumbai-Delhi and Mumbai-Chennai railway routes. Mumbai-Agra National Highway no.3 lies near the city (Fig. 2.2). The land use pattern and built-up area in Dombivli city is shown in fig. 2.3 and 2.4 respectively.







LOCATION MAP OF DOMBIVLI

Fig. 2.1





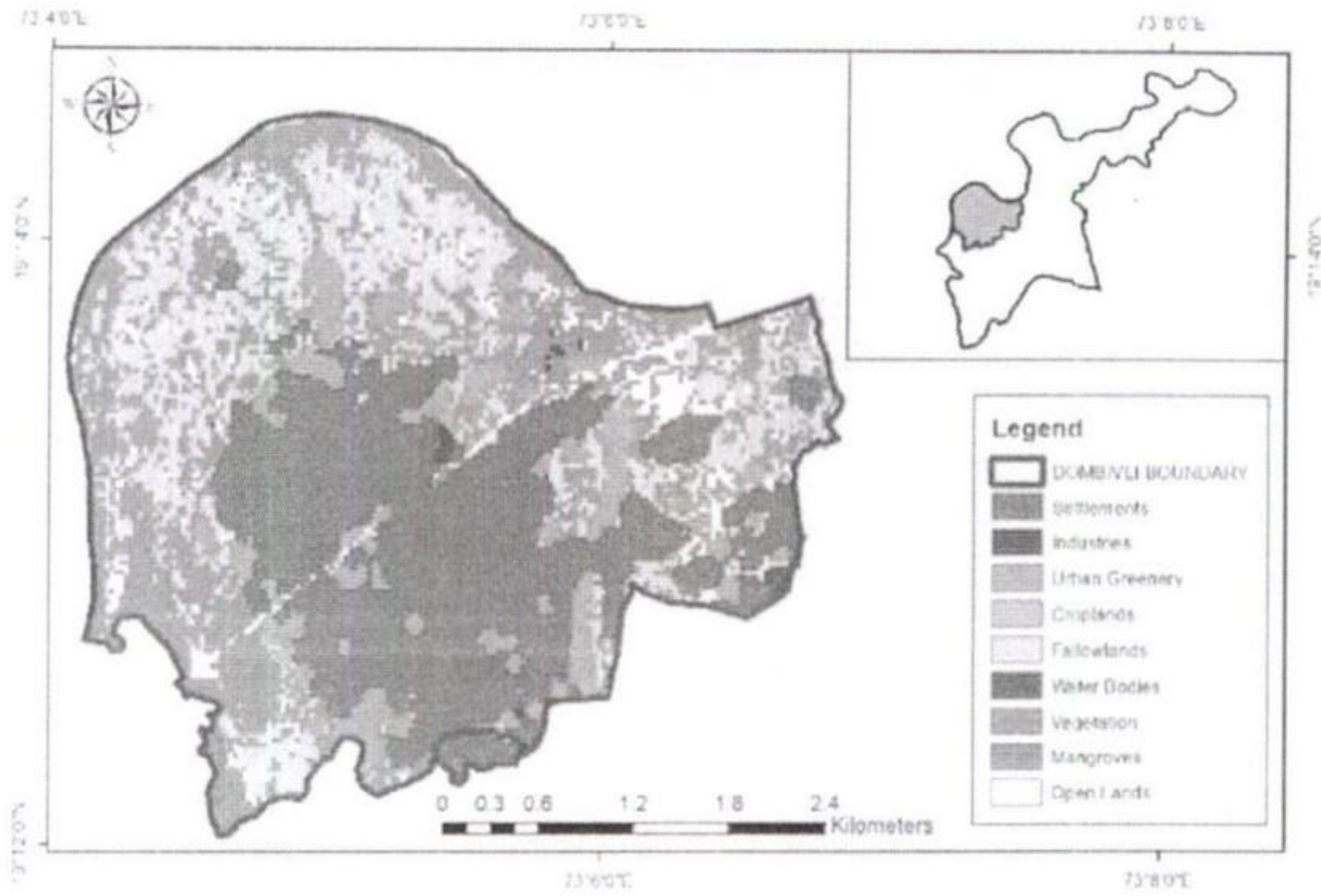


**Satellite Image of Dombivli**

**Fig. 2.2**

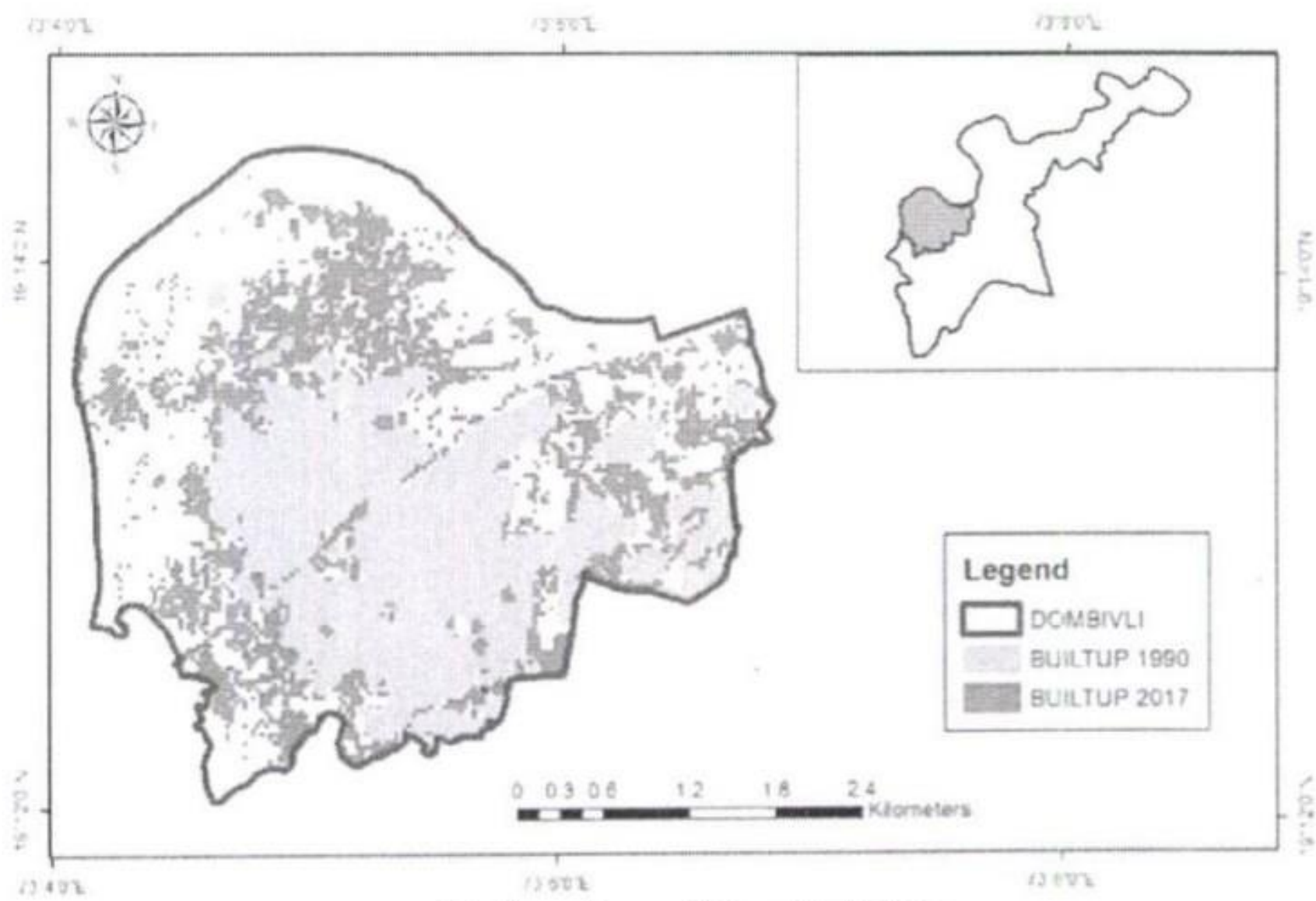






Land use Pattern of Dombivli City

Fig. 2.3



Builtup Area of Dombivli City

Fig. 2.4





### **2.3 GEOLOGY**

Deccan traps basalt of upper cretaceous to Lower Eocene age is the major rock type covering most of the area, creek alluvium is other formation occurring only in western end of the city.

### **2.4 PHYSIOGRAPHY**

The city of Dombivli is situated in the narrow coastal plain of Konkan Region of Maharashtra, which has spread between Arabian Sea to the west and Sahyadri scarp to the east. Dombivli is located in the Ulhas River basin. The city of Dombivli has an average elevation of 13.5 meters above mean sea level. The land in and around the city of Dombivli is rough and rocky by nature.

### **2.5 DRAINAGE**

The city of Dombivli is located in the Ulhas River basin. The area of the city is drained to this river through streams. As most of the land is brought under construction, streams of the area are narrowed, resulting in a decrease in their water-carrying capacity.

### **2.6 CLIMATE**

Climate denotes average weather over a particular area on a time scale of thousands of years to a few years or even on inter-annual, seasonal and monthly scale (Pant and Rupa Kumar, 1997). Temperature and rainfall amongst all climatic elements are the key elements, governed by physical factors like geographical location of the place, relief, distance from the sea and physiography of the region. It governs the types of anthropogenic activities and the spread of pollutants in an area. Thus, an attempt has also been made to know the climatic characteristics of Dombivli.

Climate of the Thane district is characterized by high humidity throughout the year, an oppressive summer followed by well-distributed and heavy rainfall during the southwest monsoon season. The cold season starts from December to February followed by summer from March to May. The southwest monsoon season is from June to September while October and November constitute as a post-monsoon season. The mean daily maximum temperature is 32.9°C and mean daily minimum temperature at 26.8°C. The normal annual rainfall over the district ranges from 1900 mm to 2600 mm. The rainfall analysis carried out for the past 50 years (1961-2010) using Thane IMD data indicates that the probability of incidence of moderate drought is 18%, severe and acute drought is nil and the probability of receiving normal rainfall and excess rainfall are 64% and 18% respectively (GoI, 2013).





### 2.6.1 Temperature

Dombivli experiences its highest temperature of the year during the summer season. The month of May records highest (30.1<sup>0</sup>C) temperature while January records the lowest temperature (23.6<sup>0</sup>C) of the year. The monthly temperature increases from January and reaches at its peak in the month of May. Further, it is because of the onset of SW monsoon, the temperature decreases from the month of June (Table 2.1).

**Table 2.1 MEAN MONTHLY TEMPERATURE (°C) AT DOMBIVLI**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp	23.6	25.1	27.6	29.3	30.1	27.9	26.1	25.9	26.3	27.3	26.5	24.6

Source: CLIMATE-DATA.ORG

### 2.6.2 Rainfall

The mean annual rainfall of Dombivli is 1,439 mm. The north-south stretching Western Ghats in the east, affects the rainfall pattern of the city. Dombivli receives about 92.43% (1330 mm) of its annual rainfall during the period of SW monsoon season. The month of July records the highest (446 mm) rainfall while, the months of January, March and April receives no (0 mm) rainfall (Table2.2).

**Table 2.2 MONTHLY RAINFALL (mm) AT DOMBIVLI**

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	0	1	0	0	19	319	446	328	237	75	9	5

Source: CLIMATE-DATA.ORG

### 2.6.3 Humidity

Owing to the proximity of the Arabian sea, the climate of the city is on the whole humid nearly all through the year.

### 2.6.4 Cloudiness

During the season of SW Monsoon, i. e. the period between June and July, the skies are heavily clouded to overcast. Skies remain clear to lightly clouded during rest of the year.

## 2.7 SOILS

Soils of Dombivli are brownish-black in color and are suitable for Paddy cultivation. Excessive chemical weathering and leaching of parent rock in high rainfall and temperature boost the process of laterization and formation of lateritic soils take place. Presence of oxides and hydroxides of iron in the soil color the laterites reddish to brownish. The lateritic soils are more permeable and acidic in their nature. As these soils are devoid of base metals, their pH ranges





between 5 and 6. Soils at Dombivli are rich in nitrogen and they can support forests and few crops like millet, paddy etc.

## 2.8 NATURAL VEGETATION

The natural vegetation in and around the city is of tropical moist deciduous type. The common plant species found are *Tectona grandis* (Teak), *Madhuca indica* (Moha), *Butea monosperma* (Palash), *Terminalia crenulata* (Aien), *Bridelia retusa* (Asana), *Acacia catechu* (Khair), *Lagerstroemia parviflora* (Bondara), *Syzygium cuminii* (Jambul), *Carrissa carandas* (Karvanda), *Calycopteris floribunda* (Ukshi), *Woodfordia fruticosa* (Dhayati) etc.

## 2.9 GROUND TRUTH INFORMATION

The information available from the office of Kalyan-Dombivli Municipal Corporation (KDMC) was utilized to understand the particulars of the town. This information facilitates the general background of Dombivli. However, by considering the significance of ground truth data, an attempt has also been made to extract information on people's awareness on environmental alertness. This has been achieved through the discussions held with the residents and questionnaire schedule implemented.

In all two hundred twenty questionnaires were filled and analyzed. It revealed that 88% of the residents are aware of the sources of environmental pollution, its causes, effects and possible measures to prevent it. As the settlement is densely populated and roads are narrow, air pollution levels normally remain high due to the congestion of auto vehicles. Residential areas, marketplaces, industrial zones and transportation systems are the main sources of environmental pollution. Brick kilns, paddy cultivation in the vicinity and domestic animals in the city are other sources of environmental pollution.

It is found that around 85% of the people are not aware of MPCB and government guidelines to cope with environmental pollution. Terms viz. global warming, climate change, acid rain and Ozone layer depletion are not known to 36% of the people. As the city of Mumbai with its suburbs are called as magnet for the migrants. The city of Dombivli has a large number of immigrants and they are not serious about the environmental problems of the city. About 26% of the residents are not aware of the measures to be implemented for reducing pollution levels; however, 52% of the people think that the growing population and deforestation are the only causes of global warming-induced climate change.





## CHAPTER III SOURCES OF POLLUTION

*The present chapter deals with the study of existing sources of environmental pollution. As industries, vehicular traffic, domestic and commercial activities are the important sources of environmental pollution, an attempt is made in this chapter to identify the sources by considering the type of pollution.*

### 3.1 Introduction

The previous chapter was focused on understanding physical environment of Dombivli. In an attempt to understand the pollution prevention and mitigation measure, one should have the knowledge about various sources of pollution in the study area. The city of Dombivli is one of the densely populated industrial settlements in the country. The city has multiple sources of environmental pollution like industries, auto vehicles, residential and market areas. Residents of this city face many environmental issues like contamination of air, water and soil, industries and traffic congestion-induced noise pollution and poor housing conditions worsen by uncontrolled urban development. Pollution prevention and mitigation measures with an integrated assessment of these risks will offer opportunities for holistic solutions in the urban environment that can bring multiple benefits.

### 3.2 Sources of Air Pollution

The city of Dombivli is one of the densely populated industrial cities of India. People in this city perform a variety of economic activities. Some of them can be identified as a source of air pollution. These are as follows.

#### 3.2.1 Industrial Emissions

Dombivli, a densely populated settlement, has a large industrial area with variety of industries as source of air and water pollution. The industrial area of Dombivli was developed in two phases by MIDC in the 70s and 80s. It comprises textile, engineering, chemical and other units. The majority of these industrial units are located in the vicinity of a residential area.

#### 3.2.2 Brick Kilns

With the expansion of Industrial area and growing job opportunities in banking, education, marketing, service, trade and transport sectors, the city is witnessing a variety of construction activities like houses, factories, roads, schools, colleges, malls, storehouses etc. With this background some of the brick kilns are developing around the city. Today, there are 11 brick kilns located around the city. Fossil fuel like coal, Organic fuel like dried grass and paddy straw are being used as a fuel in the process of brick baking. Burning of this organic and fossil fuel emits a variety of greenhouse gases like CO, CO<sub>2</sub>, SO<sub>2</sub> etc.





### 3.2.3 Auto Vehicles

The amount of CO and CO<sub>2</sub> emitted from burning a unit of mineral oil in the auto vehicle depends on the amount of carbon present in the fuel. During combustion, most of the carbon get emitted in the form of CO, CO<sub>2</sub> and Hydrocarbons. Carbon content varies from fuel type. It is observed that, except e-vehicles, motorbikes and auto rickshaws, passenger and goods transport vehicles use diesel as a fuel and emit a relatively large amount of GHGs. As a densely populated industrial city, Dombivli experiences heavy traffic within and around the city. The residents owned a sizable number of auto vehicles viz. motorbikes, light vehicles including auto rikshaws and motor cars as well as heavy vehicles like trucks and matadors. In addition, State Transport (ST) and City buses run in and around the city. Thus, a large a large number of vehicles in Dombivli emits Green House Gases (GHGs).

### 3.2.4 Paddy Fields

Rural parts around Dombivli are comprised of some paddy fields. In paddy fields, farmers apply nitrogenous fertilizers which are a major source of N<sub>2</sub>O. CH<sub>4</sub> emission is pronounced under anaerobic condition while intermittent drainage appreciably reduces its emission (Yogi et al. 1990). The paddy fields provide favorable conditions for the production and emission of methane and nitrous oxide. However, it is difficult to forecast the extent of the emission of these gases because factors affecting the production and emission of CH<sub>4</sub> and N<sub>2</sub>O from paddy fields are different. (Table 3.1) It is estimated that irrigated fields account globally for 70-80 percent of CH<sub>4</sub> from the global rice area, while rain-fed rice about 15 percent and deep-water rice about 10 percent have a lower share. So, irrigated paddy represents the most promising target for mitigation strategies (Wassmann et al., 2000). Many reviews have been published on the emission of CH<sub>4</sub> and N<sub>2</sub>O from soils and their mitigation (Eicher, 1990; Neue, 1993).

There are many interplaying factors, e. g. soil water content, nutrient application, organic matter in the soil, soil type (texture), soil pH, soil redox potential, soil flood water temperature, plant type and population, land management practices which influences the production and emission of the gases from irrigated paddy fields. Production of the gases may be far more than the actual emissions, as these gases get entrapped in soil (Neue, 1993; Majumdar et al., 1999). Methane is known to trap heat 5 times more effectively than CO<sub>2</sub>. It contributed about 18 per cent towards greenhouse effect. Several mechanisms are known, by which CH<sub>4</sub> is generated in paddy fields soil:



N<sub>2</sub>O is not only a greenhouse gas but is also responsible for the destruction of ozone layer. This gas is very stable with an average life of 150 years and moves into the atmosphere and result into NO





and NO<sub>2</sub>, which affect O<sub>3</sub> destruction in the stratosphere. It is estimated that every 5-15 parts of N<sub>2</sub>O, 1 part of O<sub>3</sub> is destroyed (Gupta, 2002).

**Table 3.1: Factors Affecting Production and Emission of CH<sub>4</sub> and N<sub>2</sub>O from Irrigated Paddy Fields.**

Sr.No	Factors	Response to CH <sub>4</sub>	Response to N <sub>2</sub> O
1	Soil Submergence	Enhanced emission	Enhanced emission
2	Intermittent drainage	Reduced emission by In fluxing O <sub>2</sub> in Soil	Increased
3	Soil temperature	Increase with rising Temperature	Increased
4	Organic matter application	Increase drastically	Increase with addition
5	Urea	Both increased and decreased than control	Increased emission
6	Potassium nitrate	Reduce emission	More emission
7	Calcium Sulphates	Mitigated emission	NA
8	Urea incorporated	Mitigated	Mitigated
9	Nimin coated urea	Mitigated emission	Mitigated emission
10	Dicyadamide (DCD)	Mitigated emission	Mitigated emission
11	Encapsulated calcium carbide (ECC)	Mitigated emission	Mitigated emission
12	Soil texture	Heavy soil, emitted less	Heavy soil lesser Emission
13	Soil pH	7.5-8.5 range is optimum for production	Optimal 8.5 for production with a decrease below 6.5
14	Chemical addition	Mn <sup>2+</sup> , NO <sup>3-</sup> , SO <sup>2-</sup> Mitigate production preventing reduction. Fe <sup>3+</sup> by	No <sub>3</sub> <sup>-</sup> may increase while others do not.

(Source: Majumdar, 2003)

### 3.2.5 Construction Industry

Dombivli with Kalyan is a twin city with textile, chemical and other types of industrial units located in an industrial area developed by the Maharashtra Industrial Development Corporation (MIDC). It provides job opportunities to the people in various sectors like service, manufacturing, trade and transportation. With this background, the establishment of factories, housing societies and apartments in Dombivli have boosted the construction industry which is one of the major sources of air pollution. CO, CO<sub>2</sub> and other GHGs emitted from construction, demolition and allied activities are the major constituents of GHGs getting released from the town.

The buildings constructed for residential and industrial purposes consume energy in five





different phases. Manufacturing of building material is the first phase of energy consumption. The second phase corresponds to the energy used in transportation of material from production plants to the site of construction. The third phase of energy consumption is related to the energy used in the actual construction work of the buildings. In fourth phase, energy is being consumed at the operational activities, i. e. after the building is occupied. While in last phase energy is consumed in the demolition process of building as well as in the recycling of its parts.

### **1. Production of construction material**

The production of construction material like bricks takes place in and around the city of Dombivli which needs energy through the burning of coal, oil and paddy straw that in turn release a large volume of GHGs.

### **2. Transportation of construction material**

Use of diesel trucks for transportation of construction material is a common practice in Dombivli. Most of these trucks are not maintained properly. Sometimes they are overloaded and emit a large amount of smoke containing greenhouse gases like CO, CO<sub>2</sub> and other GHGs.

It is because of the shortage of laborer and for time constrain, automated mixers and lifts are being used in construction work. Both these types of machines consume diesel as a source of energy and they emit GHGs.

### **3. Operational phase of construction**

In this phase families residing in the buildings and machinery operated in the factories use different sources of energy like LPG (Liquefied Petroleum Gas), kerosene, cow dung cakes, wood etc. that emit greenhouse gases like CO<sub>2</sub> in the form of smoke.

### **4. Demolition of structures**

Demolition of old structures is one of the important phases in construction activity where the consumption of energy takes place to run different machines. Most of the machines used for this purpose consume diesel and emit smoke into the atmosphere.

#### **3.2.6 Domestic Activities**

Domestic activities like use of fossil fuel such as kerosene, cow dung, wood and paddy straws emit GHGs like CO and CO<sub>2</sub>, the incomplete combustion of fuels emit a large amount of smoke in the atmosphere and release GHGs. The use of hanky perfume spray is one of the domestic sources of GHGs in the city.

#### **3.2.7 Refrigerators and Air conditioning (RAC)**

Dombivli, being an industrial town and a settlement of middle-class population, there are many units of Refrigeration and air conditioning. The direct emissions associated with the loss of refrigerant from the cooling system take place because of the leakages, during maintenance or





during end-of-life decommissioning. Many refrigerants release very powerful GHGs like HFCs and CFC's so even a small leak can have a significant environmental impact.

### **3.2.8 Rabbing**

The contribution of this source is very less in the emission of greenhouse gases. Rice cultivators in and around Dombivli follow the conventional practice of burning litter called rabbing in which they burn a piece of land where a rice nursery has to be developed. Some of the rice growers have adopted the age-old method of preparing rice seedlings, in which farmers spread cow dung cakes, grass, dry leaves, dried twigs on the piece of land and they burn it. The material to be burnt in Rabbing varies according to its availability; nearness of forest, distance from the house and availability of material. Rabbing is the partial sterilization of soil in which burning of weed seeds takes place. It improves the soil structure and enhances nutritional value of it. Thus, it helps in substantial rising of seedlings. However, Rabbing involves a huge amount of organic matter which can be used as manure after composting. Rabbing helps in better germination of seeds and improves crop yield.

However, Rabbing creates ecologically undesirable situations by releasing different GHGs in the atmosphere like CO, CO<sub>2</sub> and SO<sub>2</sub>. Sometimes fire in Rabbing spreads widely and causes forest fire which is also one of the sources of GHGs.

### **3.2.9 Cattles**

Reared and stray animals like cows and buffalos in the city are one of the sources of Green House Gases. Though the cattle population is very less in the city, it adds to the emission of Green House Gases like methane. Eructation of methane by cattle begins approximately 4 weeks after birth when solid feeds are retained in the reticulorumen (Anderson et al. 1987). Fermentation and methane production rates rise rapidly during reticulorumen development. Estimates of yearly methane production of the typical beef and dairy cow range from 60 to 71 kg and 109 to 126 kg respectively (EPA, 1993).

## **3.3 Sources of Water Pollution**

The city of Dombivli has the potential to pollute water in many ways. Domestic sewage and industrial effluents are the major sources of water pollution in the city. Runoff from streets carries oil, rubber, heavy metals and other contaminants from automobiles. The sources of water pollution in the city of Dombivli are discussed below.

### **3.3.1 Industrial Effluents**

Industrial development in Dombivli has taken place in two different phases. Chemical, textile, engineering and other industrial units are located in this area. Most of these industries discharge effluent which contaminates the water bodies of the city. The major industries located in





the city are Gharda Chemicals Ltd., Runa chemical pvt. Ltd., Indo Amines Ltd., Sekhsaria chemical limited, Galaxy chemicals and pharmaceuticals limited, Shah chemicals, Omega fine chemicals, Samuha chemicals, Srinivasa chemicals, Altra pharma chemicals private limited, Real impex, Quality industries, S.P instruments and chemicals, Oasis chemical industries, Shreekrupa exports private limited, Runa Chemicals Private Ltd., Diksha chemicals, context chem private limited, Chemtech Pvt. Ltd., Akshat Chemicals, Runa Chemicals Pvt. Ltd. and Indo Amines Ltd.

The analytical study of mainstream toxic heavy metals viz. Arsenic (As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Cobalt (Co), Iron (Fe), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn) in water samples collected at the sites of effluent discharge in the river was conducted. There is a rise in the discharge of effluents into the Ulhas River near Dombivli due to widespread industrialization. Many of the major industries have facilities for the treatment of generated waste. But, in the case of small-scale industries, since they have lesser profit margins, they do not afford large investments to develop pollution control facilities. Thus, there is sufficient evidence related to mismanaged effluent disposal. Consequently, at the end of each time period, the pollution problem takes threatening concern.

### **3.3.2 Domestic sewage**

Domestic sewage is a wastewater that is removed from the daily routine of households, hotels, restaurants, schools, colleges, hospitals and shopping malls. With the improving purchasing power, high standard of living, the use of water for domestic purposes has also increased in the city of Dombivli, water used for vehicle washing, use of showers for baths, use of washing machines are some of the sources of increasing sewage. The sewage water of Dombivli is characterized by a large amount of organic matter like starch, proteins, fats and urea, which has to be separated properly.

### **3.4 Sources of Noise Pollution**

Being a suburb of the financial capital of the country, Mumbai and a magnet for migrants, the city of Dombivli is densely populated. There are various sources of noise pollution. However, major sources are as follows.

#### **3.4.1 Auto Vehicles**

Traffic noise is the result of the movement of auto vehicles especially old vehicles with minimal or no maintenance and those vehicles which have not been physically cleared to be driven on the roads. Being a densely populated industrial city, Dombivli experiences heavy traffic, resulting in the problem of noise pollution. Auto rickshaws, private cars, city buses, state transport buses, tourists buses, trucks carrying construction materials, debris, industrial materials, vegetables, fruits, electronics and other types of materials to be sold in the market are vehicular sources of





noise pollution in the city. Noise pollution is one of the fastest-growing environmental pollution types in the study area.

### **3.4.2 Industries**

The city of Dombivli is one of the major industrial cities in the state of Maharashtra. It has a variety of industries. Machinery, construction work and vehicles are the three most damaging sources of noise pollution in the industrial area. All these activities create intolerably high levels of sound that can irritate public. In addition to this, the construction works, blasting, bulldozing and various other similar activities create intense noise pollution.

### **3.4.3 Market Places**

Markets in Dombivli are of two types viz. Regular market and weekly market. Weekly Monday Market in Dombivli is a periodical phenomenon. Both are the major sources of noise pollution in the city. Vendors sitting on the footpath, hawkers selling vegetables and other items of daily needs are also the source of noise pollution.

### **3.4.4 Domestic Noise Pollution**

As a densely populated settlement with multistoried buildings, households are the major source of noise in the city. Music, raised voices, baby's crying, dogs barking, alarms, television sound, grinders, tape recorders, music systems and mixers are the main reasons of domestic noise pollution.

## **3.5 Sources of Soil Pollution**

Soils in the residential, market and industrial areas of Dombivli show variations in their physicochemical properties. Pollution levels of soils in the industrial area are high as compared to the soils from other areas.

### **3.5.1 Industries**

The results of the physicochemical parameters, inorganic and organic contents were obtained from the analysis of soil samples. In all, Dombivli soil samples are highly acidic, color of the soil also changes and in these samples quantity of the heavy metals is above permissible limits. Present conditions of the soil as well as water and air are dangerous conditions for humans, animals, plant etc. Working with soil releases particles into the air that may be inhaled by workers and others nearby. Very small particles may lodge in the lungs, and there is a chance that contaminants may be absorbed into the bloodstream. Compared to ingestion, this is a far less significant source of exposure, but may be relevant to those exposed repeatedly over a long time period. The more toxic form of chromium can cause skin contact problems. Absorption of a chemical through the skin is known as 'dermal absorption', or sometimes 'cutaneous' or 'transcutaneous absorption'. (Kulkarni and Bambardekar, 2019).





### **3.5.2 Auto vehicles**

The Vehicular population of Dombivli includes a variety of auto vehicles viz. auto rikshaw, city busses, trains, bikes, cars, trucks and matadors. Leakages of mineral oil from these vehicles are one of the major sources of soil pollution. Auto vehicles mainly add organic pollutants to the soil mainly in the form of mineral oil.

### **3.5.3 Agriculture**

There are some small paddy fields located in Dombivli. The use of chemical fertilizers and pesticides used in the field of agriculture pollutes the soil. The application of some chemicals in the form of weedicides and herbicides for plant protection also pollute soils in the city area.





## CHAPTER IV EXISTING EMISSION CONTROL MEASURES

*Emission of air, water, noise and soil pollutants in Dombivli is a regular phenomenon. Majority of the people in the city are aware of this fact. Thus, at the levels of individual and organization, efforts are being made to cope up with the problem of environmental pollution. The present chapter focuses on the understanding about existing pollutant emission control measures in the city.*

### 4.1 Introduction

An attempt has been made in the preceding chapter to know the sources of environmental pollution in Dombivli. The study reveals that, the city has a variety of pollution sources. The major sources of environmental pollution are industries, auto vehicles, households, market places, paddy fields, brick kilns and the burning of fossil fuels. No doubt, that this study is important in understanding the nature, sources and types of pollutants getting emitted from the city, however, in order to recognize the human efforts, put in the direction of reducing the emission of pollutants, it is always suggested to know about the existing methods being adopted to reduce the emission of pollution. Though the people of Dombivli are not fully aware of the methods of pollution control, knowingly or unknowingly they follow certain practices which serve the purpose. Following efforts are being made in the city of Dombivli to reduce the levels of pollution.

### 4.2 Air Pollution:

In view of coping with the problem of air pollution, many efforts are being made to cope up with the problem.

#### 4.2.1 Use of Liquefied Petroleum Gas (LPG)

The questionnaire schedule implemented for data collection revealed that, around 97% of households are using LPG as fuel for cooking. Commercials like hotels, eateries, restaurants and food stalls are using LPG as fuel. Use of LPG can be useful in reducing air pollution in several ways:

- 1. Clean-burning fuel:** LPG is a clean-burning fuel that emits fewer harmful pollutants than other traditional fuels such as coal, wood and diesel. When used in vehicles, LPG emits few significantly harmful gases such as nitrogen oxides, carbon monoxide and particulate matter, which contribute to air pollution.
- 2. Reduced Greenhouse gas emissions:** LPG emits few greenhouse gas emissions than other fossil fuels such as coal and oil. This makes it a clean alternative for heating houses and offices, cooking food and powering vehicles.
- 3. Low sulfur content:** LPG has low sulfur content, which means it produces fewer sulfur dioxide





emissions that contribute to acid rain.

Overall, the use of LPG help reduce air pollution by minimizing harmful emissions of greenhouse gases. However, it's important to note that LPG is still a fossil fuel and transitioning to renewable energy sources is ultimately the best solution to reduce air pollution and mitigate climate change.

#### **4.2.2 Use of Local Trains**

Traveling by local train reduces air pollution in several ways:

##### **1.Reduced dependence on private vehicles**

Train system in Dombivli is a lifeline of the city, and many people use it daily to commute to their workplace. The use of local trains by people in the city is of great help in reducing the number of cars and two-wheelers running on the roads of the city. It reduces the vehicular exhaust.

##### **2.Higher passenger capacity**

Local trains have a higher passenger capacity as compared to the buses and cars, which means that a larger number of people can travel in a single train trip. This reduces the number of trips needed to transport the same number of people, further reducing vehicular emissions.

##### **3.Use of electric train**

The suburban railway system uses electric trains, which emit much less pollutants than coal or diesel-powered trains. This means that the air quality in the areas surrounding railway tracks is much better than it would be if diesel trains were used.

##### **4.Encourages public transport**

The availability of an efficient and affordable public transport system like Mumbai's local trains encourages people to use public transport instead of private vehicles. This reduces the overall carbon footprint of the city, leading to cleaner air and a healthy environment. Overall, the use of local trains for traveling in Dombivli and nearby areas help to reduce air and noise pollution and thereby improving air quality of the city.

#### **4.2.3 Use of e-vehicles for private and public transport**

Using electric vehicles in Dombivli is of great help in reducing both air and noise pollution. Here are some ways in which electric vehicles can contribute to a cleaner environment:

**1.Reduction in air pollution:** Electric vehicles do not produce any harmful emissions while driving, unlike traditional petrol or diesel-powered vehicles. This means that there is a reduction in harmful particulate matter and nitrogen oxides, which are the primary contributors to air pollution. This leads to cleaner air and a healthier environment for the residents of Dombivli.





## **2.Lower noise pollution**

Electric vehicles produce significantly less noise than traditional vehicles. Thus, the use of electric vehicles in Dombivli can help reduce the overall noise levels in the city, leading to a more peaceful and less stressful environment.

## **3.Increased use of renewable energy**

Use of electric vehicles in Dombivli can lead to an increase in the use of renewable energy. This is because electric vehicles can be charged using electricity generated from renewable sources such as wind and solar power. This, in turn, can lead to a reduction in the use of fossil fuels, which are a major contributor to air pollution.

## **4.Reduced dependency on fossil fuels**

Electric vehicles do not require petrol or diesel to run, which means that there is a reduced dependency on fossil fuels. This leads to a reduction in greenhouse gas emissions and helps to combat climate change.

Overall, the use of electric vehicles in Dombivli can significantly reduce both air and noise pollution. It can also contribute in creating sustainable and cleaner environment for future generations.

### **4.2.4 Low level of energy consumption**

There are several reasons why people in Dombivli may have a low level of energy consumption:

#### **1.Climate**

Dombivli experiences tropical climate with moderate temperature and humidity for most of the year. This means that people may not need to use heating or cooling systems as much, which can significantly reduce their energy consumption.

#### **2.Lifestyle**

Majority of people in Dombivli follow a simple lifestyle, which may not require the use of energy-intensive appliances or devices. For example, they use public transport. They do not use air conditioning system or other electrical appliances excessively.

#### **3.Economic factors**

Dombivli is a suburban town with a low cost of living if compared with the cities like Mumbai. This means that people may not have the financial means to buy energy-intensive appliances or use them excessively.

#### **4.Cultural values**

Indian culture emphasizes frugality and conservation, which may encourage people to be more mindful of their energy consumption and use it sparingly.

Overall, the low level of energy consumption in Dombivli may be a result of all these





factors, as well as other regional and individual differences.

#### **4.2.5 Optimum use of Auto vehicles**

The optimum use of auto vehicles in Dombivli to reduce air and noise pollution can be done by adopting the following measures:

##### **1.Promoting electric or hybrid vehicles**

Electric and hybrid vehicles produce fewer emissions than traditional gasoline, petrol or diesel vehicles. Encouraging use of electric or hybrid vehicles like auto-rickshaws and other public transport vehicles help reduce air pollution.

##### **2.Regular maintenance of vehicles**

Regular maintenance and servicing of auto vehicles ensure that they operate efficiently and emit fewer pollutants. Ensuring that auto-rickshaws and other public transport vehicles are regularly maintained help reduce air and noise pollution.

##### **3.Implementing a vehicle age limit**

Old vehicles tend to emit more pollutants than new vehicles. Implementing an age limit for auto-rickshaws and other public transport vehicles can help phase out older, polluting vehicles and encourage the use of newer, cleaner vehicles.

##### **4.Encouraging carpooling**

Carpooling or ride-sharing is an effective way to reduce number of vehicles on the road, which can help reduce air and noise pollution. It also reduces the traffic congestion. Auto-rickshaw drivers offer carpooling services help reduce the number of vehicles on the road and improve air quality.

Overall, promoting the use of electric or hybrid vehicles, regular maintenance of vehicles, implementing a vehicle age limit, share autorickshaw system and encouraging carpooling are all the effective measures that can help reduce air and noise pollution from auto vehicles in Dombivli. Rikshaws, also known as auto-rickshaws help reduce air pollution in Dombivli in several ways:

##### **i. Fuel efficiency**

Rikshaws are generally more fuel-efficient than cars, which means they emit fewer pollutants per kilometer traveled.

##### **ii. Reduced traffic congestion**

Rikshaws take up less space on the road than cars and buses, which means they contribute less to traffic congestion. This, in turn, reduces overall emissions from idling vehicles.

##### **iii. Use of cleaner fuel**

Some rikshaws in Dombivli run on Compressed Natural Gas (CNG), which is a cleaner-burning fuel than gasoline or diesel. By using CNG-powered rikshaws, emissions of particulate





matter and nitrogen oxides can be reduced.

#### **iv. Encouraged carpooling**

Rikshaws are typically smaller than cars, which means they can only carry a limited number of passengers. This can encourage carpooling, where multiple passengers share a single rickshaw ride instead of taking individual cars. This reduces the number of cars on the road and overall emissions.

To further promote the use of rikshaws in Dombivli, the government can provide incentives for rickshaw drivers to switch to CNG or electric-powered rikshaws. The government can also invest in more rickshaw stands and dedicated rickshaw lanes to reduce traffic congestion and make rickshaw rides more convenient and accessible.

#### **4.2.6 Use of renewable energy resources**

Dombivli, like many other cities in India, is gradually adopting renewable energy resources to reduce air pollution. Here are some examples of the existing use of renewable energy resources in Dombivli:

##### **i. Solar Power**

Some of the households and commercial buildings in Dombivli have installed rooftop solar panels to generate electricity. Solar power is also used to power streetlights in some areas, reducing the dependence on traditional grid electricity and lowering carbon emissions.

##### **ii. Biogas**

Dombivli has several biogas plants that generate energy from organic waste. For example, the Dombivli Municipal Corporation (DMC) has set up a biogas plant that processes organic waste and generates biogas, which is used to power streetlights.

##### **iii. Wind Power**

Dombivli has not yet adopted wind power on a large scale, but some households and industries have installed small wind turbines to generate electricity. Wind power is a potential source of clean energy for the city, given its geographical location.

##### **iv. Hydropower**

Dombivli does not have any significant hydropower projects, but some small-scale hydro plants have been set up on nearby rivers to generate electricity. In conclusion, while the use of renewable energy resources in Dombivli is still limited, the city is gradually adopting clean energy to reduce air pollution. Solar power and biogas are currently the most widely used renewable energy resources in the city, but wind power and hydropower have significant potential for future development.





### **4.3 Water Pollution**

A variety of efforts are being taken by the government, NGOs, cooperatives and private agencies to cope with problem of water pollution. Some of them are as follows.

#### **4.3.1 Waste Water treatment**

Dombivli is a city in Maharashtra, India, and like many other cities, it faces challenges related to water pollution. Here are some measures that have been adopted to reduce water pollution in Dombivli:

##### **1. Sewage Treatment Plants (STPs)**

The Kalyan-Dombivli Municipal Corporation (KDMC) has installed Sewage Treatment Plants (STPs) to treat wastewater before it is discharged into rivers and lakes. The treated water is then used for irrigation and industrial use.

##### **2. Ban on Plastic**

The use of single-use plastic bags and other plastic items has been banned in Dombivli. This has reduced the generation of plastic waste that ends up in water bodies.

##### **3. Cleaning of Water Bodies**

The Dombivli Municipal Corporation regularly cleans and distilled water bodies like lakes, ponds, and rivers to remove accumulated waste and pollutants.

##### **4. Public Awareness Campaigns**

The Municipal Corporation conducts public awareness campaign on harmful effects of water pollution and the measures they can take to prevent it.

##### **5. Effluent Treatment Plants (ETPs)**

The Maharashtra Pollution Control Board has made it mandatory for industries in Dombivli to install ETPs to treat their wastewater before releasing it into the water bodies.

##### **6. Rainwater Harvesting**

The Kalyan-Dombivli Municipal Corporation has made it mandatory for newly emerging apartments, buildings and structures in Dombivli to install rainwater harvesting systems. This has reduced the demand for freshwater and it also prevents runoff from carrying pollutants into the water bodies.

##### **7. Regulation of Industrial Activities**

The Maharashtra Pollution Control Board regularly monitors and regulates the activities of industries in Dombivli to ensure that they comply with environmental regulations and do not discharge harmful effluents into the environment.

These measures, along with sustained efforts from the Municipal Corporation and the citizens of Dombivli help reduce water pollution and ensure a cleaner and healthier environment.





#### 4.3.2 Water Purification at Domestic level

In Dombivli, the most common practice for domestic water purification is to use a combination of filtration and UV sterilization. Here's a general overview of the existing practices:

**1. Water filters:** Most households in Dombivli use water filters to remove impurities from the water. These filters use a combination of activated carbon, sediment filters, and other materials to remove sediment, chlorine, pesticides, and other contaminants from the water. These filters are usually installed under the kitchen sink or on the countertop.

**2. UV sterilization:** To further purify the filtered water, many households use UV sterilizers. These devices use ultraviolet light to kill bacteria, viruses, and other microorganisms that may be present in the water. The UV sterilizer is typically installed after the water filter, and before the water is dispensed from the tap.

**3. Boiling:** While not as common as the other two methods, some households in Dombivli still boil water before drinking it. This is a simple and effective way to kill any bacteria or viruses that may be present in the water.

Overall, the combination of filtration and UV sterilization is the most widely used methods being used for domestic water purification in Dombivli.

#### 4.3.3 Water conservation

Some of the people in Dombivli have adopted suitable water conservation methods and technics. They are given below.

##### 1. Rainwater harvesting

Many households and institutions in Dombivli have installed rainwater harvesting systems to collect and store rainwater for its use in the future. This helps to recharge groundwater and reduce the dependency on municipal water supply.

##### 2. Use of low-flow fixtures

Many households have installed low-flow toilets, faucets, and showerheads that use less water than conventional fixtures. This helps to reduce the amount of water consumed for daily activities.

##### 3. Greywater recycling

Greywater is wastewater from sinks, showers, and washing machines that can be treated and reused for non-potable purposes like watering plants or flushing toilets. Some households in Dombivli have installed greywater recycling systems to reduce their water consumption.

##### 4. Education and awareness

Several community-based organizations and government agencies in Dombivli conduct educational programs and awareness campaigns to educate people about the importance of water





conservation and ways to conserve water in their daily lives.

## **5. Wastewater treatment**

Some industries and institutions in Dombivli have installed wastewater treatment plants to treat and recycle their wastewater. This reduces the amount of water they use and helps to protect the environment

### **4.4 Noise Pollution**

Though noise pollution is one of the major environmental issues faced by the residents of the city, people are coping this issue by adopting following measures.

#### **4.4.1 Declaration of silence zones**

Silence zone is an area comprising not less than 100 mts. around hospitals, educational institutions, courts, religious places or any other area which is declared as silence zone by the competent authority. Dombivli, is known to have significant noise pollution levels due to various sources of it like vehicular traffic, industrial activities, construction work, and religious activities. Vehicular traffic, including the honking of horns, is a major contributor to noise pollution in Dombivli. The city has a high density of vehicles, which results in traffic congestion and long waiting times at traffic signals. This leads to drivers honking their horns impatiently, raising noise pollution levels.

Industrial activities, including factories and workshops, also contribute to noise pollution in Dombivli. These activities produce loud noises from machinery, tools, and other equipment, which can be heard at a considerable distance. Construction activities, including excavation, demolition, and building work also contribute to noise pollution in Dombivli. Construction work often involves the use of heavy machinery, which produces loud noises that can be heard throughout the city. Religious activities such as loudspeakers, public address systems, and firecrackers are also significant contributors to noise pollution in Dombivli, especially during festivals and religious events.

In view of addressing the above mentioned issues of noise pollution in Dombivli, the local government and community have taken steps such as enforcing noise regulations, restricting vehicular traffic, promoting public transport, practicing one way street, odd-even date parking method, encouraging the use of noise-reducing technology in industries and construction sites, and raising awareness among public about the harmful effects of noise pollution.

#### **4.4.2 Use of low noise-making vehicles**

The use of low noise-making vehicles in Dombivli can help reduce both noise pollution and air pollution. Air pollution is one of the major concerns in urban areas where vehicles are one of the primary sources of air pollution. Fossil fuels using vehicles emit harmful air pollutants such as





particulate matter, nitrogen oxides, and volatile organic compounds, which can have negative impacts on human health and the environment. Low noise-making vehicles typically use cleaner and more efficient technologies, such as electric or hybrid engines, which emit fewer pollutants than traditional gasoline or diesel engines. In addition, they tend to be quieter, reducing noise pollution. By encouraging use of low-noise-making vehicles, local authorities help reduce air pollution and improve air quality, which can have a positive impact on public health. They can also help reduce noise pollution, making the city more pleasant and peaceful place to live. To encourage the use of low-noise-making vehicles, local authorities can offer incentives such as tax breaks or subsidies for buying electric or hybrid vehicles. They invest in ecofriendly infrastructure and promote public transportation, biking, and walking as alternatives to driving. Additionally, they can enforce regulations that restrict the use of high-polluting vehicles in the city.

#### **4.4.3 Tree plantation**

The practice of tree plantation in Dombivli is significant, as it is an essential part of efforts to improve the local environment and combat climate change. Dombivli is a rapidly urbanizing area, and tree plantation has become increasingly important to counterbalance the negative impacts of urbanization. Various initiatives have been undertaken by the local government, NGOs, and community groups to promote tree plantation in Dombivli. The initiatives include organizing tree plantation drives, creating awareness about the importance of trees, and involving citizens in the planting process. The types of trees that are commonly planted in Dombivli include neem, mango, coconut, banyan, and gulmohar, among others. These trees not only provide shade and beautify the area but also have numerous environmental benefits, such as reducing air pollution, controlling soil erosion, and promoting biodiversity. In addition to government and community-led initiatives, individual citizens in Dombivli also practice tree plantation by planting saplings in their homes or neighborhoods. The practice of tree plantation has become a community effort in Dombivli, with many people working together to create a greener and more sustainable environment for future generations.

#### **4.4.4 Time limits for using loudspeakers**

A loudspeaker or public address system can be used only after obtaining written permission from the authority. The district magistrate, police commissioner or any other officer not below the rank below the Deputy Superintendent of Police are the designated authority for the maintenance of the ambient air quality standards in respect of noise.

#### **4.5 Soil Pollution**

There are several measures being implemented to reduce soil pollution in Dombivli. Some of these measures include:





#### **4.5.1 Implementing waste management practices**

The Kalyan-Dombivli Municipal Corporation (KDMC) has implemented waste management practices, such as the segregation of waste and composting of biodegradable waste, to reduce the amount of waste that ends up in landfills.

#### **4.5.2 Controlling industrial pollution**

The Maharashtra Pollution Control Board (MPCB) has implemented strict regulations on industries to control pollution. Industries are required to obtain permission to operate, and the MPCB regularly monitors their emissions and waste disposal practices.

#### **4.5.3 Promoting organic farming**

The KDMC has promoted organic farming practices by providing subsidies and incentives to the farmers for using organic fertilizers and pesticides. This has reduced the use of chemical fertilizers and pesticides that can contribute to soil pollution.

#### **4.5.4 Remediation of contaminated sites**

The KDMC has identified contaminated sites and is implementing remediation measures to clean up the soil. This includes soil excavation, treatment, and re-vegetation.

#### **4.5.5. Educating the public**

The KDMC and MPCB regularly conduct awareness campaigning and educate public on the issues like harmful effects of soil pollution and the measures that can be taken to prevent soil pollution. The campaigns aims at promoting waste reduction, recycling, and proper waste disposal practices.





## CHAPTER V CONCLUSION AND SUGGESTIONS

*Present chapter concludes the study and provides some feasible solutions to cope with the problem of Environmental pollution in the city of Dombivli.*

### 5.1 Introduction

Environmental pollution in Dombivli is found in many forms viz. air pollution, water pollution, soil pollution and noise pollution. All these types of pollution have considerable impacts on human health and the local environment. Air pollution is one of the most common types of pollution in Dombivli. It is a result of emissions from auto vehicles, factories, domestic emissions, burning of garbage and many other sources. The pollutants in the air are responsible to cause respiratory problems, such as asthma and lung cancer, and are also contributing to global warming induced climate change. Water pollution is another concern of study in the city of Dombivli. Domestic sewage water, industrial effluent, runoff from roads and other surfaces carry pollutants into rivers and ocean. This is harming aquatic life and making it unsafe for people to swim or catch fish. Noise pollution is caused by sounds from traffic, construction sites, and many other sources. It is leading to hearing loss, sleep disturbances, and stress. To address pollution in urban areas, measures such as improving public transportation, promoting clean energy sources, and regulating industrial emissions can be implemented. Individuals can also take steps to reduce the use of single use plastic, such as reducing their use of single-use plastics, conservation of water resources and use of energy-efficient appliances to help reduce pollution.

### 5.2 Suggestions

1. Performance evaluation of air, water and noise pollution control measures in all industrial units with respect to efficiency, operation and maintenance of pollution control measures should be mandatory.
2. Priority should be given to the less-polluting machines and equipment being used in the factories and industries.
3. Close pipelines should be used for transport of industrial effluent up to the effluent treatment plant.
4. Continuous power supply should be ensured to the effluent treatment plants.
5. Leakage detection in pesticides and chemical industries should be made mandatory.
6. Inventorying hazardous air pollution emitting units
7. Online display of data on pollution at prominent places in the city should be practiced.
8. Inspection and monitoring of polluting industries should be done to assess the compliance of status.





9. Repair and maintenance of approach and internal roads should be in practice.
10. Laying of closed pipelines for disposal of treated effluent up to the creek
11. Replacement of old drainage pipelines
12. Provision of scientific storage of solid waste management
13. Removal of sludge and plastic debris from gutters and nallas
14. Illegal and unscientific dumping of solid waste should be banned.
15. Capping of dumping grounds should be done.
16. There should be a ban on biomass burning on open land
17. Use of Compressed Earth Blocks (CEB) should be given priority.
18. Tree plantation at open spaces should be done.
19. Proper town planning should be made.
20. Appropriate maintenance of auto vehicles should be ensured.
21. Energy resources should be used efficiently.
22. Strict implementation of bylaws should be ensured.
23. Traffic rules should be followed strictly.

### **5.3 Conclusion**

Emission of pollutants in the environment are primarily the result of the consumption of energy from fossil fuels and the processing of substances. The sources of air pollution mainly include industries, vehicular exhaust, brick kilns, the construction industry, domestic activities, refrigerator and air conditioning, Rab and cattle etc. Sources of water pollution are industrial effluent and domestic sewage while noise pollution is taking place due to auto vehicles, industries, market place and domestic gadgets. Industries, auto vehicles and agriculture are the sources of soil pollution. Proper planning and implementation of awareness campaigning can reduce the pollution levels in the city.

### **5.4 Future line of research work.**

It is evident from the study that the concentration of toxic heavy metals in the river water is increasing due to the discharge of industrial effluent from Dombivli industrial belt Phase I and Phase II. The high concentration of heavy metals in effluent water will increase the concentration of heavy metals in the above-surface water. Air pollution levels are normally high in the city mainly due to the emission of greenhouse gases from the industrial, transportation and domestic sectors.

The study concludes that, there is an urgent need to conduct methodical and consistent monitoring of pollution levels along Ulhas River with the intention to obtain scientific data on heavy metal content in the river water. Such data will be useful to improve the industrial waste treatment technology adopted along the Dombivli industrial belt.





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## QUESTIONNAIRE

*Questionnaire No.*

**Date:**

1. Name and address of the respondent.
2. Are you aware of the problem of Environmental Pollution in the city? Yes/ No
3. If yes, what are the causes and types of environmental pollution in your opinion:

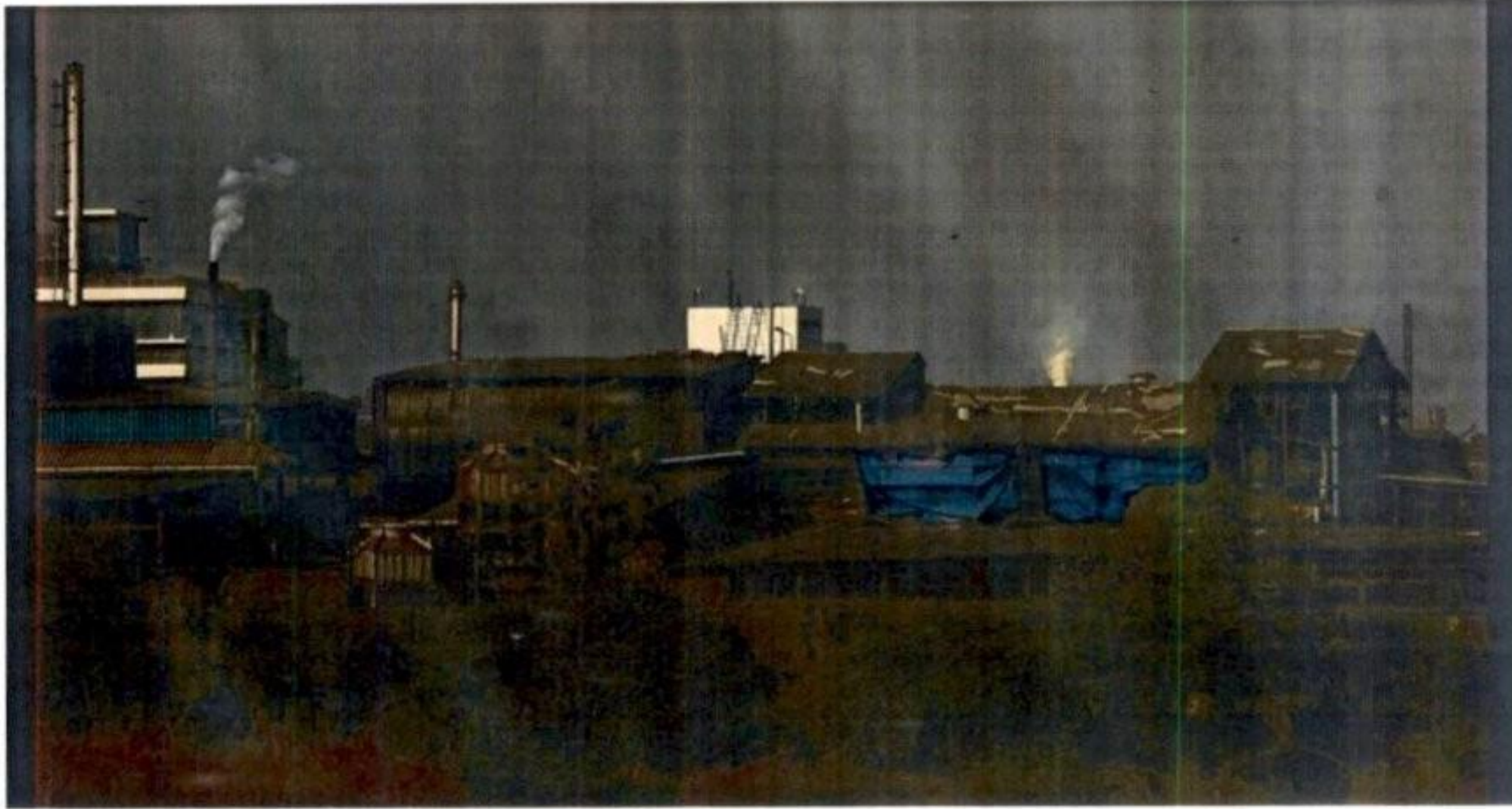
4. What facilities do you have?

Facility	motorbike	Car/ Jeep	Motorcycle	Air conditioner	Freezer	LPG gas connection	Any Other
Units							

5. Do you follow the guidelines given for the control of environmental pollution?
6. Whether your family has its own industry? Yes/No
7. Whether open spaces are available near the place of your residence?
8. Do you prefer to use the public mode of transportation?
9. Have you planted a protected tree in your life? If yes, how many times?
10. Do you suffer from any pollution-induced health issues?
11. If yes, mention the nature of it.
12. What measures do you take in view of minimizing environmental pollution?
13. What measures would you like to suggest to bring down the pollution levels?
  - i) At individual level
  - ii) At community level
  - iii) At the level of government







Factories in Dombivli MIDC area, Source of air, noise and water pollution



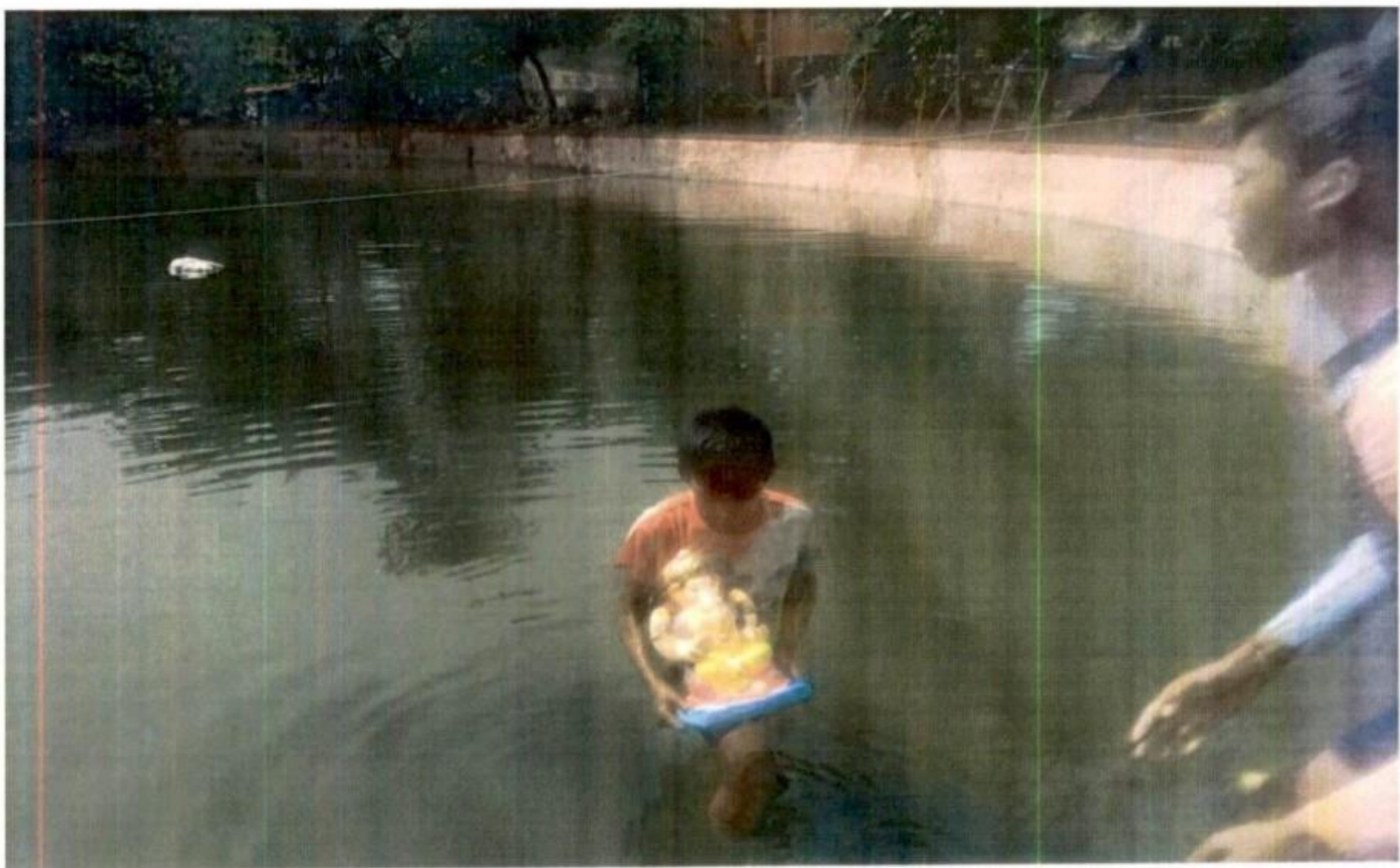
Festival: A source of noise pollution







Immersion facility provided by Kalyan Dombivli Municipal Corporation



Immersion facility provided by Kalyan Dombivli Municipal Corporation







Immersion facility provided by Kalyan Dombivli Municipal Corporation



Arrival and Sale of E-Vehicles in Dombivli







E-bikes with a variety of colors and models



Use of electric bus for public transportation in Dombivli

