

CONTENTS

CHAPTER NO.	TITLE	PAGE NO
	LIST OF TABLES	
	LIST OF FIGURES	
	LIST OF ABBREVIATIONS	
1.	ENVIRONMENTAL IMPACT ASSESSMENT FOR RIVER BASIN	1
1.1.	INTRODUCTION	1
1.2.	GLOBAL STATUS OF EIA	4
1.3.	GENERALIZED PROCESS FLOW SHEET OF THE EIA PROCESS	6
1.4.	HISTORY OF EIA IN INDIA	8
1.4.1.	Environmental Impact Assessment practices	8
1.5.	ISSUES IN THE IMPLEMENTATION OF EIA	10
1.6.	IMPORTANCE OF THE STUDY	11
1.7.	REVIEW OF LITERATURE	12
1.7.1.	Water chemistry	12
1.7.2.	Organochlorine pesticides	14
1.7.3.	Pathogenic indicators organisms	16
1.8.	GENERAL OBJECTIVES	19
2.	STUDY AREA	20
2.1.	TAMIRAPARANI RIVER BASIN	20
2.1.1.	Servalar	21
2.1.2.	Manimuthar	21

CHAPTER NO.	TITLE	PAGE NO
2.1.3.	Gadana	21
2.1.4.	Pachaiyar	22
2.1.5.	Chittar	22
2.1.6.	Ramanathi	22
2.2.	GEOLOGY OF THE RIVER BASIN	23
2.2.1.	Charnockites	23
2.2.2.	Granitoid gneiss	24
2.2.3.	Garnetiferous sillimanite gneiss	24
2.2.4.	Calc-gneiss	24
2.2.5.	Quartzites	24
2.2.6.	Tertiary formations	26
2.2.7.	Recent to sub-recent formations	27
2.2.8.	Teri sands	27
2.3.	LAND USE AND LAND COVER CHANGES DURING 1991-1992 AND 1999-2000	27
2.3.1.	Trends in land use pattern	29
2.3.2.	Forests	29
2.3.3.	Barren and uncultivable waste	29
2.3.4.	Land space on non-agricultural use	29
2.3.5.	Cultivable waste	30
2.3.6.	Permanent pastures and grazing lands	30
2.3.7.	Current fallows	31
2.3.8.	Other fallows	31
2.3.9.	Net area sown	34
2.4.	AGRICULTURE IN THE RIVER BASIN	34
2.4.1.	Cropping pattern	35
2.4.2.	Crop rotation	35

CHAPTER NO.	TITLE	PAGE NO
	2.4.3. Rice	36
	2.4.4. Rice (Kar season)	36
	2.4.5. Rice (Pishanam season)	37
	2.4.6. Rice (advance Kar)	37
	2.4.7. Pulses	37
	2.4.8. Sesamum	37
	2.4.9. Banana	38
2.5.	MUNICIPAL AND INDUSTRIAL SUPPLY	38
2.6.	MATERIALS AND METHODS	39
	2.6.1. Field sampling	39
	2.6.2. Physicochemical analysis	41
	2.6.3. Extraction of pesticides	42
	2.6.3.1. Instrumentation	42
	2.6.3.2. Analytical quality control	43
	2.6.4. Enumeration pathogenic indicator organisms	44
3.	WATER QUALITY PARAMETER ANALYSIS	48
	3.1. BACKGROUND	48
	3.2. GEOCHEMISTRY OF SURFACE WATER	53
	3.2.1. pH, Electrical conductivity and calculated total dissolved solids	53
	3.2.2. Major anions	55
	3.2.3. Major cations	62
	3.3. FACTOR ANALYSIS	65
	3.3.1. Factor – I	72
	3.3.2. Factor – II	73
	3.3.3. Factor – III	73

CHAPTER NO.	TITLE	PAGE NO
3.4.	CLUSTER ANALYSIS	74
3.5.	DISTRIBUTION OF DISSOLVED INORGANIC NUTRIENTS	76
3.5.1.	Nitrogen	76
	3.5.1.1. Nitrite	79
3.5.2	Phosphorus	80
	3.5.2.1. Orthophosphate	81
4.	ORGANOCHLORINE PESTICIDES IN WATER AND SEDIMENTS	84
4.1.	BACKGROUND	84
4.2.	GLOBAL DISTRIBUTION	87
4.3.	PESTICIDE POLLUTION IN INDIAN RIVERS	90
4.4.	SOURCES OF PESTICIDE IN TAMIRAPARANI RIVER BASIN	91
	4.4.1. Organochlorine pesticides in water	93
	4.4.2. Residual levels in sediments	96
	4.4.3. Spatial and temporal distribution of OCPs in sediments	100
5.	MONITORING OF PATHOGENIC INDICATOR ORGANISMS	104
5.1.	INTRODUCTION	104
5.2.	HISTORY OF MICROBIAL CONTAMINATION	105
5.3.	EMERGING CONTAMINANTS	107
5.4.	INDICATIVE ORGANISM OF FAECAL POLLUTION	112
	5.4.1. Total Coliforms	112
	5.4.2. Vibrio like organisms	113

CHAPTER NO.	TITLE	PAGE NO
	5.4.3. <i>Escherichia coli</i>	114
	5.4.4. <i>Salmonella spp</i>	117
	5.4.4.1. Human health effects	117
	5.4.4.2. Source and occurrence	118
	5.4.4.3. Significance in drinking water	118
	5.4.5. <i>Shigella spp</i>	118
	5.4.5.1. Source and occurrence	119
	5.4.5.2. Significance in drinking water	119
	5.4.6. Faecal <i>Streptococci</i> and <i>Enterococci</i>	120
	5.4.6.1. Significance of the thermotolerant coliform: faecal <i>Streptococci</i> ratio	121
	5.4.7. <i>Pseudomonas aeruginosa</i>	122
5.5.	SIGNIFICANT RESULTS	124
5.6.	DISCUSSION	137
6.	SPATIAL AND TEMPORAL ASSESSMENT USING GEOGRAPHIC INFORMATION SYSTEM	143
6.1.	INTRODUCTION	143
6.2.	GLOBAL POSITIONING SYSTEM	147
6.3.	GIS APPLICATION	147
	6.3.1. Seasonal and temporal distributions of total dissolved solids	148
	6.3.2. Seasonal and temporal distributions of Sodium	149
	6.3.3. Seasonal and temporal distributions of Bicarbonate	149

CHAPTER NO.	TITLE	PAGE NO
	6.3.4. Seasonal and temporal distributions of Sulphate	152
	6.3.5. Seasonal and temporal distributions of Chloride	152
	6.3.6. Seasonal and temporal distributions of Nitrite	156
	6.3.7. Seasonal and temporal distributions of Orthophosphate	156
	6.3.8. Seasonal and temporal distributions of Σ OCPs in the water and sediments	159
7.	SUMMARY AND CONCLUSION	163
	7.1. BACKGROUND	163
	7.2. APPROACHES TO MONITORING	164
	7.3. SIGNIFICANT RESULTS	165
	7.3.1. Chemical composition of the Tamiraparani river	165
	7.3.2. Impact of pesticides on water and sediments	166
	7.3.3. Pathogen indicator organisms counts	167
	7.4. RECOMMENDATIONS FOR PATHOGENIC INDICATOR ORGANISMS	169
	7.5. CONCLUSION	171
8.	REFERENCES	i-xxx