TABLE OF CONTENTS

			,,	Page 1
Chapter 1			Introduction	1-9
1.1			Introduction	2
1.2			Objectives of the thesis	7
1.3			Structure of the thesis	,8
Chapter 2	Mater	ials a	nd Methods	10-43
2.1			Study Area	11
2.2			Geological Setting	16
2.3			Climatic features of the Ganga Basin	18
2.4			Sampling	20
	2.4.1		River and Groundwater	27
	2.4.2		Sediments and suspended particulates	28
	2.4.3		Other samples	29
2.5			Analytical techniques	29
	2.5.1		Water samples	30
		(a)	pH, temperature and electrical conductivity	30
		(b)	Major ions and dissolved silica	30
		(c)	Sr and ⁸⁷ Sr/ ⁸⁶ Sr isotopes	33
	2.5.2		Sediments	34
		(a)	Major elements	34
		(b)	CaCO₃ and organic carbon	36
		(c)	Isotopic measurements: Mass spectrometry	40
		(d)	Sr and Nd isotopes	41
Chapter 3	Basin	: Sec	isotopes in river sediments from the Ganga diment Provenance and Spatial Variability in rosion	44-80
3.1			Introduction	45
3.2			Results and discussion	46
	3.2.1		Sr, Nd concentrations and 87 Sr/ 86 Sr and ϵ_{Nd}	50
	3.2.2		Sources of sediments to the Ganga plain	55
	3.2.3		Estimation of sediment contribution from sub-	61
			basins to the Ganga mainstream	
	3.2.4		Spatial variability in erosion rate	68
	3.2.5		Uncertainty in estimation of sediment fraction and	71
			in erosion rate	
	3.2.6		Comparison with available erosion rates over the	72
			Himalaya	
	3.2.7		Control on erosion	77
	3.2.8		Focused erosion and rapid uplift	79
3.3			Summary	80

Chapter 4	Chemical	or and major ions in the Ganga River Syster weathering in the Ganga plain and peninsul and dissolved Ca and Sr budgets	81-139
4.1 4.2	4.2.1	Introduction Results and discussion General observations	82 85 85
	4.2.2	Water Chemistry of the Gomti, Yamuna and the Son and its impact on the chemistry of the Ganga Mainstream in the plain	94
4.3		Chemical Erosion in the Plain, Peninsular and the Himalayan Sub-Basins of the Ganga	103
	(i)	Ganga plain	108
	(ii)	Peninsular Sub-basin	109
	(iii)	Himalayan Sub-basin	109
	(iv)	Uncertainties in the estimates of fluxes and erosion rates	113
4.4		Silicate Erosion Rates (SER) and associated CO ₂ Consumption in the Ganga Basin	116
4.5	· .	Impact of saline/alkaline salts in Sr geochemistry of the Ganga in plain and erosion rates of Sr in the Ganga sub-basins	120
4.6		Impact of Chemical erosion in the plain and peninsular sub-basins on estimates of silicate erosion rates in the Ganga basin and elemental fluxes	121
4.7		Behaviour of Ca and Sr in the Ganga river system: Clues from Ca/Sr and ⁸⁷ Sr/ ⁸⁶ Sr of waters.	123
4.8		Biweekly variation in major ions, Sr concentration and ⁸⁷ Sr/ ⁸⁶ Sr of the Ganga	131
	4.8.1	General observations	132
4.9	*	Summary	138
Chapter 5	Sediment C	Seochemistry of the Ganga River: Implications erosion fluxes	140-167
5.1		Introduction	141
5.2		Results and discussion	146
	5.2.1	Major element geochemistry and relative mobility of elements in the Ganga river system	146
	5.2.2	Carbonates in the Ganga sediments	151
5.3		Weathering Intensity of the Ganga Sediments	155
5.4		Composition of Sediments and Silicate weathering flux	157
5.5		Time averaged silicate weathering flux and their comparison with water derived data	162

5.6	Summary	167
Chapter 6	Synthesis and Future Prospects	168-173
6.1	Studies on physical erosion in the Ganga basin	169
6.2	Studies on chemical erosion in the Ganga river system	170
6.3	Studies on sediment geochemistry of the Ganga basin	171
6.4	Scope of future research	172
References		174-195