ACID RAIN

Rhetoric and reality

Chris C. Park

METHUEN
London and New York

CONTENTS

	List of tables List of figures	VIII
		ix
	Acknowledgements	xi
	Preface	· xii
Part I	THE PROBLEM OF ACID RAIN	
1	THE ACID RAIN DEBATE IN CONTEXT	1
	'Long to reign over us'	
	Acid rain as a pollutant	2
	The geography of acid rain	3
	Acid rain in historic context	5
	Heritage of interest	6
	Polarization of views	7
	The debate opens	8
	Legislation – success or failure?	13
	Alarm bells ring in Britain	16
	Britain's invisible export	17
	An international problem	19
	Conclusion	21
2	SOURCES, PATTERNS, AND PROCESSES	22
	'The answer is blowing in the wind'	
	Acidity – definition and measurement	23
	Rainfall chemistry	25
	Acidification of rainfall	26
ņ	The acid rain cocktail	32
	Natural and man-made emissions of SO_2 and NO_x	32
	Fossil fuels and oxide emissions	38
	Dispersion and transformation	40
	Acid deposition	47
	Acid surges	48

Part II	THE SCIENCE OF ACID RAIN	
3	SCIENTIFIC COMPLEXITIES	53
	Damage attributed to acid rain	53
	Buffer capacity and acidification	58
	Uncertainty and complexity	62
	Conclusion	67
4	EFFECTS ON SURFACE WATERS	69
	'Down by the riverside'	
	Acidification of surface waters	70
	Evidence of recent changes	70
	Acidification processes	74
	Effects of acidification on surface waters	76
	The heavy metal connection	87
	Conclusions	89
5	EFFECTS ON SOILS AND VEGETATION	91
	'Deep in the forest'	
	Acidification of soils	92
	Effects on vegetation	96
	Waldsterben – damage to West German forests	100
	Damage spreads	105
	Forest damage in Britain	106
	Complexity of forest damage	108
	Crop damage	110
	Trees as pollution filters	. 111
	Conclusions	112
6	EFFECTS ON BUILDINGS AND HUMANS	114
	'Palaces and people'	
	Effects on materials and buildings	114
	Effects on human health	123
	Conclusion	130
Part III	THE TECHNOLOGY OF ACID RAIN	
7		135
	'We have the technology'	
	Cure by buffering	135
	Prevention	137
_	Conclusions	153
ą		

Part IV	THE POLITICS OF ACID RAIN	
8	INTERNATIONAL CONCERN AND INITIATIVES	157
	The acid rain storm	
	The debate opens – early milestones	157
	The game plan unfolds	160
	International initiatives	167
	Growing awareness and heated exchanges (1983)	171
	Actions and decisions (1984)	174
	Enforcement and progress (1985)	181
	Conclusions	185
9.	ACID RAIN IN THE UNITED STATES	189
	Gripes of wrath	
	Roots and routes	190
	Carter initiatives	195
	Reagan – the early years	200
	Mounting indecision (1983)	205
	Resistance and entrenchment (1984)	209
	Problems at home and abroad (1985)	213
	Minor concessions (1986)	217
	Conclusion	219
10	ACID RAIN IN BRITAIN	220
	'Not guilty, m'Lord	•
	The early debate	220
	The summer of '84	229
	Select Committee report	233
	Storm clouds gathering	236
	Official attitudes	238
	1986 and all that	240
	Conclusions	242
	Bibliography	245
	Index	266