

CONTENTS



<i>Preface</i>	vii
1 The importance of freshwater acidification	1
Developing awareness of the problems of freshwater acidity	3
Acidification and water quality	6
Mechanisms of acidification effects on freshwater biota	8
References	11
2 Natural acidification processes	14
The hydrologic cycle	14
Atmospheric inputs to ecosystems	16
Natural materials deposited from the atmosphere	18
Seasonal trends in precipitation chemistry	23
Short-term trends in precipitation chemistry	23
Hydrology of upland catchments	23
Mechanisms of water transport through soil	28
Soil/water interactions	29
Relevant soil formation processes	37
Natural acidity of soils	39
The importance of vegetation	42
pH buffering of freshwaters	43
The significance of readily weatherable mineral depletion	46
Snow and snowmelt	48
Frozen soils	50
References	51
3 Anthropogenic influences on acidification processes	56
Afforestation and forest clearance	56
Summary of effects of forest clearance/afforestation	58
Other land use changes	67
Acidifying pollutants in the atmosphere	80
Interactions of acidic deposition with vegetation	83
The significance of vegetation effects in relation to acidifying pollutants	92
Acid deposition–soil interactions	97
Direct acidification effects	101

vi **Contents**

Acid rain, changes in land use or natural acidification?	101
References	102
4 Experimental methods in acidification research	109
Possible sampling objectives	110
Sampling frequency	110
Sampling river and lake water	112
Characterisation of wet and dry deposition inputs	113
Lysimeters in 'acid rain' research	119
Other uses of simulated rain	122
Sample contamination and storage	122
Modelling and water acidity	123
References	125
5 Possible priorities in freshwater acidification research	129
Water acidification and aquatic biota	129
Vegetational effects	130
Hydrological pathway research	131
Carbon dioxide effects	131
Soil acidification and recovery rates	132
Some concluding remarks	132
<i>Index</i>	133