Cambridge University Press 978-0-521-85173-2 - Soils: Basic Concepts and Future Challenges Giacomo Certini and Riccardo Scalenghe Table of Contents <u>More information</u>

Contents

List of contributors					
Pr	Preface				
Ac	Acknowledgements				
1	Concepts of soils Richard W. Arnold	1			
	 1.1 Some Greek and Roman concepts 1.2 The transition 1.3 The awakening 1.4 Genetic supremacy 1.5 Sampling volumes 1.6 Landscape systems 1.7 The new millennium 	2 4 4 5 7 9 9			
2	 Pedogenic processes and pathways of horizon differentiation Stanley W. Buol 2.1 Horizonation processes 2.2 Studies of soil genesis 	11 11 12			
	2.3 Surface horizons2.4 Subsurface horizons2.5 Formation of structural features in soil	14 15 21			
3	Soil phases: the inorganic solid phase G. Jock Churchman				
	3.1 Description3.2 Future prospects	23 44			
4	Soil phases: the organic solid phase Claire Chenu	45			
	4.1 Soil organic matter complex composition	46			

viii	Contents			
	4.2 Organomineral associations4.3 Soil organic matter dynamics	51 54		
5	Soil phases: the liquid phase Randy A. Dahlgren			
	5.1 The liquid phase of soils5.2 Methods of soil solution characterization5.3 Application of soil solution studies to pedogenesis5.4 Conclusions	59 63 66 73		
6	Soil phases: the gaseous phase Andrey V. Smagin			
	6.1 Gaseous components of soil6.2 Sources, sinks and transport of gases in the soil6.3 Agroecological evaluation of the soil air6.4 Gases emissions and global ecological functions of the soil	75 77 84 85		
7	Soil phases: the living phase Oliver Dilly, Eva-Maria Pfeiffer and Ulrich Irmler			
	 7.1 Physiological capabilities of soil organisms 7.2 The role of organisms for soil functions 7.3 Aerobic and anaerobic metabolisms in soil 7.4 The living phase indicates soil quality 7.5 Modification of biotic communities during soil degradation 	92 95 96 98 100		
8	The State Factor theory of soil formation Ronald Amundson			
	8.1 The soil system8.2 State factors8.3 Importance of State Factor theory	105 108 111		
9	Factors of soil formation: parent material. As exemplified by a comparison of granitic and basaltic soils Michael J. Wilson			
	 9.1 Mineralogical properties 9.2 Physical properties 9.3 Chemical properties 9.4 Conclusions 	114 116 119 127		
10	Factors of soil formation: climate. As exemplified by			
	volcanic ash soils Sadao Shoii Masami Nanzyo and Tadashi Takahashi	131		
	10.1 Global climate and soil formation	132		

		Contents	ix
	10.2	Influences of climatic factors on soil formation based on the studies on volcanic ash soils	137
11	Facto	ors of soil formation: topography	151
	Robert C. Graham		
	11.1 11.2 11.3 11.4	Topographic elements of landscapes External factors mediated by topography Pedogenic processes linked to topography Topography-based models of soil distribution	151 155 156 162
12	Factors of soil formation: biota. As exemplified by case studies		
	on	the direct imprint of trees on trace metal concentrations	
	in	soils	165
	Fran	çois Courchesne	
	12.1 12.2 12.3 12.4	Approach Case study 1: Trace metal distribution at the soil–root interface Case study 2: Trace metal patterns in organic horizons In conclusion	168 169 175 179
13	Facto	ors of soil formation: time	181
	Ewart A. FitzPatrick		
	13.1 13.2 13.3 13.4 13.5	Time for horizon differentiation Soil development Holocene soil formation Soil age and progressive change Time and soil classification	182 183 185 185 190
14	Soil 1	formation on Earth and beyond: the role of additional	
	soi	il-forming factors	193
	Giac	omo Certini and Riccardo Scalenghe	
	14.1 14.2 14.3	The anthropogenic factor Other factors of pedogenesis Extraterrestrial soils	194 205 208
15	Soil 1	functions and land use	211
	Joha	n Bouma	
	15.1 15.2 15.3 15.4	How to deal with future demands on our soils To characterize soil functions better Storylines: what can the soil tell us when we listen? In conclusion	212 215 219 221
16	Phys	ical degradation of soils	223
	Michael J. Singer		
	16.1 16.2 16.3	Soil compaction Sealing and crusting Physical soil management	224 227 229

Cambridge University Press
978-0-521-85173-2 - Soils: Basic Concepts and Future Challenges
Giacomo Certini and Riccardo Scalenghe
Table of Contents
Moreinformation

х		Contents	
	16.4 16.5	Secondary effects Conclusions	231 232
17	Chemical degradation of soils <i>Peter Blaser</i>		235
	17.1 17.2	Chemical soil degradation processes Our duty	236 253
18	The	future of soil research	255
	Anthony C. Edwards		
	18.1	Soils and their buffering capacities	257
	18.2	The soil resource	258
	18.3	Soil phosphorus	258
	18.4	Soil processes	260
	18.5	Nitrogen cycling	261
	18.6	The continued investigation of soil processes	263
App	endix:	Naming soils and soil horizons	265
	Stanle	ey W. Buol, Giacomo Certini and Riccardo Scalenghe	
References		277	
Index			303