

Table of contents

1 Introduction	1
1.1 The challenges for soils in the urban environment (J.L. Morel, W. Burghardt, K.-H.J. Kim)	1
1.2 Activities of SUITMA: from origin to future (W. Burghardt, J.L. Morel, S.A. Tahoun, G.-L. Zhang, R.K. Shaw, A. Boularbah, P. Charzyński, C. Siebe, K.-H.J. Kim)	7
2 Composition, properties, and functions of soils in the urban environment	19
2.1 Main characteristics of urban soils (W. Burghardt)	19
2.2 Anthropogenic soil criteria, identification and classification of human-altered and human-transported materials (R.L. Riddle, M.J. Levin)	27
2.3 Urban soils contamination (S. Norra, Z. Cheng)	35
2.4 Functions of soils in the urban environment (A. Greinert)	43
2.5 Heat transfer in urban soils (M. Watanabe, S. Miyajima)	53
2.6 Hydraulic properties of urban soils (R. Horn, H. Fleige, I. Zimmermann, J. Doerner)	63
3 Pedogenic evolution of urban soils	71
3.1 Pedogenic processes in soils of urban, industrial, traffic, mining and military areas (H. Huot, G. Séré, L. Vidal-Beaudet, S. Leguédois, C. Schwartz, F. Watteau, J.L. Morel)	71
3.2 Specific properties of soils underneath pavement construction (M. Kawahigashi)	78
3.3 Micropedology of SUITMAs (F. Watteau, G. Séré, H. Huot, J.-C. Begin, C. Schwartz, R. Qiu, J.L. Morel)	84
4 Classification of urban soils (P. Charzyński, J.M. Galbraith, C. Kabała, D. Kühn, T.V. Prokofeva, V.I. Vasenev)	93
5 Urban soil surveys	107
5.1 The case of the New York City Soil Survey Program, United States (R.K. Shaw, J.T. Isleib)	107
5.2 The case of Germany (L. Makowsky, J. Schneider)	113
5.3 The case of Toruń, Poland (P. Charzyński, P. Hulisz)	123
5.4 The case of Moscow, Russia (T.V. Prokof'eva, I.A. Martynenko)	129
6 The management of soils in the urban environment	139
6.1 Soils in green infrastructure (P. Mankiewicz, T. Morin, Z. Cheng)	139
6.2 Waste capping systems processes and consequences for the long term impermeability (St. Beck-Broichsitter, H. Fleige, R. Horn)	148
6.3 Pedological engineering for brownfield reclamation (G. Séré, C. Schwartz, J. Cortet, S. Guimont, F. Watteau, M.-O. Simonnot, J.L. Morel)	152
6.4 Using wastes for fertile urban soil construction – The French Research Project SITERRE (L. Vidal-Beaudet, P. Cannavo, C. Schwartz, G. Séré, B. Béchet, M. Legret, P.-E. Peyneau, P. Bataillard, S. Coussy, O. Damas)	159

7 Soil sealing ways, constraints, benefits and management (W. Burghardt)	169
8 Urban agriculture	177
8.1 Urban agriculture and food security (R. Lal)	177
8.2 Garden soils in industrial countries (C. Schwartz, S. Joimel, P. Branchu, J.L. Morel, E.-D. Chenot, B. Béchet, J.N. Consalès)	181
8.3 Recovery of strategic metals from urban soils (M.-O. Simonnot, B. Laubie, J. Moccasin, G. Mercier, J.-F. Blais, J.L. Morel)	189
9 Ecosystem services provided by soils	197
9.1 Urban soils are primary providers of ecosystem services (J.L. Morel, K. Lorenz, C. Chenu, G. Séré)	197
9.2 Regulating services provided by urban soils	203
9.2.1 Carbon storage in urban soils (K. Lorenz, R.K. Shaw)	203
9.2.2 Urban soils as phosphorus reservoir (K.-H.J. Kim, T. Nehls, C. Schwartz, J.L. Morel)	206
9.2.3 Biodiversity (A. Auclerc)	213
9.2.4 Ecosystem services provided by heavy metal contaminated soils in China (K. Ding, Q. Wu, H. Wei, W. Yang, G. Séré, S. Wang, G. Echevarria, Y. Tang, J. Tao, J.L. Morel, R. Qiu)	220
9.2.5 Pollution mitigation: natural attenuation of organic pollutants (C. Leyval, A. Cébron, T. Beguiristain, P. Faure, S. Ouvrard)	227
9.3 Cultural services provided by urban soils	231
9.3.1 Devil in the sand – the case of Teufelsberg Berlin and cultural ecosystem services provided by urban soils (G. Wessolek, A.R. Toland)	231
9.3.2 Microstructural pictures: a tour in the thickness of SUITMA (F. Watteau, G. Sere, H. Huot, C. Schwartz, J.L. Morel)	241
10 Key initiatives on soil awareness by Global Soil Science Communities: World Soil Day, International Year of Soils 2015 and International Decade of Soils 2015–2024 (J. Yang, K.-H.J. Kim, S. Huber, R. Horn)	249