
Contents

Introduction	ix
Chapter 1. Deltas: Young, Fragile and Threatened Environments	1
1.1. Long-term construction of deltas: general mechanisms	2
1.1.1. Processes and basic forms	2
1.1.2. Dynamics of construction and redistribution in progress	2
1.1.3. Young and unstable areas	5
1.2. Some of the Earth's last great natural deltas: two deltas in the Arctic	8
1.2.1. The Lena Delta	8
1.2.2. The Mackenzie Delta	9
1.3. The Earth's deltas: what is their current situation in the face of terrestrial and marine constraints?	11
1.3.1. The rise in sea levels	11
1.3.2. Sedimentary exhaustion of continents	13
1.3.3. Extraction of resources and accelerated subsidence of deltas	15
1.4. Subsiding deltas in Southeast Asia	16
1.4.1. An example of a young, mainly rural delta, the Huang-He	16
1.4.2. Urbanized deltas in Southeast Asia	16
1.5. Conclusion	25
Chapter 2. Old Societies and Deltaic Crises	27
2.1. Some vulnerable deltas in the Holocene during the long and medium terms	27
2.1.1. The Nile Delta, a condensed version of the history of the African climate	28

2.1.2. The lower Huang-He and its delta: a Holocene metamorphosis under anthropological control	29
2.1.3. The Rhône Delta during the Holocene: fluvial branches and the coastline record the history of its climate and society	35
2.2. The Rhine and the Meuse Deltas: from complete control of fluvial and marine waters to attempts at restoration to a natural state	36
2.2.1. The fight against fluvial floods	36
2.2.2. Hydraulic works and environmental objectives in the dyked zone	39
2.2.3. What kind of compatibility or synergy takes place between fluvial restoration and protection against flooding?	41
2.2.4. Defense of the Netherlands against the sea	42
2.3. Contemporary imbalances in the Old World	47
2.3.1. A delta with a reprieve: the Nile Delta	47
2.3.2. The Rhône Delta: changes in the basin and the delta	52
2.3.3. The Ebro Delta: alone against the sea	54
2.3.4. The delta of the Po plain: historical dispersion of weak points	57
2.3.5. The Danube Delta: still room for hope	59
2.4. Conclusion	61
Chapter 3. Tropical Deltas in Crisis, Between Open and Closed Formations	63
3.1. A delta that is both open and alive: the Ganges and Brahmaputra Delta	63
3.1.1. Rivers and a delta	64
3.1.2. The Ganges–Brahmaputra–Meghna plain, the most populated and the poorest on Earth	65
3.2. The Mekong Delta in a suspended status	78
3.2.1. A technical machine, constantly more complex	78
3.2.2. Extremely worrying emerging factors	87
3.2.3. What will be the management choices in the future? Giving preference to the scale of the basin	95
3.3. The Niger Delta: unlimited exploitation of black gold	97
3.3.1. The deltaic zone	97
3.3.2. The effects of the extraction of hydrocarbons on the environment	98
3.3.3. Serious social and political stakes at play	101
3.4. The Indus Delta, dramatically dried out	103
3.4.1. The delta and its coast	103
3.4.2. The deleterious effects of dams on water and sediment fluxes	103
3.4.3. A serious environmental, economic and social crisis	104
3.5. The Ayeyarwady, initial symptoms of imbalance?	106
3.5.1. Burma, a country on the cusp of development	106

3.5.2. The Ayeyarwady, an enormous conveyor belt	107
3.5.3. The delta: crisis or stability?	107
3.6. Conclusion	109
Chapter 4. The Aging Delta of a Country in the New World, the Mississippi	111
4.1. New Orleans: an “inevitable city on an impossible site”	111
4.1.1. “Discovering” the river	111
4.1.2. At the origins of New Orleans	112
4.1.3. An area with serious issues at stake	113
4.2. Floods and protection of the lower Mississippi valley and the delta since 1717	116
4.2.1. Initial protections	116
4.2.2. The beginning of generalized protections	117
4.2.3. The 1927 flood in the Mississippi valley	118
4.2.4. The Jadwin plan (1928)	119
4.2.5. Current protection elements	120
4.3. The “deltas” in the lower Mississippi valley, from wilderness to the current crisis	120
4.4. The Mississippi Delta <i>stricto sensu</i> : a natural zone in crisis	124
4.4.1. Flow and landscape dynamics	124
4.4.2. The Atchafalaya and its deltaic lobes	127
4.4.3. The conversion of delta marshes into free water and coastal regression	129
4.5. Hurricanes and their effects on the Mississippi Delta	132
4.5.1. Hurricane Katrina	132
4.5.2. What does the future hold for New Orleans?	134
4.6. Sediments in the Mississippi and equilibrium of the delta	137
4.6.1. Simply a reduction in inputs or a sediment deficit?	137
4.6.2. The rise in sea levels and climate change	138
4.6.3. Reconstruction of the marshes	138
4.6.4. Sedimentary management of deltaic branches and the future of the marshes	139
4.6.5. Coastal protection plan	140
4.7. Conclusion	141
Chapter 5. What Strategies Can Help Overcome the Delta Crisis?	143
5.1. Delta dynamics: contrasting budgets on a global scale	143
5.1.1. The progress of analytical approaches adds complexity to the understanding of deltas on a global scale	143
5.1.2. The unforeseen effects of scientific choices	145

5.1.3. Open, vulnerable systems	147
5.2. Some control logic for rivers and deltas	148
5.2.1. Situations involving crises and knowledge	148
5.2.2. Contemporary hydraulic engineering pitted against the dynamics of economic domination	149
5.2.3. Scientific knowledge at the service of policies on rivers and on their deltas: the case of the Mekong	151
5.2.4. Avatars and tribulations of geopolitics	153
5.2.5. Expert appraisal and conquest of engineering markets on deltaic land	154
5.3. What sustainability is there for deltas in the 21st Century? Comparative approaches	158
5.3.1. The typology of deltas as a function of the changes expected in the risk profile	158
5.3.2. Typology of deltas as a function of their energy consumption	159
5.3.3. The degree of vulnerability or the relative vulnerability of deltas to current changes	160
5.3.4. The notion of the tipping point of a delta and of the socioeconomic system	161
5.4. Actions at the scale of the continental fluvial system to rebalance the deltaic systems	162
5.4.1. Implementation of actions of sedimentary management	162
5.4.2. Establishment of current and future sediment budgets	165
5.5. The actions developed in the deltaic system in response to crisis situations	166
5.5.1. Structural solutions: dykes and fluvial levees	166
5.5.2. Some solutions for correction of the sedimentary deficit of deltaic plains	169
5.5.3. The sustainable solutions	171
Conclusion	177
Glossary	179
References	185
Index of Place Names	205
Index of Common Words	211