
Contents

Foreword	ix
Preface	xi
Introduction	xv
Chapter 1. The Torrential Crisis in the European Mountains (14th–19th Centuries)	1
1.1. Introductory generalities on global fluvial systems	1
1.2. Manifestations of the LIA crisis in the river valleys of Western Europe	5
1.2.1. Mountain crises	5
1.2.2. River crises and metamorphoses of the Drac and the Isère in Grenoble	7
1.2.3. Flooded piedmont plains in Switzerland	11
1.2.4. Sedimentation and large works in Italy	12
1.3. The difficult mastery of the Rhine delta in the modern era	17
1.3.1. Flow distribution between river branches: an age-old battle against the elements of nature	17
1.3.2. Returns on destabilization	19
1.4. Observations on the torrentiality of the Southern Alps in the late 18th and 19th Centuries	20
1.4.1. A highly degraded state of affairs in the late 18th Century	20
1.4.2. Prefect Pierre-Henri Dugied's project (1819)	23

1.4.3. Alexandre Surell, author of the French policy for restoring mountain territories	23
1.4.4. The restoration of mountain land (RTM)	28
1.4.5. The Southern Prealps (Drôme): what kind of balance in torrential milieus?	31
1.5. The sediment conveyor belt, from torrents to outlets	32
1.5.1. The forester Georges Fabre, from the Aigoual to the Gironde	32
1.5.2. The Rhône river trough	33
1.5.3. The redistribution of alluvia in the upper delta of the Rhône	35
1.5.4. Solid contributions to the Rhône outlet and progression of the Camargue delta	35
Chapter 2. Continuity in European Hydraulic Science (16th–18th Centuries)	39
2.1. From hydraulic architecture to the fluvial system: transalpine preeminence	41
2.1.1. At the roots of European science	42
2.1.2. A great Italian scholar, Paolo Frisi	44
2.2. The first naturalist approaches to the water cycle in the Seine basin	50
2.2.1. Pierre Perrault	51
2.2.2. Edme Mariotte	52
2.2.3. French hydraulic science in the 18th Century	53
2.2.4. Emergence of the natural state of rivers in the mid-18th Century	59
2.2.5. Jean-Antoine Fabre, the great naturalist engineer of Southern Alpine torrents	62
2.3. Conclusion	67
Chapter 3. Exploited Nature and the River's Responses to the Globe's Surface	69
3.1. Mistreated soil and accelerated erosion	71
3.1.1. The Huang-He (Yellow River) basin: accelerated erosion in a highly fragile milieu	71
3.1.2. Soil erosion in North America	77
3.1.3. Accelerated erosion on the Great Russian Plains, from Belarus to the Urals	83
3.1.4. New Zealand, "destruction on the pretext of development"	86

3.2. Mineral predation and river bursts	91
3.2.1. Lead and zinc in the Pennines: mines threatening dairy livestock	92
3.2.2. The “debris” from the gold-bearing alluvia of the Sierra Nevada (California)	93
3.2.3. The coal mines of the Loess Plateau, the Huang-He watershed.	100
3.2.4. Mountaintop mining in the Appalachians at the risk of downstream reaches	101
3.3. Conclusion	104
Chapter 4. From Hills to the Ocean: Production, Transfer and Trapping	107
4.1. Global continental contributions to oceans	107
4.1.1. Continental denudation and sediment flux to river mouths	108
4.1.2. Natural sediment interception on the way to oceans	112
4.1.3. Disturbances in “geological” fluxes during the Anthropocene	117
4.2. Selected case studies on the Earth’s surface.	121
4.2.1. The Yangzi basin	121
4.2.2. The sediment load of rivers in mountain regions subject to tropical cyclones	121
4.2.3. The effects of the recent protection of degraded continental milieus.	122
4.2.4. Mining and the increase in river loads	125
4.3. Irreversible flux disturbances	126
4.3.1. The major role of artificial reservoirs	126
4.3.2. Hydrological and sedimentary effects.	127
4.3.3. Trapping and effects on sediment transfer	129
4.3.4. River diversion, loss of transport capacity and trapping.	131
4.3.5. Predation of river resources: sand and gravel.	135
Chapter 5. The Recent Hydrosedimentary History of Some of the Globe’s Largest Rivers	145
5.1. A river in its natural state, the Amazon	146
5.1.1. The river in its basin	146
5.1.2. River function	147
5.1.3. The threat of dams	149
5.2. Adjusted rivers in China and Southeast Asia	150
5.2.1. The Huang-He downstream of the Loess Plateau: contemporary generalities	150

5.2.2. The Yangtze and the Three Gorges Dam	155
5.2.3. The Mekong	160
5.3. The Mississippi, an altered river in a new country	166
5.3.1. Basin and hydrology	166
5.3.2. Geology of the Mississippi basin	167
5.3.3. Aspects of the river	168
5.3.4. Modifications to the sedimentary budget	170
5.4. Overexploited rivers in regions with a water deficit	176
5.4.1. The God River and the Aswan Dams	176
5.4.2. The Colorado River.	182
Conclusion	189
Glossary	193
Bibliography	199
Index of Common Terms	219
Index of Places	223
Index of Names	229