

Index

1. Introduction.....	1
1.1. Background and goals.....	2
1.2. Outline of the document	5
1.3. Framework of the dissertation	5
2. Modelling the sediment cycle.....	7
2.1. Introduction.....	8
2.2. Erosion, transfer and deposition processes	8
2.3. Mathematical modelling of the sediment cycle	10
2.3.1. Model classification.....	11
2.3.2. Sediment model calibration	13
2.3.3. Sediment models: some examples.....	14
2.3.4. Main limitations of sediment models	19
2.4. Proxy data exploitation	21
2.4.1. Reservoir sedimentation	22
2.4.2. Palaeohydrological techniques	31
3. The TETIS model.....	35
3.1. Hydrological sub-model.....	36
3.1.1. Model formulation	36
3.1.2. Model parameters.....	43
3.1.3. The initial conditions	45
3.2. Sedimentological sub-model	45
3.2.1. Hillslope processes	47
3.2.2. Gully and channel processes	48
3.2.3. Model parameters.....	49
3.2.4. Sediment initial conditions.....	50
3.3. Automatic calibration	53
3.4. Small reservoir sedimentation sub-model	54
3.4.1. Water routing	54
3.4.2. Sediment routing.....	56

4. Goodwin Creek: gauged data	59
4.1. Introduction and goals.....	60
4.2. The case study: Goodwin Creek	62
4.2.1. Catchment characteristics.....	62
4.2.2. Hydrometeorological data	66
4.2.3. Sediment data	67
4.2.4. Model parameters.....	68
4.3. Results	72
4.3.1. Hydrological sub-model calibration and validation	73
4.3.2. Sedimentological sub-model calibration and validation.....	76
4.3.3. Continuous simulation	89
4.4. Conclusions.....	90
5. Rambla del Poyo: proxy data	93
5.1. Introduction and goals.....	94
5.2. The case study: Rambla del Poyo	95
5.2.1. Catchment characteristics.....	95
5.2.2. Hydrometeorological data	97
5.2.3. Sediment data	98
5.2.4. Wildfire data	115
5.2.5. Model parameters.....	117
5.3. Results	125
5.3.1. Hydrological sub-model calibration and validation	125
5.3.2. Calibration and spatial validation of the sedimentological sub-model.....	128
5.3.3. Alluvial infill volume estimation of check dam 2.....	130
5.3.4. Temporal validation of the sedimentological sub-model	133
5.4. Conclusions.....	140
6. Rambla del Poyo: transfer of information	143
6.1. Introduction and goals.....	144
6.2. Results	145
6.3. Conclusions.....	153
7. Ésera River: proxy and gauged data	155
7.1. Introduction and goals.....	156

7.2. The case study: Ésera River	158
7.2.1. Catchment characteristics.....	158
7.2.2. Hydrometeorological data	160
7.2.3. Sediment data	161
7.2.4. Model parameters.....	164
7.3. Results	170
7.3.1. Hydrological sub-model calibration and validation	170
7.3.2. Sedimentological sub-model calibration and validation.....	173
7.4. Conclusions.....	185
8. Conclusions.....	187
8.1. Main contributions	190
8.2. Limitations and future research lines	191
9. References	195