

Contents

1	Introduction	1
2	Methodology	3
2.1	Principles of Drought Analysis and Assessment	3
2.1.1	Drought Definitions and Types	3
2.1.2	Drought Risks and Impacts	5
2.1.3	Methods of Drought Assessment	6
2.2	Theoretical Basis of the Water Quality Assessment	32
2.2.1	Water Quality: Definition and Evaluation Methods	32
2.2.2	Water Quality Indicators	42
	References	48
3	Software Tools Used at Work	55
3.1	HydroOffice	55
3.2	Hydrogeochemical Tools	59
	References	60
4	Area of Interest and its Natural Conditions	61
4.1	Geological and Pedological Conditions	61
4.2	Climatic Conditions	64
4.3	Hydrological Conditions	68
4.4	Hydrogeological Conditions and Currently Processed Research	69
4.5	Land Use of Assessed Area	72
	References	73
5	Analysis of Hydrological Drought	77
5.1	Foreword	77
5.2	Analysis of Hydrological Drought on River Profiles of Slovakia	78

5.2.1	Methods of Data Processing	78
5.2.2	Intensity Analysis of Hydrological Drought in Slovakia	79
5.2.3	Spatial Extent of Hydrological Drought	81
5.2.4	The Length of Drought Periods	84
5.2.5	Seasonality and Frequency of the Drought Periods in Slovakia	86
5.2.6	Classification and Drought Assessment	89
5.3	Meteorological Drought in the Upper Part of the Nitra River Catchment	90
5.4	Surface Water Drought in the Upper Part of the Nitra River Catchment	105
5.5	Groundwater Drought in the Upper Part of the Nitra River Catchment	111
5.6	Comparison of Drought Characteristics in the Evaluated Components of Runoff in the Upper Part of the Nitra River Catchment	128
	References	139
6	Water Quality Assessments in Dry Seasons	141
6.1	Introduction	141
6.2	Input Data and Used Methods	141
6.3	The General Assessment of Water Quality	143
6.4	Spatial Assessment of Water Quality	150
6.5	Temporal Assessment of Water Quality	152
6.6	Water Quality in the Periods of Hydrological Drought	153
6.7	Water Quality Assessment in Dry Seasons	155
6.7.1	Sodium	155
6.7.2	Potassium	156
6.7.3	Ammonia Nitrogen	157
6.7.4	Calcium	159
6.7.5	Magnesium	161
6.7.6	Manganese	162
6.7.7	Iron	163
6.7.8	Chloride	165
6.7.9	Nitrites	167
6.7.10	Nitrates	167
6.7.11	Bicarbonates	169
6.7.12	Sulphates	170
6.7.13	Phosphates	172
6.7.14	Silicates	173
6.7.15	Water Alkalinity	174
6.7.16	Water Acidity	174
6.7.17	Chemical Oxygen Demand	175

6.7.18	Oxygen	175
6.7.19	Oxygen Saturation	177
6.7.20	Electrolytic Conductivity	179
6.7.21	Total Dissolved Solids	180
6.7.22	Water pH	182
6.7.23	Water Temperature	183
6.7.24	Summary of Results.	187
	References	190
7	Summary of Thesis Results	191
7.1	Development of New Hydrological and Hydro-Geochemical Software Tools	191
7.2	Assessment of Hydrological Drought in a Regional Scale	192
7.3	Evaluation of Meteorological Drought	193
7.4	Assessment of Hydrological Drought in Surface Waters.	195
7.5	Assessment of Hydrological Drought in the Groundwater.	196
7.6	Comparison of the Incidence and Nature of Drought in Individual Parts of the Catchment Hydrological Cycle	198
7.7	Assessment of Water Quality Changes During Hydrological Drought	199
	References	202
8	Recommendation for Further Research	203
9	Conclusions	207
	Appendix A: Assessed Profiles of Rivers in Slovakia.	209
	Appendix B: Analysis of the Achieved Deficits in the Individual Catchments of Slovakia	213
	Appendix C: Analysis of the Relative Occurrence of Maximum Annual Deficits in Individual Months of Year for Selected Catchments (in %)	217
	Appendix D: Statistic Overview of Annual Precipitation Totals in Evaluated Meteorological Stations (in mm)	221
	Appendix E: Statistic Overview of Annual Effective Precipitation Totals in Evaluated Meteorological Stations (in mm)	223

**Appendix F: Statistic Overview of Annual Effective Precipitation
Totals in Evaluated Meteorological Stations
with Consideration of Water Volume Time Shift
in Snow Cover. 225**

Appendix G: List of Selected Gauging Profiles on Surface Streams. . . 227

Appendix H: List of Selected Groundwater Monitoring Objects 229