

CONTENT

1 Introduction	5
2 Vltava River cascade of reservoirs and knowledge of its influence on flood regime	6
2.1 Development of the needs and uses of the Vltava and construction of dams	6
2.2 Operation and functions of the Vltava cascade	6
2.3 Influence of the Vltava cascade on flood regime	7
3 Methods	10
3.1 Model of the Elbe River basin.....	10
3.2 Hydrological and hydraulic models applied.....	11
3.3 Time step of the simulation	11
4 Description of the model of the Elbe basin	12
4.1 Structure of the model	12
4.2 Modelling tools and their application.....	17
4.2.1 SNOW-17 model of snow cover formation and melting	17
4.2.2 SAC-SMA rainfall-runoff model	17
4.2.3 TDR, Muskingum – Cunge MCT hydraulic models.....	17
4.2.4 Development of sMAN model for reservoir operation	17
4.3 Main modelling methods.....	18
4.3.1 Time discretisation	18
4.3.2 Spatial discretisation	19
4.3.3 Initial and boundary conditions.....	19
4.3.4 Calibration.....	19
4.4 Alternative solution of transformation effect of reservoirs and floodplains	20
4.4.1 Study of Lipno Reservoir operation by using HEC-ResSim system	20
4.4.2 Study of flood transformation in the Elbe River floodplains by using HEC-RAS and RFR tools	21
5 Preparation of data series.....	25
5.1 Data for the period used (1890-2002)	25
5.1.1 Selection of water gauging stations.....	26
5.1.2 Flows	27
5.1.3 Selection of floods.....	27
5.1.4 Determination of periods for which data on reservoir operation are required	27
5.1.5 Preparation of data on water stages.....	28
5.1.6 Preparation of data on maximum flows and mean daily flows	28
5.1.7 Review of maximum flows and mean daily flows in Děčín and Ústí nad Labem water gauging stations	29
5.1.8 Selection of precipitation stations and preparation of data on precipitation	32
5.1.9 Air temperature	32
5.1.10 Preparation of data on causal precipitation for selected floods.....	32
5.2 Collection of historical data and their possible use.....	33
6 Simulation of flood hydrographs	37
7 Analysis of simulated annual maximum flow series	43
7.1 Derivation of N-year floods	43
7.2 Results of the analysis	43
8 Accuracy of the results.....	51
9 Conclusions	52