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Anthropogenic impacts on flood generation in an Austrian mesoscale catchment

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The Traisen river catchment, a southern tributary to the Danube, is a prealpine basin with about 700 km^2. Human inventions in this basin are mainfold ranging from river channelization, losses in flood plains, changes in the land use patterns, increased housing and domestic areas as well as development of infrastructure.

In this paper a continuous, semi-distributed rainfall-runoff model, COSERO, was used to simulate the runoff patterns under different scenarios. The response of the catchment in 1900 and under recent conditions was analysed by utilizing land use maps and other information from these periods.

The catchment was subdivided into homogenous units that were identified by intersections of sub-catchments, land cover information and elevation bands. For each unit a set of parameters is required which refers to mean physical characteristics, some of them affected by anthropogenic measures, like interception losses, infiltration capacity, surface roughness and hill slope length of the unit.

Spatial information of actual land cover, vegetation type and geology and observed runoff were used to estimate the parameters of the hydrological model for the present situation.

Additionally, the magnitude of the anthropogenic impacts was estimated comparing historical and actual information. Physically based models (Hec-Ras, kinematic wave model,...) were used to estimate the relation between the human impacts during the

last 100 years and the respective parameters in the hydrological model.

Channelizing rivers and the building of dams lead to a decrease of time of concentration and an increase of flood peaks up to ten percent for floods with a recurrence interval of 30 years. The impact decreased with higher recurrence intervals.

Only 1% of the catchment is sealed. Thus urbanization lead to an increase of flood peaks of merely 0.5%. Infrastructural measures in the catchment lead, given a proper culvert system, to an increase of about 2% of the flood peaks.

Due to the significant increase of coniferuous and deciduous forest in the last 100 years (35% to 80% nowadays), the land use changes lead to a decrease of flood peaks up to 20%.