

Hydrological research area of Krofdorf



NW-FVA

Krofdorf, Germany

Basin characteristics		Instrumentation and data			
River Basin / River Basin (according EU-WFD) Operation (from to)	Lahn river basin Since 1972, still in operation	Measured hydrological parameters	Measuring period	Temporal resolution	Number of stations
Gauge coordinates / Gauge datum: Catchment area:	8° 39' E; 50° 41' N; 233 m (A area), 253 m (B area) Four small catchments: A1 (0.09 km²); A2 (0.2 km²); B1 (0.11 km²); B2 (0.14 km²)	Stream flow	Nov 1971 – cont.	1h 15 min (since 2007)	4
Elevation range: Basin type: (alpine, mountainous, lowland)	232.6 - 336.0 m a.s.l. mountainous	Precipitation	Nov.1971 – cont. Nov.1987 – cont. Nov.1971 - 2004	daily 30 min. monthly	1 1 9
Climatic parameters:	700 mm (1972-2004): DWD Gießen: 644 mm (1972-08): 9.4 °C	Airtomo bumiditu	1097 cont	20 min	1

(mean precipitation, temperature and others)

Hydrogeology: (Type of aquifers, hydraulic conductivity) Forestry with deciduous leave trees (European beech: 50-83%, oak: 13-20%)

Brown earth, lessivated brown earth, Pseudogley

Shale, greywacke

Porous aquifer over dense impermeable schistous rock

Characteristic water discharges: (Qmin, Qmax, Qmean)

Land use:

Geology:

Soils:

A1: 0.3 I/s; 263 I/s; 8.6 I/sB1: 1.2 I/s; 299 I/s; 7.6 I/sA2: 0.3 I/s; 188 I/s; 5.3 I/sB2: 0.5 I/s; 156 I/s; 5.7 I/s

Map of the research basin



Applied models

1. Brook 90

2. NuCM

Main scientific results

1. The hydrological research area of Krofdorf was designed as a paired/multiple Watershed Experiment

- 2. The average ratio of runoff (1972-04) to precipitation is 24% (A2), 26% (B2), 34% (B1) and 39% (A1). The rate of runoff hasn't shown any vectored trend since the beginning of the observation.
- 3. 10-year-calibration-period (1972-1981) showed a strong correlation between the two experimental sites A1 and A2 and the reference basin B1 concerning runoff.
- 4. Reduction of stand density index from 0.83 to 0.62 in A1 increased runoff by 20 mm * year (5%).

Mean hydrograph / Pardé flow regime



- 5. Runoff increased by 46 mm (16%) in the year following clear cut of the upper part of watershed A1 (1986).
- 6. During the first seven years after the final cutting in A1 runoff was on average 70 mm (30%) higher than in the reference basin B1.
- 7. Mean nitrate concentration in creek A1 during the calibration period was 5 mg/l with maximum values up to 15 mg/l. As a result of clear cutting mean nitrate concentration doubled to10 mg/l with maximum values to 23 mg/l. 6 years after clear cut nitrate concentrations decreased to values before clear cut.
- 8. Concentration of sulphate in precipitation and throughfall decreased until 2000 and remained on a constant level since then. Sulphate concentration in creek water of all 4 basins is also decreasing.
- 9. The water balance as well as the matter balance could be analysed and described with the models BROOK 90 and NuCM. The concequences of thinning and clear cutting could be simulated satisfactorily.

Key references for the basin

Special basin characteristics

Effect of clear cut in A1 on the discharge of creek A1

1972 to 1982: calibration period1983 to 1987: final felling in A11986 to 1988: planting of beech

on the clear cut

1993 to 2003: thinning in B1 (41 fm/ha) in 1997



- 1. Kennel, M. (1998) Modellierung des Wasser- und Stoffhaushalts von Waldökosystemen- Fallstudien: Forsthydrologisches Forschungsgebiet Krofdorf, Referenzeinzugsgebiet Große Ohe. Forstliche Forschungsberichte München, Nr. 168/1998
- Führer, H.-W. (1993) Paired basin studies on the Krofdorf Forest research area, Hesse/Germany. Report No. 120, Methods of Hydrological Basin Comparison: 72:81. Walligford/UK: Institute of Hydrology.
 Führer, H.-W. (1990) Einflüsse des Waldes und waldbaulicher Maßnahmen auf Höhe, zeitliche Verteilung und Qualität des Abflusses aus kleinen Einzugsgebieten – Projektstudie im Krofdorfer Buchenforst. Forstliche Forschungsberichte München, 106/1990

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