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Echo-sounding, measurement of water levels, ADCP current measurements and setup a water balance for the Barrage „Lac de la Haute Sure“, (Phase I)

Client: Syndicat des Eaux du Barrage d´Esch-sur-Sure (SEBES)

Location: Esch-sur-Sûre, Luxemburg

Scope of Work: Development of a comprehensive database for later analysis of drinking water security

Method: Delimitation of the catchment area, Echo-Sounding of the lake, 3D velocity measurements (ADCP), determination of a water balance for the years 1990-2014

INTRODUCTION

To secure the drinking water supply in Luxemburg a barrage was built between 1955 and 1957 near Esch-sur-Sûre. The Lac de la Haute Sure lake now covers at maximum water level an area of 3.8 km^2. With a maximum depth of 43 m its volume reaches 60 Mio. m^3. SEBES operates a water purification plant and provides more than half of the drinking water in Luxemburg. Further, the company Soler AG maintains two turbines where each generates 5500 kW.

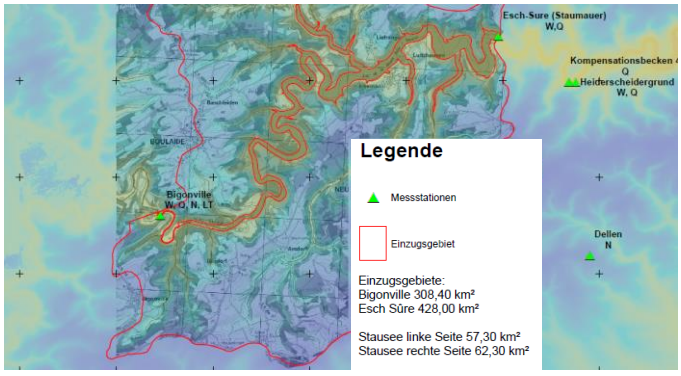

Fig. 1: Southern catchment area and extend of the Lac de la Haute Sure lake

METHOD

With the determination of flow times for characteristic flow conditions, the flow times for a potential hazardous situation could be assessed. This included the following steps:

1. Survey of the lake topography (Fig. 2 a)
2. ADCP 3D-flow measurements (Fig. 2 b)
3. Calculation of flow times
4. Development of an overall water balance for the Lac de la Haute Sure lake

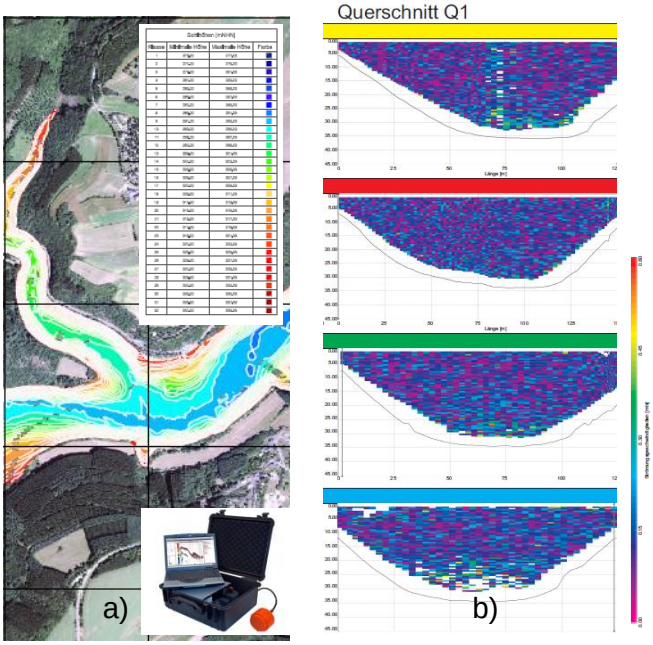

Fig. 2: Echo-sounding plus equipment (a) and results of ADCP-flow measurements (b)

RESULTS

The development of an overall water balance clearly indicated the significance of inflow through tributaries to the lake (Tab. 1). To meet the necessity for further investigation to develop a fully reliable water balance for the whole barrage we installed additional gauging station.

Table1: Seasonal water balance for the barrage (1990 to 2014)

Month	Water Level Dam [mNN]	Positiva / Negativa [m³]
January	316,29	3.519.689
February	315,59	-2.649.228
March	314,79	-3.027.689
April	316,04	4.730.765
May	316,58	2.043.690
June	316,63	189.230
July	316,26	-1.400.306
August	315,74	-1.967.998
September	315,23	-1.930.152
Oktober	314,42	-3.065.535
November	314,67	946.153
December	315,36	2.611.382