



Smart-SWS: Combining flood protection and drought prevention -- Concept and site selection criteria

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Climate changes in the anthropocene lead to an increase of rainfall intensity while the infiltration capacity of the soil is reduced during extended dry periods. As a consequence surface runoff increases and groundwater levels are reaching all-time lows: even close to the alps water becomes scarce. Keeping precipitation water local is a must and one option is to direct flood water into local aquifers (Flood-MAR). This comes with a number of challenges, first of all, a pronounced asymmetry of floods with very high volume flow in very short times, and droughts requiring long-term storage. From a hydrogeological perspective, infiltration of flood waves requires extremely well-connected groundwater bodies with high hydraulic conductivity contrasting with slow groundwater flow required for long-term storage. Geotechnical measures like sheet-pile walls or sand injections can be used to control the release of groundwater back to the river. The infiltrated water has to be conditioned to meet hydrochemical and sanitary criteria. In contrast to conventional managed aquifer recharge (MAR) the time frame for treatment is extremely limited. As floods are not occurring regularly, any treatment system has to work autonomously and to be insensitive to long downtimes between flooding events. The decision tree for the selection of suitable sites starts with the occurrence and extent of flooding events (regular flooding events with volumes less than roughly 1 million m³), the morphology of the site (leveled with groundwater levels below river water), and the hydrogeological properties of the adjacent aquifers (ideally porous aquifers with high specific yield and hydraulic conductivity). Further criteria are land use (agriculture preferred), infrastructure (access to the site, no subsurface installations), protection zones (groundwater, habitats, ...) and ecosystem services, and risk factors in the catchment (hazardous substances, extended mobilization of soil during flooding, ...). Three sites have been selected as pilot sites and will be presented.

