Importance of groundwater flow systems in river base flow and ecology in a Mediterranean catchment: Santa Coloma River (Catalonia, NE Spain)



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Introduction and objective

Mediterranean river basins generally show seasonal periods of water shortage, mainly in summer

• River/streams are more sensitive to human impacts -wastewater and water diversion

• In an aquifer-river connected systems groundwater keep the base flow and sustain a good ecological status



Study the role of groundwater in a stream-connected alluvial aquifer where different scale groundwater flow systems occur

Study Area



Local and regional groundwater flow systems with different characteristics

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Methodology



Two field campaigns: September 2009 and April 2010

 Groundwater head (38 wells in the alluvial aquifer)

• Stream flow (10 points) considering water treatment plants and drainage network

• Hydrochemistry of surface and groundwater including 2 springs and a thermal spring (Major elements, F and Br)

Results: groundwater contour map



 Groundwater levels of the alluvial aquifer indicate losing stream behavior except in the upper part

• Stream water infiltrates into the shallow aquifer during the all year

Results: river flow



- No flow in some reaches during the summer months
- Despite the stream losing behavior there are points with flow increase

Influence of other non-local groundwater flow systems

Results: Hydrochemistry



• During the wet season similar trends with less F content and Na-HCO₃ facies

Some stream reaches influenced by regional large scale GW flow systems

Results: Hydrochemistry



• During the wet season similar trends with less influence of groundwater

Conclusions



• Stream-aquifer interaction influenced by local and **regional groundwater** flow systems along the main faults.

• Stream discharge will be much more sensitive to surface water diversion than to groundwater extractions

 "Gaining stream" behaviour observed in the upper part shows a good constant water quality allowing a better ecological status than in most of downstream reaches

Conclusions

• Groundwater input allows some wastewater dilution and, thus, improves the hydrochemical quality of the stream discharge

•The contribution of regional flow systems along main faults to the stream-alluvial aquifer water budget helps to maintain a base flow during the summer months



Thank you



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