Quantification of Water-related Ecosystem Services in the Upper Santa Cruz Watershed

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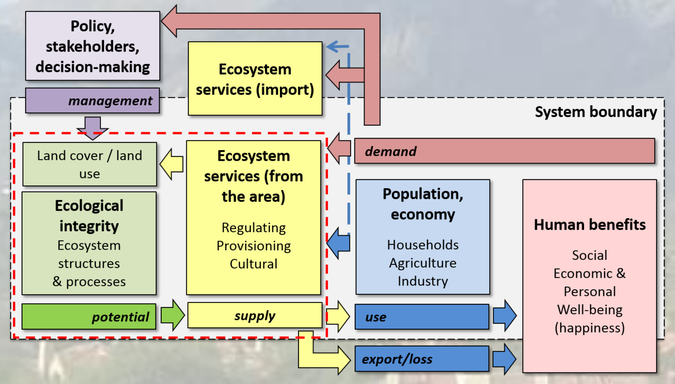
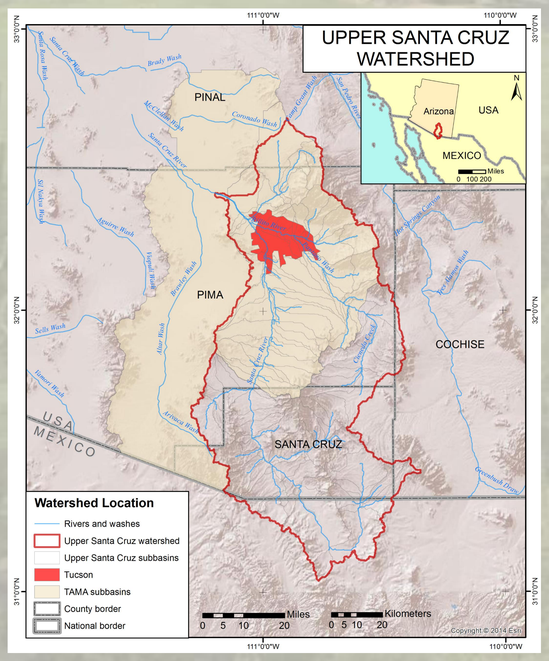
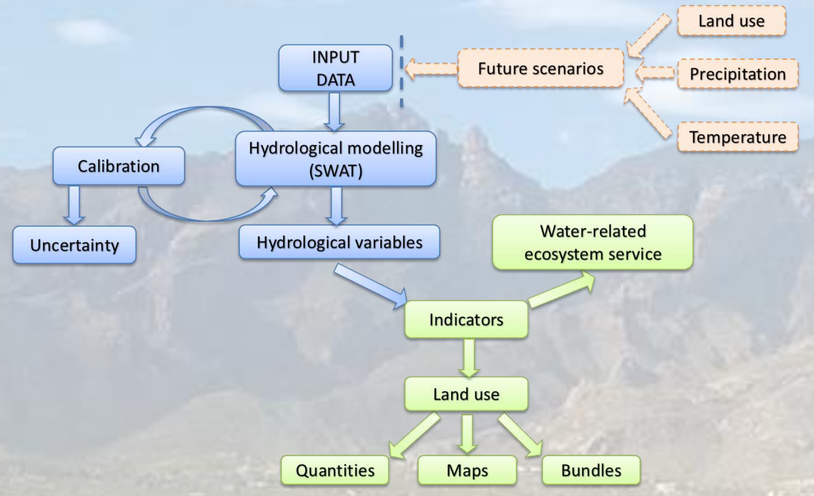
The ongoing drought in the Southwestern United States places pressure on both scientists and practitioners to find new solutions to water-related issues. In the state of Arizona, this situation requires that the present state of the ecosystems and natural resources be re-evaluated to assess their capacity to sustain the future flow of Ecosystem Services (ES) to society. In this poster, we present an investigation of the influence of local land use practices on the water cycle, and the consequent impact on the supply of Water-Related Ecosystem Services (WRES) that can provide support for water and land management and decision-making in areas experiencing water scarcity.



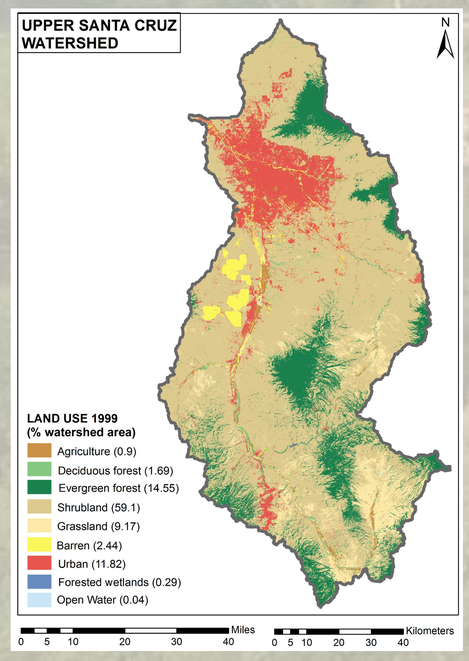
Our study focuses on the Upper Santa Cruz watershed located mainly in southern Arizona but with a small portion in the Sonora region of northern Mexico.

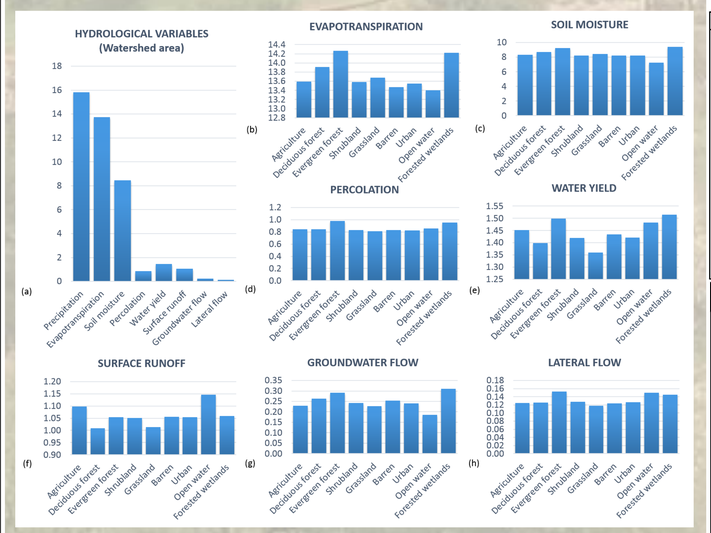


We propose a methodology for spatially explicit quantification and evaluation of the WRES within the watershed, and use the Soil and Water Assessment Tool (SWAT) hydrological model to derive a set of hydrological indicators from model simulation for the period 1987-2006.



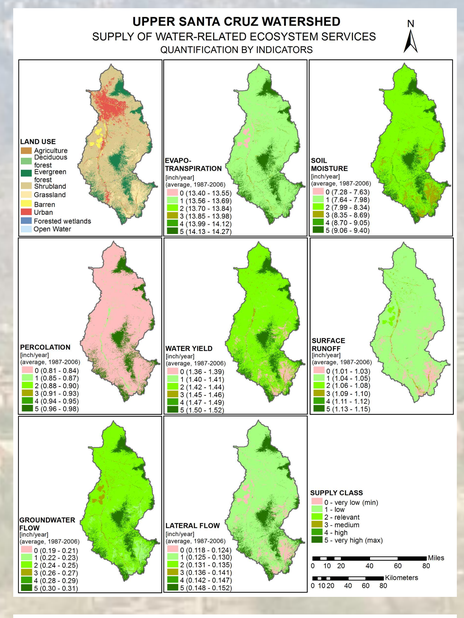
Being a water-limited region, the vast majority (approximately 87%) of the incoming precipitation water leaves the system as evapotranspiration. The different land use types within the watershed influence the hydrological cycle and, thereby, the supply of WRES. We assess and map impacts by analyzing the average annual values of the hydrological variables for each land use type.

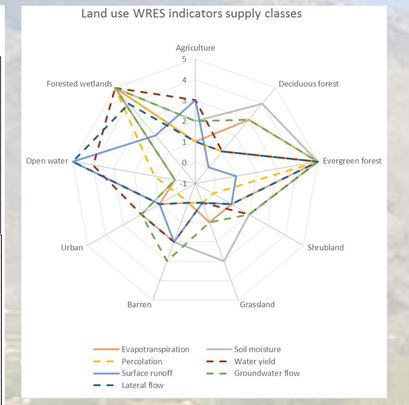


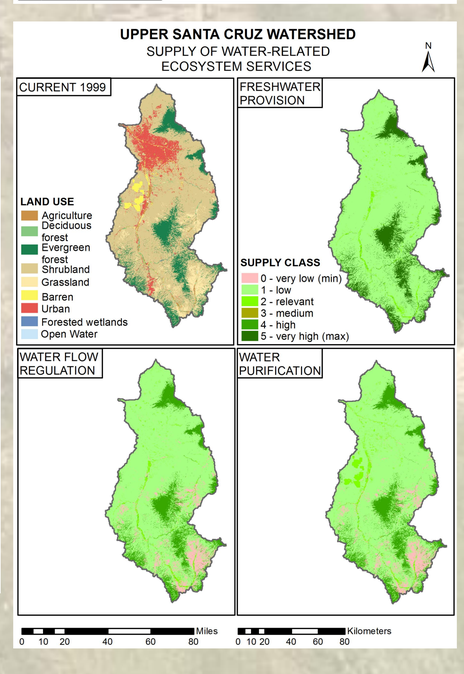


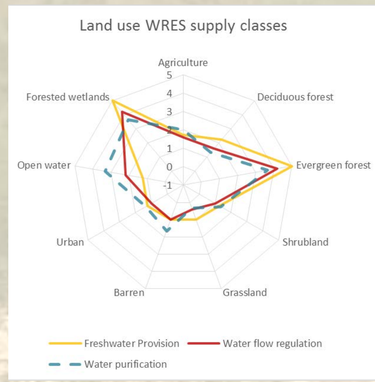
Background image source: Kremena Boyanova, personal collection

We highlight the importance of forested lands (evergreen forests and forested wetlands - approximately 15% of the watershed area) for providing the highest supply of WRES in the region and consequently, the importance of their preservation. Nevertheless, the predominant land use types within the watershed (shrublands, urban areas and grasslands – approximately 81% of the watershed area) provide the lowest supply of WRES, which significantly decreases the overall supply of WRES at the watershed scale.









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