



## **Irrigation Management, Evolving Canal Systems and Social Simulation in Hohokam Society, Central Arizona**

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As many societies that rely on irrigation, the Hohokam civilization in South West Arizona faced challenges arising from the variability and unpredictability of water supply and the physics underlying the flow of water through open channels. Such challenges can be overcome through cooperation and other forms of structured social interactions and institutions ranging from simple to complex. These interactions are influenced by and are influenced themselves by environmental conditions, including hydrology, soils and vegetation. At the same time, the environmental record provides clues to these interactions. To better understand these past interactions we combine geoarchaeological studies with flow simulations and Agent Based Modeling. Fieldwork conducted on Hohokam irrigation revealed new details about canal morphology, including shape, size, elevation, slope, and cleaning events. Micromorphological study of the sediments in these structures allow finer resolution in discerning the performance (velocity, discharge, etc.) of the canal channels and their evolution through time. We couple this with basic agent-based modeling to explore how these constraints might have required alternative strategies for cooperation. The combination of both approaches is key to discerning both broad differences between periods and fine variation within major chronological periods. We show that the coupling of social and physical models on very fine time scales can offer insight into the social arrangements and day-to-day life of people in the prehistoric past and inform our understanding of those societies' long-term changes.