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Colorado River Salinity: Correlation to Geostrata and Mitigation with Carbon-Fiber Capacitors

This study focused on determining the geologic contributions to salinity in the Colorado River and mitigation strategies to reduce that salinity. Salinity was determined for the mainstream of the Colorado River and the side streams of the river within Grand Canyon National Park. Data were collected from every flowing side stream in July, and thus every stream in the canyon was sampled which was derived from an aquifer, rather than surface-water. The side stream salinities were correlated to different aquifers, geostrata, and emergence layers to determine the salt source for the side streams. Shale layers in the aquifer are the largest contributor to salt content, while carbonate layers contribute minimal salt to the streams. Since the South-rim aquifers are lower, encompass shale layers, and form artesian pathways, streams derived from South-rim aquifers are higher in salinity than streams derived from North-rim aquifers (which are karstic aquifers in carbonate layers). A method for de-salination was developed using carbon-fiber capacitor electrodes to remove ions from test solutions. The carbon-fiber capacitor technique removed at least one monolayer of ions from ionic solutions. Surface area, time, and ion-type were tested with the carbon-fiber capacitor to determine optimal conditions for de-salination. The results suggest that de-salination of Colorado River sidestreams using carbon fiber capacitor electrodes could be feasible with high surface area materials. Geostrata make a significant contribution to salt levels in Colorado River aquifers.