

## Characterization of Convexity of Water Bodies

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### ABSTRACT

Convexity is considered as one of the basic descriptors of shapes. In this paper, the characterization of the convexity of water bodies is performed. Concepts of mathematical morphology are used to compare water bodies and their corresponding convex hulls in terms of their size distribution, shape-size complexity and homotopic ratios. A power law relationship is observed between the convexity measures and areas of water bodies. This power law relationship arises as a consequence of the fractal properties of the convexity of water bodies. Convex hull computation increases the size of the water bodies. This enlargement is not even; smaller water bodies undergo smaller enlargements compared to larger water bodies, and hence, convex hull computation alters the water body size distribution. The computed convex hulls have a more even shapiness index distribution compared to the water bodies, as water bodies are random chaotic objects while convex hulls are well defined polygons. Convex hull computation also causes a loss of homotopic information. This study provides useful insight into the dynamical behavior of the floodings of water bodies.

**Keywords:** water bodies, convexity; water bodies; mathematical morphology; fractal power law relationship; size distribution; shape-size complexity; homotopic ratio.