

*FINAL REPORT  
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*Assessment of the morphological diversity and the ecological patterns in the near threatened colonial waterbirds across Indian sub-continent using novel approach*



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## Executive Summary

Understanding the morphological diversity and the ecological patterns is important to understand the life history patterns of species. Regular bird monitoring programme at breeding site has been integral part, and such long term monitoring is required in assessing population trends and other possible determining factors affecting the heronry birds over a long time scale.

Here, we addressed some of the critical ecological, hydrological, morphological questions pertaining to breeding birds in a heronry setup. In the chapter one and two, we discussed the plausible reasons for prevailing of water scarcity in sanctuaries, both in north and south India, and its relative effects on the breeding success of the birds. We identified hydrological problems and solutions which could be applied through hydrological management approach, 3) finally, on the third chapter, we elaborated the existence of intraspecific morphological variation in the Painted Stork (*Mycteria leucocephala*) using a novel and advanced morphometric shape analysis. Thus satisfying the broad objectives of the proposed study.

Thus, since 1990s census of heronry birds has been a regular exercise in the Keoladev National Park. As water being the single most dominant determinant factor in a wetland ecosystem, in this study, we performed Multiple Regression Analysis on 17 years of data (1992-2008) assuming that annual variation in the breeding population (total nest count) of birds and water availability in the Park would be intimately related. To verify the presumption, a regression model was attempted taking rainfall and water released to the Park from the neighbouring reservoir as predictor variables and total nest count as the response variable. The analysis shows that inter-annual variation in total nest counts were explained by the previous year's rainfall as well as water release to the Park. Habitat quality of the previous seasons, particularly related to water availability, reflected the intensity of nesting in the subsequent season.

Morphological diversity, particularly the sexual size dimorphism, for long is being quantified on the basis of univariate measurements of key traits. However, this

method faces several limitations. The limitations of the traditional univariate measurements could be circumvented by the application of Geometric Morphometrics, which examines the shape associations among an entire set of landmark points. Here, we tested the Sexual Shape Dimorphism (SShD) in the wild Painted Stork using Geometric morphometrics. We identified the subtle difference in the bill shape between the sexes of Painted Storks. As expected, males are comparatively larger and broader than females, and variation in the bill size and shape are prominent between males and females. Thus, we could demonstrate the utility of Geometric Morphometrics to understand the ontogenic variations and the expression of the sexual size and shape dimorphism in wild Painted Stork. Because the Painted Stork is a large bird with no sexual dimorphism, and both the sexes look alike, therefore, our results aids in differentiating the subtle morphological variation between the sexes along its size and shape. Further, it could help testing a number of hypotheses on morphological variations.