

## Cartographic Depiction and Visualization of Wetlands Changes in the North-Western States of India

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**Abstract :** Cartographic depiction and visualization of wetland changes is an important tool to map spatial-temporal information about the wetland dynamics effectively and to comprehend the response of these water bodies in maintaining the groundwater and surrounding ecosystem. This is true for the states of North Western India, i.e., J&K, Himachal, Punjab, and Haryana that are bestowed upon with several natural wetlands in the flood plains or on the courses of its rivers. Thus, the present study documents, analyses and reconstructs the lost wetlands, which existed in the flood plains of the major river basins of these states, i.e., Chenab, Jhelum, Satluj, Beas, Ravi, and Ghagar, in the beginning of the 20th century. To achieve the objective, the study has used multi-temporal datasets since the 1960s using high to medium resolution satellite datasets, e.g., Corona (1960s/70s), Landsat (1990s-2017) and Sentinel (2017). The Sentinel (2017) satellite image has been used for making the wetland inventory owing to its comparatively higher spatial resolution with multi-spectral bands. In addition, historical records, repeated photographs, historical maps, field observations including geomorphological evidence were also used. The water index techniques, i.e., band rationing, normalized difference water index (NDWI), modified NDWI (MNDWI) have been compared and used to map the wetlands. The wetland types found in the north-western states have been categorized under 19 classes suggested by Space Application Centre, India. These enable the researcher to provide with the wetlands inventory and a series of cartographic representation that includes overlaying multiple temporal wetlands extent vectors. A preliminary result shows the general state of wetland shrinkage since the 1960s with varying area shrinkage rate from one wetland to another. In addition, it is observed that majority of wetlands have not been documented so far and even do not have names. Moreover, the purpose is to emphasize their elimination in addition to establishing a baseline dataset that can be a tool for wetland planning and management. Finally, the applicability of cartographic depiction and visualization, historical map sources, repeated photographs and remote sensing data for reconstruction of long term wetlands fluctuations, especially in the northern part of India, will be addressed.

**Keywords :** cartographic depiction and visualization, wetland changes, NDWI/MDWI, geomorphological evidence and remote sensing

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