

Monitoring of water area in the dry season of East Dongting Lake Wetland from 2022 to 2023 based on Google Earth Engine

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Wetlands have functions such as hydrological regulation, water purification, and climate regulation. However, under the dual influence of global climate change and human activities, the frequency and intensity of wetland ecological droughts are increasing, leading to shrinkage of wetland area and decline in ecological service functions, seriously threatening wetland ecological security.



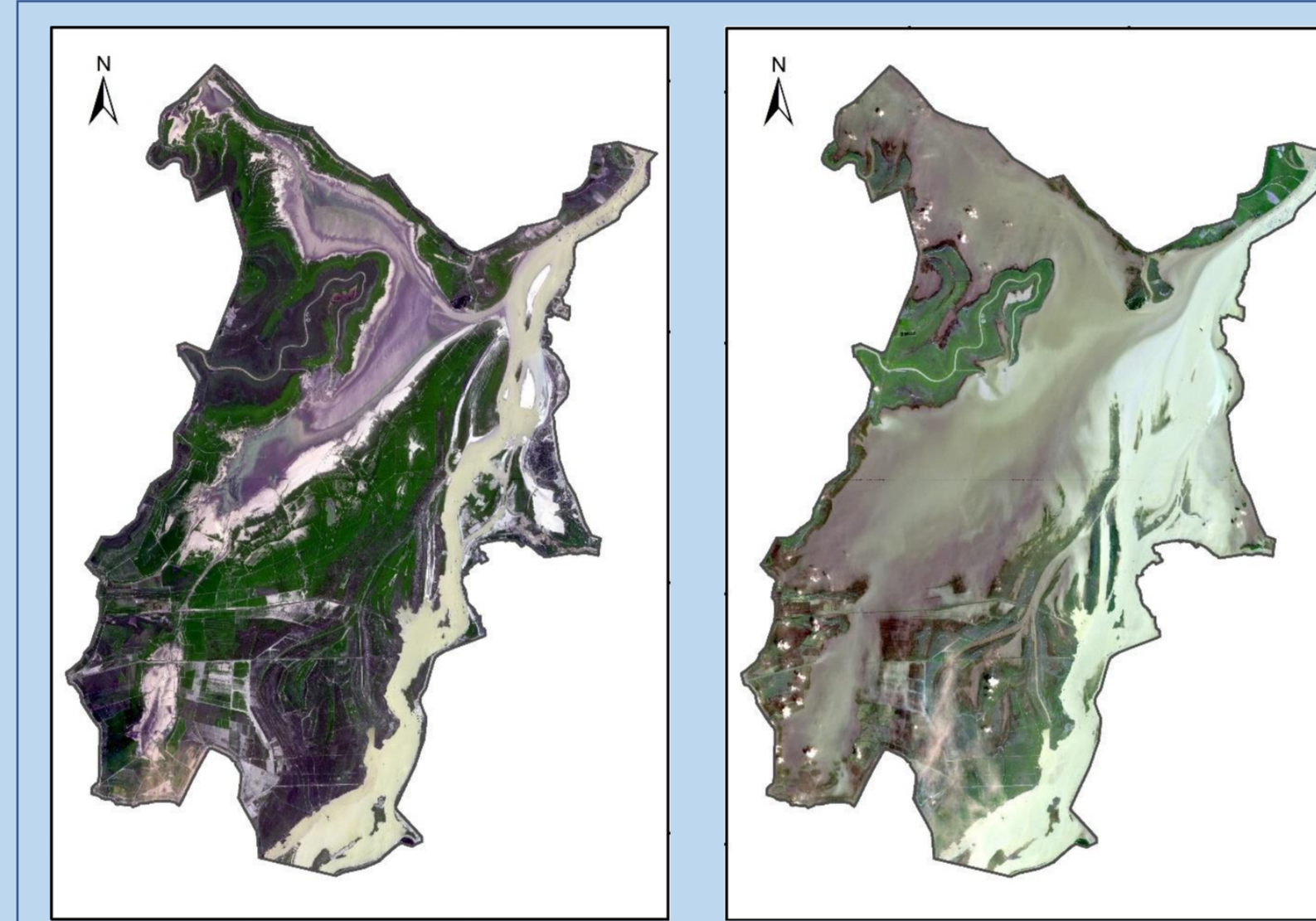
Migratory birds migrating to the wetlands of East Dongting Lake

Elk are strolling on a wetland grassy bank



We used the Sentinel-1 GRD data provided on **Google Earth Engine** and developed a water area monitoring module based on the OTSU method, which provided us with water distribution data of the East Dongting Lake wetland during the target period. There are 44 available Sentinel-1 GRD images in these 305 days. The average water area in the dry season calculated from the 44 images is 230.75 square kilometers. In contrast, there were 49 available images in the same period of the previous year, and the average water area was 486.32 square kilometers. The average water area in the same period of the previous year was even larger than the maximum water area of 369.06 square kilometers during the target period. This reflects the continued impact of the severe drought in China's Yangtze River Basin in the second half of 2022 on the East Dongting Lake wetland.

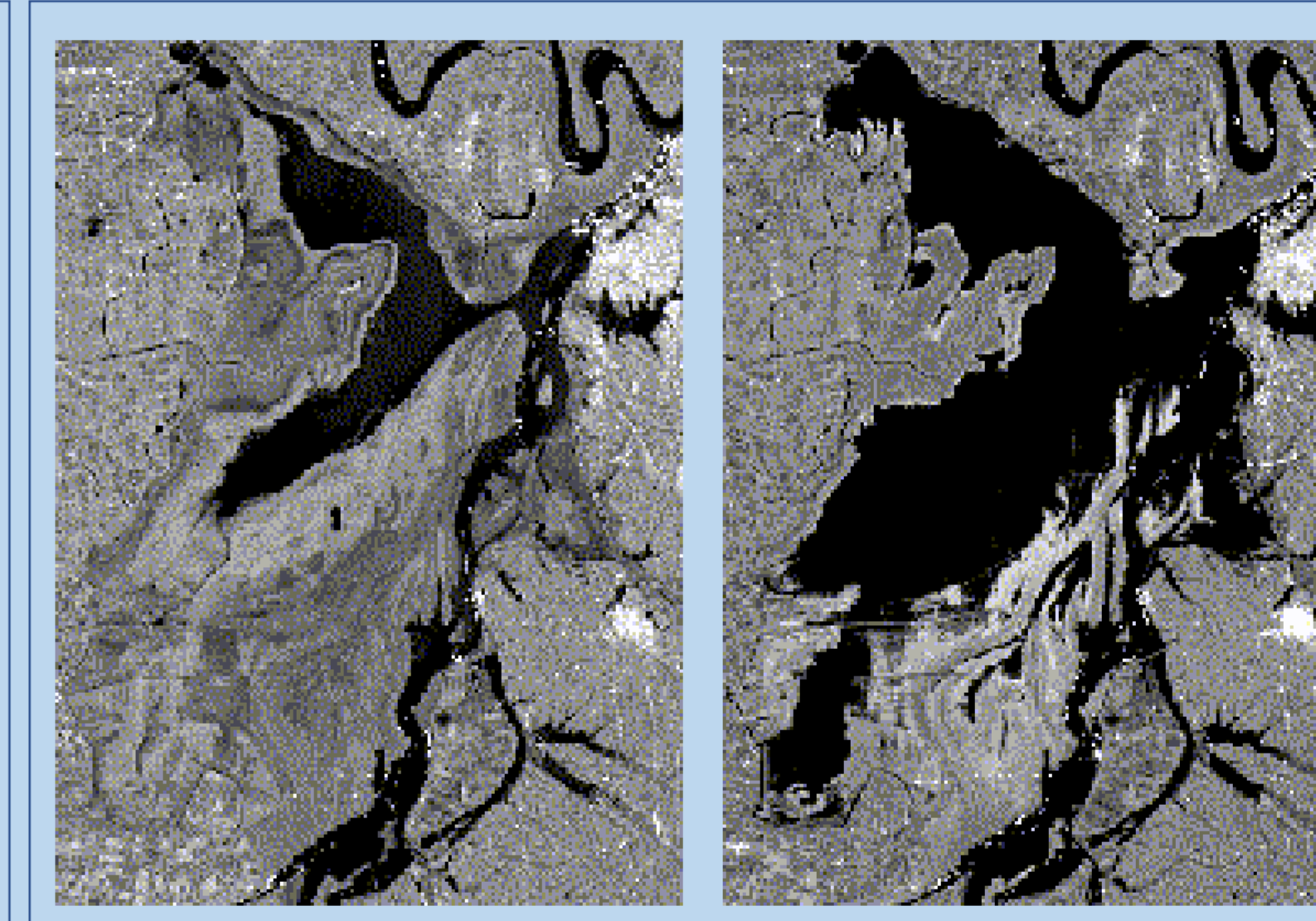
Sentinel-2 MSI



August 20, 2022 (Extreme drought)

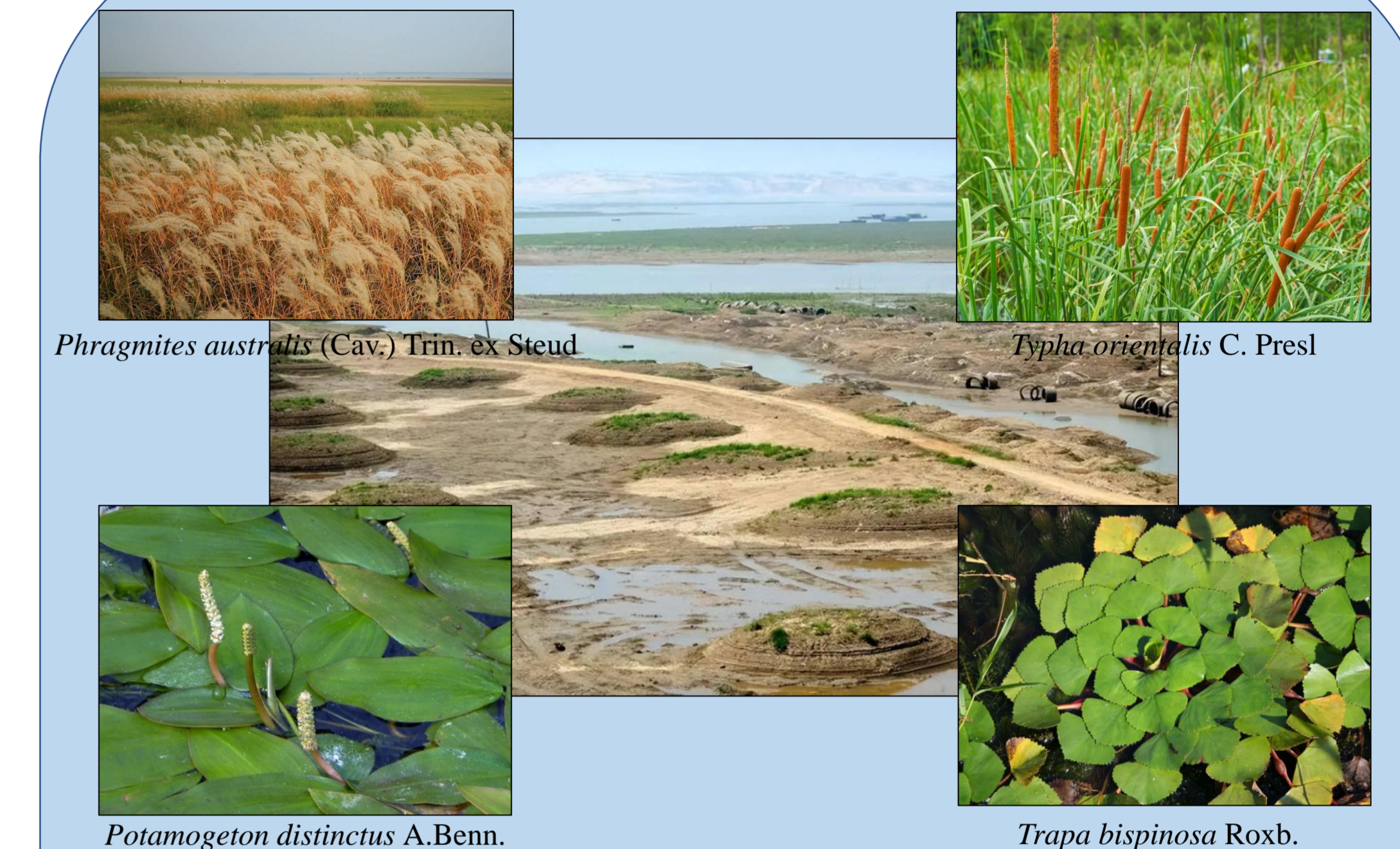
August 20, 2021 (Normal)

Sentinel-1 GRD



August 2, 2022 to June 5, 2023 (Extreme drought)

August 2, 2021 to June 5, 2022 (Normal)



Phragmites australis (Cav.) Trin. ex Steud

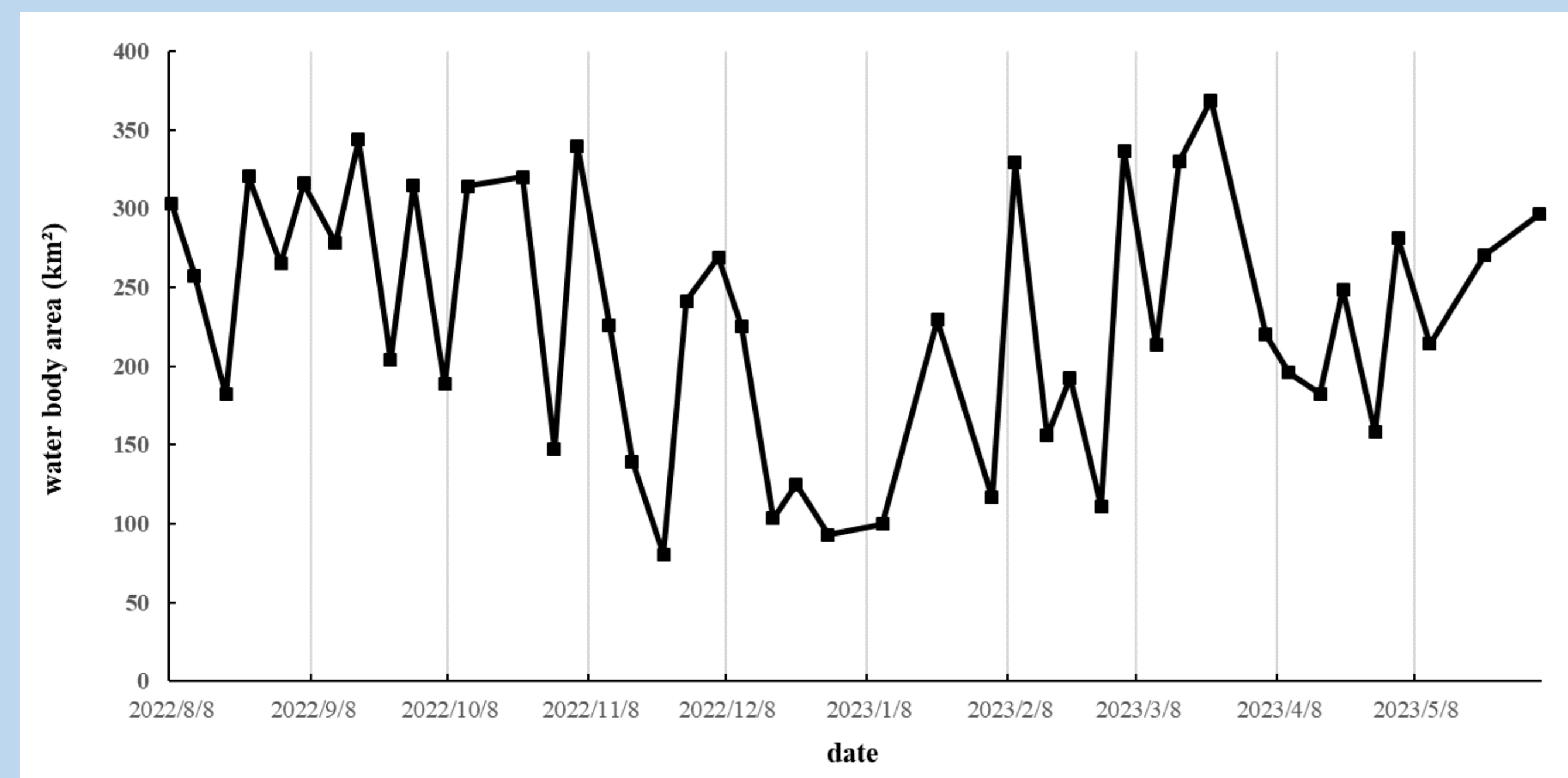
Typha orientalis C. Presl

Potamogeton distinctus A.Benn.

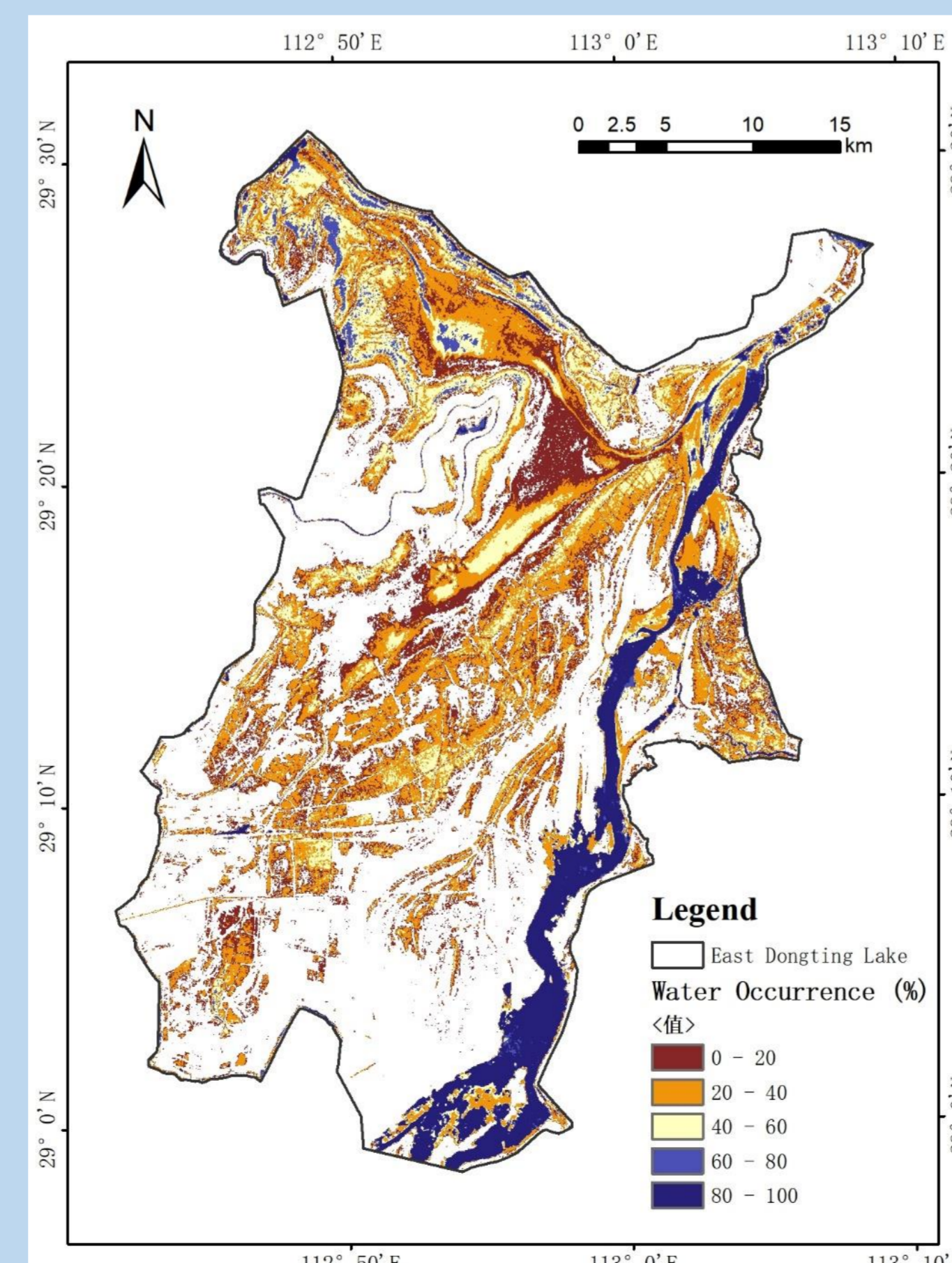
Trapa bispinosa Roxb.

The advance of the dry season mainly affects the seasonal growth of wetland vegetation, including submersed plants (*Potamogeton distinctus* A.Benn), floatingleaf plants (*Trapa bispinosa* Roxb.), emergent plants (*Phragmites australis* (Cav.) Trin. ex Steud and *Typha orientalis* C. Presl), swampy meadows (*Carex brevicuspis* C. B. Clarke) and swamp grasses (*Miscanthus lutarioriparius* L. Liu ex Renvoize & S. L. Chen). The drought has even affected the habitat of elk and has had a complex impact on wetland ecology.

East Dongting Lake Wetland is located in Hunan, China. According to the observation results of the Chenglingji Water Level Station, from **August 2, 2022 to June 5, 2023**, it entered an abnormal dry period of 305 days, which is the longest dry period since observation records began. Our goal is to understand the changes in water distribution in East Dongting Lake during this period based on satellite images.

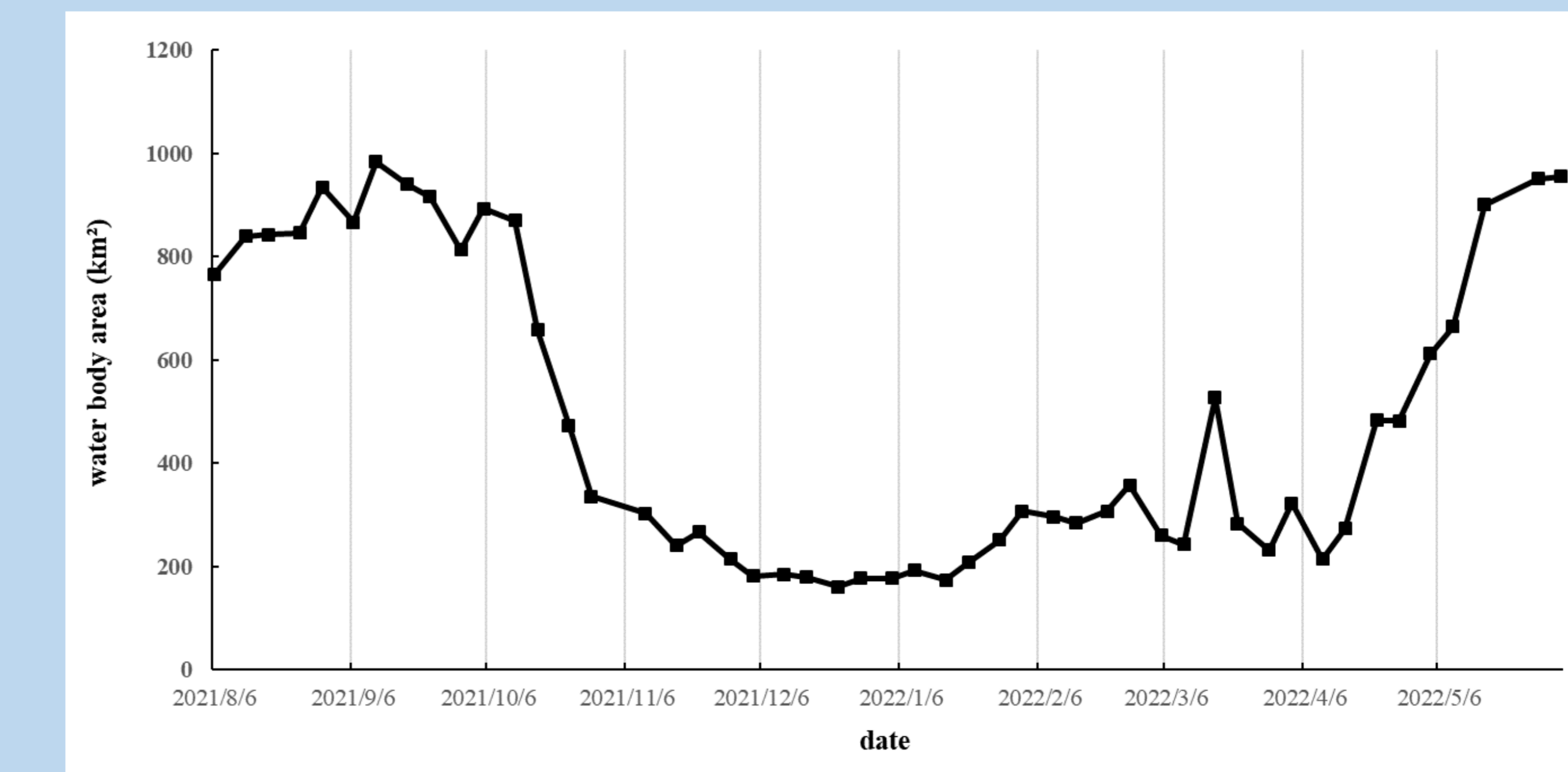


Water area of August 2, 2022 to June 5, 2023

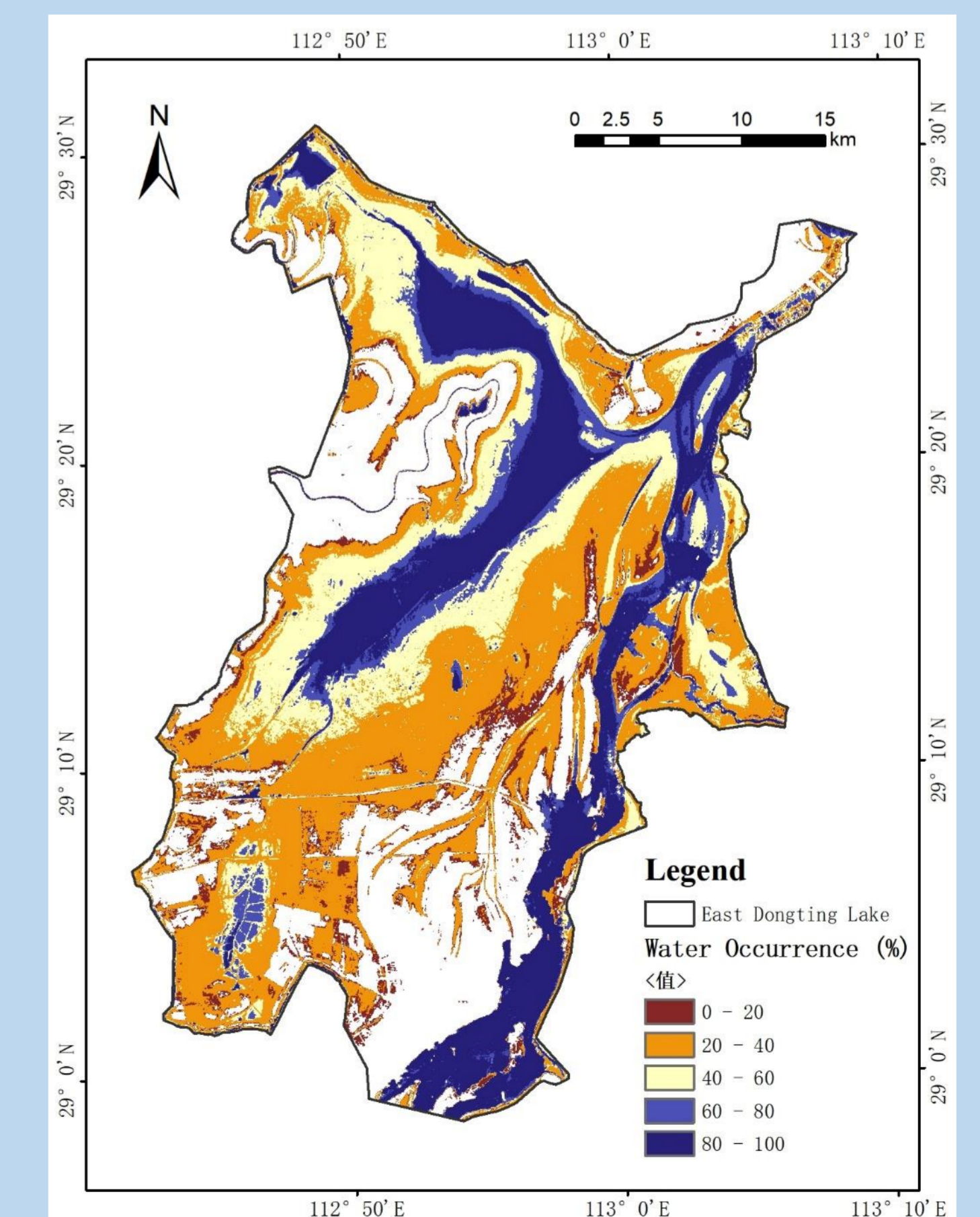


Water occurrence of August 2, 2022 to June 5, 2023

The results showed that contiguous exposed lake beds were exposed in the north and south of the main lake body of East Dongting Lake, and the main flood channel even experienced drying out. Drought has affected the core area of the East Dongting Lake Wetland, causing the water level to drop rapidly into the dry season, resulting in rapid changes in the spatial distribution of the Dongting Lake Wetland's shoals and water bodies.



Water area of August 2, 2021 to June 5, 2022



Water occurrence of August 2, 2021 to June 5, 2022