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Water resources management of grasslands under climate change in the historic rural landscape of Lessinia Regional Park (Veneto, Italy)

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Grasslands cover a large portion of the terrestrial ecosystems, and are vital for biodiversity conservation, environmental protection and livestock husbandry. However, climate change scenarios (e.g., drought) could pose grasslands under threat seriously affecting their ecosystem services role. Ponds, an indispensable part of water storage on the grassland, could exert a key role in water supply during extreme water scarcity scenarios, controlling the cycle of water, nutrients, and sediments, supporting livestock and agricultural land production and maintaining the ecologic functions of pastures. Ponds could indeed be seen as a sustainable solution for more resilient grassland landscapes. The climate change forcing will have an impact on grassland extension and spatial distribution of ponds. On the other hand, in literature small ponds have not been satisfactorily investigated in the study of ecosystem service due to the inconformity of geographic location.

In this context, we considered the pastures located in Lessinia Regional Park (Veneto, Italy) with elevation ranging from 800 up to 1600 m asl. The climate is classified as cold with no dry season and warm summer with annual rainfall greater than 1500 mm. The area was recently listed (September 2020) in the Italian national register of historic rural landscapes by Italian Ministry of Agricultural, Food and Forestry Policies. The area is characterized by a dense distribution of ponds, supporting livestock activities. We investigated the ecosystem service role of these ponds, and their spatial patterns and fragmentation (also considering remote sensing, e.g., Sentinel-2) under different weather condition: wet and drought in Lessinia Regional Park. Our work is significant for estimating the ecosystem service value by the integration ponds benefit (e.g., visual ponds and walking ponds) with cultural service. This study will provide scientific basis for rational allocation of environmental resources, formulation of regional protection and management planning, and promotion of sustainable development of man-land relationship.