



ORIGINAL CONTRIBUTION

# Estimation of Time Variant Water Availability and Irrigation Potential of Small Ponds in a Semi-arid Region of Rajasthan, India

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Received: 12 September 2013 / Accepted: 7 January 2016 / Published online: 20 January 2016  
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**Abstract** A field experiment was conducted to assess water availability and irrigation potential of two small, shallow and Ephemeral ponds located in a small watershed of the semi-arid region of Rajasthan, India. The Holistic Water Depth Simulation (HWDS) model was employed for estimating the pond water availability with 3 years field data (2006–2008). The analysis revealed that the value of depth of water in the selected ponds predicted by the HWDS model had closed match to the field data. The index of agreement between measured and predicted values of depth of water in the selected ponds was found to be ranged from 0.93 to 0.94 for the pool data sets. The *F* and Student's *T* test between measured and predicted values revealed that model estimates were not statistically different from measured values at 0.01 % level of significance. Analysis revealed that mean pond volumetric water availability for the selected ponds ranged from 1448 to 5001 m<sup>3</sup> during the study period. During the off monsoon seasons, water availability period was varied between 35 and 78 days with a mean of 61 days. Analyses revealed that water availability in the selected ponds lasted at least 48–61 days. The off monsoon season irrigation potential of ponds with one and two irrigations for the rainfed crops at critical growth stage in the region was estimated to be 12.6 and 6.3 ha, respectively.

## Introduction

In arid and semi-arid region of India, ponds (small reservoirs) are constructed to stored runoffs from their catchment and direct rainfall over them. The ponds have important hydrological, ecological and social implication. The ponds stored the runoffs from their catchment to life saving irrigation during dry spells of monsoon season or full irrigation during off monsoon season, to fish farming, to recharge the underneath aquifer, and to drink animals. These ponds also used to attenuate the flood peaks at downstream of the catchment during the monsoon season and provide habitats for birds and animal those are dependent on aquatic plants. The pond is much preferred and accepted technology by the farming community in many regions of the India especially in Rajasthan for many reasons. First and most importantly, it directly solves the problem of water which is primary concern of the rural people. Second, it is simple and low cost technique, requires less repair and maintenance cost and within the reach of local population. Third, not require much skill to design and construct the pond. According to an estimate by the end of year 2004, more than 15,561 ponds covering an area of 4,30,780 ha are available in the Rajasthan State [1]. Out of which, 2272 ponds had been built by the erstwhile rulers during the State time over 100 years ago