

## Cattle and water buffalo densities wading into small village reservoirs of Sri Lanka impact on yields on the culture-based fisheries thereof

Asanka D. Jayasinghe<sup>1\*†</sup>, J. Arachchige Athula<sup>2‡</sup>, Sena S. De Silva<sup>3</sup> and Upali S. Amarasinghe<sup>1</sup>

<sup>1</sup> Department of Zoology, University of Kelaniya, Kelaniya 11600, Sri Lanka


<sup>2</sup> National Aquaculture Development Authority, No. 41/1, New Parliament Road, Pelawatte, Battaramulla 10120, Sri Lanka

<sup>3</sup> School of Life and Environmental Sciences, Deakin University, Warrnambool, Victoria 3280, Australia

† Present address: Department of Limnology and Water Technology, Faculty of Fisheries and Marine Science & Technology, University of Ruhuna, Wellamadama, Matara 81000, Sri Lanka

‡ Present address: Department of Animal Science, Faculty of Animal Science and Export Agriculture, Uva Wellasa University, Badulla 90000, Sri Lanka

\* Correspondence (asanka@fish.ruh.ac.lk)

 <https://orcid.org/0000-0002-7528-7718>

**Abstract** This study investigated whether allochthonous inputs generated by cattle and water buffaloes grazing in the catchment or wading in the water in small village reservoirs of Sri Lanka can make a significant effect on yields from culture-based fisheries of those reservoirs. The analysis is based on limnological data of 37 randomly selected reservoirs. As culture-based fish yield data were available over the 2002 - 2003 period only for 23 reservoirs, fish yield data from seven more reservoirs were gleaned for the present analysis. Cattle and water buffalo densities (BD) in 37 reservoirs where limnological data were available, were found to be significantly correlated to the biological productivity-related parameters such as chlorophyll-a content. Culture-based fish yield in the 30 reservoirs varied from 54.6 to 1800.8 kg ha<sup>-1</sup> and BD associated with the reservoirs studied varied from 0.90 number ha<sup>-1</sup> to 216.25 numbers ha<sup>-1</sup>. Fish yield (FY) was significantly correlated with BD the relationship being,  $FY = 4.758 BD + 242.740$  ( $R^2 = 0.345$ ;  $p < 0.001$ ). The importance of taking into consideration factors such as grazing cattle and buffalo density in preparing management strategies for culture-based fisheries in small village reservoirs is discussed.

**Keywords:** allochthonous nutrient inputs; exotic carps; inland fisheries; irrigation reservoirs; stocking-and-recapture fisheries

### INTRODUCTION

Animal faeces are a conventional type of fertilizer commonly used in aquaculture systems in many developing tropical countries. Addition of such organic fertilizer is done manually or through a self-nourishing systems for example as in integrated farming; fish-cum-poultry farming. Cattle manure (cow dung) can be manually added to pond water considering the nature of cultured organism, water quality and soil characteristics of that area (Bardach et al. 1972). In pond fish culture cow dung is often used in combination with or without poultry manure and/ or inorganic inputs.

For rearing Indian or Chinese carps the conventional manure dosage for pond fertilization may vary between 10 – 50 t ha<sup>-1</sup> yr<sup>-1</sup> (Li and Xu 1995; Garg and Bhatnagar 2000; Das et al. 2005), and often unattainable due to scarcity of manure. In culture-based fisheries, a natural or a man-made water body often relatively far larger than a fish pond makes manual fertilization impractical. Nevertheless, if it is a non-perennial water body, which is smaller in size and if there is a higher density of cattle (*Bos taurus* L.) and water buffaloes (*Bubalus bubalis* (L.)) grazing within the catchment and wading into the water body the scenario would appear as an integrated farm setup.

