ash in fish muscle was found to be significantly low ($p<0.05$) in downstream section than upstream section which may be due to the heavy pollution load in downstream section.

Key words: proximate composition, lipid, moisture, protein, *Labeo boga*, River Tawi.

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VULNERABILITY OF SHRIMP AQUACULTURE TO CLIMATE CHANGE – A CASE STUDY IN KARNATAKA

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Fisheries and aquaculture which are being undertaken in the coastal fragile eco-system is expected to be more vulnerable to climatic variability. Shrimp farming is an important farming component in the coastal agro-ecosystem contributing significantly to the food, nutritional and livelihood security of about one million people across the coastal states in India. A case study undertaken among the small scale shrimp farmers of Udupi and Uttar Kannada districts of Karnataka adopting participatory methodologies indicated that unusual extreme temperature variations, rising tidal amplitudes, flash floods and unseasonal rainfall and shifting seasons were the perceived climate change events over the past decade. Temperature changes including higher diurnal variations were the regular phenomenon which had disastrous impact on shrimp aquaculture leading to more than 50% productivity loss. Vulnerability levels worked out based on the primary data collected from the shrimp farmers show that one fourth (25%) of the farming area was highly vulnerable and about half of the farms (48%) were moderately vulnerable to climate variability. The technical and policy adaptation measures to reduce aquaculture vulnerability to climate change.

Keywords: Shrimp aquaculture; climate change; vulnerability; adaptations.