

AUTOMATIC MEASUREMENTS OF FISH LENGTH IN SMALL-SCALE FISHERIES USING IMAGE ANALYSES

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ABSTRACT

Fish length is a useful indicator to explore catch size structure and fishing effects on resources. However, measuring hundreds of individuals manually require intensive fish manipulations and a lot of time that is hardly operational in the context of tropical small-scale fisheries. To overcome these limitations, we developed a method to automatically measure total fish length using digital images analyzed by procedures developed using the ImageJ software. For testing these procedures, a total of 180 fishes from 19 families with two color patterns and two caudal fin types were obtained from small-scale fishermen in southwestern Madagascar in 2018. We took standardized pictures of the fishes using a locally-made, cost-effective camera-equipped device. Fish size accuracy and measurement time were compared across the ImageJ automatic procedure, the ImageJ on-screen manual measurements, and measurements using an ichthyometer, the latter providing the reference fish lengths. The ImageJ automatic measurement procedure reached 98.4% accuracy and the measurement time was reduced by 57% and 40% compared to the ichthyometer and ImageJ on-screen manual measurements, respectively. This automatic measurement procedure was then tested for monitoring the multi-specific reef fish catches within a multi-gear fishery in the survey area. This trial allowed us to propose some recommendations for reducing measurements errors and some of the limitations of this method. We conclude that the automatic measurement procedure should be implemented by non-governmental and research organizations for monitoring small-scale fishery catches, so as to study more precisely fishing and management impacts.