Comprehensive evaluation of aquaculture pond water quality based on farmed fish health: a case study on grass carp (Ctenopharyngodon idella)

WANG Shoubing[1], Lirijian Cheng[1], Xingguo Liu[2], Huikang Xue[3], and Yiru JIANG[1]

[1]Fudan University
[2]Chinese Academy of Fisheries Sciences Fishery Machinery and Instrument Research Institute
[3]Ma 'anshan Ecological Environment Bureau

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Abstract

To this day, no technical procedures have been established for the evaluation of aquaculture pond water quality based on the health of the farmed species themselves. Here, grass carp (Ctenopharyngodon idella; i.e., the main farmed fish species in China's freshwater ponds) aquaculture was taken as an example to preliminarily study and establish novel strategies for the assessment of pond water quality. This manuscript discusses the selection and establishment of an evaluation index system, including classification of fish health degree, determination of evaluation benchmarks and presentation of evaluation results. The scoring formula were performed by Membership Function method based on fuzzy mathematics and scoring results were demonstrated by radar chart. This study finally selected a total of 6 indicators for pond health evaluation: (1) dissolved oxygen concentration, (2) non-ionic ammonia concentration, (3) pH, (4) nitrite nitrogen concentration, (5)copper ion concentration, and (6)zinc ion concentration. Through a case study on a fish pond in Songjiang District (Shanghai, China), we demonstrated the practicality of the proposed evaluation system, thus establishing a methodological framework for grass carp farmers to quickly evaluate the fish health and water quality, as well as for the future development of evaluation systems for other cultivated animals.

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