

Application of a multiple-criteria decision making approach for selecting non-perennial reservoirs for culture-based fishery development: Case study from Sri Lanka

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Abstract

In Sri Lanka, small non-perennial reservoirs (mostly < 50 ha) are numerous in the dry zone receiving less than 185 cm annual precipitation. These are irrigational and are not traditionally used for inland fisheries, due to inadequate natural recruitment, but have the potential for utilization for the development of culture-based fisheries (CBFs), a form of extensive aquaculture. However, the suitability of water bodies for CBF is wide ranging because of the seasonal water retention period and fingerling availability for stocking, variable biological productivity, and community willingness to adopt CBF. In such circumstances multi-criteria decision making (MCDM) approaches are useful for selection of water bodies for CBF. Analytic hierarchy process (AHP), a MCDM approach was employed in this study where, three main criteria (reservoir productivity, catchment characteristics and socio-economic factors) that influence CBF yield were considered. There were two, five and three sub-criteria under each, respectively. As most of the sub-criteria in the analysis are essentially spatial data, it was possible to quantify the influence of each of these on CBF yield using geographical information systems (GIS) and remote sensing (RS) techniques, which were subsequently weighted. Based on the total scores from the weighted linear combinations of the AHP for various sub-categories, the reservoirs were categorized for their suitability for CBF in to four levels as excellent, good, fair and poor. As there was a positive significant relationship between the total AHP score and CBF yield, it was concluded that use of AHP based weighted linear combination would be a feasible approach for selection for CBF development, and that this methodology would be applicable to comparable situations in the tropical region.

Keywords

- Analytic hierarchy process;
- Limnological characteristics;
- Major carps;
- Reservoir morphometry;
- Site selection;
- Socio-economics;
- Stocking;
- Tropical reservoirs