Determination of the sustainability of tank cascade system using remotely sensed data

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This study was carried out with the objectives of identifying a few cascades and their physical environment in Rajarata area using topographical map sheets and satellite remote sensing data, developing the ratio of catchment area to the water surface area (CA/WA) and Water surface area to the Command area of tank (WA/COA) respectively and overall hydrologic potential of the cascade, i.e. the ratio of cascade area to the total water surface area of the cascade (TCA/TWA) and the ratio of total cascade water surface area to the total cascade command area (TWA/TCOA), ranking the sustainability of tanks according to the developed ratios and finally incorporating other information related to the tank sustainability such as catchment land use change to rank the sustainability of the studied cascades accordingly.

Extraction of micro cathment areas was done using the stereoscopic viewing of adjacent photographs (stereo pairs) of the aerial photographs covering the area. The extracted areas were classified in order to identify the land use change from year 1992 and 1998 for six land use classes namely forest, scrubs, chena, other crops, paddy and water. The sustainable tanks were defined as the tanks which are having CA/WA>7.5, and WA/COA<1. The tanks that fulfilled the above conditions were taken as sustainable and others as unsustainable. According to the proportion of the number of sustainable tanks in a cascade, the ratios of TCSA/TWA, TWA/TCOA obtained for the cascade along with the sustainability assessment with respect to the changes in land cover especially forest and scrubs cover were used as the basis for ranking the cascades.

About fifty percent of the tanks need a certain degree of rehabilitation works to be done. Further, it can be observed that the sustainability of these tanks have reduced with time, according to the multi temporal image analysis. The land cover classification and the derived spatial maps show that there is a reduction of forest and scrub cover by 6.45 and 4.5 percent respectively during the period of six years. It is recommended to carry out a cost benefit analysis to study the profitability of rehabilitation of the selected cascades.

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