Session: Flow Variability and Floodplain Fisheries: Ecology and Management
Presentation: Oral

The response of a Tonle Sap-Great Lake system fishery to annual flood pulsing

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Large floodplain-river ecosystems around the world driven by a single annual flood pulse and supporting important commercial, artisanal and recreational fisheries are coming under mounting pressure to meet multi-sectoral demands. Many of these systems intersect international boundaries and are located in regions with developing economies where water storage infrastructure and hydropower facilities form central components of national and regional development strategies. Under natural flow conditions, the annual flood pulse in floodplain-rivers promotes the lateral transport of water, nutrients and organisms across the aquatic-terrestrial interface which enhances their biological productivity. Hydrological manipulation by water resource infrastructure alters the magnitude, duration and timing of the flood pulse reducing this productivity. The Tonle Sap-Great Lake (TS-GL) system in Cambodia is the most distinctive hydrogeomorphic feature in the Mekong River Basin. The Great Lake itself is the largest wetland in southeast Asia and supports one of the most productive inland fisheries in the world. Flow regulation by hydropower dams currently being proposed for construction upstream of the TS-GL on the main stem and tributaries of the Mekong River in Laos and Cambodia is likely to contribute significantly to declines in fish production and loss of biodiversity. Therefore, there is an urgent need to provide accurate predictions on the response of river fish populations to forecasted changes in river flow. In this study, 12 years of catch survey data from trawl boats (dais) located on the Tonle Sap River were used to investigate the effects of the flood pulse on fish production. An annual Flood Index was developed that takes account of flood duration, magnitude and the percentage of floodplain inundation in the Great Lake basin. A general linear model (GLM) was employed to test the ability of the Flood Index to explain seasonal variations in dai catch rates with month, lunar phase and dai location included as additional categorical explanatory variables. Correlations between the Flood Index and daily catch rates were positive and highly significant with the model explaining up to 66 % of the variation in Dai catch rates. The predictions emerging from the model suggest that reduced flooding will result in a proportional non-linear decline in fish yield with a reduction in the Flood Index. The findings therefore provide strong evidence to suggest that attenuated flooding downstream of impoundments will negatively impact fisheries in the TS-GL system and the Mekong River system as a whole.

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