

ZAMBEZI DELTA DRIFT APPLICATION
EFFECTS OF TIMED WATER RELEASES
ON FISH AND FISHERIES




by

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Selection of sub-components

-  Approximately 60 fish species occur in the delta freshwaters
-  Many are small and unimportant economically
-  Fish fauna can be divided into floodplain users and mainstream only users

Selection criteria adopted = species of

- (1) Fisheries and/or ecological importance
- (2) Different dependency on flooding

Species chosen:-

Clarias gariepinus

Catfish species of continent-wide occurrence, thrives in floodplains, spawns in flooded margins and uses floodplains for food and growth.

Oreochromis mossambicus

Widespread tilapiine species, spawns wherever suitable substrate (sand/mud bottom) occurs, juveniles dependent on protection by marginal vegetation, moving into deep water as they grow.

C. gariepinus



O. mossambicus



Species chosen:-

Labeo altivelis


Riverine species not commonly found on floodplains, spawns early in floods, vulnerable to over-exploitation on spawning migrations.


Hydrocynus vittatus

Active predator in main river channels, spawns early in floods on sandy substrate along flooded riverbanks.




 Breeding success of all fish species in the system is flood-dependent.

 Under natural flood cycle, fish populations much higher than under unnatural fluctuating water levels.

 Benefit of good flood most pronounced for floodplain-adapted fish, e.g. *Clarias gariepinus*.

 Majority of freshwater fish in the system are floodplain-adapted.


 Mainstream fishes also benefit from good regular floods.

 Predators, e.g. tigerfish, benefit from fish production on floodplain, providing abundant food as flood waters recede.



Fisheries also benefit from flooding



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- 🐟 Flooding helps to scour out channels and maintain connectivity
 - 🐟 Flooding allows dispersal of fishes to new areas
 - 🐟 Flooding introduces nutrients to the system from inundated land
 - 🐟 Flooding provides large areas of productive water and cover for juvenile fish survival and growth

Result:-


Rapid fish growth – floodplains produce same amount of fish as same area of permanent water body in 30% of the time, leaving land free for other use in remainder of year


EXTENT AND DURATION OF FLOOD

The fish fauna is adapted to the natural flood regime, therefore:-







Ideal conditions for fish production =

 Natural flood regime with rising waters from Nov/Dec to March to allow successful breeding

 Sustained high water level for several weeks to provide cover for juveniles and conditions for rapid growth

 Subsequent drainage from floodplain to main channel to facilitate fishing and provide food for other mainstream predators such as tigerfish

EFFECTS OF HIGH FLOW IN DRY SEASON

-  The greater the water area the greater the fish carrying capacity
-  Higher sustained water levels thus beneficial to fish stocks
-  Fishing, however, is more difficult in higher flows
-  At low fishing effort, therefore, an individual fisherman's catches will be greater when dry season water levels are lower
-  With greater fishing effort, however, fish stocks and thus reproductive capacity will be more easily depleted
-  On balance, higher dry season flows are most likely to be beneficial for both fish and fisheries

FISHERY BENEFITS

Potential not fully known as yet

Experience in other floodplains in the Zambezi system, i.e. Lower Shire, Barotse, Chobe, Okavango suggests yields much higher than so far estimated, e.g. extrapolation from Lower Shire estimates to much greater area of Zambezi Delta suggests yields of 30,000-50,000 tonnes annually if flood regime managed properly.


This, however, needs to be verified by thorough surveys of fishery at different stages of the flood.


THREATS TO FISHERY

(1) ERRATIC FLOOD RELEASES

 Fish breeding is adapted to an annual flood cycle

 Breeding is triggered by rising water and possibly by influx of chemicals/nutrients from land run-off

 Rapid changes in water level caused by operational changes in power station may leave fish eggs stranded on dry land or in too deep water or exposed to predation

 Failure to release enough water to inundate marginal floodplains leaves juvenile fishes exposed to heavy predation in the river channels

THREATS TO FISHERY

(2) LOSS OF SILT AND NUTRIENT INPUT

Silt is trapped in Caborra Bassa reservoir, result is bank and sandbar erosion downstream and loss of annual nutrient input to the floodplain lagoons, thereby reducing productivity.



THREATS TO FISHERY

(3) CONFLICTING LAND USE

Irrigation for e.g. sugar is accompanied by construction of irrigation canals and draining of floodplain areas, resulting in loss of fish habitat



SUMMARY (1)

Clarias gariepinus. Potentially the most productive fish species in the floodplain system. The greater the flooded area, the better the catches.

Oreochromis mossambicus. Needs extensive cover for juveniles until large enough to avoid predation. Benefits greatly from flooding.

Labeo altivelis. Prime need is for rising levels at the right time to stimulate breeding, and non-erratic sustained flows for egg and fry development.

Hydrocynus vittatus. Similar flow requirements to *L. altivelis*. Further benefit of good flood is increased prey production on floodplain, which becomes available as the level drops, forcing prey into the main channel.

SUMMARY (2)

A photograph of a sunset over a large body of water. The sun is low on the horizon, creating a bright orange and yellow glow that reflects on the water's surface. The sky is filled with scattered clouds, some of which are illuminated by the setting sun, showing shades of orange, yellow, and blue. The water in the foreground is dark blue with small ripples. In the distance, a dark silhouette of a forested shoreline is visible against the bright sky.

**The greater and more sustained the flood,
the greater the production of all fish in the system.**