

Cage Culture Suitability Mapping for Lake Zonation: A Case Study of Lake Victoria, Kenya

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Preparation

This brief has been generated from the latest scientific data to offer advice to fisheries managers on the mushrooming cage culture investments in Lake Victoria, Kenya. Information contained herein should provide guidance geared towards sustainable exploitation of the Lake while reaping economic benefits for the riparian communities dependent on the resource.

Introduction

Cage culture has presented itself as a new socioeconomic frontier with good prospects for income in Lake Victoria, besides conserving declining wild fish stocks. Whereas there is an increase in adoption of cage culture in Lake Victoria owing to prospects of better income, the sustainability of this technology within the lake remains uncertain. With rise in cage culture investments, concerns on environmental degradation arise, since it brings about discharge of particulate and dissolved nutrients such as uneaten waste feed, fecal matter, and excretory products which are bound to negatively impact the fishery

environment by causing anoxic conditions in sediments underlying the cages thus changing the abundance and composition of biotic communities.

When sustainably managed, Cage technology has the potential to provide significant contribution to national fish production, increased job opportunities, enhanced food security and incomes for both rural and urban dwellers in light of the blue economy.

The Research

- Through its SUNRISE programme, Kenya Marine and Fisheries Research Institute (KMFRI) worked with the UK Centre for Ecology & Hydrology (UK CEH) to map areas of the Kenyan part of Lake Victoria that are suitable for the sustainable development of these systems
- Our project focused on cage farming of tilapia in the Kenyan part of Lake Victoria.
- We mapped a wide range of environmental data relating to the suitability of different areas for cage fish farm development
- Data included water quality and depth, water hyacinth hotspots, fish breeding grounds, distance to shoreline.
- These factors affect the success of the cage fish farm industry and its potential impacts on the environment.
- We brought these data together to create a cage fish farm suitability map to support the sustainable development of cage fish farming

Findings

We produced a suitability map for the Kenyan part of Lake Victoria to support the development of cage fish farming and a sustainable blue economy (Figure 1).

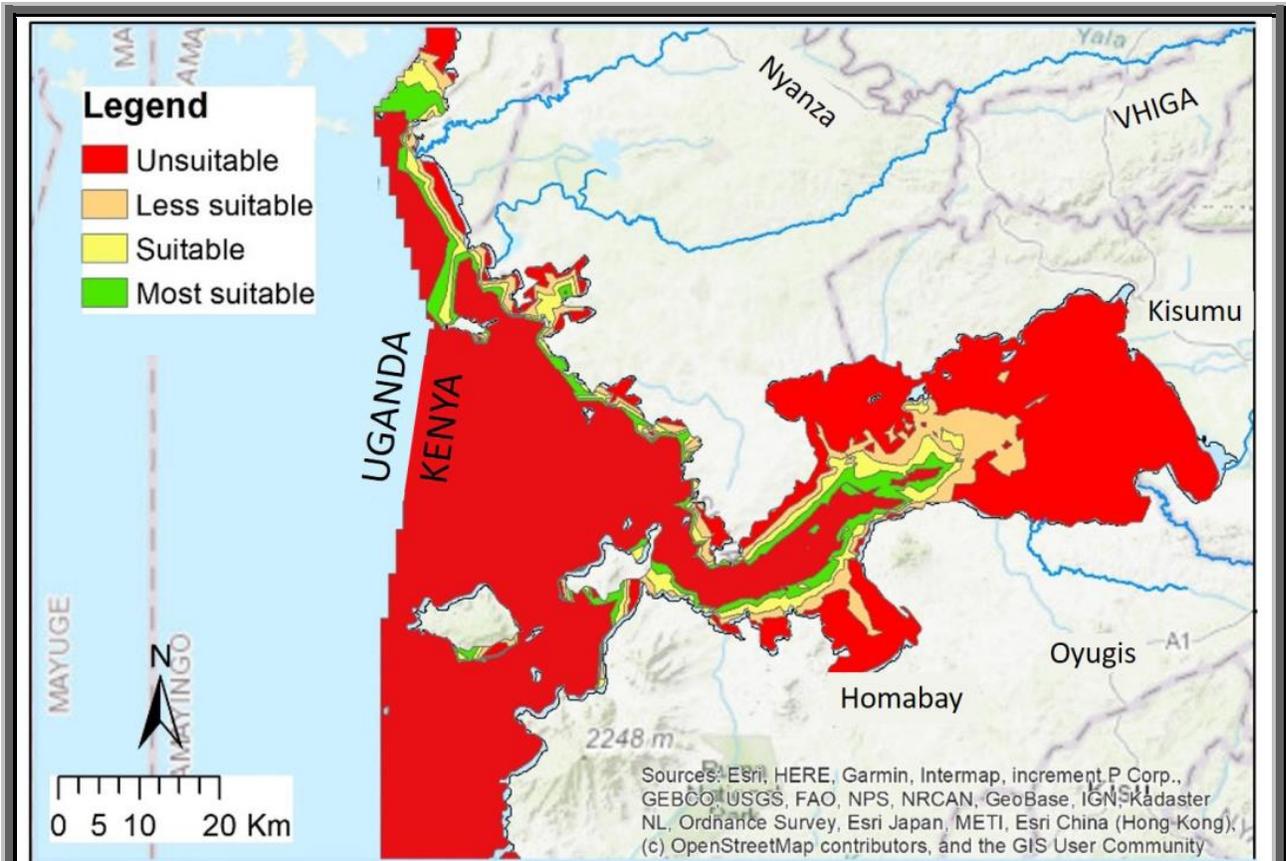


Figure 1: Suitability of the Kenyan part of Lake Victoria for cage culture.

The latest version of the fish cage suitability map, updated to reflect the outcome of the workshop discussions, can be found here: <https://shiny-apps.ceh.ac.uk/Fishfarming/>. It includes the assessment criteria that were agreed. It is currently password protected and will remain so until it is officially approved to access the page, please use these details:

username: fishfarmuser

password: Azy1357!

When you access the page for the first time, using your computer or mobile phone, you will probably be asked if you want to share your location. If you do, then the map will zoom in to your current location, which is helpful when checking the app in the field. If you deny it permission, it will default to a more general view of the Winam Gulf.

After allowing or blocking this permission, you should see a cage fish farming suitability map for the whole of the Kenyan part of Lake Victoria. This uses seven suitability categories ranging from 'Unsuitable' (Score = 0/3) to 'Most suitable' (Score = 3/3) with half steps in between. This is displayed in a legend format.

By clicking on any cell, you can display the specific score for that location, and its latitude and longitude. Any selected cell will be highlighted by a yellow border.

Conclusion

Fish cage culture is generally considered one of the most promising ways for development of industrial fresh water fish in the region. Ultimately, this enhanced knowledge will help to inform future regulation of the cage fish farming industry enabling it to provide welfare, health and economic benefits to the population without degrading the natural environment.

References

May L, Aura CM, Becker V et al. (2021) Getting into hot water: Water quality in tropical lakes in relation to their utilisation. *IOP Conference Series: Earth and Environmental Science* 789: 012021 <https://iopscience.iop.org/article/10.1088/1755-1315/789/1/012021>.

Aura CM, Musa S, Nyamweya CS et al. (2021) A GIS-based approach to delineating the areas of a lake that are suitable for cage fish culture. *Lakes and Reservoirs Management: Science, Policy and Management for Sustainable Use* 26: e12357. <https://doi.org/10.1111/lre.12357>.