GIS Mapping of Pond Aquaculture Potential in southern Cameroon, Africa

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Background and Approach

Figure 1

Currently there is an unmet demand for freshwater aquaculture production in Cameroon to satisfy domestic fish needs and enhance food security. The aquaculture sub-sector remains under-developed despite its reported potential and past efforts to stimulate its growth.

Location-specific successes of smallholding pond aquaculture (Fig. 1) need to be out-scaled to benefit more farm households. However conditions favoring adoption do not occur uniformly over geographical space.

GIS modeling techniques were used to identify and map the potential for smallholding pond aquaculture systems to aid aquaculture planning and management.

A resource evaluation frame-work was adopted (Fig. 2) and implemented for the southern provinces of Cameroon.

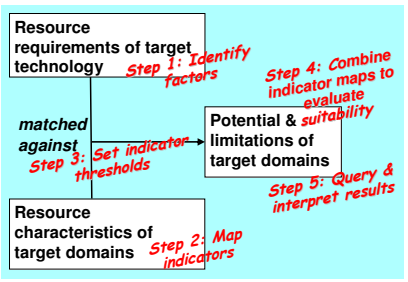

Figure 2

GIS Modeling and Results

Through literature review, consultations with aquaculture specialists and local experts, we identified five groupings of the key determinant factors and their indicators that are quantifiable and mapable. Listed below are the indicators (➢ bulleted) and their proxy functions (*blue italics*), by factor grouping.

BIOPHYSICAL FACTORS

- ➢ Duration of available pond water
  length of culture period
- ➢ Proximity to rivers & perennial streams
  supplemental water supply
- ➢ Land use
  compatibility with pond aquaculture
- ➢ Slope steepness
  ease of pond construction

SOCIO-ECONOMIC FACTORS

- ➢ Population density
  local demand
- ➢ Proximity to road
  physical access
- ➢ Proximity to urban centres
  affordability to purchase fish
- ➢ Proximity to aquaculture station
  info & seed source
- ➢ Numbers of small ruminants, pigs & poultry
  livestock by-products

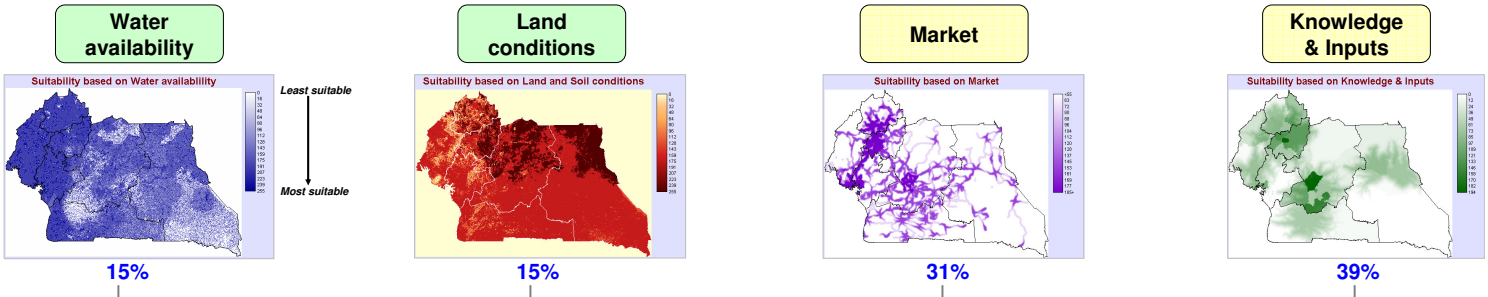

Figure 3

The multi-criteria evaluation technique (MCE), which is a weighted linear combination of the input indicator maps, was applied to each factor grouping as a sub-model. The sub-models would then be combined in the main model for evaluating overall aquaculture suitability.

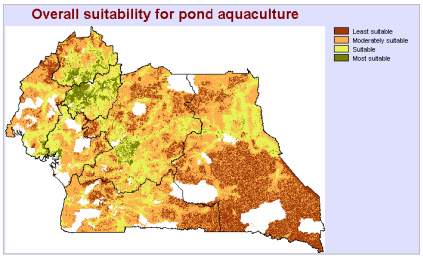

Figure 4

Experts were consulted to assign weights for combining the indicator maps for each sub-model and for the overall model. Fig. 3 shows the mapped results of the sub-models while Fig. 4 shows the resulting overall pond-aquaculture suitability map.

Querying results to identify limitations

For aquaculture planning and management purposes, it is not enough to produce suitability maps. The same rating of low potential at two locations may be due to different sets of limitations (Fig. 5).

For the convenience of target users, we developed the Suitability Analysis and QUery for Aquaculture (SAQUA) freeware for MCE modeling and for conducting drill-down query and filtering of multiple map layers, such as the overall suitability map and its component input maps (Fig. 6).

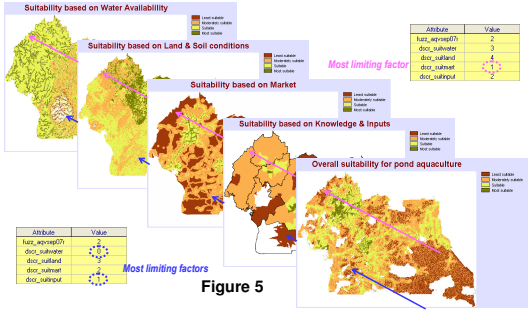

Figure 5

Knowing the limitations at specific places helps determine what interventions are needed to overcome them

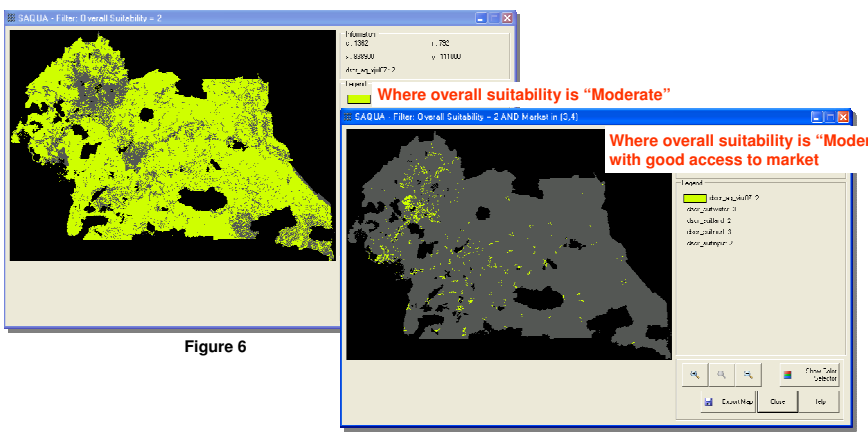

Figure 6

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