Smallholding aquaculture in Malawi is gaining popularity, particularly with the promotion of pond-fish culture within integrated agriculture-aquaculture (IAA) systems (Fig. 1). These systems benefit poor farm households through enhancing food security and supplementing farm income. Location-specific successes of IAA need to be out-scaled to benefit more farm households. However, conditions favoring adoption do not occur uniformly over geographical space.

**GIS Modeling and Results**

Through literature review, consultations with aquaculture specialists and local experts, and carrying out multiple regression analysis, 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
- Land form
- Proximity to rivers & perennial streams
- Frequency of flooding
- Slope steepness
- Soil pH
- Population density
- Frequency of flooding
- Slope steepness
- Soil pH

### SOCIO-ECONOMIC FACTORS
- Literacy rate
- Radio ownership
- Proximity to road, markets & urban centres
- Proximity to govt. station & innovative farmers
- Population density
- Land use
- Frequency of flooding
- Slope steepness
- Soil pH

Experts were consulted to assign weights for combining the indicator maps for each sub-model and for the overall model. Two sets of weights were assigned for the current and a future scenario of pond aquaculture development in Southern Malawi. Fig. 4 shows the resulting overall pond-aquaculture suitability maps.

### 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).