



Building Geoprocessing Models for Land Suitability Assessment for “Thanh Tra” Pomelo in Central-Vietnam



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INTRODUCTION

“Thanh Tra” pomelo (*Citrus grandis* L. Osbeck) is one the major special fruit crops in Hue, Central Vietnam. This variety has its special characteristic quite different from other varieties in other regions. Consumers appreciate the external and internal quality and the growers are satisfied from the yield and storage suitability. Since 2005 “Thanh Tra” pomelo is officially registered from the authorities as a famous specialty of Thua Thien Hue province with the name “Thanh Tra Hue” and they decided to enlarge the cultivation area.

The problem of selecting the suitable land for cultivation of a certain type of agriculture and horticulture production in the district is mainly empirical issue and the critical question is whether the “Thanh Tra” pomelo can be grown with high efficiency. Hence, land suitability assessment for “Thanh Tra” pomelo in the district is essential to support land use policy in order to meet the increased demand for horticulture production with shortage of resources and in particular for the “Thanh Tra”.



“Thanh Tra” pomelo in Thua Thien Hue, Vietnam

RESEARCH MATERIALS AND METHODS

Materials:

The framework for land suitability assessment in this study required maps of land use, soil types, digital elevation model (DEM) scale 1: 25,000. The soil map was classified by the method of FAO/UNESCO. Monthly precipitation, temperature and sunshine were obtained from Nam Dong statistical department as followed the Nam Dong Weather Observation Station. The land use requirements for “Thanh Tra” pomelo were adopted from Sys *et al.* (1991).

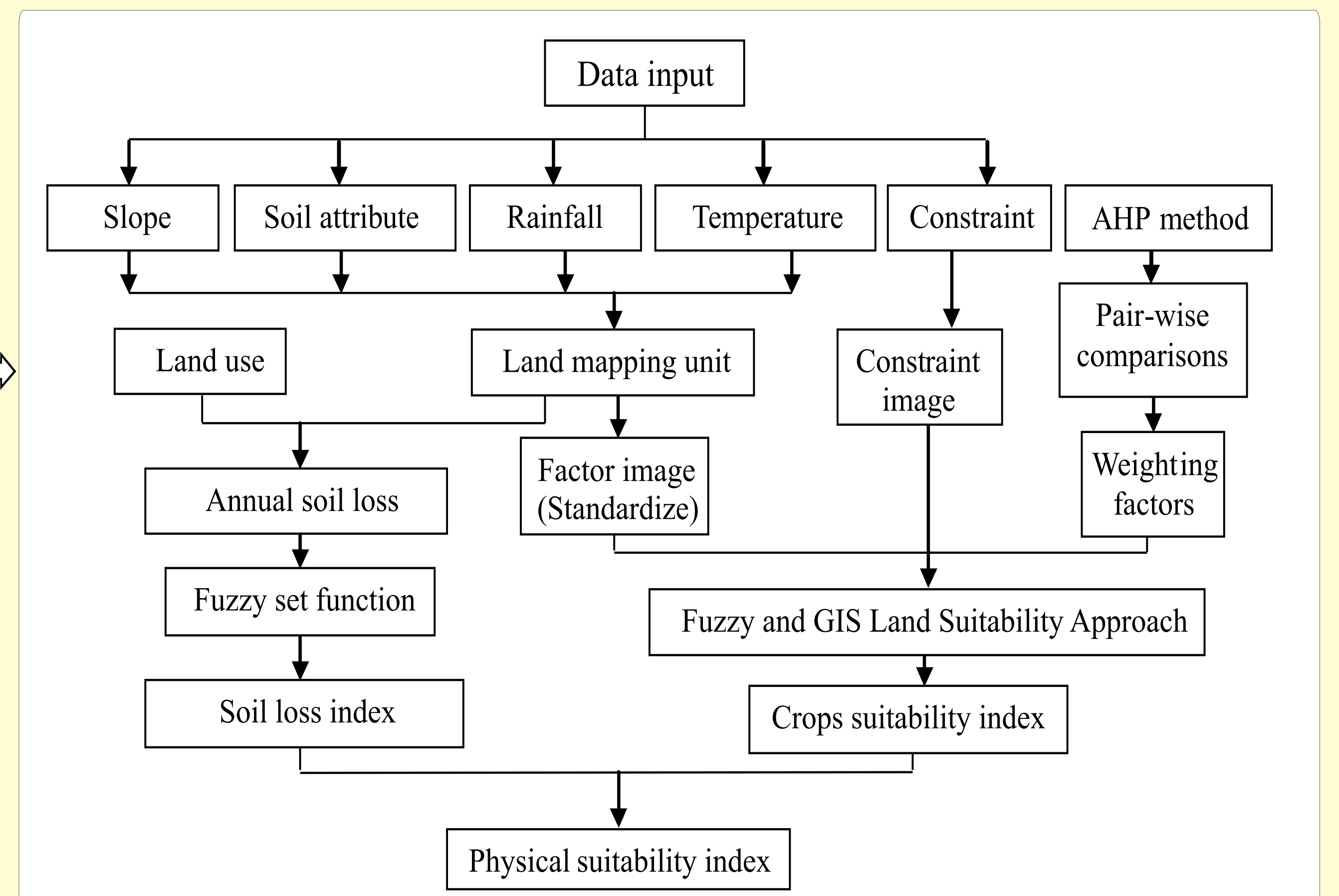
Field works were carried out and workshop were organized to define the score weight of each factor by using Analytic Hierarchy Process (AHP). Fifteen participants participated in the workshop including specialists of agricultural extension, experienced farmers, young farmers (men and women) who are involved in growing particular crop to obtain data for the weighting factors calculation.



Nursery garden of “Thanh Tra” pomelo

Data analysis:

To achieve the objective of the study, multi-criteria evaluations and GIS technique were used to evaluate land suitability. Multi-criteria decision making in GIS approach involves the evaluation of alternative choices based on the criteria for land suitability. Factors or criteria used in land evaluation were standardized with fuzzy method by selecting suitable membership function (MF). With this approach, the attribute values were converted to common membership grades (from 0 to 1.0).



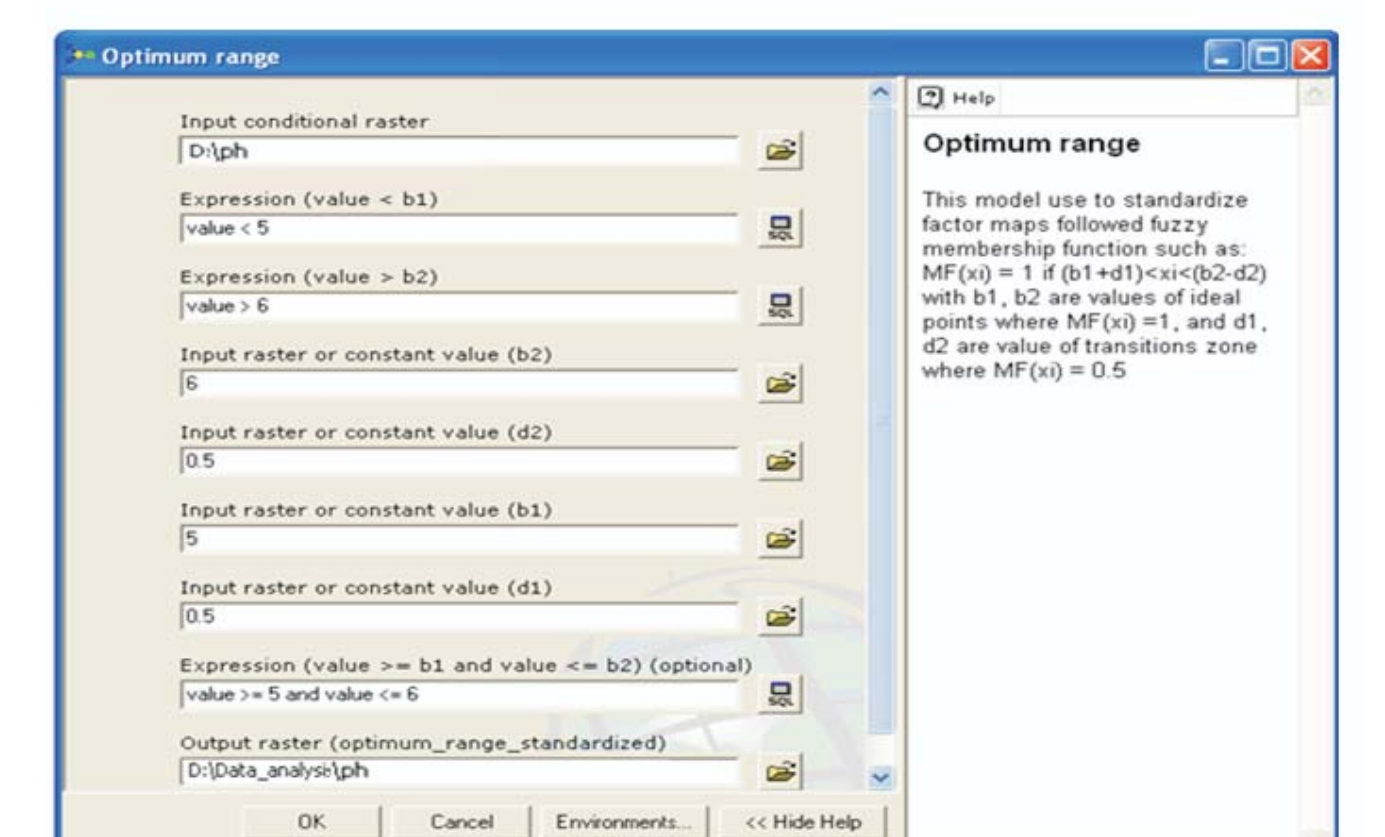
The framework for land suitability assessment in this study

RESULTS

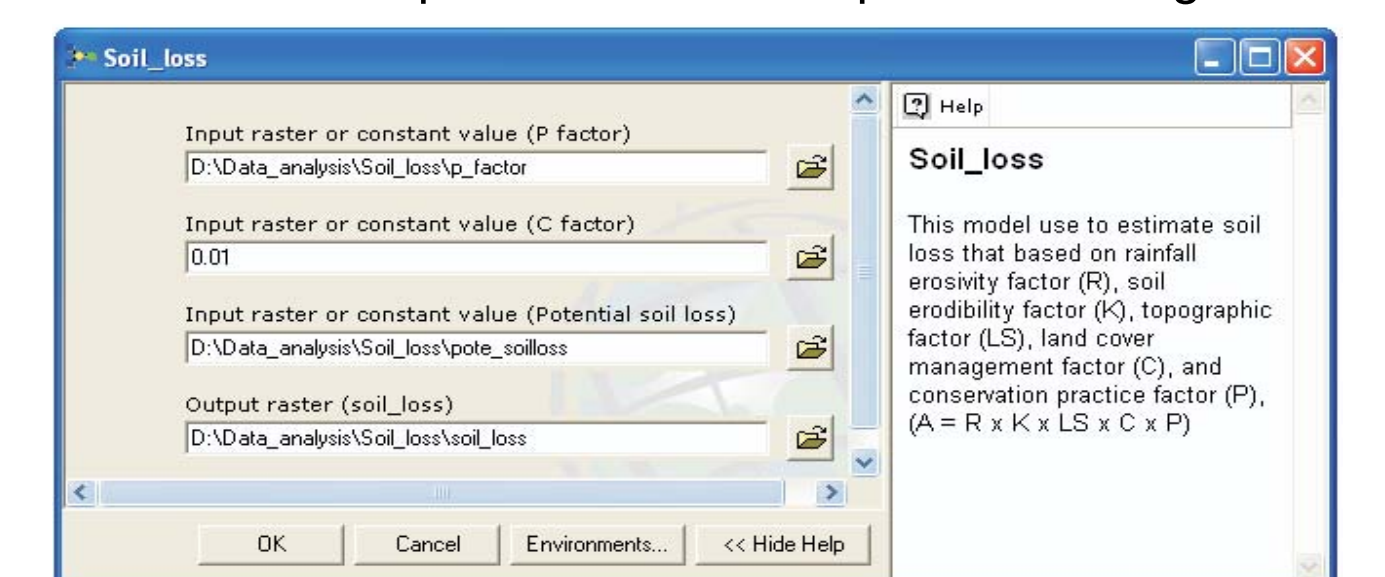
Geoprocessing models

In order to facilitate processing of the procedure outlined above, geoprocessing models were built using Model Builder Extension in ArcGIS. Once the models are built, long and complex steps of spatial analysis can be processed without human errors. Models were developed in a raster environment with grid format map layers. The raster system was used because it can store, manage, and analyze the data needed in a suitability analysis, as well as display the results effectively.

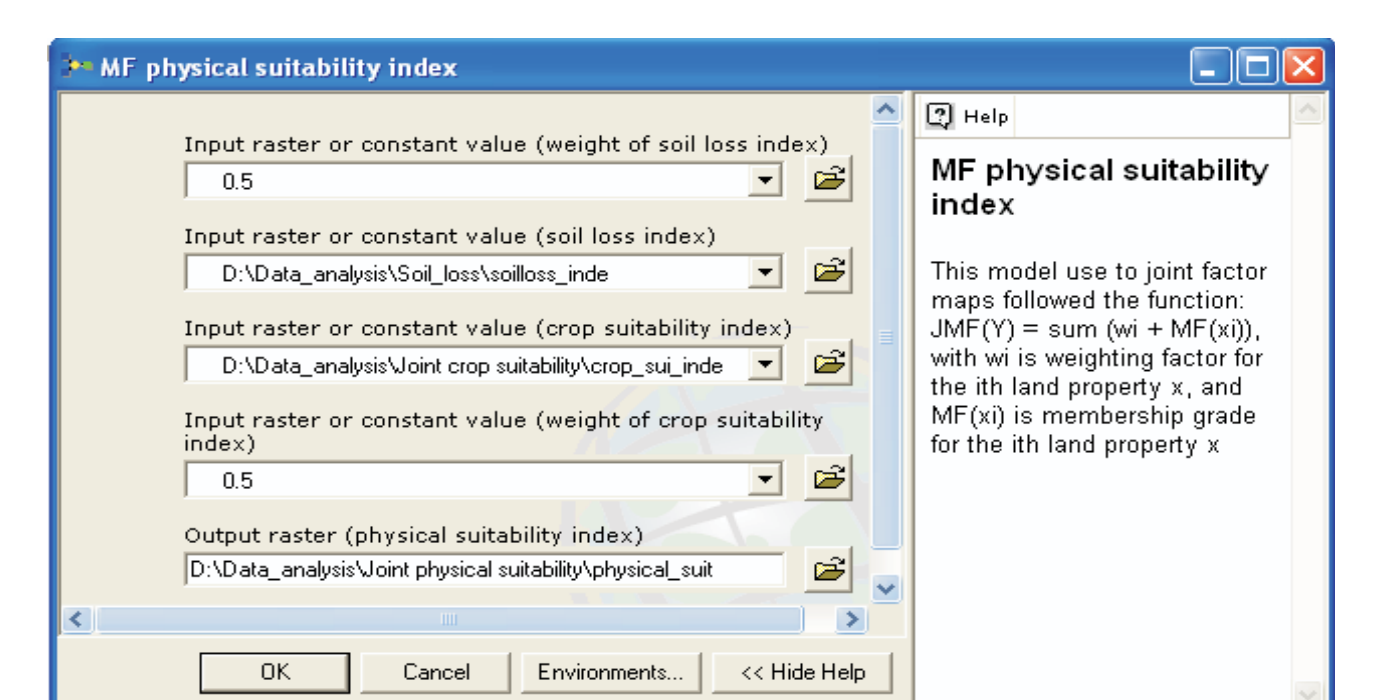
Models in this study were built to standardize all factors by using Spatial Analysis Tools for land suitability assessment in the study area based on fuzzy method with MF values of individual land characteristics such as the model to standardize factors, for soil loss calculation, then there factors will be combined using a joint membership function.



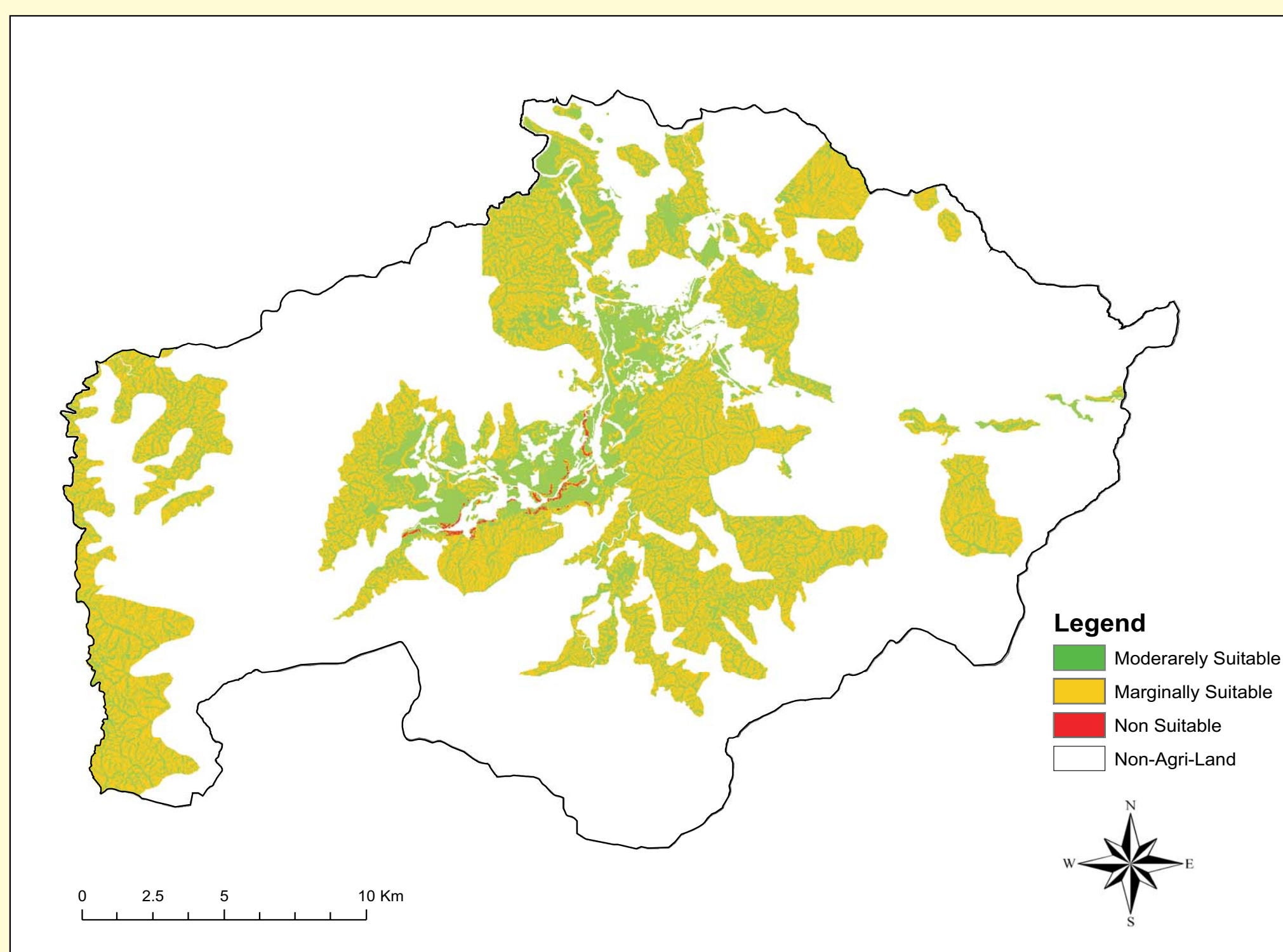
The window to enter parameters in optimum range model



The window to enter parameters for soil loss estimation model



The window to enter parameters in joint membership function of physical suitability model



The physical suitability of “Thanh Tra” pomelo (*Citrus Grandis* L. Osbeck) in Nam Dong district, Thua Thien Hue province, Vietnam

The suitability analysis

The results of spatial analysis physical suitability of “Thanh Tra” pomelo was obtained after run all geoprocessing models, the results showed that there was non highly suitable area, the highest percentage was belong to the marginally suitable which was 11,057 ha (53.30%), and following by moderately suitable with area of 9,619 ha (46.37%), while the non suitable was 0.34% (69.57 ha).

CONCLUSION

- ★ The geoprocessing models are very helpful tool in order to find an efficiency solution for land suitability assessment by excluding human error to get final map. Those models can be applied for other crops and other regions with highly reliable.
- ★ The physical suitability of “Thanh Tra” pomelo in Nam Dong district, Thua Thien Hue province was done that help local land users and administrator who need to have scientific support for their decision on the future land use systems.

ACKNOWLEDGMENT:

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REFERENCE:

Sys, C., E. van Ranst, and J. Debaveye. 1991. Land Evaluation - part III - Crop Requirements. Agricultural publication - No 7. Brussels. Belgium.