

RAMAS GIS v4.0

Model Uses	RAMAS GIS links GIS to an ecological model for use in population viability analysis with landscape-based data that incorporate changes in habitat into a meta-population and combine geographic and demographic data for risk assessments.	
Major Categories	Population Modeling; Decision Support	<u>Subject Knowledge Level</u> Intermediate
Minor Categories	Ecological Risk Assessment; Population Viability Analysis	<u>Technical Difficulty Level</u> Intermediate
Model Type	Physical Model	<u>Geographic in Nature?</u> Yes

Abstract

RAMAS GIS is designed to link your GIS with a meta-population model for population viability analysis and extinction risk assessment. Habitats used by most species are becoming increasingly fragmented, requiring a meta-population modeling approach to risk analysis. Recognizing habitat patchiness from an endangered species' point of view requires spatial information on habitat suitability. RAMAS GIS meets both these requirements by linking meta-population modeling with landscape data and GIS technology. It is a comprehensive extinction risk assessment system that operates in five steps:

1. Spatial data:

RAMAS GIS imports spatial data on ecological requirements of a species. These may include GIS-generated maps of vegetation cover, land-use, or any other map that contains information on some aspect of the habitat that is important for the species (temperature, precipitation, slope, aspect, etc.). RAMAS GIS then combines the information in all these map layers into a map of habitat suitability (HS) with a user-defined habitat suitability function.

2. Patch recognition:

RAMAS GIS uses the HS map to find habitat patches. It uses a patch-recognition algorithm and identifies areas of high suitability as a patch where a subpopulation may survive. The carrying capacity and other population-specific parameters of this patch (e.g., survival, fecundity, maximum growth rate) can be calculated as a user-defined function of the total HS, average HS, core area, patch perimeter (edge) and other habitat characteristics (from the GIS maps) for that the patch. RAMAS GIS then displays the spatial structure of the meta-population, super-imposed with a color-coded map of habitat suitability and any other geographical feature that the user wants to include (coastlines, rivers, cities, etc.), and saves the patch structure as input for the meta-population model. It also calculates various landscape indices (shape index, fractal dimension, edge:area ratio, etc.).

3. Habitat dynamics:

If you have predictions about how habitat may change in the future (e.g., as a result of forest growth, logging, etc.), including merging or splitting patches because of habitat growth or fragmentation. RAMAS GIS imports this information in the form of a time series of habitat maps, and creates time series of population-specific parameters for input into the meta-population model.

4. Meta-population model:

RAMAS GIS combines the spatial information on the meta-population with user-input ecological parameters of the species to complete the meta-population model. This model is identical to RAMAS Metapop, which is described below. RAMAS GIS contains RAMAS Metapop, so you should not buy both programs.

5. Ecological risk assessment:

The user can run the meta-population model to predict the risk of species extinction, time to extinction, expected occupancy rates and meta-population abundance. The output options include all results listed for RAMAS Metapop. In addition, RAMAS GIS has a sensitivity analysis feature that allows multiple simulations with automatically changed input parameters. You can compare results from different simulations by superimposing graphs of risk curves, time-to-extinction distributions, trajectory summary, meta-population occupancy and other outputs.

Future Developments

Unknown

Model Limitations

Unknown

Model Features

- Spatial data relationships with ecological requirements
- Algorithm base patch recognition
- Habitat dynamic modeling
- Metapopulation model
- Ecological Risk Assessment tools

Required Data Types

Shapefiles, Blank ASCII data sets, Fixed Grids.

Model Outputs

Each result can be viewed as a graph on the screen; printed as a graph to a printer; saved as a graphics file; viewed as a numerical table on the screen; printed as a numerical table to a printer; saved as a numerical table to a disk file; exported to a spreadsheet as a data table.

Hardware Requirements

Processor: 486 or better (100mhz+ reccomended);

Memory:

Windows 95: At least 16Mb; Recommend 48Mb +
Windows 98: At least 32Mb; Recommend 64Mb +
Windows 2000: At least 48Mb; Recommend 104Mb +
Windows XP: At least 80Mb; Recommend 168Mb +

At least 15mb of hard disk space.

Software Requirements

GIS Software package, including: GRASS, IDRISI, ArcInfo, PC ArcInfo, ArcView, ERDAS

Cost, Licensing and Availability

\$2,395 - Available from link below

Source

RAMAS Environmental Software

Source URL

<http://www.ramas.com/ramas.htm#gis>

Supported Platforms

DOS	<input type="checkbox"/>	UNIX	<input type="checkbox"/>
Windows	<input checked="" type="checkbox"/>	Macintosh	<input type="checkbox"/>