Documentation for Marine Planning Helper Toolbox

These tools were created to help automate common InVEST pre- and post-processing functions done in ArcGIS. All tools were coded for ArcGIS 10.0 and should work for versions 9.3 through 10.2

1) **Erase** – Erase the shape of one polygon shapefile from another.
2) **Area Zones of Human Use** – Calculates total area within planning regions for a directory of human activity layers.
3) **Adjust Area of Functional Habitat** – Calculates "functional" area of habitats within planning regions based on low, medium or high risk scores from the InVEST Habitat Risk Assessment (HRA) model.

1) Erase

This tool creates a feature class by overlaying the Input Features with the polygons of the Erase Features. Only those portions of the input features falling outside the erase features outer boundaries are copied to the output feature class. This helper tool is a workaround for the Erase (Analysis) tool that is standard in ArcGIS. We developed this workaround to make the tool available for users who do not have an ArcInfo license.

Erase is calculated by subtracting the area of the Erase Feature Class from the Input Feature Class:
$Output\ FC = (\ Input\ FC - Erase\ FC\ )$

Inputs

- *Input Feature Class:* The input feature class or layer. The area of this shapefile input will be erased by the area of the Erase Feature Class.
- *Erase Feature Class:* The features to be used to erase coincident features in the input

Outputs

- *Output Feature Class:* The feature class that will contain only those Input Features that are not coincident with the Erase Features.

Screenshot of Interface Using Sample Data
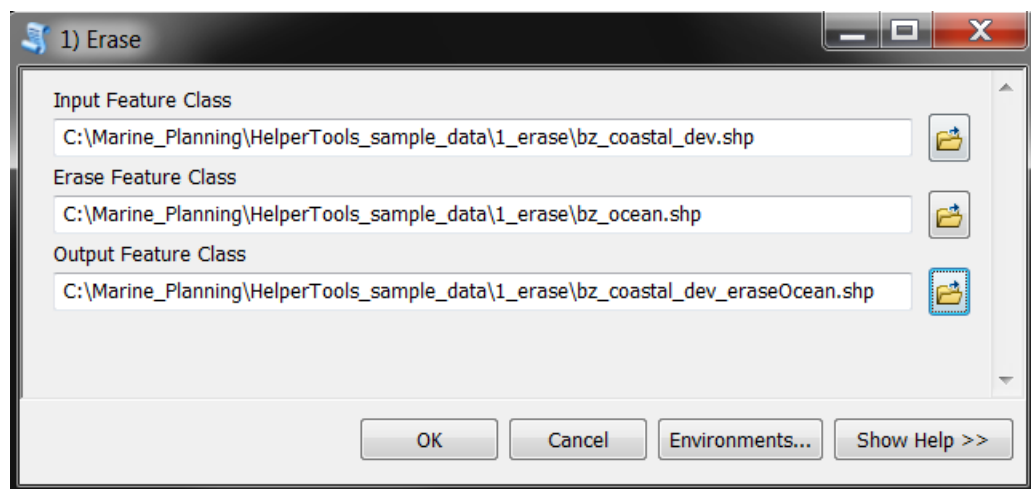
2) Area Zones of Human Use

When conducting MSP, it is often helpful to understand the spatial distribution of human activities (e.g., fishing, transportation, coastal development, etc.) within planning regions or other administrative boundaries. In addition to variation across planning regions, this distribution of activities may change under alternative management or scenarios. This tool calculates total area within each user-provided planning region for a directory of human activity layers.   Run the tool multiple times to compare area of human activities across scenarios.

Requirements

These human use layers and the planning region boundary layer must be polygon shapefiles. All inputs should have the same projection, with "meters" as the linear unit of the coordinate system.

Inputs

- *Workspace:* The folder where all files generated by the tool are saved. The path to this folder must contain no spaces. Required input.
- *Scenario Name (e.g., "current")*: Label that will be appended to the end of the name for the CSV output.
- *Planning Regions Layer*: Polygon shapefile that delineates planning regions or other administrative boundaries.
- *Planning Regions Identified Field*: Unique identifier in the Planning Region Layer's attribute table to differentiate the regions. This field can be of type string or number. Use any field name except "Id".
- *Directory of Human Use Layers*: Folder directory containing all the polygon shapefiles of human use activities.

Outputs

All final output files are found in the folder **<Workspace>/Output**.

- *AreaStats_<Scenario Name>.csv*: A CSV file that tallies total area of each human activity within each planning region.

There are many intermediate steps involved in producing these area summaries, some of which may be of interest. Intermediate outputs are found in the folder **<Workspace>/Intermediate**.

Screenshot of Interface Using Sample Data
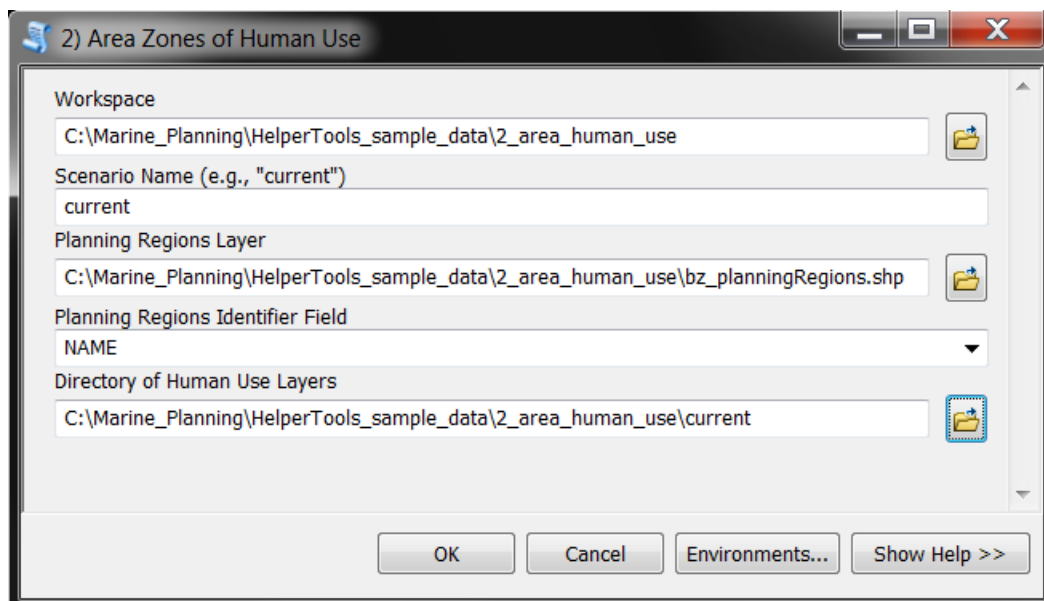
3) Adjust Area of Functional Habitat

The InVEST Habitat Risk Assessment (HRA) model evaluates risks posed to multiple habitats in terms of exposure to human activities and the consequences of that exposure for delivery of environmental services. This helper tool takes output from the HRA model and approximates the functional area of healthy and degraded habitats within a planning region. For a detailed explanation of how this tool was used in Belize, including assumptions, see *Arkema et al. 2015*.

Requirements

These habitat layers and the planning region boundary layer must be polygon shapefiles. All inputs should have the same projection, with "meters" as the linear unit of the coordinate system.

Inputs

- *Workspace:* The folder where all files generated by the tool are saved. The path to this folder must contain no spaces. Required input.
- *Scenario Name (e.g., "current")*: Label that will be appended to the end of the CSV file name containing the area statistics.
- *Planning Regions Layer*: Polygon shapefile that delineates planning regions or other administrative boundaries.
- *Planning Regions Identified Field*: Unique identifier in the Planning Region Layer's attribute table to differentiate the planning regions. This field can be of type string or number. Use any field name except "Id".
- *Habitat 1 Output from HRA*: Risk output from InVEST HRA model found in <Workspace>\output\Maps\[habitat name]_RISK.shp. This input must contain a column called "CLASSIFY" with values "HIGH", "MEDIUM", and "LOW" indicating classifications of risk by the HRA model.
- *Habitat 2 Output from HRA*: See above.
- *Habitat 3 Output from HRA*: See above.
- *Low Risk Percent Reduction*: Reduction to total area of habitat ("functional area") classified as "LOW" Risk by the HRA model. Default value = 0%
- *Medium Risk Percent Reduction*: Reduction to total area of habitat classified as "MED" Risk by the HRA model.   Default value = 50%
- *High Risk Percent Reduction*: Reduction to total area of habitat classified as "HIGH" Risk by the HRA model.   Default value = 100%

Outputs

All final output files are found in the folder ***<Workspace>*/Output**.

- *AreaStats_<Scenario Name>.csv*: A CSV file with total functional area of each habitat within each planning region. Area summaries are reported by risk classification (low, medium and high) and adjusted area.
- *Hab1Zones.shp*: Shapefile copy of habitat 1 input intersected by the Planning Regions Layer input.
- *Hab1Zones.shp*: Shapefile copy of habitat 1 input intersected by the Planning Regions Layer input.
- *Hab1Zones.shp*: Shapefile copy of habitat 1 input intersected by the Planning Regions Layer input.
- *PlanningRegions.shp*: Shapefile copy of the Planning Regions Layer input.

There are also many intermediate steps involved in producing these area summaries, some of which may be of interest. Intermediate outputs are found in the folder ***<Workspace>*/Intermediate**.

Screenshot of Interface Using Sample Data

3) Adjust Area of Functional Habitat

Workspace

C:\Marine_Planning\HelperTools_sample_data\3_adjust_area

Scenario Name (e.g., "current")

current

Planning Regions Layer

C:\Marine_Planning\HelperTools_sample_data\3_adjust_area\bz_planningRegions.shp

Planning Regions Identifier Field

NAME

Habitat 1 Output from HRA

C:\Marine_Planning\HelperTools_sample_data\3_adjust_area\current\output\Maps\[corals_1]_RISK.shp

Habitat 2 Output from HRA (optional)

C:\Marine_Planning\HelperTools_sample_data\3_adjust_area\current\output\Maps\[mangrove_2]_RISK.shp

Habitat 3 Output from HRA (optional)

C:\Marine_Planning\HelperTools_sample_data\3_adjust_area\current\output\Maps\[seagrass_3]_RISK.shp

Low Risk Percent Reduction

0

Medium Risk Percent Reduction

50

High Risk Percent Reduction

100

OK   Cancel   Environments...   Show Help >>