Crop Probability Map Tutorial

To be used in association with the CropProbabilityMap ArcReader document
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This document provides a few key details about the information contained within the CropProbabilityMap and how to explore it. For information about the research that underlies the content, see the associated Final Report. For more information about using all the features of ArcReader, see the Help provided on the ArcReader menu.

Note: there are some large files associated with this map document, so it may take a long time to load and sometimes a long time to respond to a functionality request. It may speed up in a particular working session when you access the layer or function for subsequent uses.

Getting started

Install ArcReader

In order to see the map layers provided, you will need to download and install ArcReader. It is available as a free download from www.esri.com/software/arcgis/arcreader/download. You will be asked to use an Esri Global Account to access the download which you can easily create on the log in page. Don't worry about giving away your information here. Esri is a very reputable company and they provide a huge quantity of valuable environmental information and free mapping tools you may want to learn about. You will not be bombarded with junk mail.

Once downloaded you will need to unzip the file and then click on the extracted file to install the program.

Unzip the CropProbabilityMap zip file

After downloading the CropProbabilityMap zip file, you will need to unzip it and put the resulting folder in an easily accessible location on your computer.

Open the ArcReader document

Once ArcReader is installed, navigate to the CropProbabilityMap file that you have stored on your computer and double click to open it.

Map Layers

Layer visibility

Map layers are displayed in the order they are listed in the Table of Contents (ToC) on the left. You make a layer visible by clicking on the check mark in the box to the left of the title.

It is important to remember that any layers above others in the ToC, when turned on, will lie on top of and possibly hide those below. This applies in particular to the Crop Probability layers -- you can only see the topmost probability layer that is checked in the list. If you want to see the last one in the list, all the Crop Probability layers above it must be turned off. All of the layers in the Framework section are lines, so they can be turned on at any time and layers below that will still be visible between the lines.

Organization and Contents

The Table of Contents (ToC) is organized into several groups of map layers. Expand or collapse each group by clicking on the + to the left of the name. If you click on the + to the left of a layer, the symbology representing the values of the variable is shown. Below are all of the layers included in this map document.

TopoMapOverlay – is a single semi-transparent layer provided to assist in navigation around the map. Since it is semi-transparent, layers below it will be visible, though they will be greyed out slightly. To view other layers more clearly, turn this layer off when you do not need it.

Framework – this group contains four layers with line features that will be useful as a locational framework. Since they are lines, they do not hide layers turned on below them.

IslandOutline - is a simple black line that shows the edge of the island. Leave this on to delineate the Island's edge crisply, if you wish.

Major Roads - shows only a few roads and is intended to provide general locational reference at the large district scale.

Roads – shows most of the roads on the island – a dense network of lines that will only be useful at a very local, zoomed in scale.

TMK – shows the outline of TMK boundaries as of July 2011 (the most recent available data). Note that the TMK layer is very large and takes a long time to draw, so it is best not to leave it on when you are viewing large portions of the Island.

ExistingCrops – a single layer showing where crops are currently grown on Hawai`i Island. This layer is the foundation of the modeling effort that produced the Crop Probability layers in this study. The Existing Crops layer was created by the Spatial Data Analysis and Visualization Lab at UH Hilo under a County of Hawai`i Research and Development Division grant as part of a Food Self-sufficiency baseline study completed early in 2012. Only crop polygons 3 acres or greater in size were included in this layer. Much more on this layer can be found in the study's report at http://geodata.sdal.hilo.hawaii.edu/GEODATA/COH_Ag_Project.html.

BedrockAtSurface – this is a single layer that is a useful overlay showing areas that are likely to be non-productive, though it should be noted that some of the Existing Crop polygons do lie on top of this layer. It was extracted from the most recent USDA Soil Surveys of Hawai`i

Island by selecting only the soil map units that have a “surface texture” equal to “bedrock”. This has a clear effect on the distribution of existing crops so was included to help explain large gaps in the probability layers.

CropProbabilities – these are the product of this research study. The values represent the predicted probability between 0-100% that conditions are suitable for a specific crop based on where the crop is currently grown and the distribution of key environmental conditions. The set of crops included here are those included in the UHH Existing Crops layer minus Dairy, Aquaculture, Energy and Taro whose locational determinants are not so strongly related to the environmental conditions examined here. Full details of how these layers were developed is given in the associated Final Report.

Environmental – these layers show the environmental conditions used in the probability modeling process. Most of these layers are rasters with 100mx100m cells. See the Final Report for a full description of these layers and their impact on the models.

SoilProperties – a polygon layer showing all of the soil map units. Associated with each map unit are the selected soil properties explored in the development of the probability model. Note, this is a large polygon layer, so it should only be turned on when it is necessary to view the boundaries of the individual soil map units.

DepthToRestrictive – one of the many soil properties explored, but the only one which effectively contributed to the distribution of crops. It is shown here associated with the original soil map unit polygons.

Elevation – a raster layer of elevation recorded in meters.

Slope – the slope angle calculated from the original elevation data and represented as the average slope within each 100x100m cell.

MinMonthTemp – the minimum monthly average temperature (C) for each cell in this 100x100m cell-size raster.

MaxMonthTemp – the maximum monthly average temperature (C) for each cell in this 100x100m cell-size raster.

MinMonthRain – the minimum total rainfall (mm) in any month for each cell in this 100x100m cell-size raster.

MaxMonthRain – the maximum total rainfall (mm) of any month for each cell in this 100x100m cell-size raster.

TotalAnnualRain – the total rainfall (mm) for each cell in this 100x100m cell-size raster.

Background

Island – is a colored polygon of the island land area that can be used in lieu of the TopoMap below as a plain backdrop to some of the layers above.

TopoMap – This is the second of two large layers that show the same topographic basemap at various scales. They are identical but have been placed at the top and bottom of the list to help in navigation. The TopoMapOverlay is discussed above. The TopoMap in the Background group at the bottom of the ToC is not transparent and will be useful ONLY when all other layers are turned off as a means of visually finding locations around the map view.

Navigating in the map

- To zoom into areas on this map, choose the + magnifying glass icon and draw a box on the map around where you would like to zoom into.
- To pan, click on the hand icon and then click and hold the mouse button while hovering over the map—you can now move the map around in the viewing window.
- To return to the full view of the island, click on the globe icon, or go to the bookmark "Island".

Finding a location

To find a location, click on the binocular icon, or choose Find in the Edit menu. It will probably take some seconds for this window to open. You have two options. Use Features if you want to find a location by TMK and use Locations if you want to use an address. Note that the map coordinates shown in the bottom right of the ArcReader window are in meters measured in the coordinate system UTM Zone 5N (not latitude and longitude) so they are likely to be irrelevant to you.

Using TMKs

In the Features tab of the Find box,

- In the Find field, enter the TMK number in the standardized numeric format IZSPPPppp where "I" always equals 3. Left fill each of the final two components with zeros. Thus, a Hawai`i Island TMK that may be provided as 2-2-12-4 must be written into the Find field as 322012004.
- In the "In" field, scroll down to and click on the layer TMK.
- Click Find.
- If you have the TMK layer turned on, when you click on the found object at the bottom of this window, the location of the parcel will flash on the map.
- Left click on the found record (bug: it may disappear for a moment after you click on it, be patient). Here you can also "Flash", "Zoom to" and "Pan to" that location. Use "Zoom to" to zoom in and center on that parcel.

Using addresses

In the Locations tab of the Find box,

- Choose a locator by browsing (click on the folder to the right of the dropdown list) to the directory that contains this ArcReader document. Open the folder "Locator" and click on the file "HIAddressLocator.loc" and click Open.
- In the "Full Address" box, type only the unit number (without hyphen) and street name. Thus 74-5044 Ane Keohokalole Hwy should be entered as "745044 ane keohokalole" (case does not matter). Suffixes such as "A" and road type should be omitted and you must type the road name correctly.
- *IF* you have typed it correctly and the address is in the database, one or more results will show in the list at the bottom.
- Left click on the found record (bug: it may disappear for a moment after you click on it, be patient). Here you can "Flash", "Zoom to" and "Pan to" that location. Use "Zoom to" to zoom in and center on the point associated with that address. Use "Add Graphic" if you'd like to a point at that location on your map.

Warning: Address locators in GIS are notoriously misbehaved, so you may find that some addresses do not produce a result. If you are having trouble, try nearby addresses that may be more reliable.

Finding the probability and environment values

Once you have zoomed into the map to an area of interest and turned on one of the Crop Probability layers, you will see the 100x100m cells of the layer. Each of these cells contains several different values that you can list by using the Identify function.

- Click on Identify (blue "i" icon) and then click on one of the cells covering your area of interest.
- The Identify window will open. What you see in this box depends on the layer or layers indicated in the "Identify from" box. There are several different choices, from individual layers to <All layers>.
    - Usually, you want to see values for only some of the layers (e.g. all the Probabilities and Environmental layers). In this case, click on all the relevant layers (being sure to open the groups and click on all of the overlaying layers), then choose <Visible Layers>.
    - While easier, the <All Layers> option is not recommended as you will get a lot of unnecessary information from the duplicated Topo Map and Framework layers. Note that with the Topo Map layers, there is a great deal of place information that is irrelevant here and some of the values (elevation, slope) are different from those

in the individual raster layers. These come from an entirely different source with a different accuracy framework and should be disregarded for the purposes of this project.

- Click on a cell in the map again and the Identify window will fill up with data from each layer at that location.
- For raster layers you will see the value of the cell. This will help you quickly see all of the probabilities for each crop type and all the raster environmental values.
- For polygon layers you will see the ID of that location. Click on that ID and the bottom box will fill with all the attributes associated with that polygon. This is particularly useful in the SoilProperties and TMK layers

Unfortunately, while you can see all of this data, unlike a full GIS, in ArcReader there is no way to capture it in a document format, or to summarize the values over several separate cells. This will need to be recorded manually, but should be fairly quick since the information is presented in a simple clear form.

Other functions

Layer effects

There are two functions that you can use to interactively change the appearance of the layers. If it is not yet available, turn on the Layer Effect toolbar by choosing View>Toolbars and clicking on Layer Effect. Then in the drop down box, *choose a visible layer (i.e. one that is above any other layers clicked on).*

- Swipe  (found on the tool bar and under Tools>Data) - Allows you to interactively peel the selected layer back and see active layers underneath it. Click it to turn on, then click and hold on the map to drag the cursor down or sideways. To turn Swipe off, click on one of the navigation tools.
- Transparency  - Adjusts the selected layer's transparency so you can see through it to active layers below.

Printing

Any view, zoomed in or full extent, can be printed. Use the normal Data view to find the area that you interested in, turn on the layer(s) that you want to show, then from the menu choose View>Layout View to see what a printed map will look like. Use the normal zoom and pan tools to move the map view around in the print template. Print from the menu File>Print.

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