

Directions for Use of the Treeplanting Code Developed in Google Earth Engine

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Access to Google Earth Engine

<https://code.earthengine.google.com/2e0d23465949211dca4ea6951d57e02a>

This code was developed as part of the requirements for the Natural Resources and Environmental Management (NREM) Department at the University of Hawaii at Manoa in partial fulfillment of the NREM 601 foundations course in partnership with Malama Maunalua.

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Introduction:

As the ecological benefits of increased canopy cover in urban settings become well established, organizations have begun to focus on creating projects focused on tree planting initiatives. On Oahu, Malama Maunalua, non-profit organization committed to conserving and restoring Maunalua Bay has begun to seek out projects of this nature. In collaboration with Malama Maunalua and UH, this project synthesizes information to facilitate the process and creation of tree planting initiatives in the Maunalua Bay watershed region. This document is a step by step guide for basic use of the code and how to extract certain information. The code itself is also heavily commented and can serve as a standalone guide.

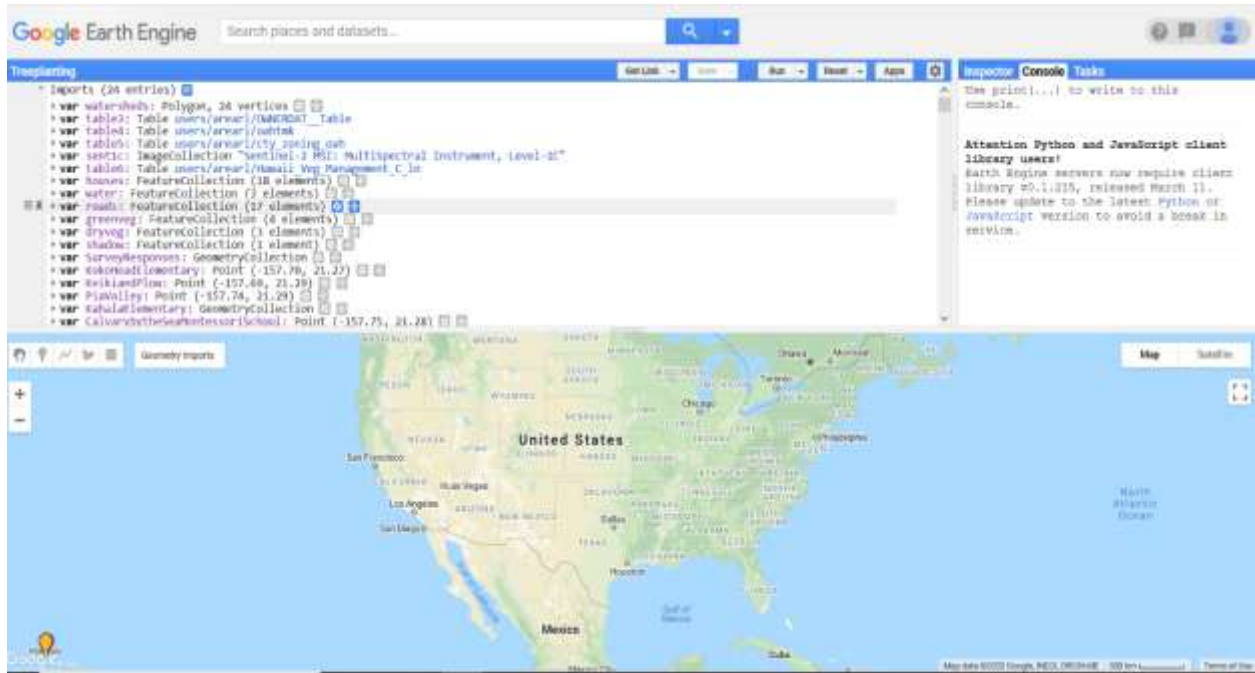
Sign Up for Google Earth Engine

1. Follow this link and sign in to Google earth engine with your google account
<https://signup.earthengine.google.com/#!/>
2. Fill out the basic information and select sign up
3. This will allow access to the code that may be restricted from just using the provided GeoTiff layers and will allow easier manipulation between GEE and GIS platforms

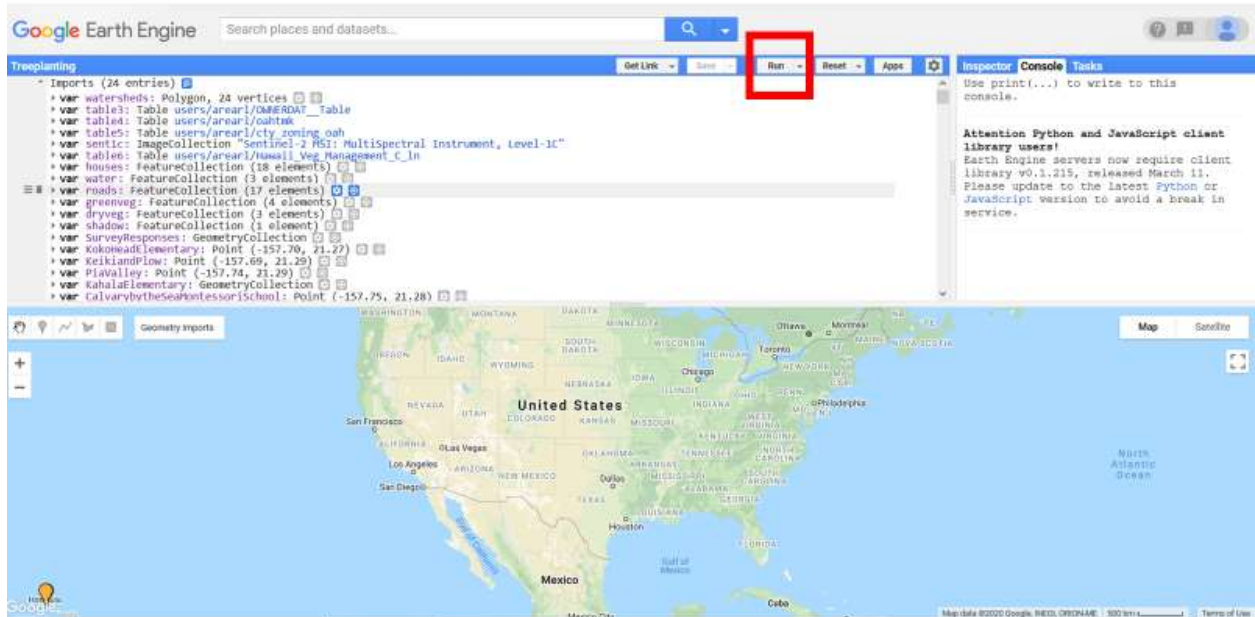
Basic Use

1. Follow this link to the creator's repository
<https://code.earthengine.google.com/2e0d23465949211dca4ea6951d57e02a>
2. Additionally, if you are having trouble contact the creator at arearl@hawaii.edu for further information and an alternative way to share the resource

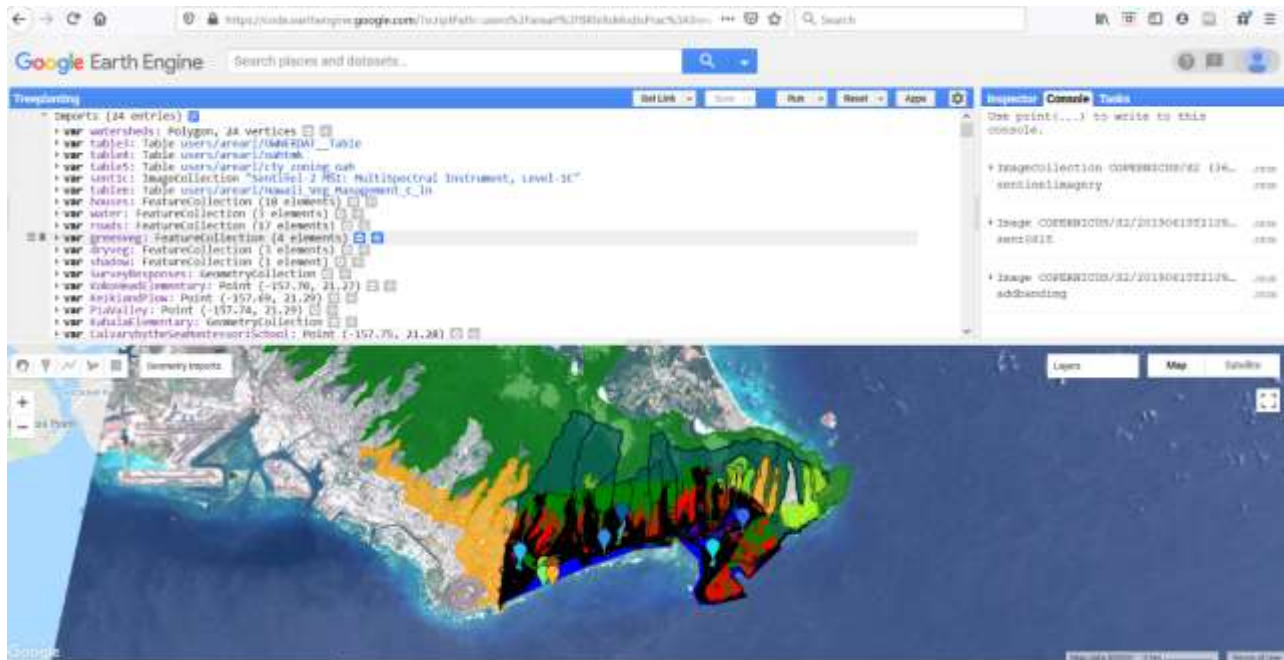
3. Upon visiting this link or contacting the creator, the Google Earth Engine Code Editor will appear and look like the below. Please allow all data to load before moving forward



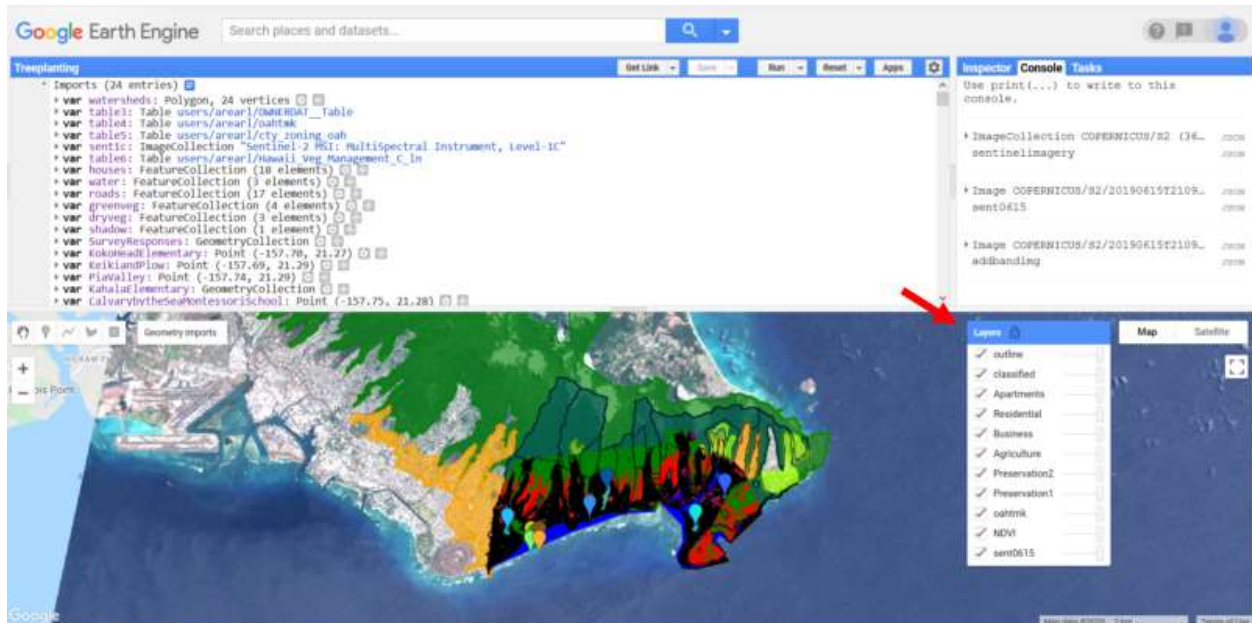
4. In the upper Right-hand corner, select RUN.



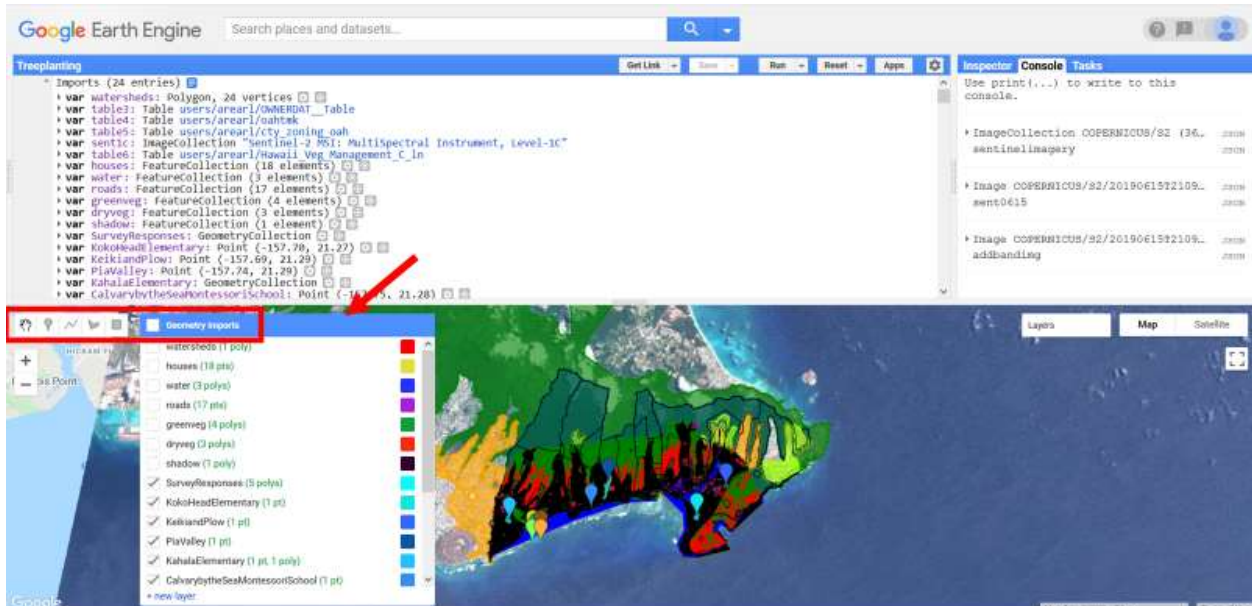
- As the code runs, it will move the map image to Oahu of its own accord. Then layers will appear with varying speed. The end result will look like this.



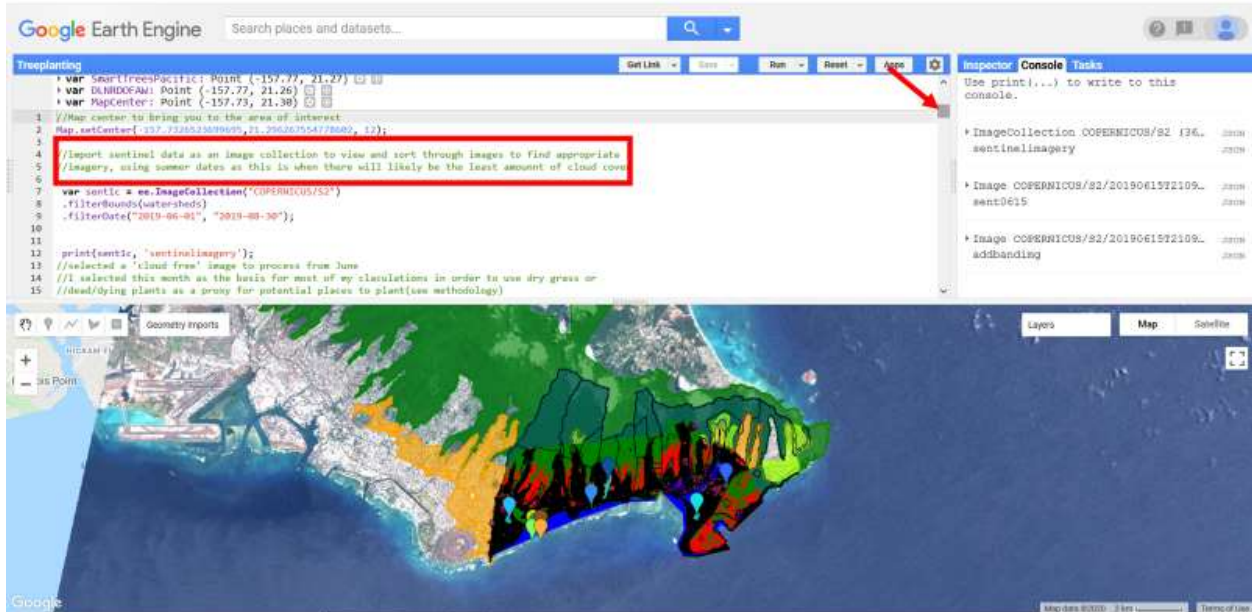
- On the right side of the screen under the console box there is a box marked layers. Use this box to check layers on and off in the image.



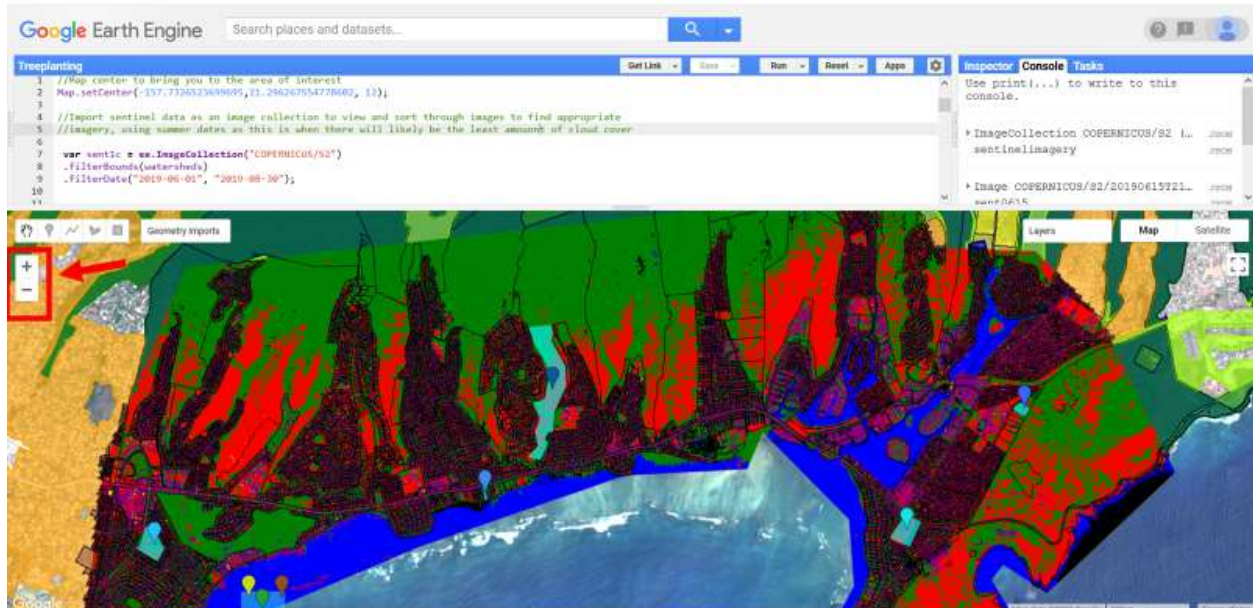
7. Similar to the layers, Geometry imports are located on the left side of the screen and include an associated tool bar. Use these items to check geometry on and off or add polygons and points.



8. To use the Code editor or type directly into the code select the scroll bar on the right side of the screen to look through the code. Code strings are written in Java script, within the editor anything that is live code will be colored. Anything that is denoted as green with two backslashes (//) are comments to help understand and use the code.

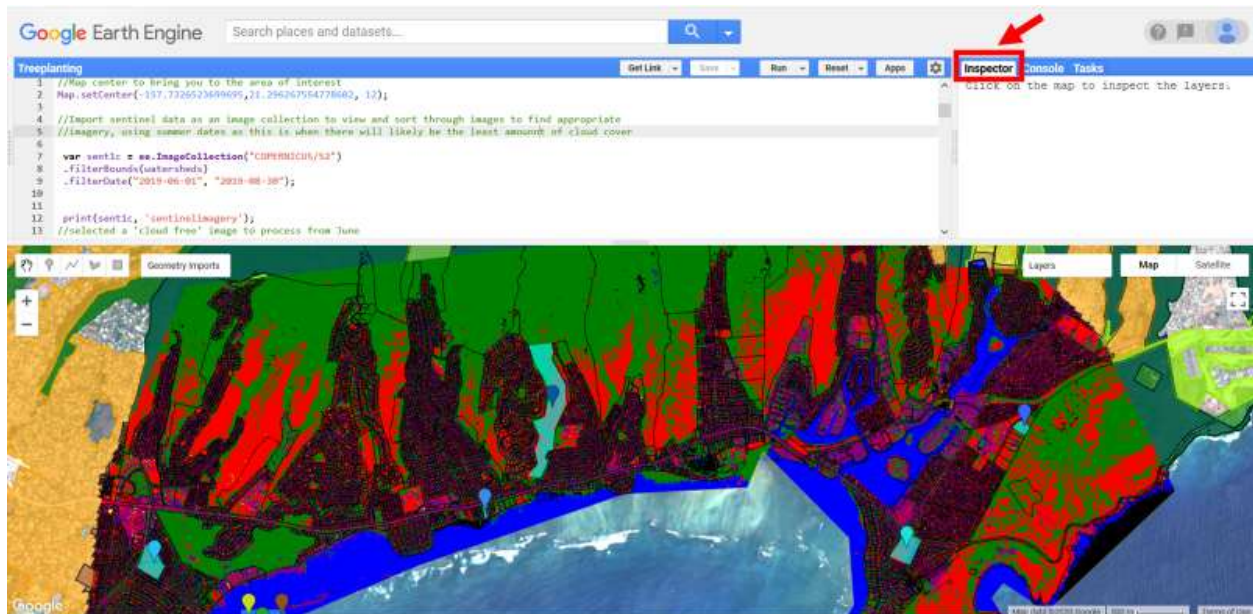


9. To change the view of the map to an area of interest, select the zoom in or out functions located on the left of the screen under the geometries.

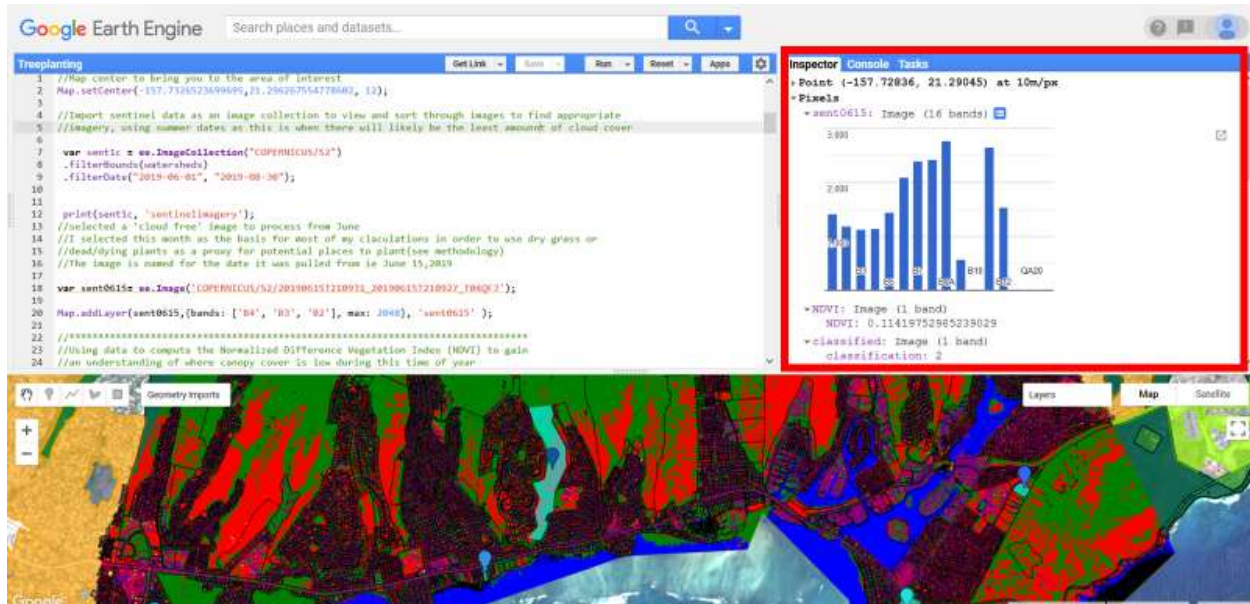


Selecting a Point

1. Selecting a point allows the user to see all of the information contained in the layers at that point using the inspector portion of the console. This will change your cursor from the hand to a cross in order to select a single point on the map.



- To select a point simply click on the desired portion of the screen. Accuracy is increased if the image is zoomed in. However, in this case a point was chosen at random from the current image to illustrate the usage of the inspector, notice how the tab has filled with information. Information is recorded in 2 ways as Pixels and as Objects, both contain information about the chosen pixel in these categories.

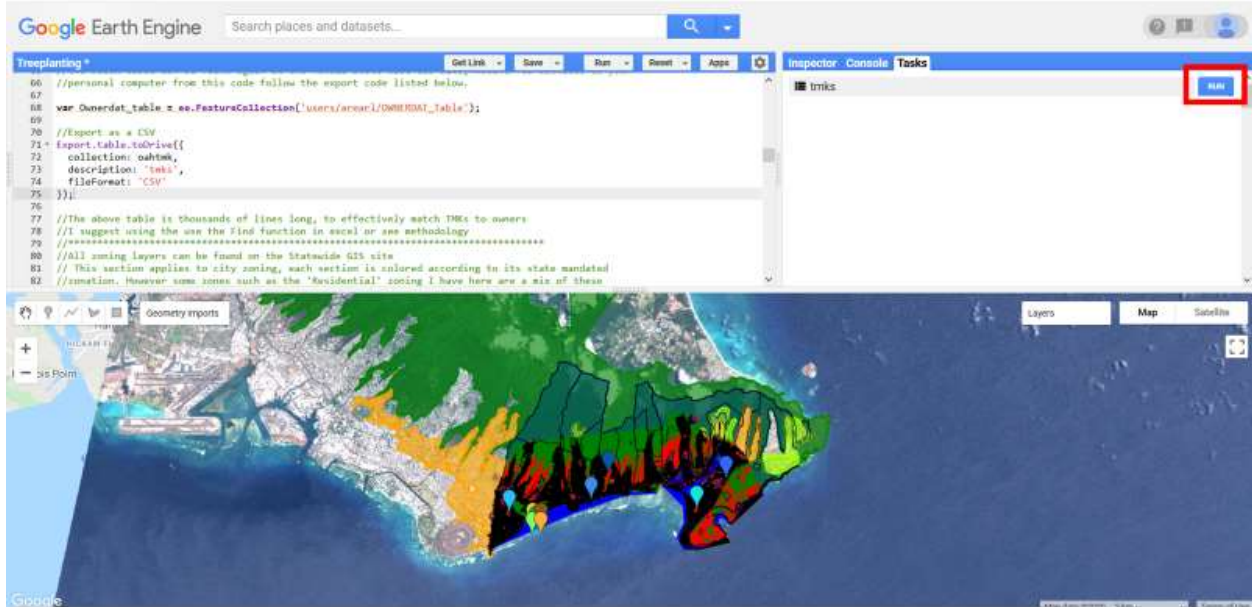


- Scroll through this information to familiarize yourself with the information about the layers. Note that even if layers are checked off in the layers box the information will still show up in the Inspector console. This is useful to visualize certain layers while maintaining all underlying information.

Utilizing the TMK information

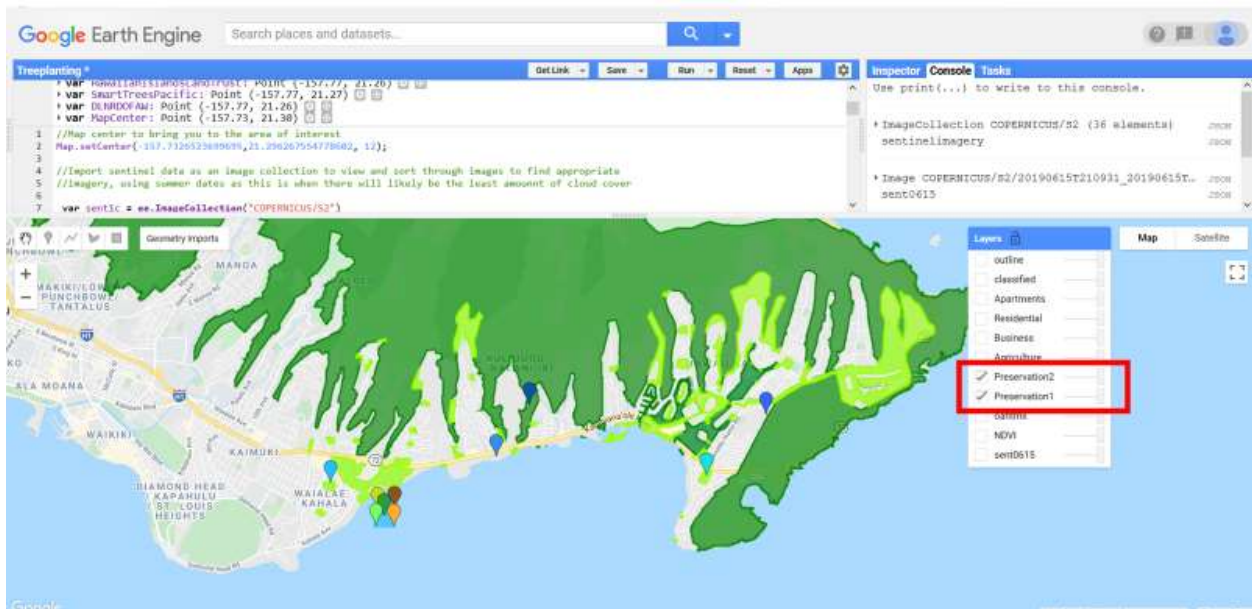
- Using the TMK information layer allows for identification of the tax map key number which can then be searched using an exported CSV file that is available in the code. This information is also located from the Hawaii statewide GIS program and can be found here. <https://honolulu-cchnl.opendata.arcgis.com/datasets/ownerdat-table/data>
 - A note about the outline layer, this is the last layer in the code. It is a blank image that the outlines of the TMKs were cast into to act as an overlay over all other layers. While visually useful this layer contains not recorded information such as the TMK numbers.
- First use the inspector icon to select the area you wish to look at. Here I have selected Koko head elementary school by first zooming in then reading the information found in the inspector console.
- Scroll in the inspector console until the Oahtmk layer, select the drop down to see all of the information. Then select PROPERTIES, this will show several numbers the first labeled TMK: is the most important for this study

2. After making the code live, run the code again. This will prompt the system to highlight the tasks tab located to the right of the console. Select this tab and press Run, this will place the CSV in the google drive associated with your account.



Using Layers to Select Zoned Properties

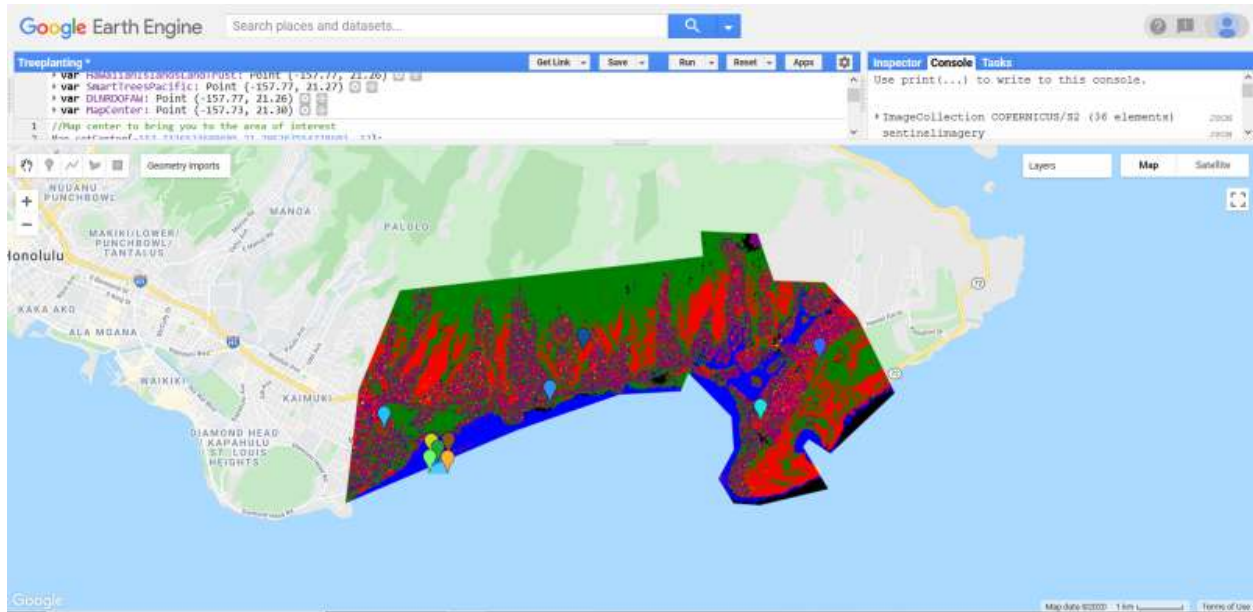
1. To search for regions by zone, simply select or deselect the layers you are most interested in visualizing. For example, if an organization can only work in Preservation 1 or 2 land, select only these layers from the console like the below example.



Using the Image classifier

1. The image classifier is a computed layer in the code that specifies areas of low canopy cover as red regions such as what is seen in the TMK examples. Below please find the colored key to these regions.

Red = Dry vegetation, Green = Green vegetation, Purple & Yellow: Roads and Houses, Blue = Water, Black = Shadow



2. Using these red regions in concert with the zoning and TMK layers may give important information to organizations interested in planting in certain areas in the Maunaloa Bay Watershed region. While this image is currently clipped to a certain region it can be expanded to the entire state if need be.

Survey Respondents

This map is connected to a survey sent to organizations with interest in tree planting. Respondents were asked a number of questions, most applicable to this map was their geographical extent. Those who responded were added into the map in a Geometries layer called 'Surveyresponses', this geometry is a light blue color that outlines the extent identified by the organization. If an organization stated their geographic extent was island or statewide, they were placed in the same layer but in a box located in the ocean to the left side of the watersheds region on the map, this placement was to limit potential misidentification of these organizations extents on land. Responses were also recorded as individual points listing the organizations name with a discrete color. Again, those that responded with island wide responses were placed in the above-mentioned box and given discretely colored points. In future more organizations can be added to this layer, or new layers can be created to capture specific regions of interest by organizations.

