

# Exercise

Understanding the Scale of the  
Damage with ArcGIS Online

Section 4 Exercise 1

08/2017



# Understanding the Scale of the Damage with ArcGIS Online

## Instructions

Use this guide and ArcGIS Online to reproduce the results of the exercise on your own.

*Note: ArcGIS Online is a dynamic mapping platform. The version of ArcGIS Online that you will be using for this course may be slightly different from the screenshots you see in the course materials.*

## Time to complete

Approximately 45 minutes.

## Technical note

To take advantage of the web-based technologies available in ArcGIS Online, you need to use a fairly new version of a standard web browser, such as Google Chrome, Firefox, Safari, or Internet Explorer. Older web browsers may not display your maps correctly.

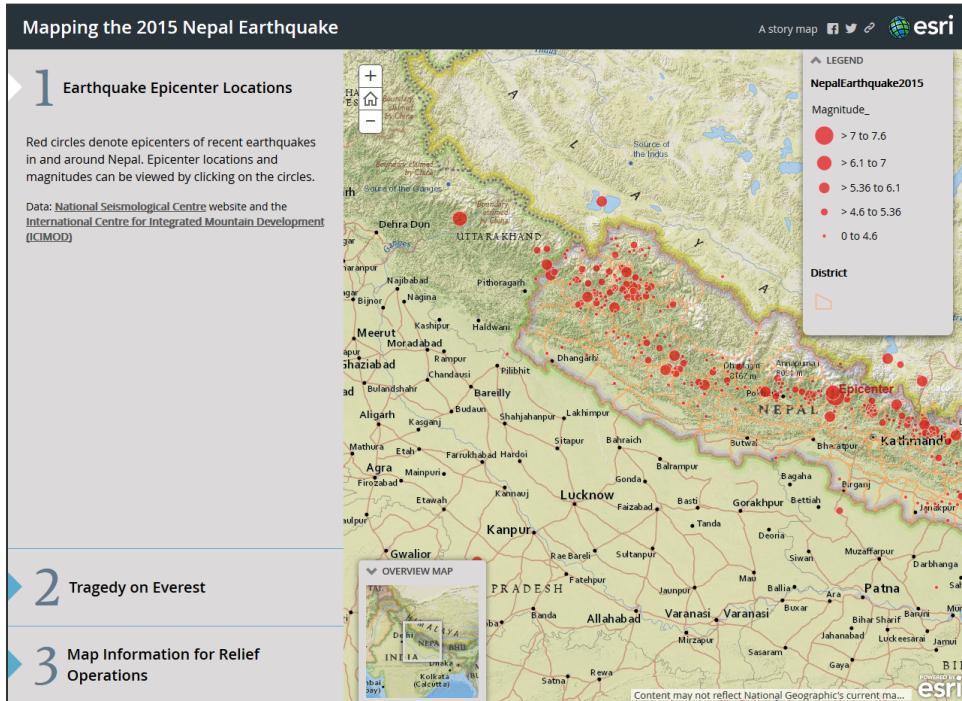
*Note: For information on supported browsers for ArcGIS Online, visit <http://doc.arcgis.com/en/arcgis-online/reference/browsers.htm>.*

## Introduction

This exercise teaches you the steps to create the **web maps, apps, and other information maps that first responders need** when responding to an emergency. You'll be using a set of maps that were created to assist several organizations that were working in concert after the Nepal earthquake in April 2015.

The way that imagery is used in a disaster fundamentally differs from how it is used in other industries because **the imagery itself is vital. The challenge is disseminating it** as quickly and broadly as possible. **There is no scenario where you need to do multispectral analysis or classify an image; you are simply trying to identify destruction** so that resources can be allocated accordingly. Often, this means that multiple organizations need to work together to combine forces. Having a common imagery portal is vital so that each organization does not spend too much time maintaining data.

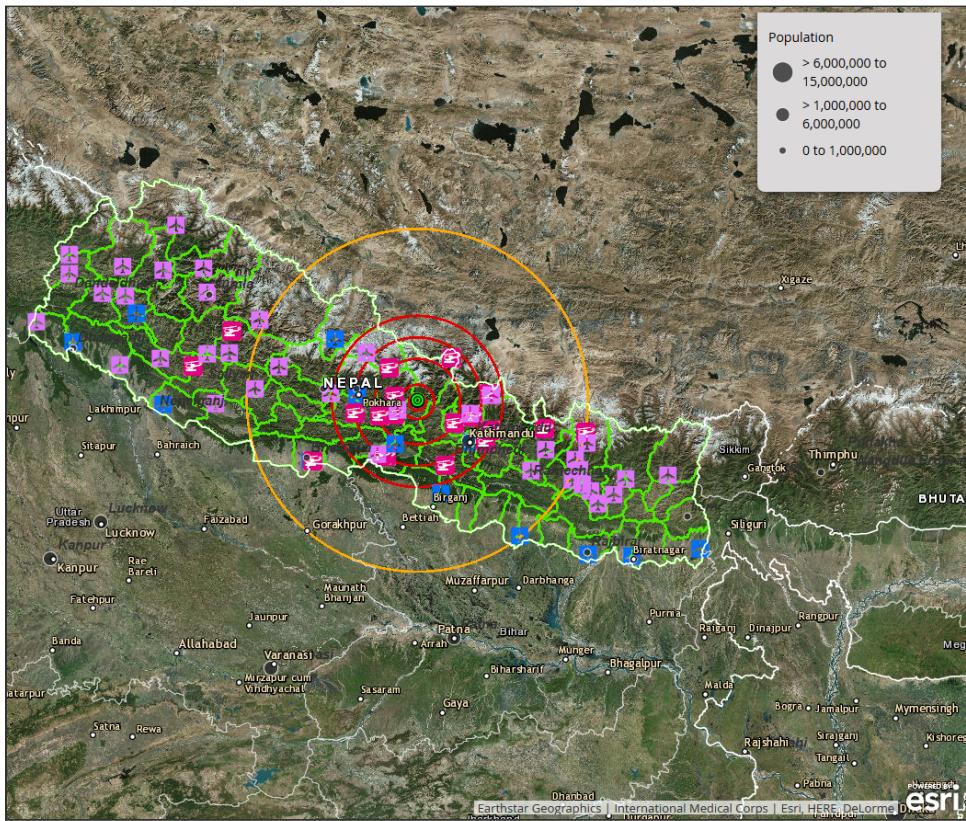
The purpose of this exercise is to learn how to create the web maps and apps that were used in response to the Nepal earthquake, which illustrates the value of imagery and information being used in disaster management. You can use these types of web maps in any disaster relief, emergency management, or other scenario when you need to get imagery and information out to the public quickly.



## Exercise scenario

After the Nepal earthquake, which had an epicenter of about 80km from Kathmandu, hundreds of thousands of people were left homeless, thousands were killed or injured, and an untold number of buildings were destroyed. Many of these buildings were centuries old in an earthquake-prone area, which gives you an idea of just how much stronger than normal this earthquake was.

Sharing geographic information in response to a disaster like a major earthquake can help first responders and other emergency management personnel make decisions, assist with relief efforts, and learn valuable lessons.



## Earth Imagery at Work

### Using ArcGIS Online and Imagery for Disaster Management

Using story maps, web apps, and shared web maps lets you efficiently disseminate imagery and information to others. The first part of your work is to **assess the extent of the damage**. You want to know **where people are most affected and how many people are affected**, and you want to start surveying the damage.

### Part 1: Understanding the scale of the impact

*How many people live in the affected areas?*

An **Impact Summary Map** is a map that visualizes the impact of an ongoing or forecasted incident or event. It is designed to give you an overview of what is going on. This interactive map **highlights an area in Nepal based on the level of shaking it experienced** and tells you how many people live in that area. Although this looks like feature data, the shaking is actually derived from remotely sensed data via the United States Geological Survey (USGS).

### Step 1: Sign in to an ArcGIS Online organization

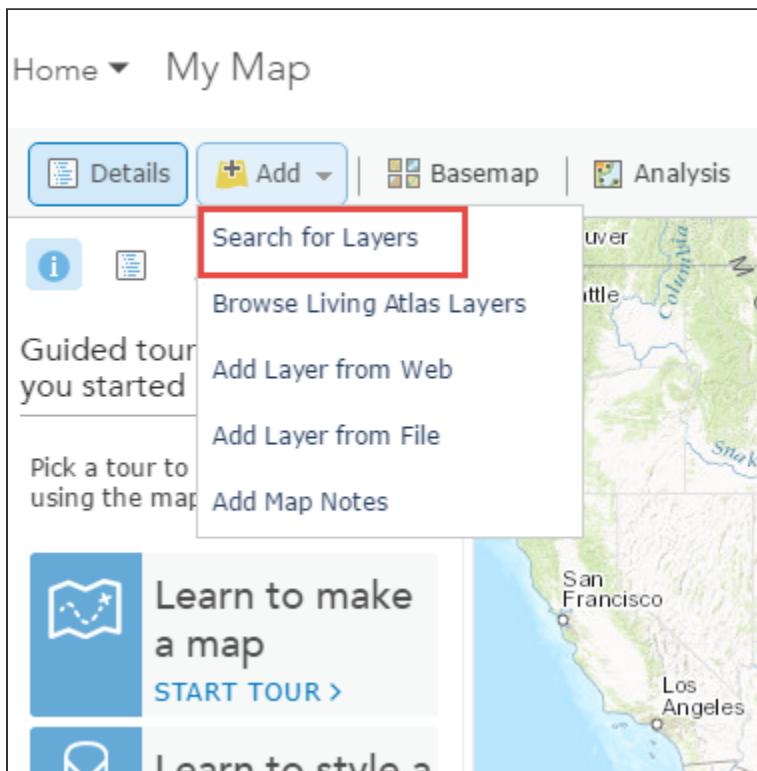
In this step, you will sign in to the ArcGIS Online organization for the Earth Imagery at Work MOOC.

- a Open a new Internet browser tab or window.
- b Go to [www.arcgis.com](http://www.arcgis.com) and sign in to ArcGIS Online using the credentials provided at the start of this course.

Note: The Section 1 Exercise 1 PDF explains how to determine your ArcGIS Online credentials (username and password) for this course. If you have trouble signing in, email [gistraining@esri.com](mailto:gistraining@esri.com) for assistance.

### Step 2: Create a new map

- a From the ribbon at the top of the ArcGIS Online window, click Map to start creating a new map.



- b Click Add, and then click Search For Layers.

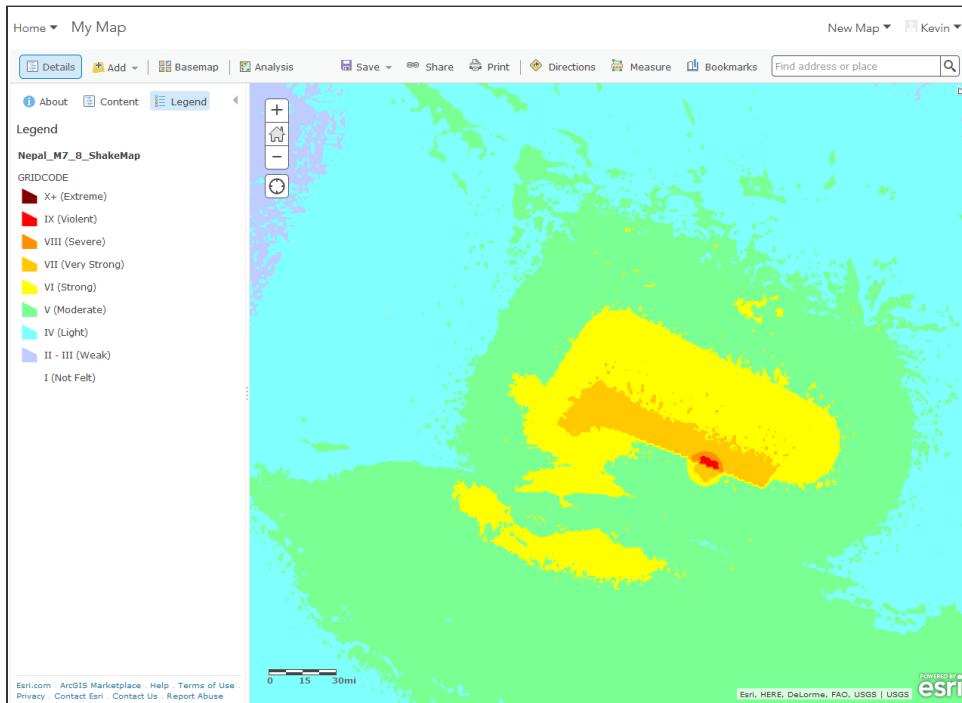
You will add an existing map layer from ArcGIS Online.

- c In the Find field, type **Nepal Shake**, and in the In field, select ArcGIS Online.
- d Ensure that the Search Within Map Area check box is not checked.
- e Click Go.

The screenshot shows a search interface for layers. At the top, there's a 'Find:' input field containing 'Nepal Shake' and a 'GO' button. Below it, an 'In:' dropdown is set to 'ArcGIS Online'. A checkbox labeled 'Within map area' is unchecked. The results section is titled '5 Results Found' and lists five items:

- Nepal\_Earthquake\_2015** by kjohnson\_imc [Add](#)
- Nepal\_M7\_8\_ShakeMap** by jpedderDRP [Add](#)
- Npl\_est\_pop\_affected** by jwhite\_DirectRelief [Add](#)
- Nepal\_Earthquake\_2015\_data** by kjohnson\_imc [Add](#)
- Dissolve Nepal Earthquake areas affected boundaries** by Stacey7 [Add](#)

- f From the results, select the **Nepal\_M7\_8\_ShakeMap** layer.
- g Click Add to **add the layer to your map**, and then click Done Adding Layers.  
To better understand what the map shows, you can view the map legend.
- h In the Contents pane, click the Legend button.



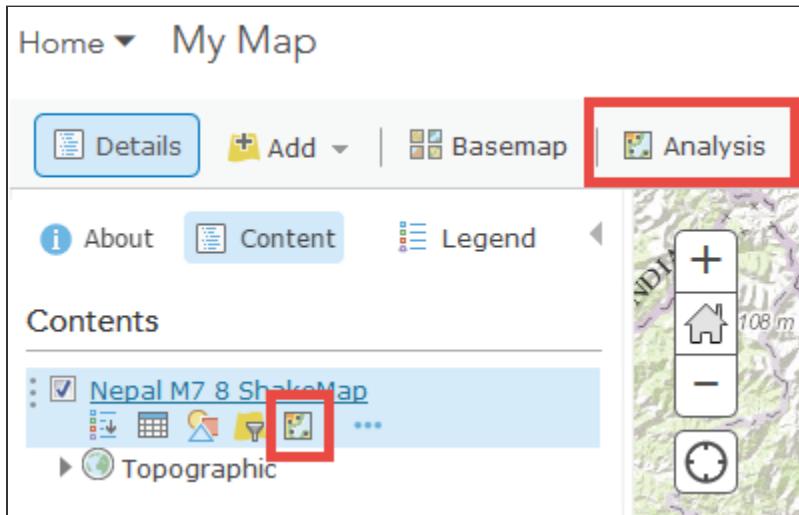
The map now shows areas around Kathmandu symbolized using color to indicate shaking intensity. The area in red is close to Kathmandu. You can zoom or pan the map to explore.

## Step 3: Perform data enrichment

You are interested in how many people felt the shaking and to what degree. To determine that, you will enrich the dataset with additional demographics; in this case, you are interested in demographics related to population.

The ArcGIS Online [Enrich Layer tool](#) allows you to perform additional analysis and answer a greater range of questions. A new layer is created that contains the additional attribute information. You can learn more about how Enrich Layer works [here](#) and sources for Esri demographic data [here](#).

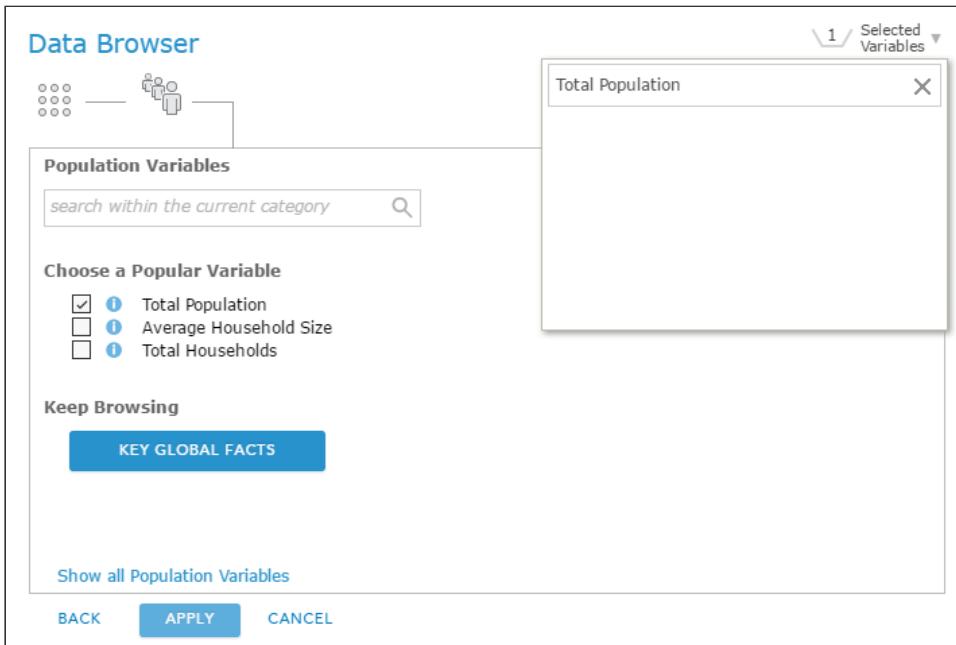
- a In the Contents pane, pause your pointer over the Nepal M7 8 ShakeMap layer, and click the icon for [Perform Analysis](#).



- b In the Perform Analysis pane, expand the Data Enrichment section and select Enrich Layer.
- c In the **Enrich Layer** pane, specify the following parameters:
- For Choose Layer To Enrich With New Data, select Nepal\_M7\_8\_ShakeMap.
  - Click Select Variables to open the Data Browser, and browse for variables that you can use to enrich the data.
  - Select Population.
  - Check the box next to the Total Population variable.

*Hint: You should be able to see the variable by clicking the drop-down arrow in the top-right corner of the Data Browser.*

- Click Apply to confirm the variables.



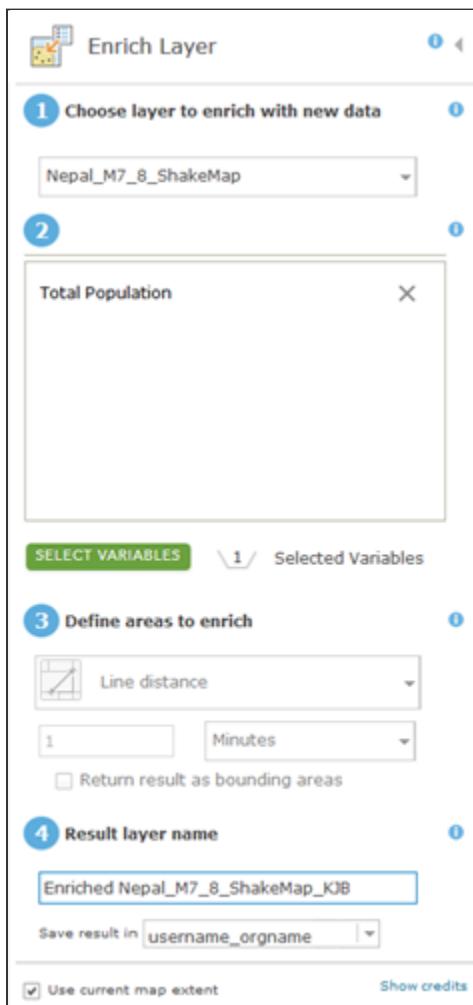
- The type of demographic data chosen does not require an enrichment area.
- For Result Layer Name, type **Enriched Nepal\_M7\_8\_ShakeMap\_yourfirstandlastname**.

The result layer name must be unique within an organization. Add an underscore and your first and last name to the name of the result layer to avoid encountering an error. If you run the analysis multiple times, you will need to **provide a unique result layer name each time** to avoid encountering the error message. An easy way to do this is to name it based on the date and time.

- d The Save Result In field defaults to your account and organization name; you do not need to change this value for this exercise.
- e The Use Current Map Extent check box is checked on by default. This limits the results to your current map extent (the map display on-screen at any moment). Unless you have zoomed in or out after adding the map layer, you do not need to change this.

If you are zoomed in, only those features in the display will be used in your analysis. The analysis should drive which features you are analyzing, so you will need to uncheck the Use

Current Map Extent box if you want to analyze all of the features. If you uncheck the Use Current Map Extent box, or if you are zoomed out and the map display shows a large number of features, the analysis processing time will be increased.

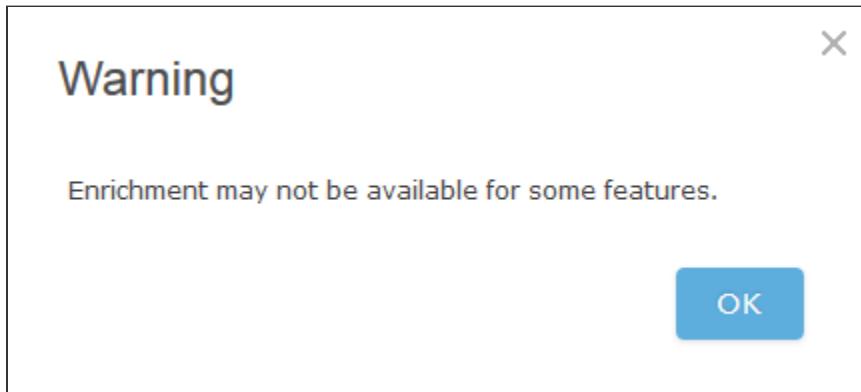


- f Click Run Analysis.

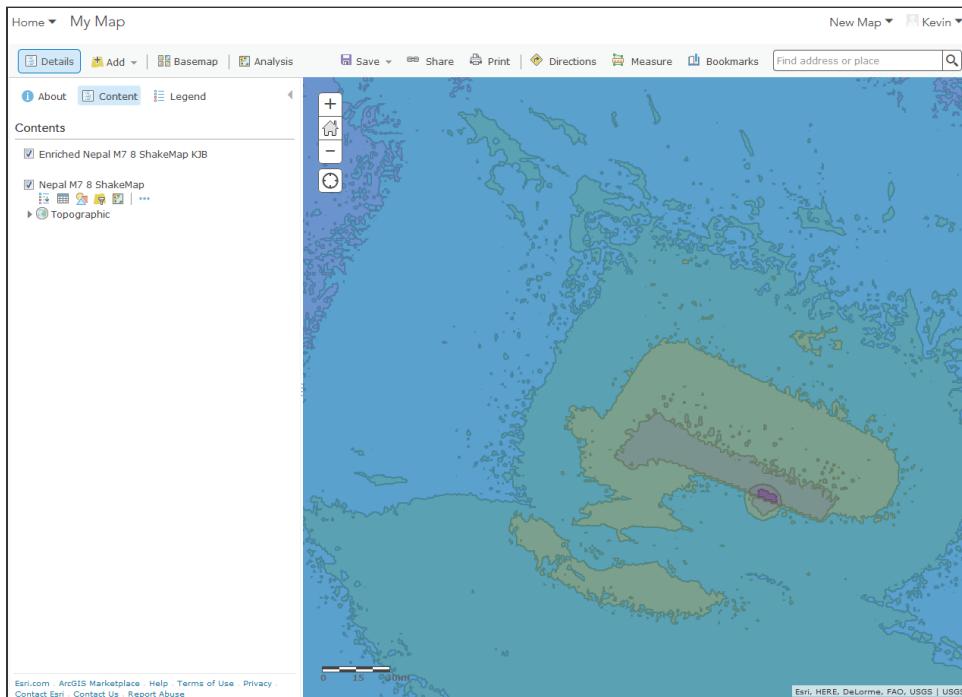
While the data is being processed, you will see a spinning circle next to the layer name in the Contents pane.

Processing time for the analysis will depend on a number of factors, including the number of features in the current extent. Another factor is Internet traffic. If your analysis does not complete after three to four minutes, try saving the map and refreshing the page, or exit ArcGIS Online and try again later.

- g If you see a warning message, click OK.



The result map displays with the new Enriched Nepal M7 8 ShakeMap layer.

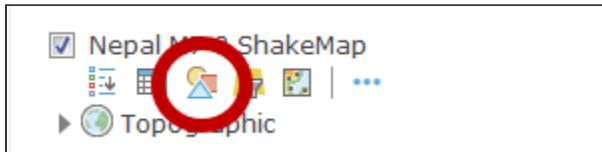


The enriched layer is symbolized as a default blue polygon, which represents the area for which population demographics exist. To better observe the impact of the shaking intensity on the population in this area, it will be helpful to change the symbology.

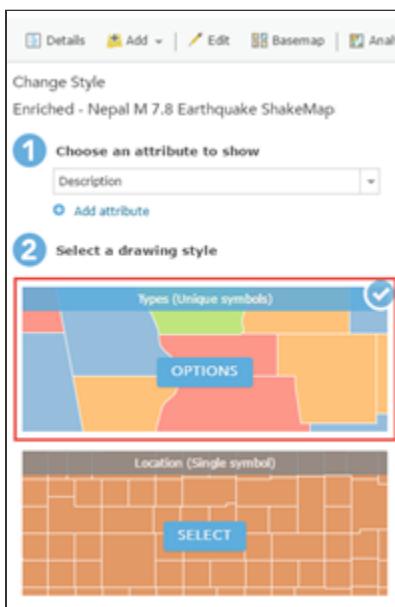
### Step 4: Change the map style

Next, you will change the way that the enriched layer is symbolized.

- a In the Contents pane, pause your pointer over the **Enriched Nepal M7.8 ShakeMap** layer, and then click the **Change Style** icon.



You will use symbols to represent the categorical data related to the description of shaking in the area where the earthquake occurred.



- b For Choose An Attribute To Show, choose **Description**.  
c In the Types (Unique Symbols) drawing style, click **Options**.

Details   Add   Edit   Basemap   Analy

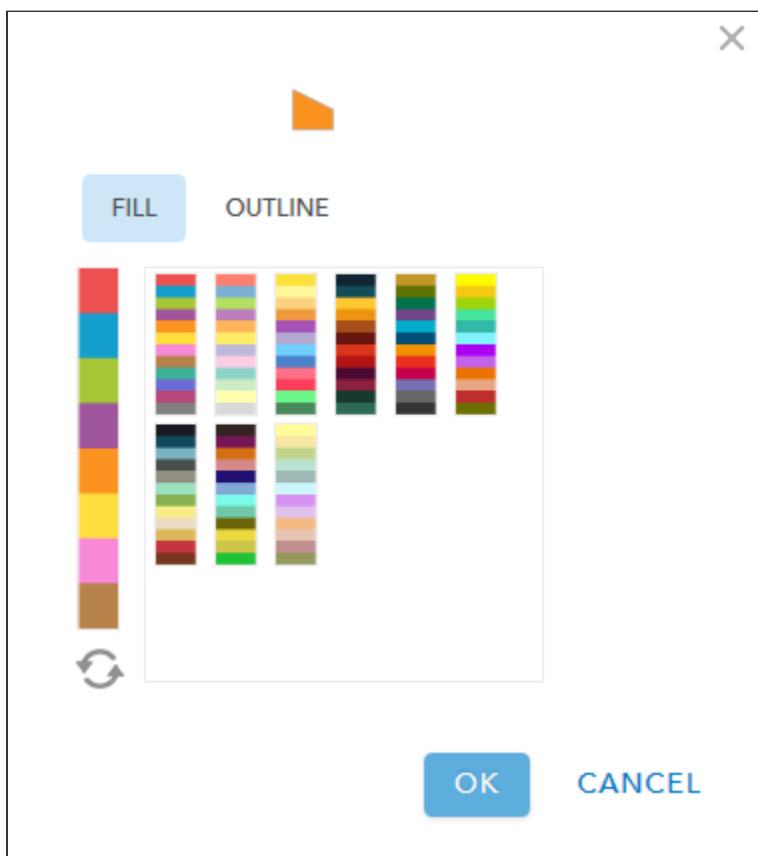
Change Style  
Enriched - Nepal M 7.8 Earthquake ShakeMap3

**Description**

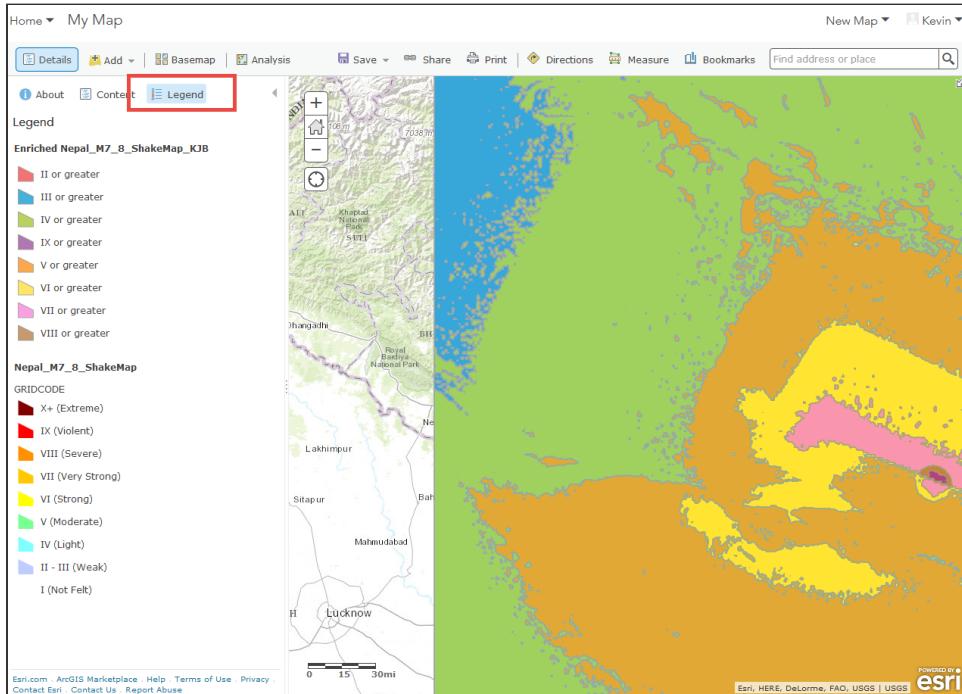
Click to edit symbol or label.

LABEL	COUNT	Symbols
II or greater	1	(Color Swatches)
III or greater	1	(Color Swatches)
IV or greater	1	(Color Swatches)
IX or greater	1	(Color Swatches)
V or greater	1	(Color Swatches)
VI or greater	1	(Color Swatches)
VII or greater	1	(Color Swatches)
VIII or greater	1	(Color Swatches)
Other	0	Ungroup

- d Open up the symbols to see the different color ramps that you can choose to display this information with. There is no correct color ramp for this type of map, so use whichever one you like best.



- e Click OK to close the Symbols pop-up and then click Done to close the Change Style pane.

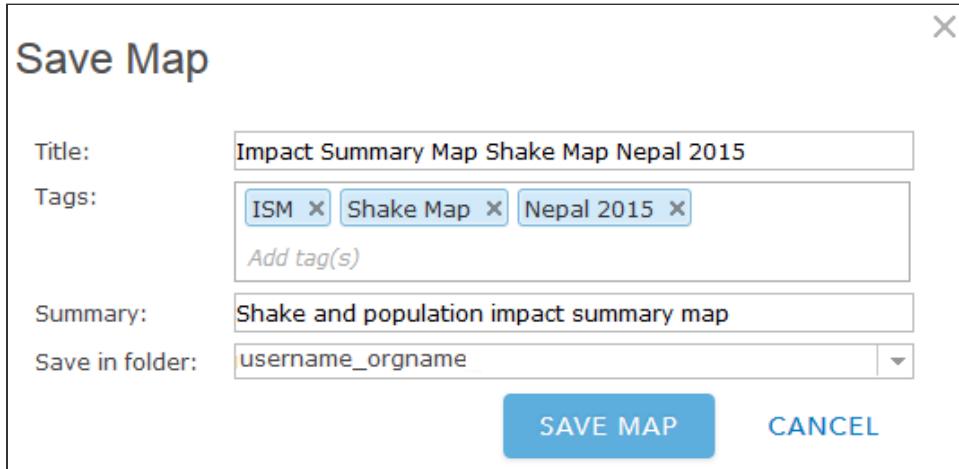


- f Click the Legend button to view the legend for the two layers in your map.
- g From the ribbon at the top of the ArcGIS Online window, click Save, and then choose Save As.
- h In the Save Map dialog box, in the Title field, type **Impact Summary Map Shake Map Nepal 2015**. Add an underscore and your first and last names so the map has a unique name.

*Note: Because many other students are creating a similar map, adding your first and last name will ensure that you can later find your map.*

It is also a good idea to add tags and other identifying information about the data, or metadata, to your items. This information will help you and others (either in your organization or the general public) find your map depending on how you want it shared.

- i In the Tags field, type **ISM, Shake Map, Nepal 2015**, and any additional tags you would like.
- Note: Press Enter after each tag to save it in the Tags field.*
- j If you want, you can add a summary description of your map in the next field. For example, you could type **Shake and population impact summary map** in the Summary field.



- k Click **Save Map**.

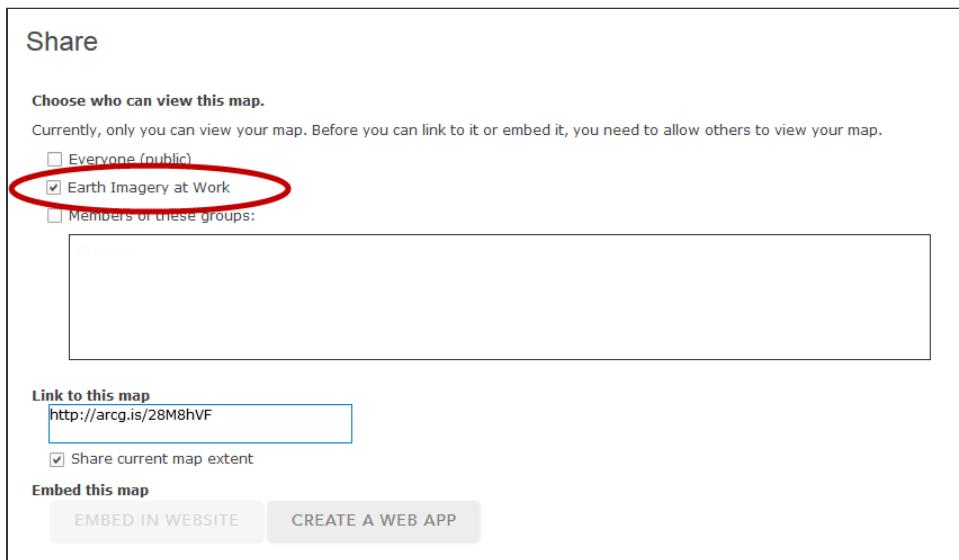
The map will be saved to your My Content collection in ArcGIS Online.

### Step 5: Create a web app

Using ArcGIS Online, you can **create a web app by putting a shared map into a template and configuring it to create a customized look and feel. You can then publish your app to ArcGIS Online or deploy it to your organization's web server.**

You will use the Impact Summary Map that you just created as the map for your web app. First, you need to share the map so you can create the application and have others view it.

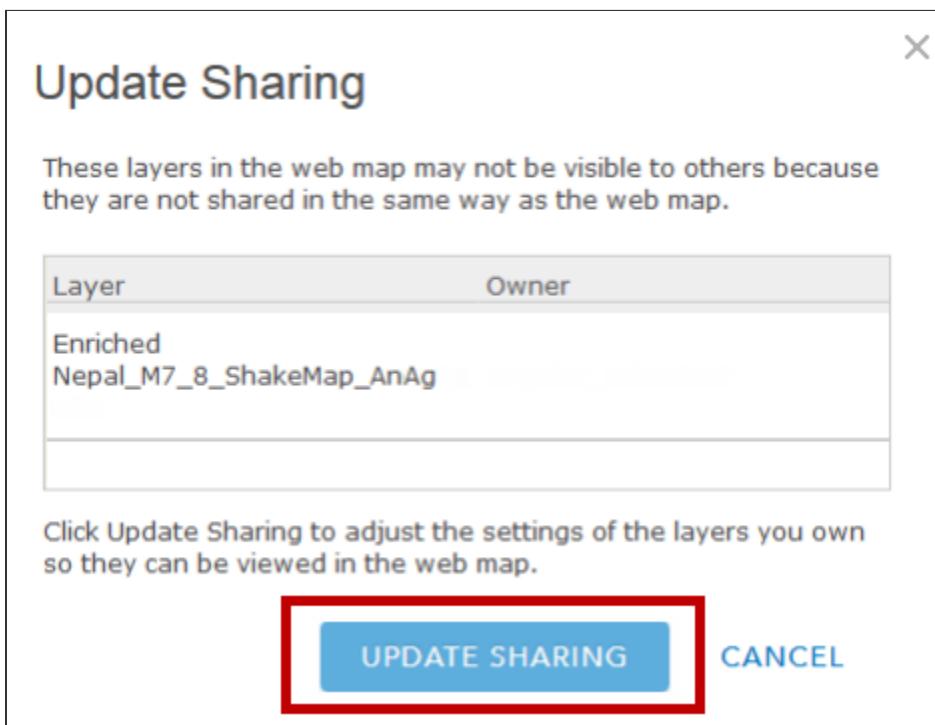
- a At the top of the window, click Share.



- b In the Share dialog box, check the box next to the organization name.

Note: The organization name for this course is Earth Imagery at Work.

Anyone who is a member of this organization will now be able to see your map. Members of your organization can find your map, either by its title or by searching for the tags that you added.



- c You might receive a message prompting you to update sharing; if you do, click **Update Sharing**, and then click Done.
- d In the Share window, click **Create A Web App**.

Share

Choose who can view this map.

Currently, only you can view your map. Before you can link to it or embed it, you need to allow others to view your map.

Everyone (public)  
 Earth Imagery at Work  
 Members of these groups:

Link to this map  
http://arcg.is/28M8hVF

Share current map extent

Embed this map

Note: To embed your map, you must share it with Everyone.

- e In the Create A New Web App dialog box, click **Explore/Summarize Data**.

Create a New Web App

Configurable Apps    Web AppBuilder

What do you want to do? Select a configurable app. [?](#)

Show All

Build a Story Map

Collect/Edit Data

Compare Maps/Layers

**Explore/Summarize Data**

Map Social Media

Provide Local Information

Route/Get Directions

Showcase a Map

Elevation Profile

Filter

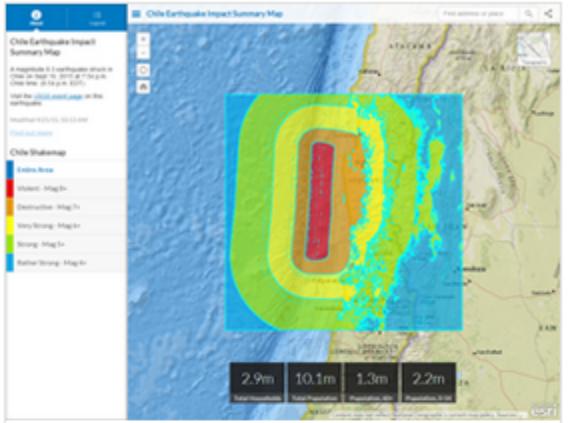
Finder

**Impact Summary**

Summary Viewer

Time Aware

- f Select the **Impact Summary** template, and then click Create Web App.



**Impact Summary**

Highlights an area and shows a summary of quantitative data related to its location.

**CREATE WEB APP**

**PREVIEW**    **DOWNLOAD**

**CLOSE**

- g In the Create A New Web App dialog box, accept the default title or type a new title for the app in the Title field. Add an underscore and your first and last names so the web app has a unique name.  
*Note: Because many other students are creating a similar web app, adding your first and last name will ensure that you can later find your web app.*
- h In the Tags field, accept the default tags and add any additional tags you would like.

Note: Press Enter after each tag to save it in the Tags field.

- i If you like, you can add a summary description of your web app in the next field. For example, you could type **Shake and population impact summary web app** in the Summary field.
- j When you are finished, click Done.

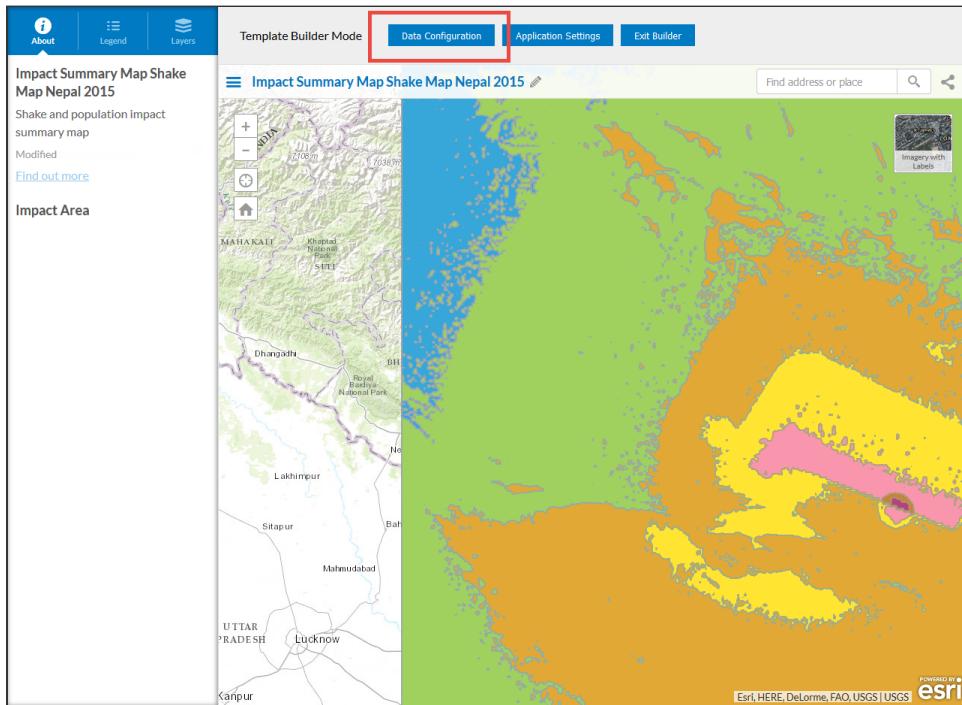
The screenshot shows the 'Create a New Web App' dialog box. It has fields for Title, Tags, Summary, and Save in folder. The Title field contains 'Web App - Impact Summary Map Shake Map Nepal 2015\_KevinButler'. The Tags field contains 'ISM X', 'Shake Map X', and 'Nepal 2015 X'. The Summary field contains 'Shake and population impact summary web app'. The Save in folder field contains 'username\_orgname' with a dropdown arrow. Below the Save in folder field is a checked checkbox for 'Share this app in the same way as the map (Earth Imagery at Work)'.

The application configuration page launches with the specified web map in Template Builder Mode.

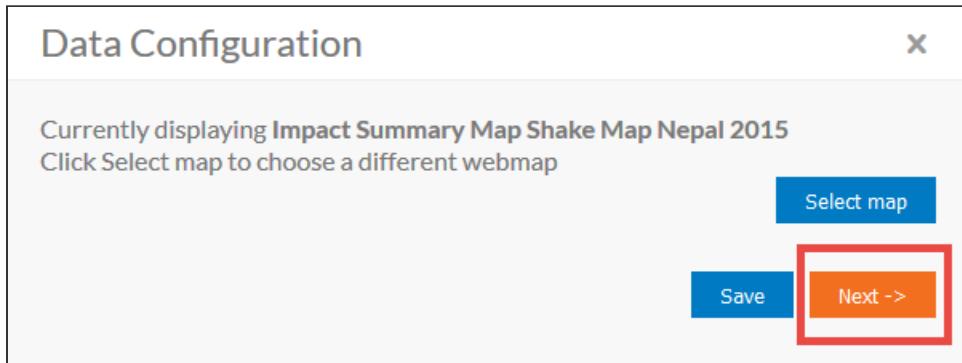
Next, you will configure the web app.

### Step 6: Configure the web app

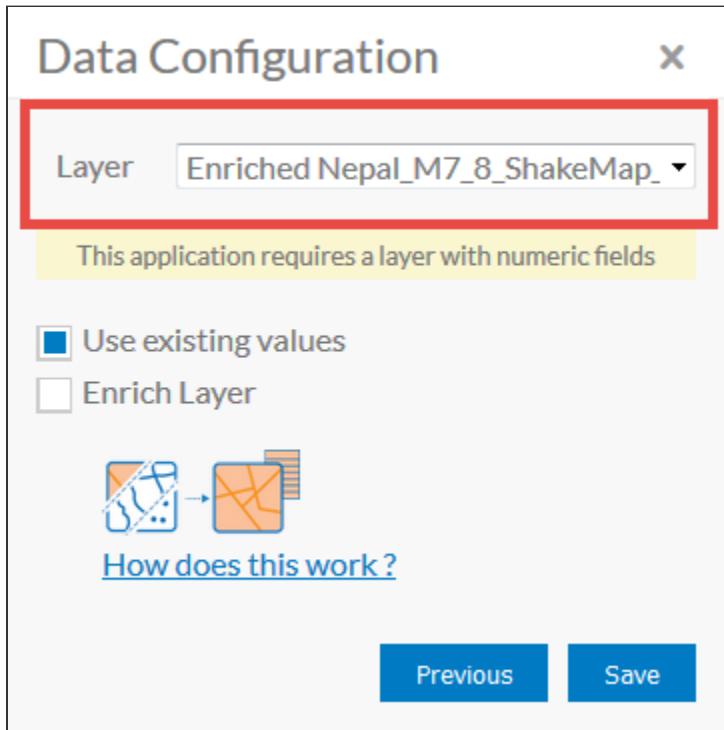
- a At the top of the page, select Data Configuration.



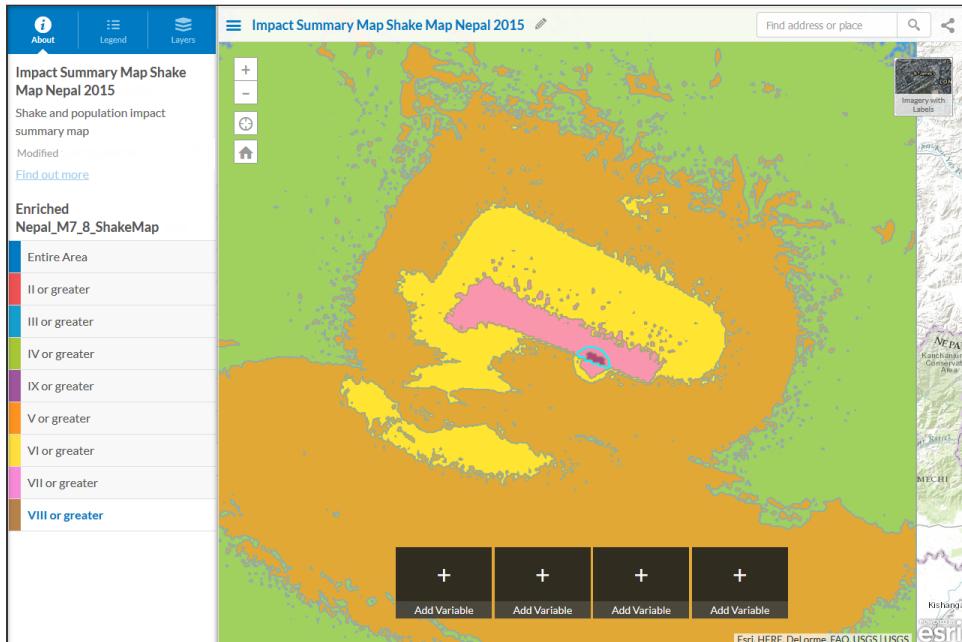
- b In the Data Configuration pop-up, click Next.



- c For Layer, select the **Enriched Nepal\_M7\_8\_ShakeMap** layer from the drop-down list.

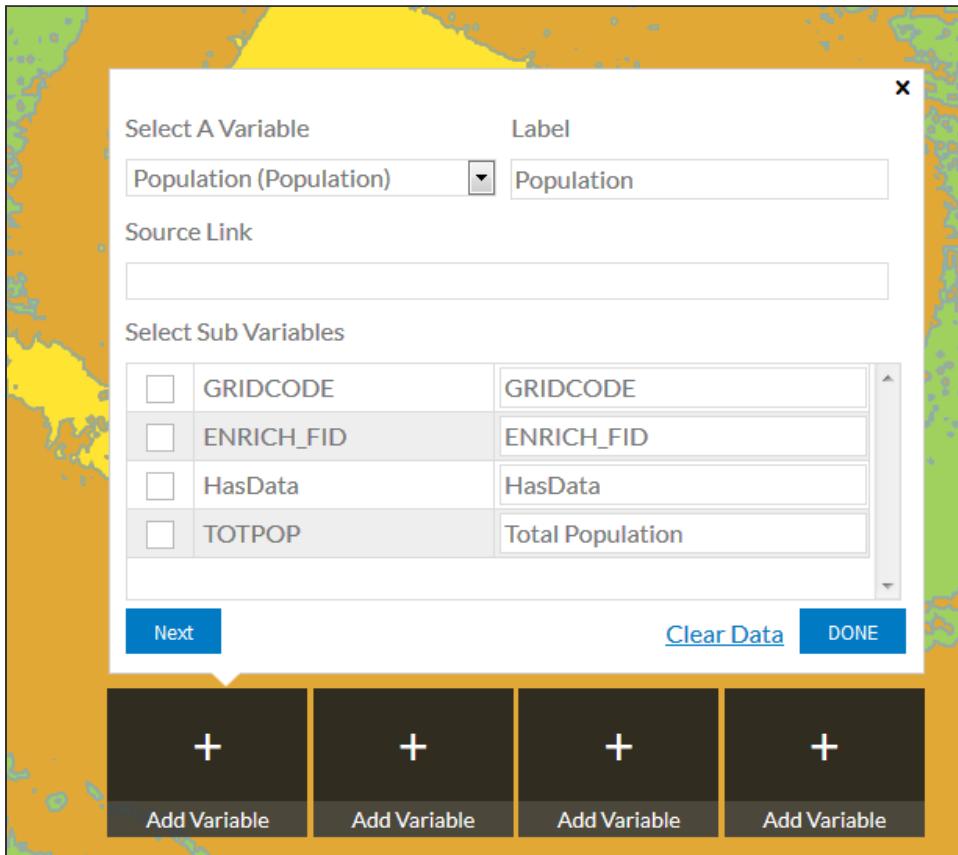


- d Check the box for **Use Existing Values**, and then click Save.



Next, you will add a variable.

- e At the bottom of the map, click the first **Add Variable** button.
- f For Select A Variable, choose **Population** from the drop-down list, and then click Done.



- g At the top of the template builder, click **Save to save your changes**, and then click **Exit Builder**.

## Earth Imagery at Work MOOC

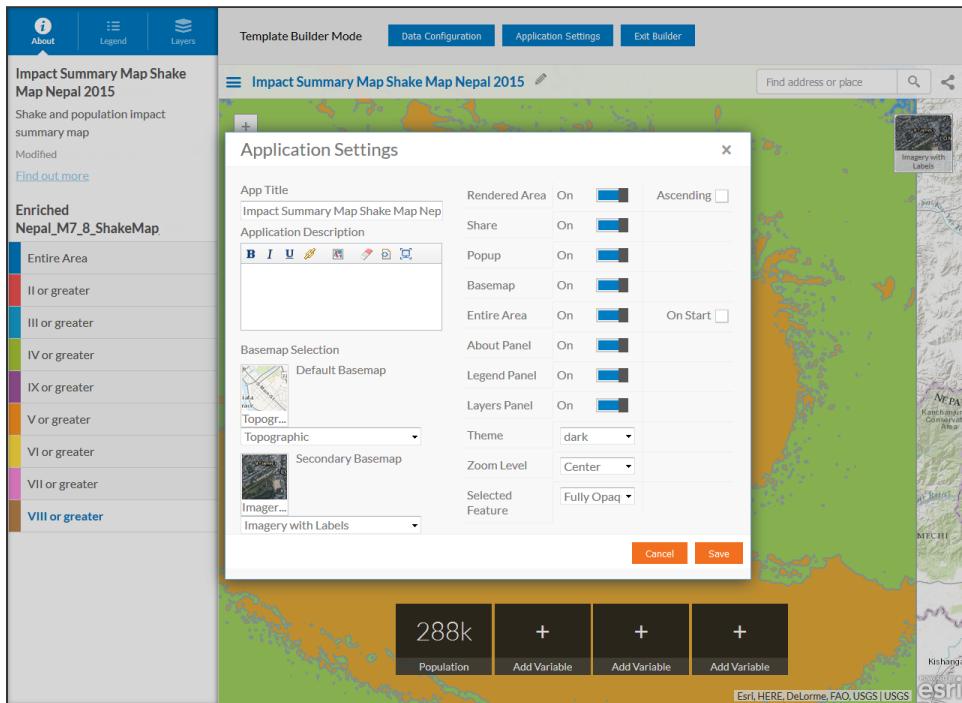


Your impact summary map is now public.



If you want, you can go back and add more information under the About section by entering Template Builder Mode and updating the Application Settings options. You can explain what the information on the map is trying to convey, or you can use sources such as [Esri's Disaster](#)

[Response Program](#) or Wikipedia to add more context to the web map in the Application Description field.



Another important aspect associated with a disaster is **assessing damage**. In the next part of this exercise, you will create a web app to show **what the area looked like before the earthquake in comparison with how it looks after the earthquake**.

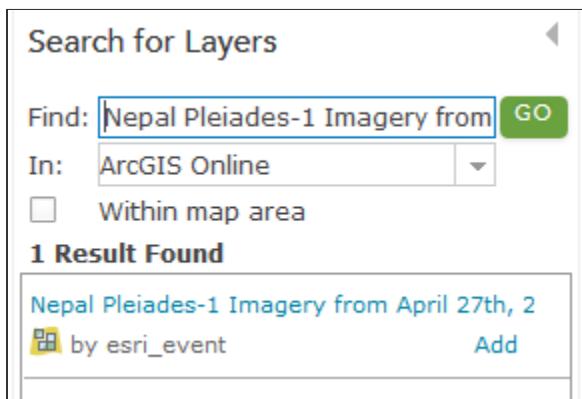
### *Surveying the damage with high-resolution imagery*

Current high-resolution imagery is of vital importance when you are responding to collapsed buildings, destroyed roads, and large-scale damage. To make a comparison, you need imagery from before and after the event. **Ideally, you would want imagery from immediately before and immediately after, but this is not always possible.** Nepal is a country that does not get imaged very frequently. Because of the **mountainous terrain**, it's actually very hard to get the imagery to line up. You'll see some of the errors in this exercise where, because of the urgency of the situation, it was more important to get the imagery published than it was to ensure positional accuracy. The other reason that Nepal isn't imaged frequently is because of **clouds**; cloudy images aren't worth much. Finally, as you will see in the last exercise, imagery tends to follow the **money**. Major urban centers have incredibly high-resolution imagery because the information you can take from that imagery is inherently more valuable. Countries like Nepal tend to have less frequently captured imagery that is at a lower resolution.

In this part of the exercise, you will create a swipe map that allows you to compare the imagery using Esri's Imagery basemap from before the earthquake to high-resolution imagery that was captured immediately after the earthquake.

### Step 7: Create a new map

- a Create a new map in ArcGIS Online. If you are starting from the previous steps, you will need to open a new browser tab.
- b Click Add, and then click Search For Layers.
- c In the Find field, type **Nepal Pleiades-1 Imagery from April 27th, 2015**.
- d For In, select ArcGIS Online, and ensure that the check box next to Within Map Area is not checked.

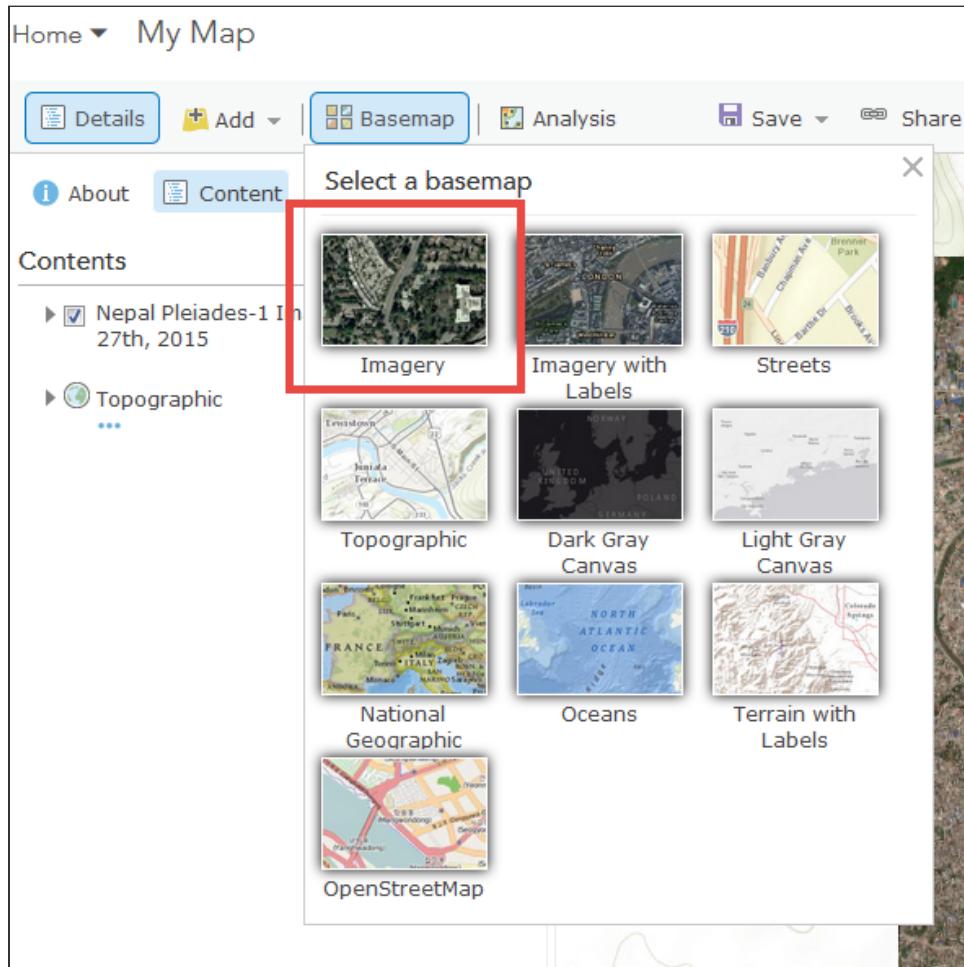


- e Click Add to add the layer to the map, and then click Done Adding Layers.
- f In the Contents pane, pause your pointer over the Nepal Pleiades-1 Imagery from April 27th, 2015 layer and click the **More Options** button .
- g Choose **Zoom To** from the drop-down list to zoom to the layer.

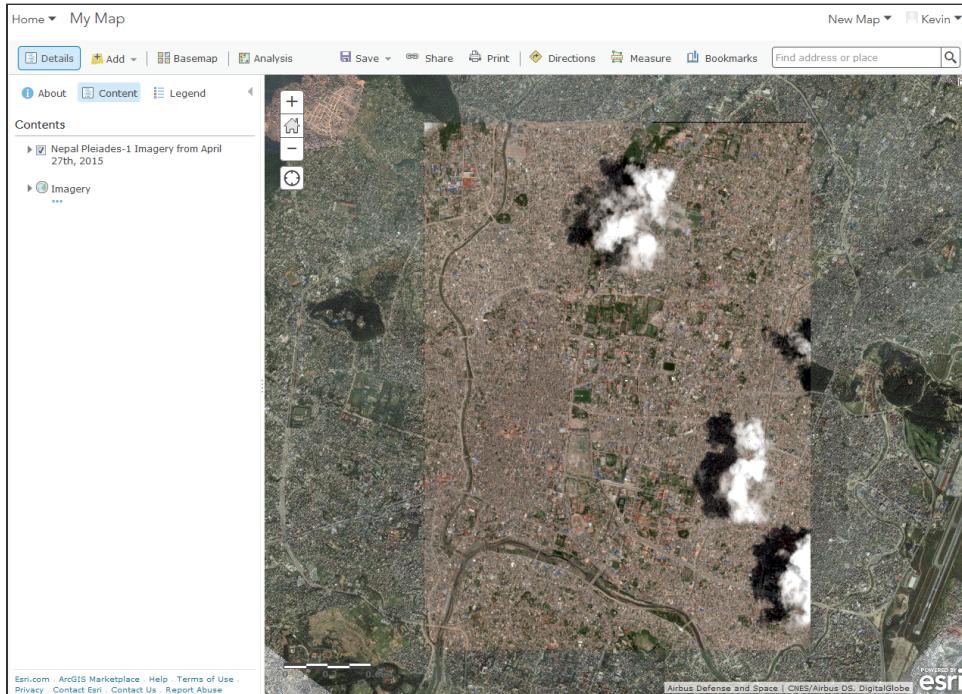
The layer contains imagery from two days after the April 25, 2015, earthquake. **Next, you will change the basemap.** The basemap is a geographic background that typically shows basic features of the landscape and place names to help orient the map's users.

In this exercise, the Imagery basemap from ArcGIS Online will serve as the imagery from before the earthquake.

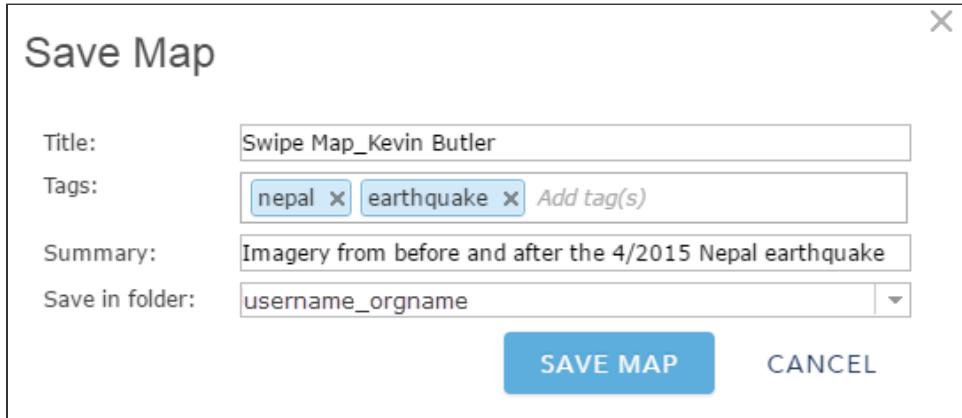
- h From the ribbon at the top of the ArcGIS Online window, click **Basemap**.
- i From the drop-down list, choose the **Imagery** basemap.



- j In the Contents pane, make sure that the Pleiades imagery layer is checked on so that it will appear in the swipe map.



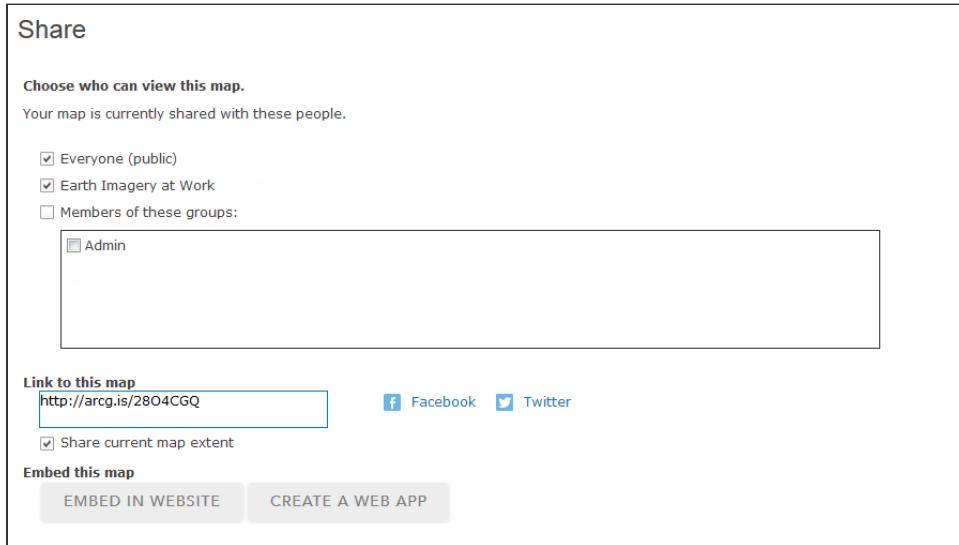
- k Click Save, then click **Save As**.
- l Give your map a title, tags, and a summary, and then click Save Map. Use the same naming convention as before, appending your full name to the end of the title.



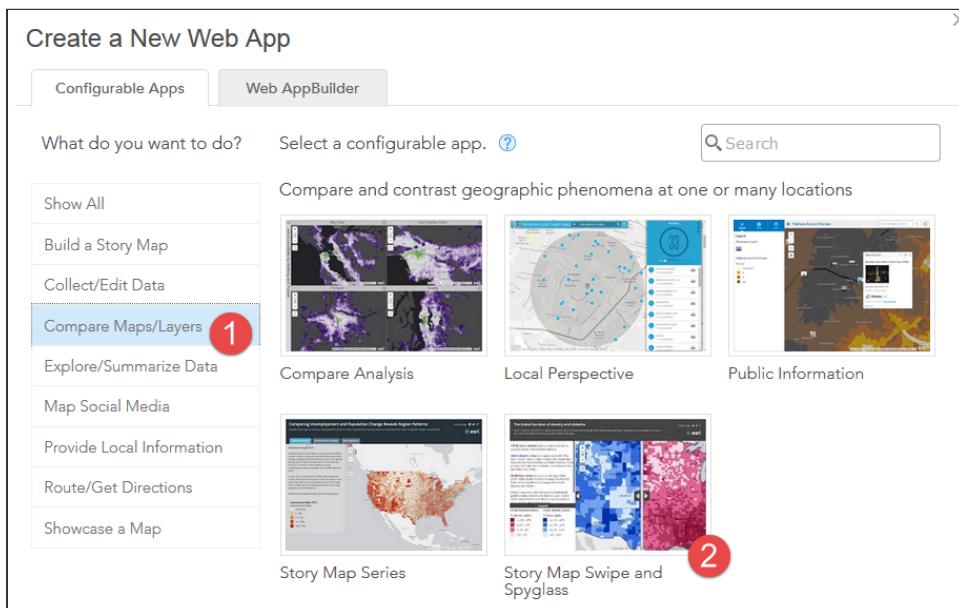
As before, you will need to share the map publicly before creating the web app.

## Step 8: Create a swipe story map

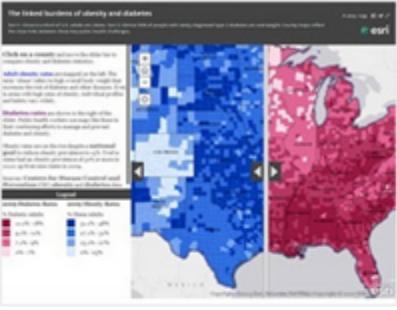
- a At the top of the window, click **Share**.



- b Check the box to share the map with **Everyone (Public)**, and then click **Create A Web App**.
- c In the Create A New Web App dialog box, click the **Compare Maps/Layers** tab, and then select **Story Map Swipe And Spyglass**.



- d Click **Create Web App**.



**Story Map Swipe and Spyglass**

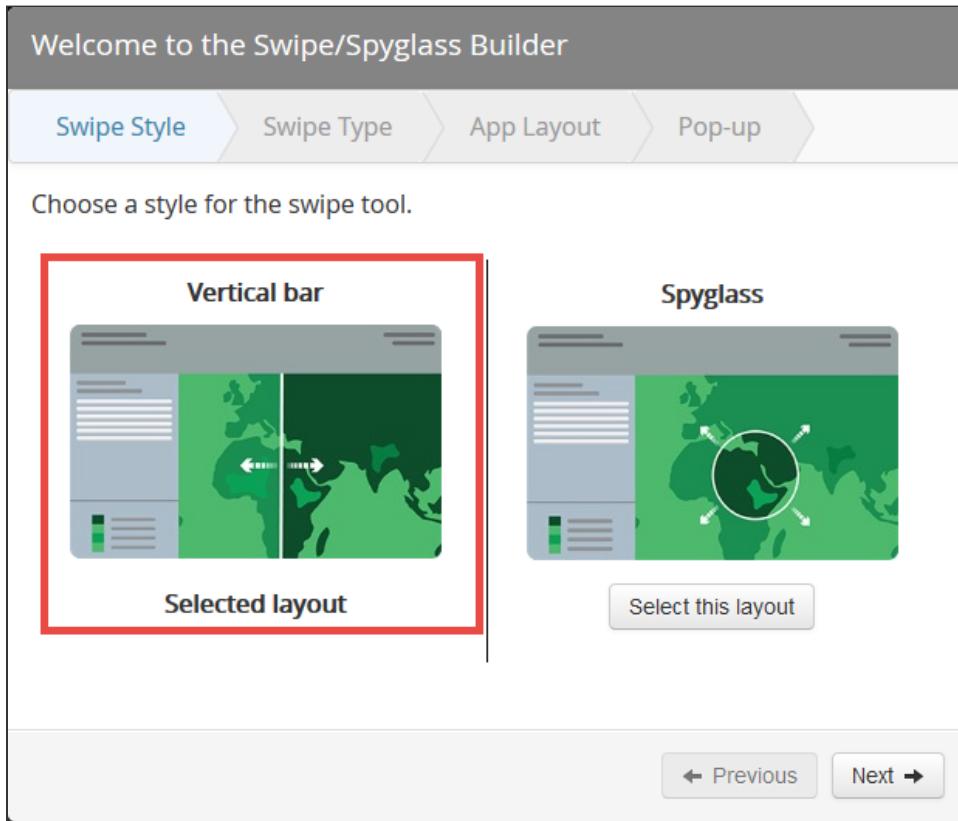
Compares layers in one web map, or compare two different web maps, using a vertical swipe bar or spyglass.

**CREATE WEB APP**

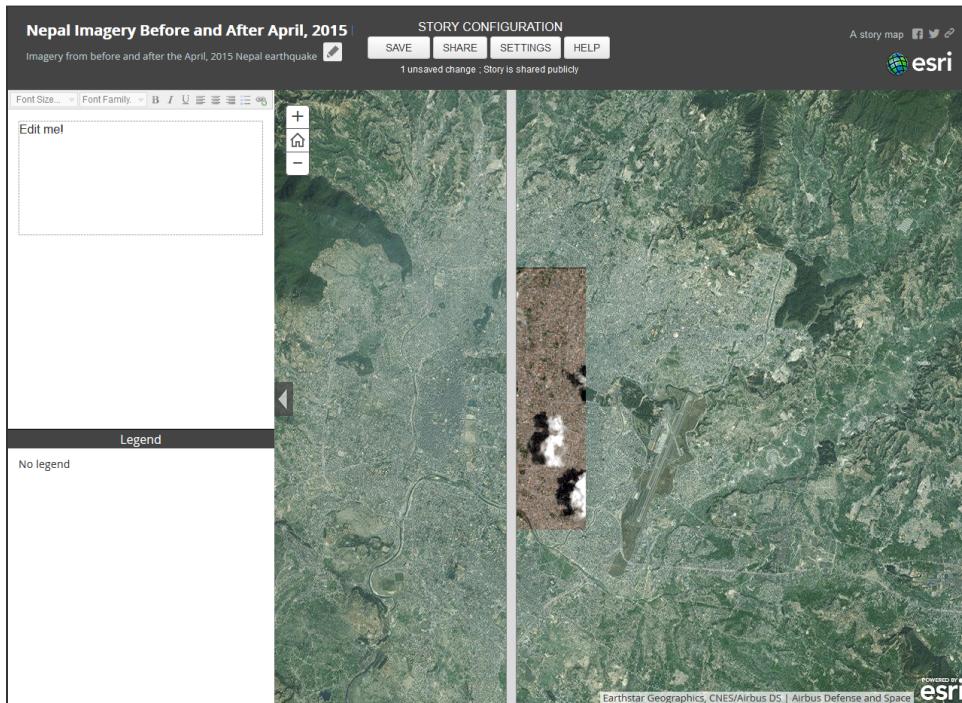
**PREVIEW**    **DOWNLOAD**

**CLOSE**

- e For the title, use your first and last name. Keep the default tags and summary for the web app and then click Done.
- f In the Swipe/Spyglass Builder, for Swipe Style, select the **Vertical Bar layout**.



- g Click Next.
- h For Swipe Type, accept the default, and then click Next.
- i For App Layout, accept the defaults, and then click Next.
- j For Pop-up, type **Before Earthquake** for the Left Map Header Title and type **After Earthquake** for the Right Map Header Title.
- k If desired, adjust the header color, and then click Open The App.
- l Click and drag the gray swipe bar to the left and right to see the imagery.



What kinds of damage do you see? What do you see besides damage that would be of interest to first responders? How can you use this type of map to inform decisions?

- m Use this information to add text to the box where it says, "Edit me!"

This summary information will help users of your story map interpret its contents.

- n When you are finished, click **Save** to save the story map.

## Part 2: Taking a closer look

At this point, **you have a sense of the number of people** who were potentially affected, and **you have developed a tool to get a bird's eye view** of the damage. You can take this a step further by incorporating photos of the damage. **Photos are important for two reasons**. First, **they give you a sense of how the damage varies** throughout the region. Even though the shaking may have been the same for a given area, building practices or terrain may affect the extent of the damage. **Photos are also important for telling the story**. They're very personal and elicit strong emotional responses to mobilize international donors, foreign governments, corporations, and nongovernmental organizations.

In this part of the exercise, you have a collection of photos from after the earthquake, which **you'll use to create a story map**. A story map allows people to view the photos and see where they are on a map.

### Step 9: Create a Map Tour story map

You will download a ZIP file containing a CSV file with the links to the collection of photos.

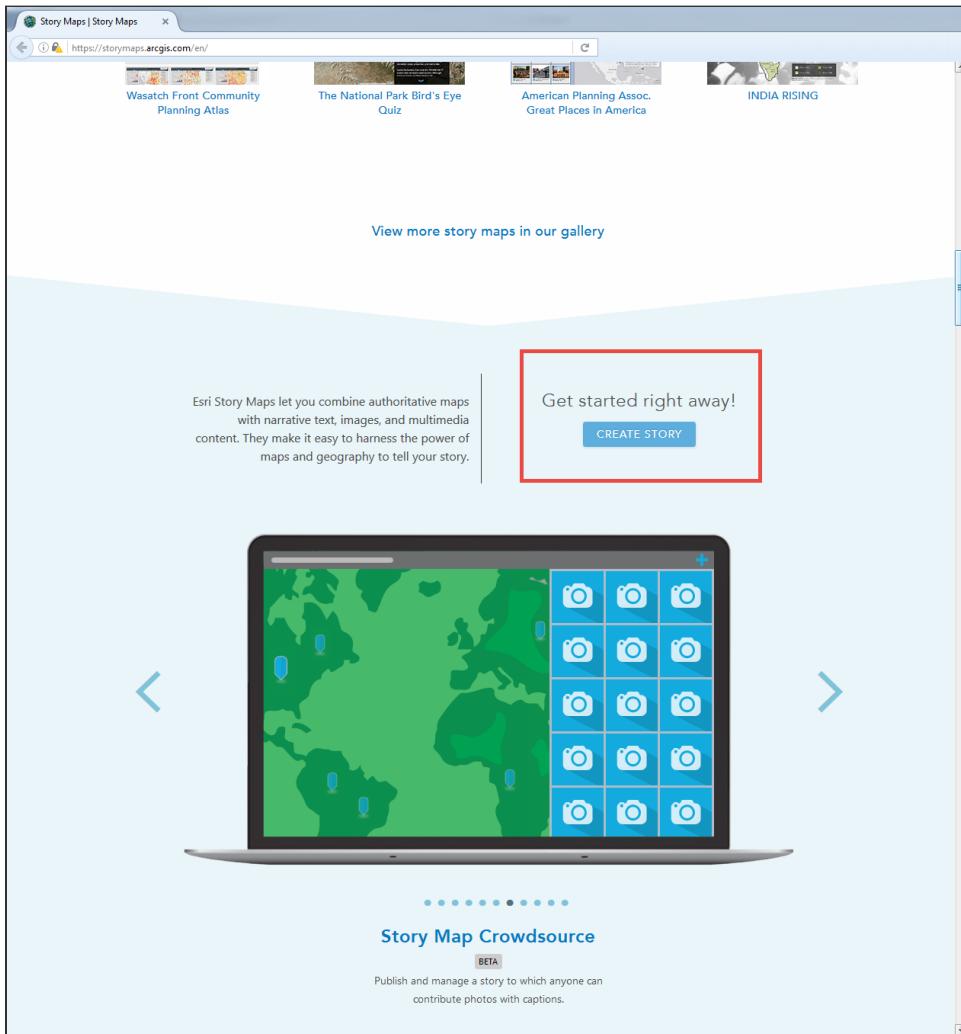
- a Download the [Section 4 Disaster Management ZIP file](#) to your computer and unpack it in a convenient location.

The screenshot shows a web browser window displaying an ArcGIS item page. The title is "Section 4 Disaster Management". Below the title, there's a thumbnail image of a world map. A text box states: "This CSV file has links to a collection of photos that are used as part of the Disaster Management exercises." Below this, it says "by kevin.eiaw" and "Last Modified: August 24, 2016". There's also a link to "CSV Collection". On the right side, there's a "Download" button which is circled in red. Below the download button, there's a "Details" section with a star rating of 0, 0 ratings, 0 downloads, and the creation date as August 22, 2016. It also shows the file size as 4 KB and provides social sharing links for Facebook and Twitter. Further down, there are sections for "Owner" (kevin.eiaw), "Tags" (UNOSAT Map Tour, Section 4, Disaster Management), and "Credits (Attribution)" (No acknowledgements).

You will use the contents of this file to create your story map.

- b Open a new Internet browser tab or window.
- c Go to <https://storymaps.arcgis.com/en/> and scroll down to the Get Started Right Away section.

## Earth Imagery at Work MOOC

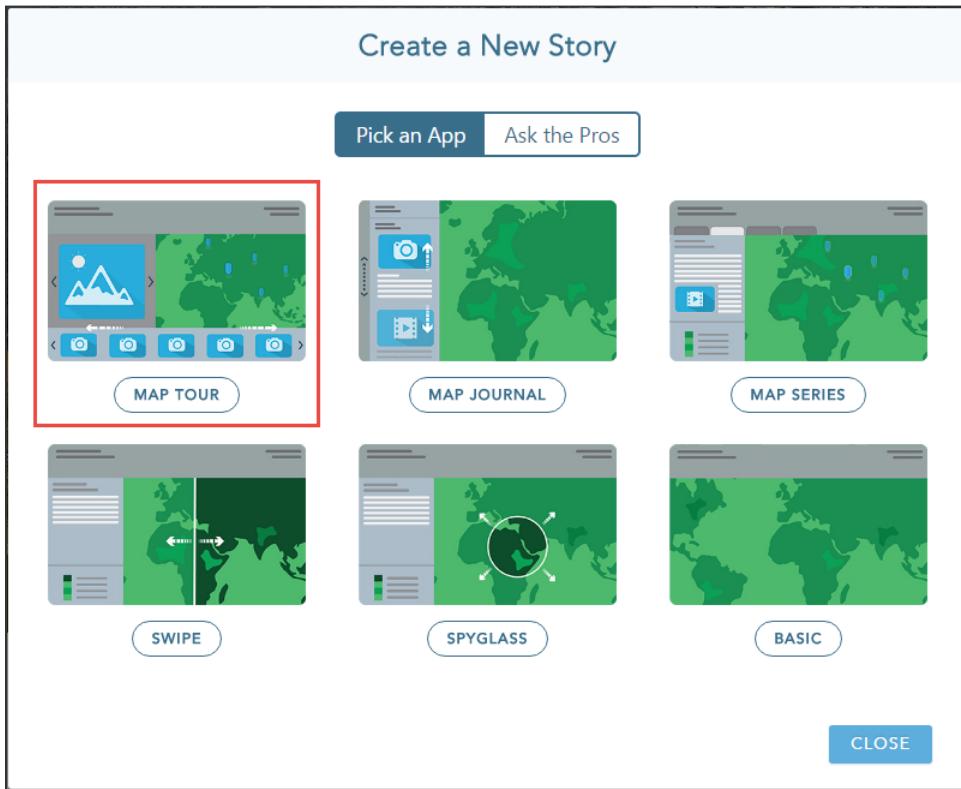


- d Click **Create Story**.

There are several different templates for story maps that are optimized for different ways of displaying your maps.

- e Choose **Map Tour**; this template allows for a gallery of photos at the bottom of the map you're about to create.

*Note: If you pause your pointer over the different app templates, you will see a brief description. You can use the **Map Tour template** to guide people through a sequence of places.*



The Map Tour Builder opens in a new browser tab. You are now in **Map Tour Builder mode**, where you are prompted to identify the location of your images.

The ZIP file that you downloaded earlier contains a CSV (comma separated values) file with location information for each of the images you will use in the tour.

- f Click the icon of the two gears, which **will allow you to import a CSV file**.

Welcome to the Map Tour Builder [?](#)

### Where are your images or videos?

They are already online      I need to upload my images

[Learn more](#)

[Make a selection](#)

- g Click Import Tour Data From A CSV File.

Advanced options

[Start a new Tour](#)

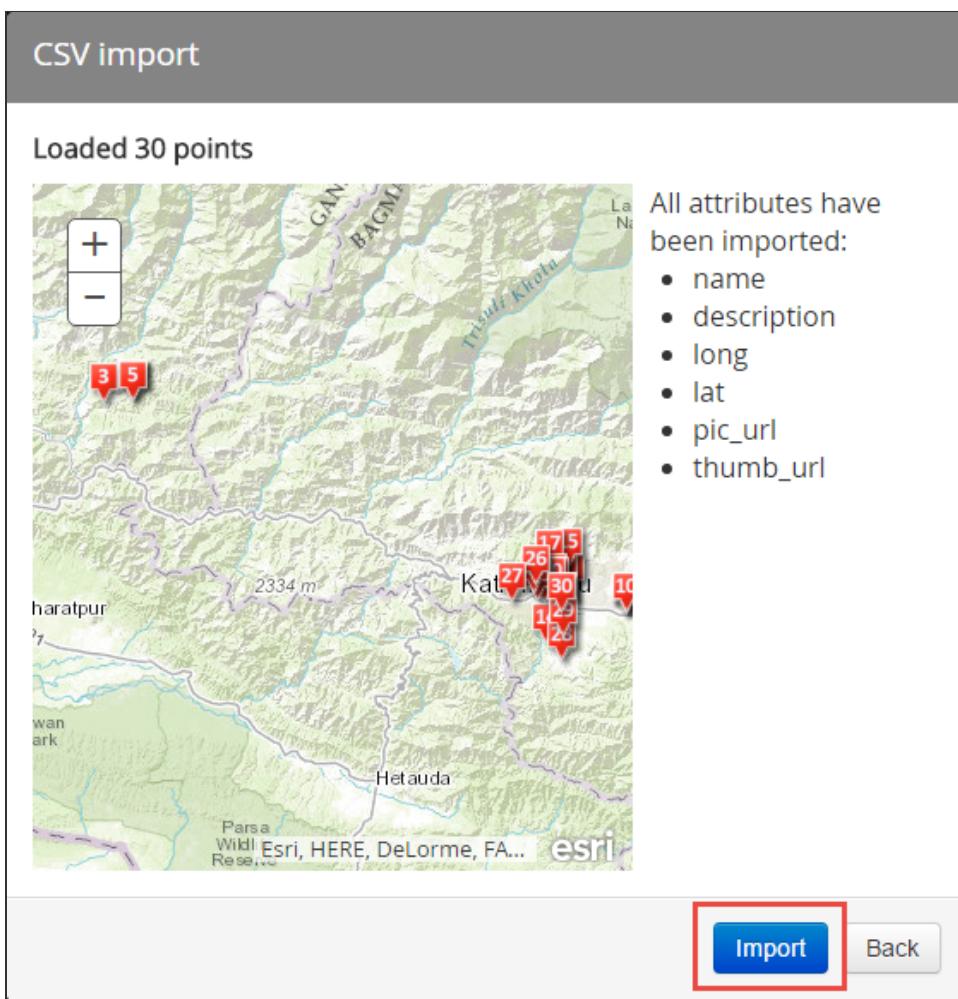
[Import Tour data from a CSV file](#)

[Download the CSV template](#)  
(Use right click and "Save as" if download doesn't start)

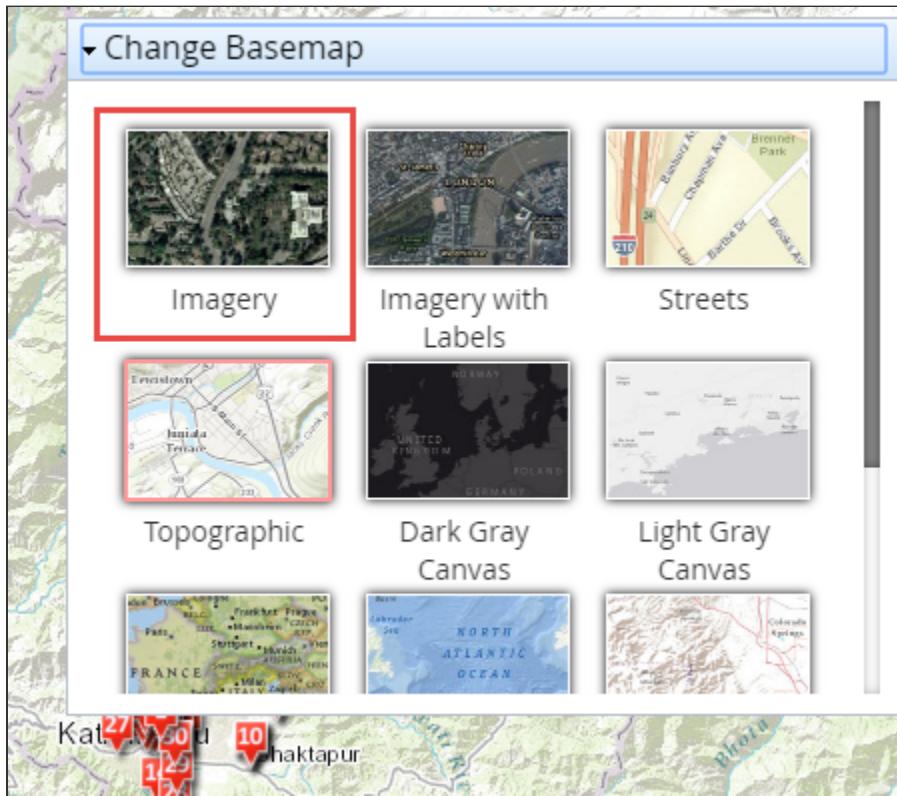
[Make a selection](#) [Back](#)

Note: You'll notice that there's an option to download the CSV template. If you want to create your own story map after this exercise, you'll need to use this template. The template comes with sample data that shows how you can import photos or videos into a story map.

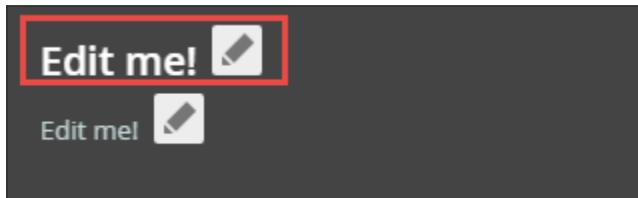
- h Select or drag the UNOSAT Map Tour Final file to import the CSV. You'll see the locations associated with each photo added to the map.
- i Click Import.



- j In the upper-right area of the map, there is an option to change the basemap. Click Change Basemap, and from the drop-down list, select Imagery.

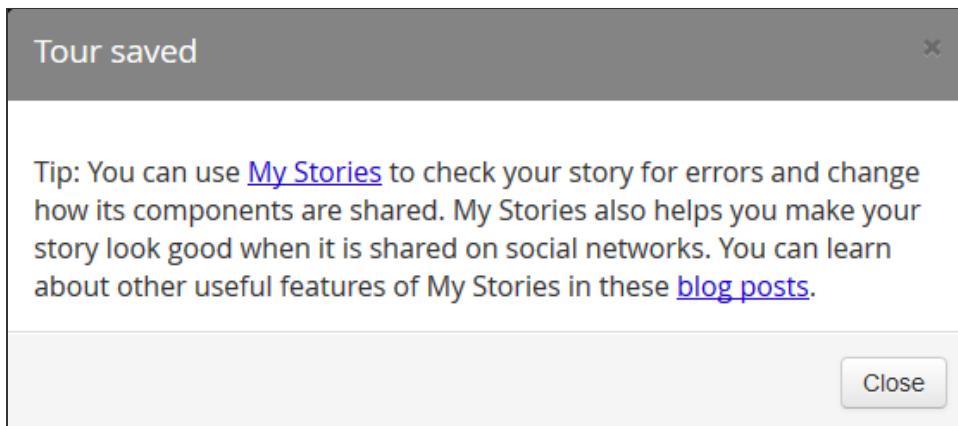


- k At the top of the story map, there are two sections that say Edit Me! Click the edit icon next to the larger of these two to add a title to the story map.

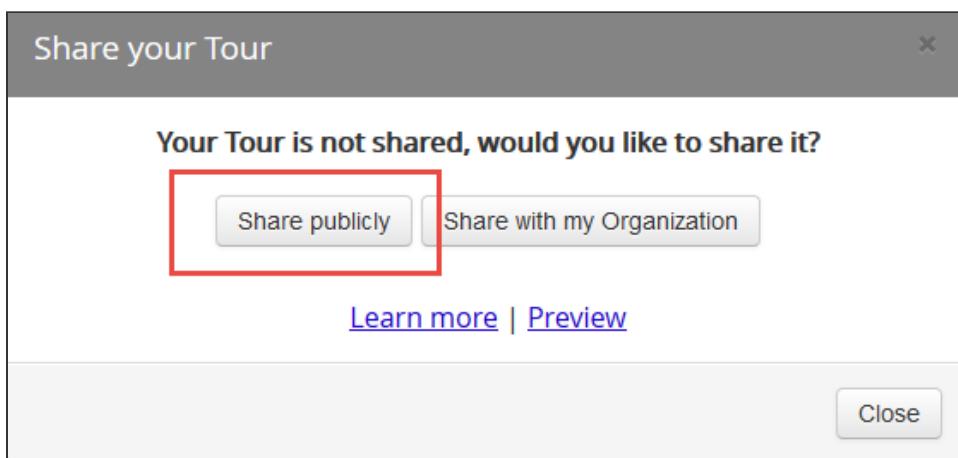


- l In the text box that appears, type **2015 Nepal Earthquake through the Eyes of UNITAR Operational Satellite Applications Programme (UNOSAT)**.
- m Click the icon next to the other Edit Me! section. In the text box that appears, type the following text to edit the story map summary: **Volunteers and residents in Nepal share photos with the UNITAR Operational Satellite Applications Programme's crowd-sourcing app called UN-ASIGN. The app is designed to take and share geo-tagged photos over low bandwidth. Tour areas affected by the earthquake by clicking points on the map or the thumbnails below.**

- n Using the Settings button, modify the configuration settings of the story, such as the layout, colors, header, data, extent, and zoom level.
- o Save the story map. A dialog box appears and provides links to helpful information about editing your story map and sharing it on social networks.



- p Click **Share Publicly** to share the story map tour publicly.



## Conclusion

In this exercise, **you used ArcGIS Online to create a story map that shows images** of the destruction in the aftermath of an earthquake as a way to share imagery and information.