Story Mapping Disaster

Introduction: All maps tell stories; this is one of the fundamental takeaways from this course. Story maps make those stories more explicit (and interactive) than had been possible prior to the development of web-based GIS platforms. Today you will use ArcGIS Online to produce a story map.

GOALS

Today's exercise will focus on the mapping of the 2005 Hurricane Katrina disaster. Katrina was the costliest natural disaster in US history (over $125 billion in damages) and also one of the deadliest with over 1,200 victims. The Katrina "natural" disaster can only partly be ascribed to natural causes. Extreme rainfall, storm surges and other natural hazards placed a population already vulnerable due to socio-economic conditions in harms way. How can maps illuminate this story? How can we visualize the intersection of social and natural vulnerabilities leading to disaster?

In this exercise, you will use QGIS and ArcGIS online to manage geospatial data and create a story map of the Katrina disaster. This assignment is largely open-ended. The instructions on this worksheet will orient you to the ArcGIS online storymapping platform and help you navigate the transfer of data from one system (QGIS) to the other (the web), **but the story you tell will be your own**.

What are storymaps?

https://storymaps.arcgis.com/collections/d34681ac0d1a417894a3a3d955c6913f
"ArcGIS StoryMaps is a story authoring web-based application that allows you to share your maps in the context of narrative text and other multimedia content. There are many different types of story mapping engines, but ESRI's storymaps are the most robust. Its built to be intuitive for both mapmakers and viewers. Its also built to be responsive on multiple platforms, including mobile devices. It does not offer the same level on interactivity and analysis as a full webmap, but much of its performance remains.

# INSTRUCTIONS

Sign into your ArcOnline Account

To complete this exercise, you will need to sign in to the course ArcGIS Online account.
Go to:https://www.arcgis.com/index.html and "sign in".

You should already have a username and password, If you don't check your email and follow the instructions to create your profile.

QGIS

1. Make a new directory for this week.

2. Open the shared google drive, download and save all folders from Week 10 to your hard drive. https://drive.google.com/drive/folders/1LhS1YgCRvPAnvxNB7GPxNdGdYhV14WUU?usp=sharing

3. Open QGIS. Before we work on our story maps, let's explore what these datasets look like using a desktop program.

4. Add a basemap of your choosing. Under the "Political data" folder, add "Gulf_Coast.shp" This is a simple political boundary shapefile for the Gulf coast states affected by Hurricane Katrina. Change the symbology to "classified" to give each state its own color.
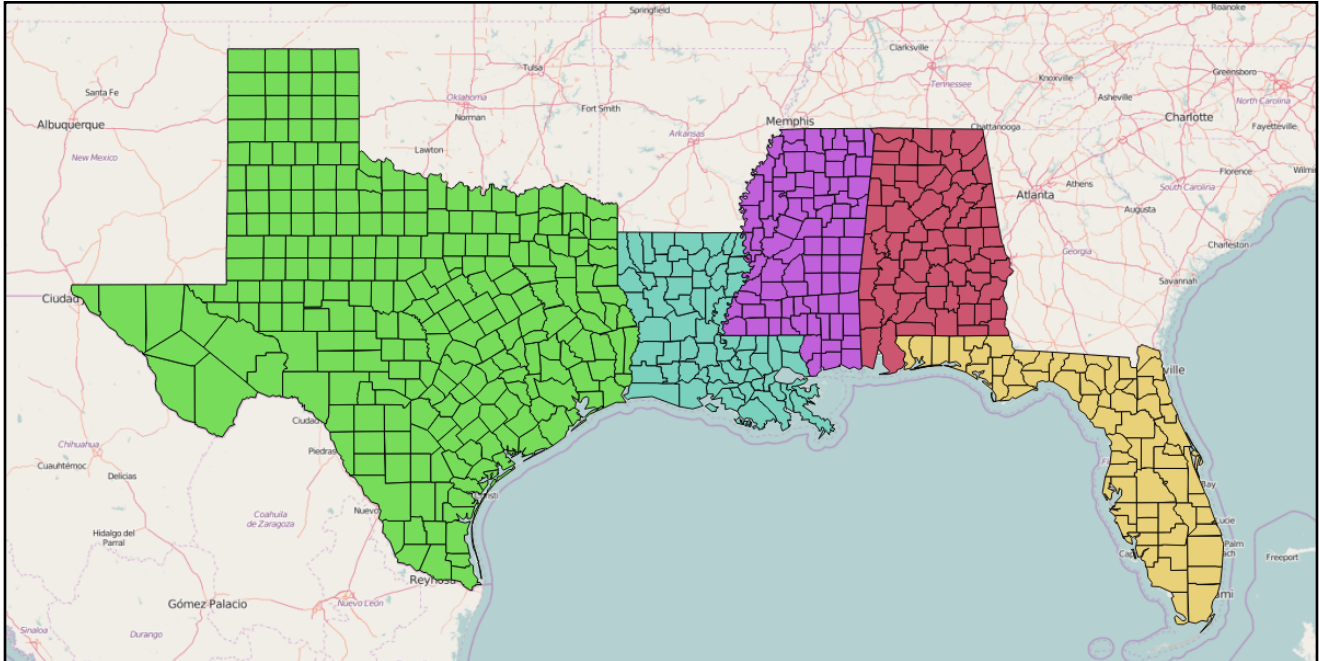
5. Go to your "physical data" folder and add hurricanes. Zoom out to furthest extent. What is this file? Open your attribute table. This data set lists every hurricane based on year, month, and data and keeps track of wind speed (in knots), the name of the storm, air pressure, and hurricane intensity according to the Saffir-Simpson scale (H1-H5) also tropical storms (TS), tropical depressions (TD) etc. What is the earliest data of this series? What is the latest date?
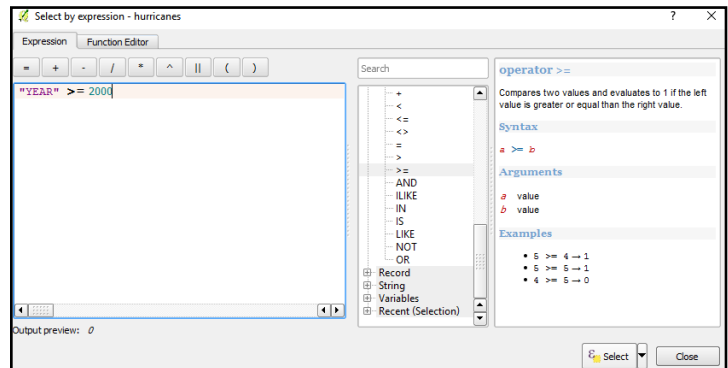
6. This data set is unruly, and since we're really only interested in Hurricanes around the time of Katrina, use "select expression" to single out all of the hurricanes in the Atlantic since 2000 and save this as a layer called "Hurricane_Paths_since_2000." This highlights all of those rows in the attribute table AND all the paths on your map. To save ONLY these selected features as a new shapefile, right click your "hurricanes" layer, click "export", and click the "Save selected features as" button. Call your file "hurricanes2000." Make sure the CRS is the same as your basemap. This should automatically appear
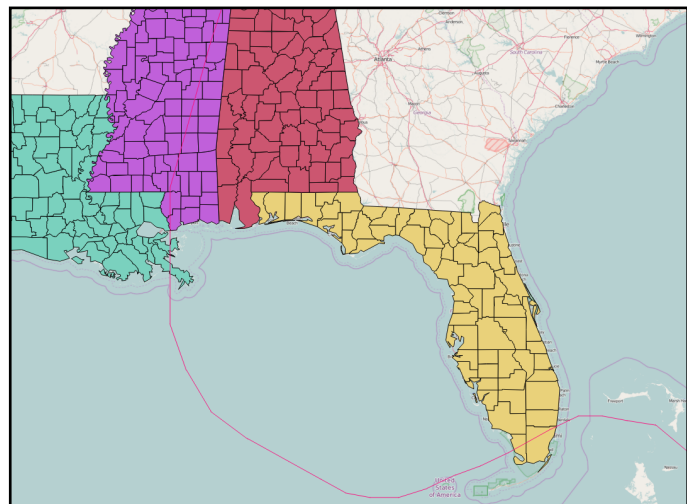
on your basemap. Now remove the "hurricanes" layer. This new layer cuts down on the confusion a lot, but there are still over 4,000 entries! We could do the same process (select by an expression) to remove all storms that were not actual hurricanes (anything that isn't H1,H2, etc), but let's go ahead and focus on Katrina.

7. Use the same "select by expression" tool in the attribute table to single out Hurricane Katrina. You'll notice that there are actually three hurricanes named Katrina, but only one in 2005. What expression should you use to select just the 2005 Katrina? Save the hurricane Katrina selection as a new Hurricane_Katrina.shp.

8. It isn't an exciting file, just a single line. Let's make it a little more useful. Open the attribute table and explore what information it contains. Hurricane Katrina, like all hurricanes, changed in intensity over the several days of its existence. Lets change the symbology to highlight that.

9. Open the properties panel of "Hurricane_Katrina.shp." Change the style to "categorized" according to the CAT (category) column. Remember to click "classify." Click apply. Before exiting the properties box, let's label Katrina. Click "labels" on the left hand panel, select "show labels
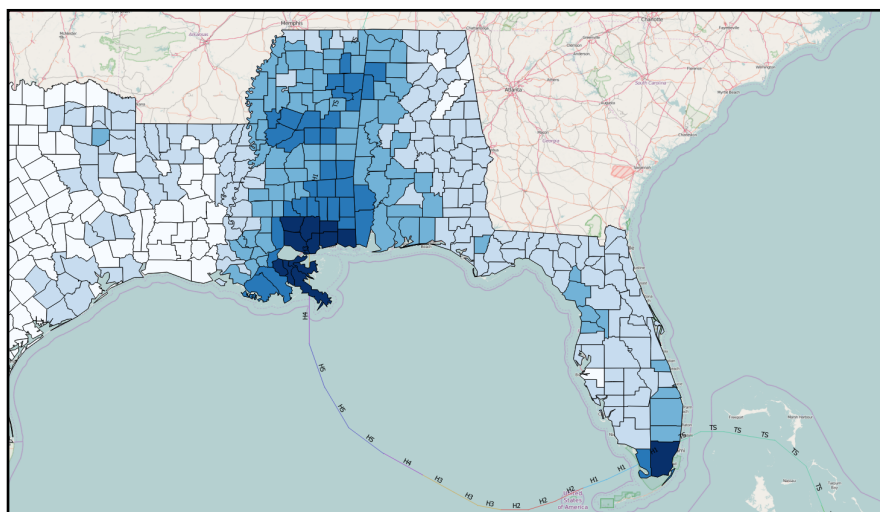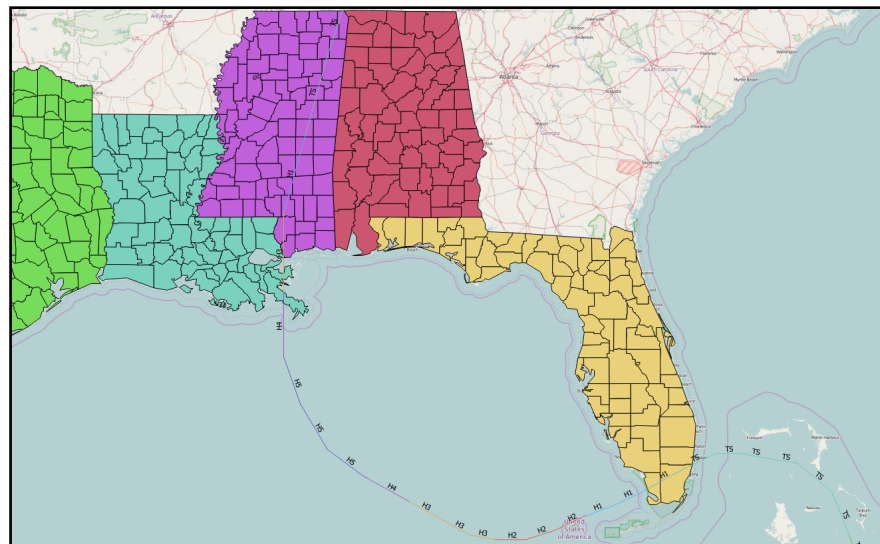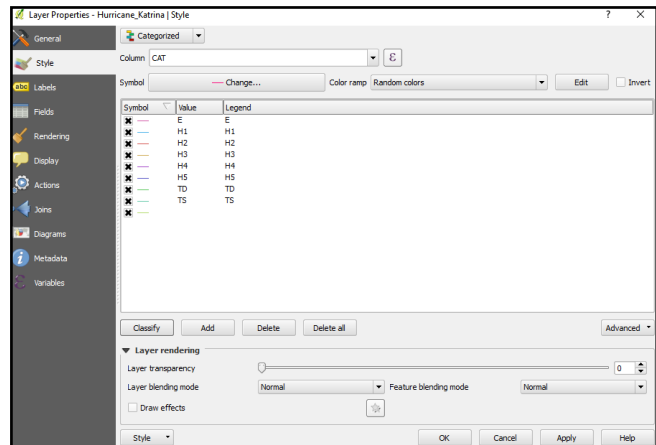
for this layer" in the dropdown menu in the upper left, "label with" CAT, and click ok. If you haven't already, save your project.

10. Now add "Rainfall_082305to083105.shp" Open the attribute table. What information is available? This file shows precipitation information between Aug 23 and Aug 31st of 2005. Let's see how much Hurricane Katrina affected rainfall patterns across the Gulf.
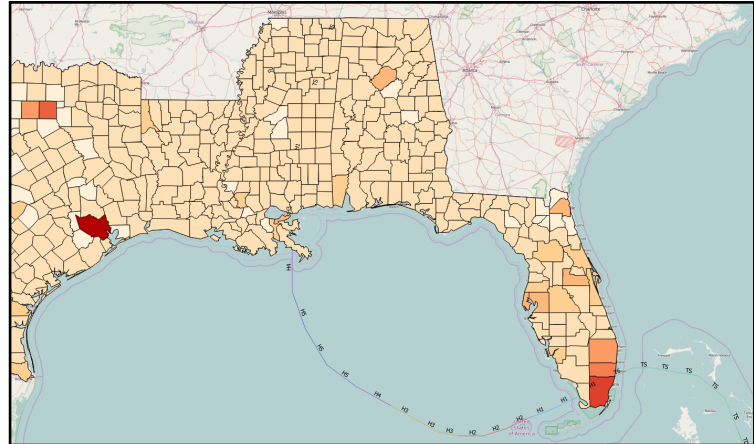
11. Reclassify your Rainfall layers to show those areas that received more precipitation as a result of the Hurricane.
CAUTION - What is cartographically problematic about showing precipitation as choropleths? What might be a better way to visualize rainfall?

12. Hurricane Katrina was not simply an environmental event (if that were the case, we probably wouldn't be mapping it right now). It was significant because it became a disaster and it was a disaster because of the confluence of natural hazards (storm surges and extreme precipitation) and social vulnerability. Let's add some social data.

13. Go to your "social vulnerability" folder and add "Gulf_Coast_Socioeconomic.shp." Open your attribute table. Inside you'll see a variety of attributes. You'll see the population (as of the 2000 census), the number of people in poverty, single parents households, median income, etc. I've already normalized this data so that it can be mapped as choropleths (prefaced with IDX). Feel free to explore this picture of the the South. Social vulnerability can be described as the combination of each of these factors. In this table, IDX_VUL_CT is our "vulnerabilty index."

14. Close the attribute table and reclassify the data along a "graduated" scale to show the most "vulnerable counties in the south. Where are they? Use your "identify features" tool to identify three of the most vulnerable counties. What are they?

15. Last but not least, let's add a New Orleans-specific vulnerability dataset. Go to your Social Vulnerability folder and add "Jeff_Orleans_vuln" (which show most of Jefferson and Orleans Parishes). Uncheck all other layers. If you haven't already, save your project.

16. Open your attribute table. This dataset is far more complex and is organized around census tracts rather than parishes. If you look at the categories, some of them will be obvious ("TOTPOP"), but most will not. I added a pdf that lists what each of these categories refers to called SVI2010Documentation. This is a CDC dataset that you can access here. http://svi.cdc.gov/SVIDataToolsDownload.html Take a moment to explore this pdf. Which of these attributes can be depicted as **choropleths**? Which might correlate to hurricane vulnerability?
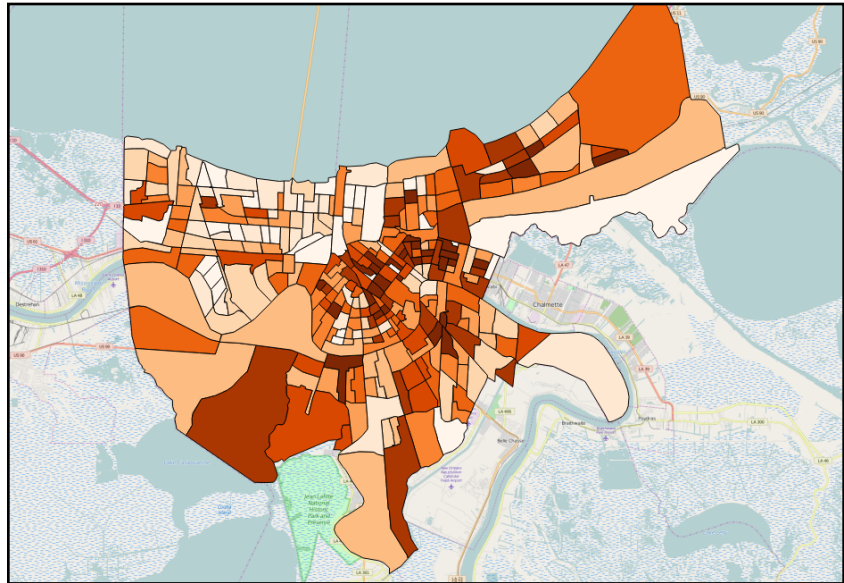
16. Choose one variable and change the graduated symbology to highlight the spatial distribution of that condition across the city. Save your project.

17. We could continue to work in QGIS and eventually build a static map (or several) to highlight how natural and social variables interact, but there are also a variety of online data sources that we can access if we map these on the web, so let's migrate our data to our ArcGIS online account.

18. Open the file folder that contains you social vulnerability data. For each shapefile, you'll see a number of different files with different extensions. To import a shapefile into ArcGIS online, you need to create **compressed .zip folders** that include the **.shp, .dbf, .shx,** and **.prj** files. If using a PC, highlight those four files, right click, "send to," "compressed zipped folder." On a mac, right click, click "compress." You've now create a folder that can be imported into ArcGIS Online. Do the same for all of the other shapefiles you have been working with in QGIS. The name of your zipped file MUST be the same as your individual file name. Create a zipped folder for the Jefferson Parish social vulnerability data. Do the same for the "Rainfall" layer and the "Katrina" layer.

Using ArcGIS online

1. Before you can build a story map, you need to build a web map. Return to the "Content" page of the ArcGIS online account.

2. Make a new folder for this week's material by clicking the create folder button on the left of the screen. Call it Week 10.

3. Click the "Map" button on the top of the screen. Immediately save your map. Name it "Katrina_yourlastname", save it to the Week 10 folder, and give it the tag "Week 10" Click Ok.

4. You should now be looking at a base map. Let's add the data we prepared as .zip files first. Click the "add" icon beside basemap, then "add layers from file."Drag your zipped folder onto the next screen. Add this shapefile layer following the prompts on the next two screens. The title for this layer should be "Jeff_Orleans_yourlastname". Save it to the Week 10 folder.Click "create and add to map."

6. You can add shapefiles, csv or txt files, or GPS files to ArcGIS online maps. Now add the "Rainfall" layer to your map using the same steps above.

7. When you add the shapefile, all of its styling will disappear. You will have to recreate this in ArcGIS online. Its fairly intuitive and we worked with this last week. Click "styles" from the tab on the left. Add the "Rain_avg" field. It should be "Counts and Amounts (Color).

8. When you click "counts and amounts (color)", i.e. a choropleth map, you'll notice it is not classified the same way it was in QGIS. To tweak your visualization and reclassify, select "style options". Toggle "Classify data" on and select "Natural Breaks."

9. Now style the other two layers as close to what you prepared in QGIS as you can. You can label your hurricane track using the "Labels" tab on the right panel. Save your map.

10. The last thing we want to add to our Katrina Base Map are hosted web layers. One of the nice things about using a corporate product like ArcGIS is that it has a giant corporate infrastructure serving it and as a result, they "host" layers that you can use on their servers. Several deal with Katrina.

13. To add them to your map, click the "add" icon, then "search for layers." You can search "Katrina" and it comes up with many more than you will be able to use. Search for, then add, the following layers: "Levee_failures_updated," "Katrina Flooding Inundation Extent, " "NOLA Population by Race," and "Imagery Post Katrina," "Imagery Pre Katrina." These last two layers are raster files, which you cannot easily import into ArcGIS
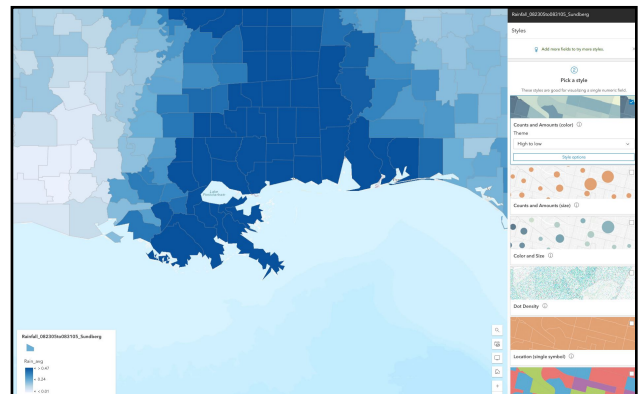
(though there are a few workarounds if you and your group are interested). Luckily, ESRI hosts these layers so we can see aerial photographs of the city before and during the flood. Make sure to save your map.

15. You now have a number of different layers to choose from and organize into maps that explain part of the Katrina story.

**What story do you want to tell?**

Using ArcGIS Story Maps

1. To make a story map, click on the "Create App" icon at the bottom of the lefthand toolbar. Select ArcGIS Storymaps.

2. You should notice that it automatically populates your storymap with your webmap. First things first, give your storymap a title. This should be eye catching - the subtitle should be more descriptive. What those titles are should relate to the story you want to tell. The storymap engine automatically saves your changes.

3. Now, your webmap includes ALL of your layers, which doesn't look great. You usually don't want to visualize more than one at a time. To turn off layer, hover over the map and click the "edit" pencil button. You can adjust the maps appearance by simply turning off all layers but one. If you don't like something about your map and want to ACTUALLY edit it, you can click the "Edit in ArcGIS" button at the bottom.

4. Before I turn you loose, one last thing. Hover your cursor beneath the webmap and a green "(+)" button appears. Click it. There are TONS of options to embed content. Its very similar to wordpress, in fact. You can add other maps, images, videos, texts, hyperlink buttons, tables etc.

Your task is to create at least **TWO** maps that help explain the Katrina disaster and integrate them into a storymap. Look at the information you have, look at the storymapping options to choose from and think about what maps might help tell the story of Katrina. The maps you create are the most important (data rich) parts of the story, but Arc's platform is most
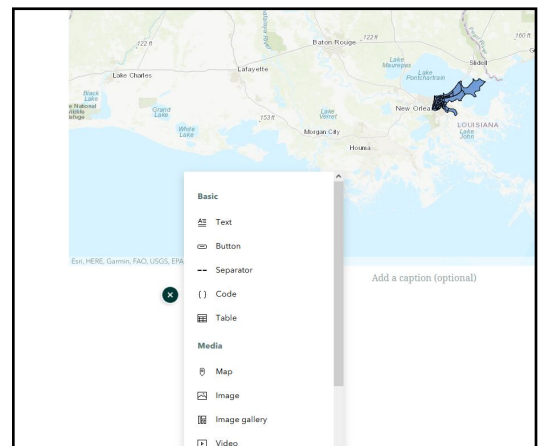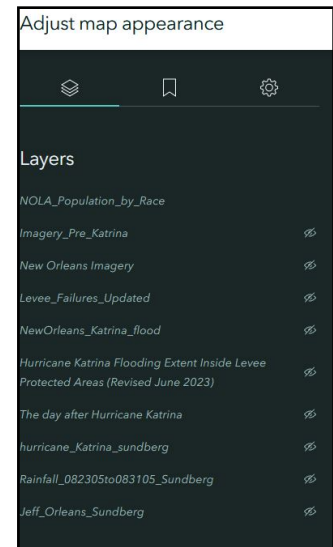
useful (and deep) when you add additional information, for instance from internet sources. Use images or videos from the web. The strength of story mapping comes partly from its multimedia capabilities. Feel free to cut and paste text to include (in don't care from where, but makes sure you cite your sources!) Maps and images should have captions.

When you're finished, click "Publish" at the top and select "Organization." You may see some warnings about permissions. We're just sharing these internally, so its not an issue to publish them. Lastly, copy and paste the URL to the blog.