

3rd Digital Mapping Course

Tutorial: Water-Environment Nexus

Environmental balances depend heavily on land use, availability and use of water resources. For this reasons, agriculture is one of the main human activities with a high environmental impact. Agricultural activities and the consequent use of soil and water redefine the relationship between man and the environment. In this tutorial, you will learn how to develop a StoryMap by using ArcGIS Online public data, improve the visualization of digital features (i.e. polygons and points), compare two maps using a Web Application, and connect the user experience through social media platforms of water in a particular location. You will display global data on average land use and water use for agricultural purposes over the period 1990-2010.

Goal #1: Visualize and compare the agriculture land use and water withdrawn worldwide

Data sources:

- FAO Stat (<http://www.fao.org/faostat/en/#home>)
- ArcGIS Hub (<http://hub.arcgis.com/pages/open-data>)

Note: All data presented comes from the above sources and has been postprocessed with the sole purpose to improve the overall quality of the data. In addition, the presented data will make it easier for the user to read the content, improve the visualization of features, and avoid inherent issues that arise when using open data.

1. First, visit the [ArcGIS website](#) and sign in using your credentials.

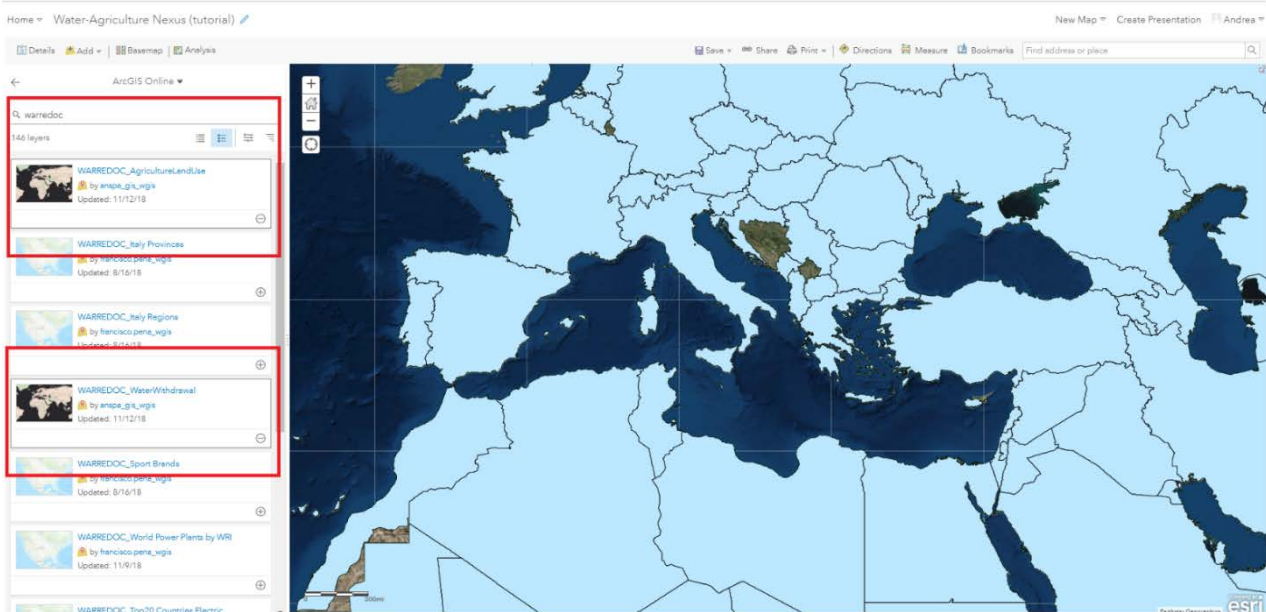
The screenshot shows the ArcGIS Sign In interface. On the left, there is a section titled 'Need an ArcGIS Public Account?' with a 'CREATE A PUBLIC ACCOUNT' button. On the right, there is a 'Sign In' form with fields for 'Username' (containing 'francisco.pena_wgis') and 'Password' (masked with dots). Below the password field is a checkbox for 'Keep me signed in'. The 'SIGN IN' button at the bottom of the form is highlighted with a red box.

2. On the upper menu:

- Click on Map

The screenshot shows the ArcGIS Online navigation menu. The 'Map' button is highlighted with a red box. The menu includes 'Home', 'Gallery', 'Map', 'Scene', 'Groups', 'Content', and 'Organization'. Below the menu is a blue header for 'Water Resources Research and Documentation Center' with an 'Edit' link. Below the header is a navigation bar with buttons for 'Overview', 'Members', 'Licenses', 'Status', and 'Settings'.

- Add > Search for Layers > ArcGIS Online > Search for the following files:
 - i. WARREDOC_AgricultureLandUse (Polygons)
 - ii. WARREDOC_WaterWithdrawal (Polygons)



3. All layers are displayed but are difficult to understand. Before you start developing your map:

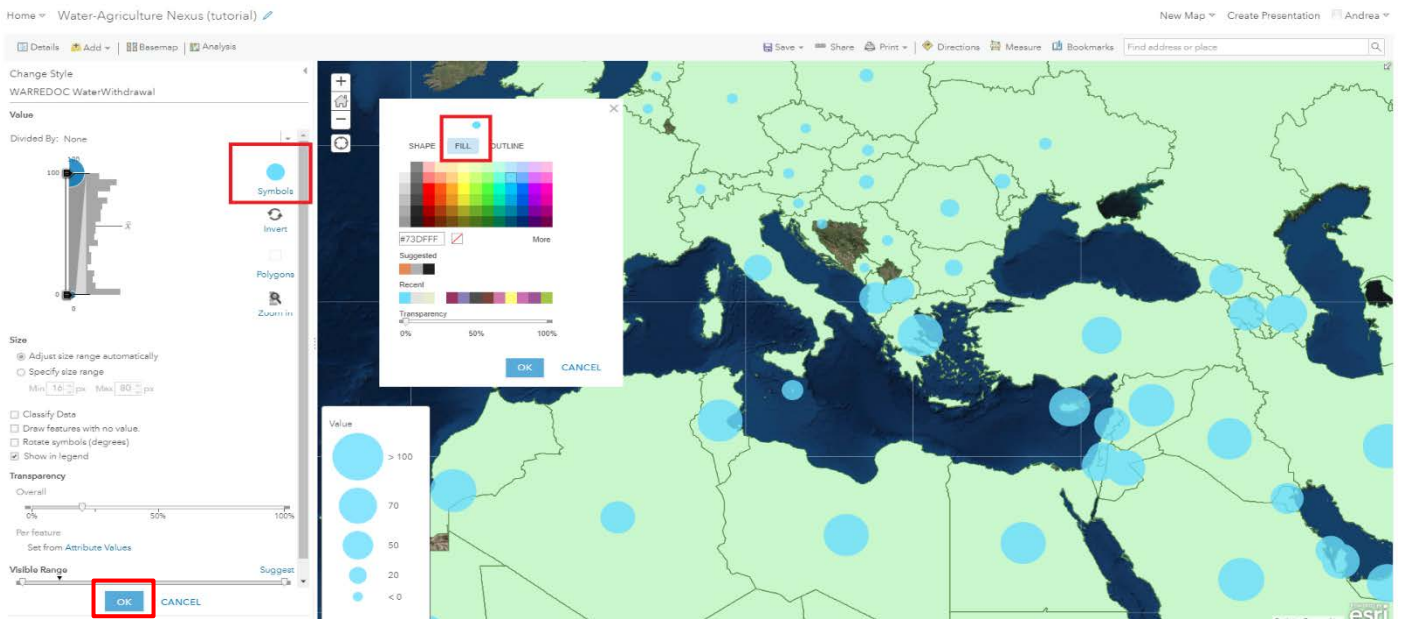
- Click on basemap > Imagery
- To save the project click on Save > Save as > Title: Water-Environment Nexus (Tutorial), Tags: WARREDOC, Summary: Water-Agriculture Nexus. 3° Digital Mapping Course



4. Now open the Attribute Table to check the data and the default selected attribute of the map. We are creating a point-relationship map and a thematic map that uses a range of colors in proportion to values of water withdrawal values per country. To change the symbology:

- Select layer WaterWithdrawal > Choose an attribute to show: Value
- Select a drawing style > Counts and Amounts (Size) > Options
- Select Symbols > Fill > Light blue color



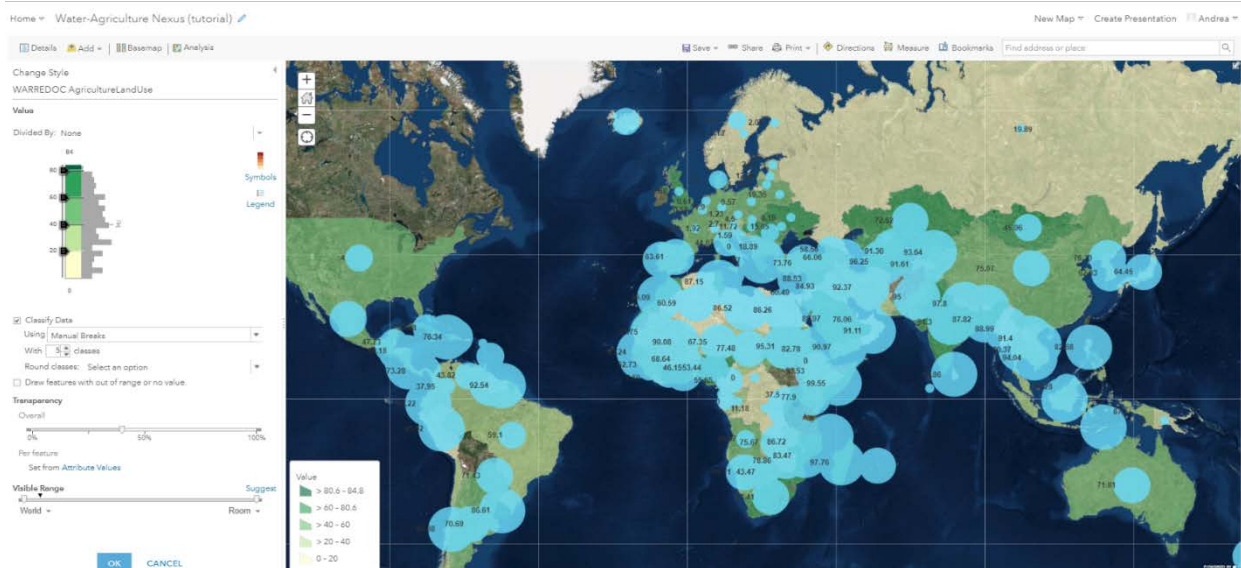


5. The thematic map is ready but the amount of water withdrawn is still missing. To label the water withdrawn value on the map above each country:

- Click on the layer name > more options icon (three points) > Create Labels > Activate Label Features > Text: Value > Size: 13 > Style: Bold > OK

6. The world water withdrawn map has been created. You will now repeat the same procedure to create the agriculture land use map for each country:

- WARREDOC_AgricultureLandUse > Change Style > Choose an attribute to show: Value
- Select a drawing style > Counts and Amounts (Color) > Options > Classify Data using Manual breaks with 5 classes > Set ranges 0, 20, 40, 60, 80 and 100
- Symbols > Fill > Green scale > OK > Done
- Click save to record all changes



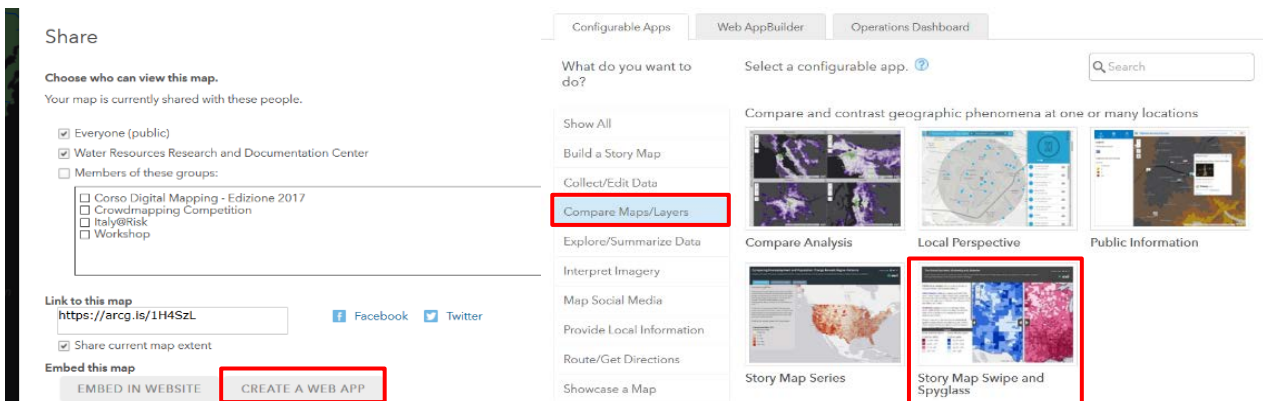
7. The map is ready: Compare global water withdraw and agriculture values.

Goal #2: Create a Web Swipe App

ArcGIS Online enables users to compare maps and layers simultaneously in a dynamic single map, improving the visualization of features before and after an event has taken place (i.e. earthquake disasters, land use changes, deforestation), different values from macro to micro scale or the display of related comparative maps. In this tutorial we will use the Map Swipe feature to compare global water withdraw and agriculture values.

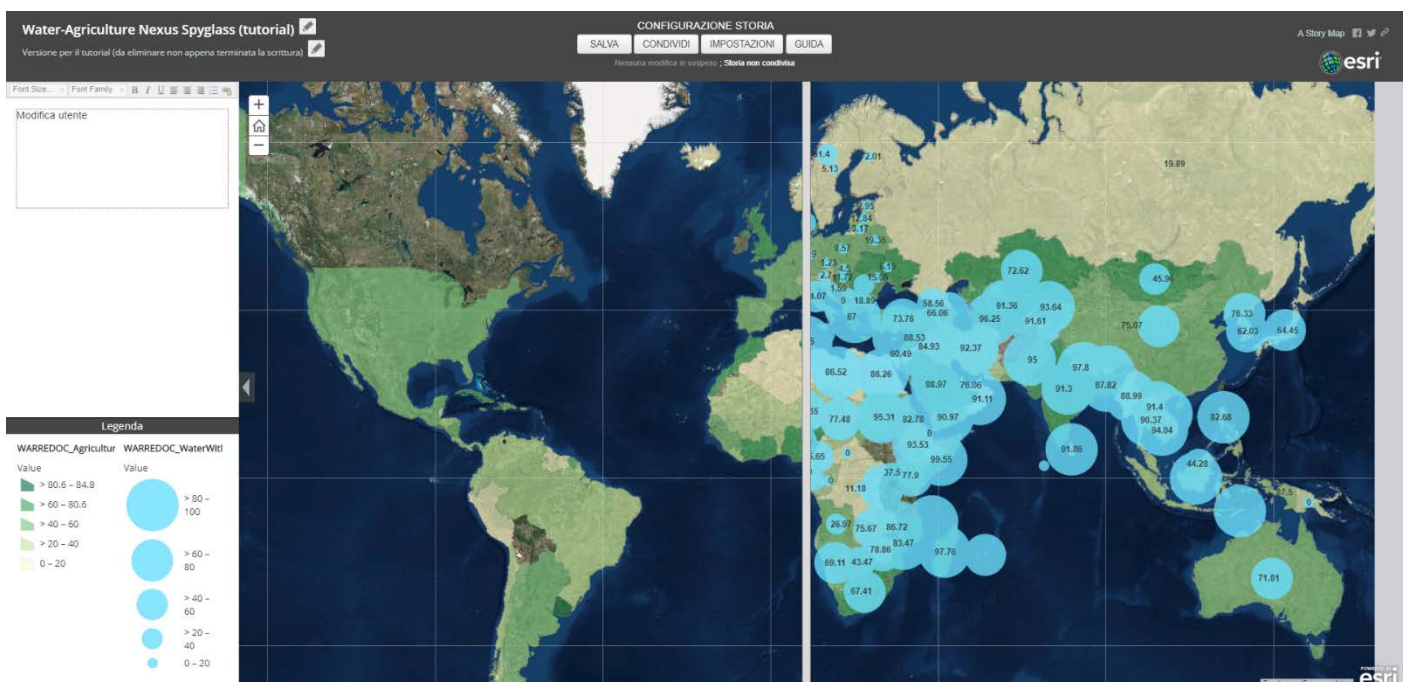
8. To create the Map Swipe App:

- Share < Share with everyone < Create a Web App < Compare Maps/Layers < Story Map Swipe and Spyglass < Create Web App
- Fill the Title, Tags and Summary as specified in step #2 < DONE



9. The Swipe/Spyglass builder will appear on the screen:

- Swipe Style > Swipe > Next
- Swipe Type > One web maps > Select as hidden layer WARREDOC_WaterWithdrawal
- App Layout > Activate Description, Legend and Pop-Up > Next
- Pop-Up > Left Map: Agriculture > Right Map: Water > Open app

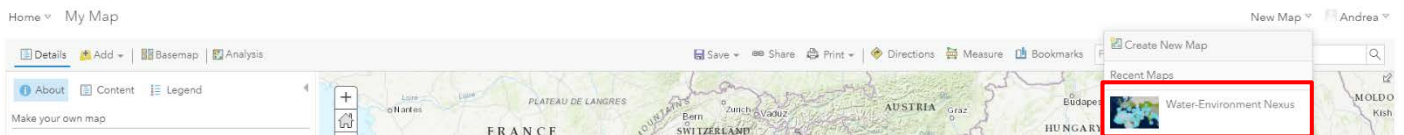


10. You have created the Swipe App. Feel free to customize the Story settings as desired, including theme, logo, header, extent and content panel. Click save when done and share to obtain the link that will be use to connect the Swipe App to final StoryMap.

Goal #3: Create Social Media App

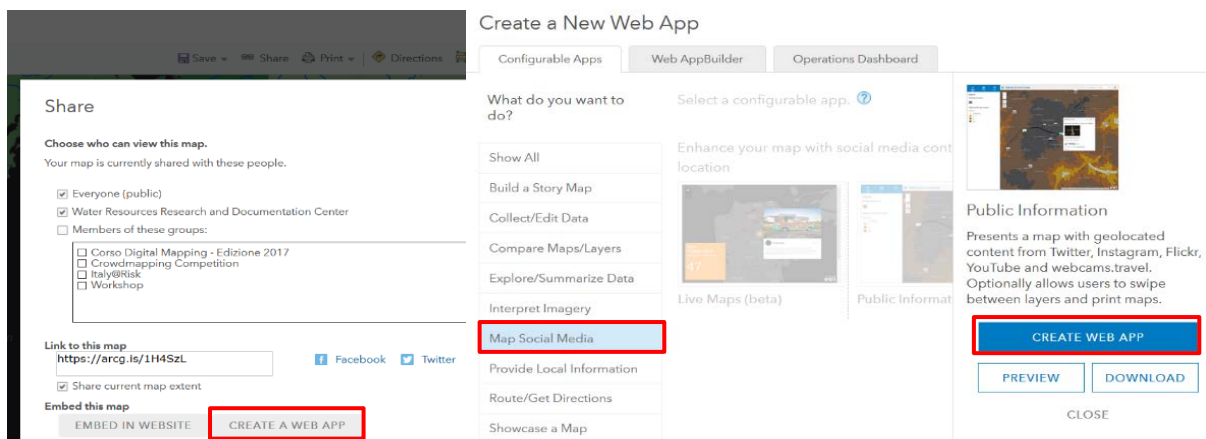
While the integration of open big data in digital maps is the cornerstone for spatial analysis and location intelligence (to understand natural and anthropic processes), the perception of locations, activities and experiences are broadened with the use of social media content. The selection of keywords provide a more precise understanding of anticipated, expected and unexpected human behaviors related to your search.

Note: In case you exit the ArcGIS Online Map screen interface, it's recommended to open a new browser app and repeat step #1 to return to the tutorial. Once you are on the Map web interface, on the right corner click on New Map and select Water-Environment Nexus



11. To incorporate social media content into the map:

- Share < Share with everyone < Create a Web App < Map Social Media < Public Information < Create App
- Title: Water-Environment Nexus Social Map
- Tags and Summary: As specified in step #2 < DONE



12. The web app pane will appear on the right side of the screen, which displays three tabs:

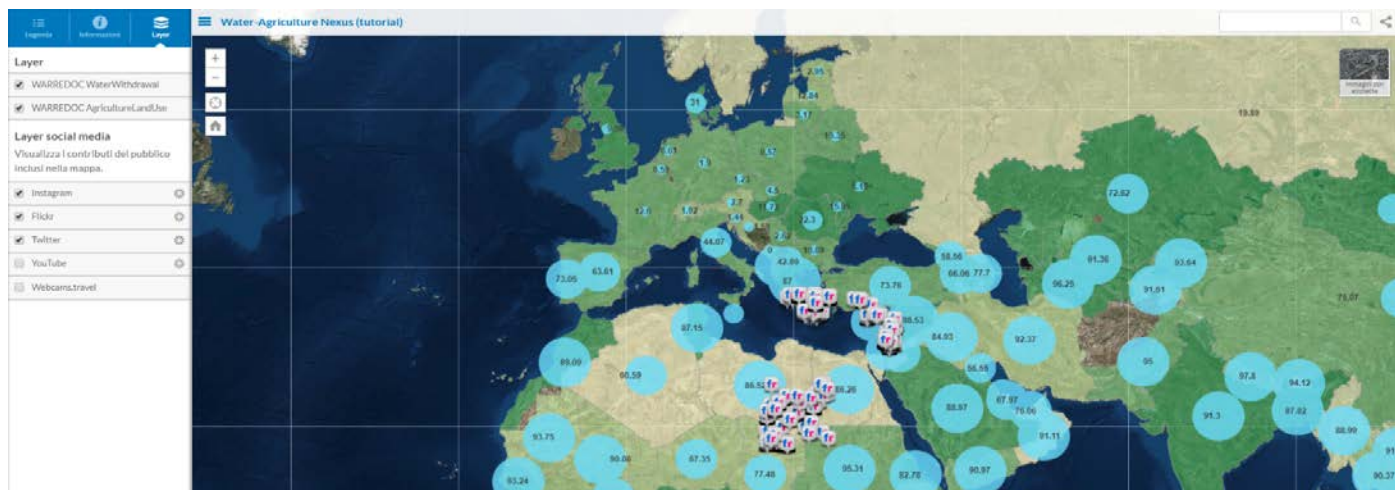
- The Legend provides the name and colors of each layers represented in the map
- The About tab includes the name of the project, last edition and additional information
- Layers are subdivided into two parts. The first one includes all shapefiles from the Water-Environment Nexus Map, and the second layers provide a list of social media platforms. Activate all media layers

Note: Some social media platforms may requests login verification to visualize the content

13. Click on the settings tool and write the keyword ‘water’ in each media layer.

14. Click on share to get the map link. This link you will use to connect the social media component with the StoryMap. **Keep in mind that the social media mapped content is in real time. In brief, the visualization of content is always changing, and depends on the location and publication date.**

The map should look like this:



Goal #4: Create a Story Map

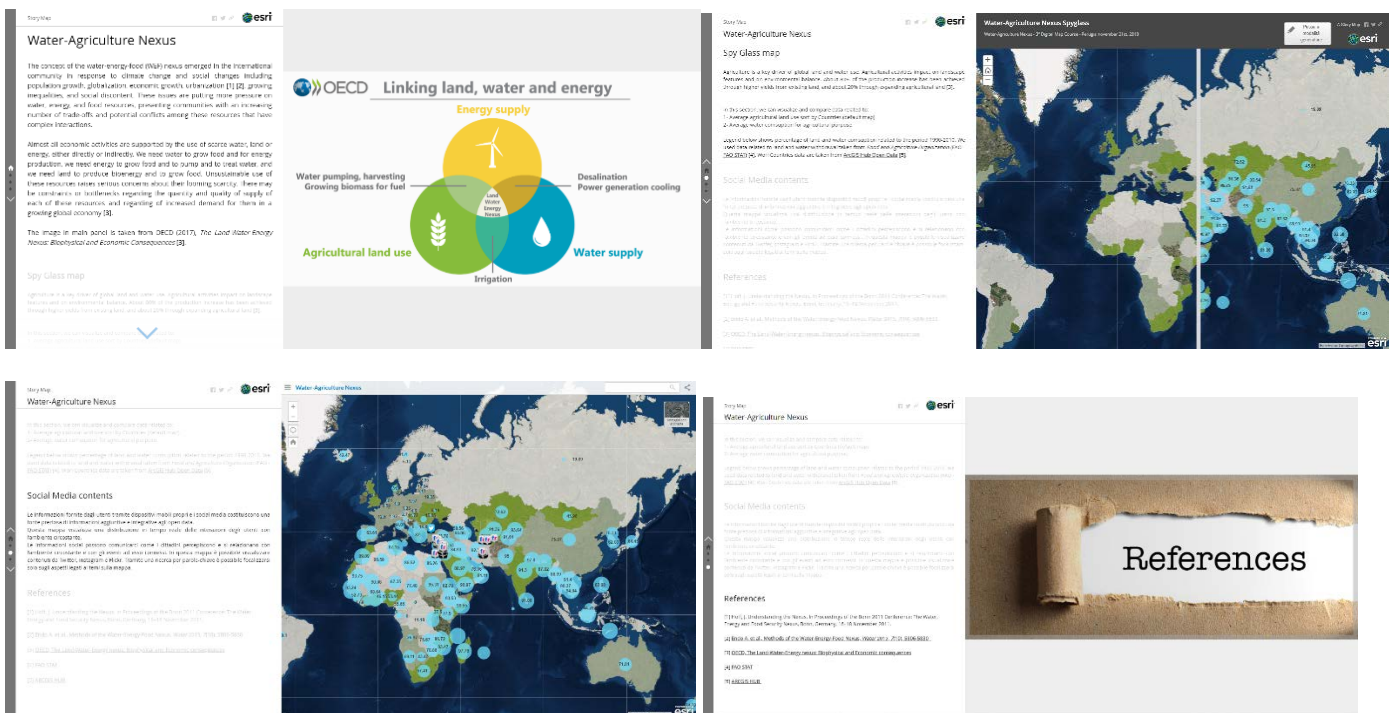
15. The integration of multiple open data layers in digital maps can result in rich content stories that provide additional value to your work at the geographic context. These results can answer complex questions and visualize new trends. Now you can incorporate text, media content and the human experience to your story. To create a Story Map:

- Share > Everyone (public) > Create a Web App > Build a Story Map > Story Map Journal > Create Web App > Title: Water-Energy Nexus > Fill the Tags and Summary > DONE
- Select Side Panel

16. According to the 3rd Digital Mapping Terms and Conditions, the map must comply with the following requirements:

- **Introduction (1 page):** Select a video that best describes the topic and write a brief introduction
- **GIS section (1 page):** Create two maps to display a comparison web app between water and agriculture (agriculture land use and water withdrawn)
- **Human experience (1 page):** Integrate the user experience into your map by adding social media content (using keywords and hashtags) to obtain meaningful insights on human behavior
- **Discussion and References (2 pages):** Create a brief summary of your main points and also include a bibliography.

The following illustrates the potential outcome of a well-developed StoryMap:



Take a look at the StoryMap: [Water-Environment Nexus](#)

Congratulations!

You have successfully completed this tutorial.