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Advancing geography
and geographical learning

The Future Tropical Forest Ecosystem



The Future Tropical Rainforest

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Objectives

To gain a greater appreciation of the level and rate of deforestation in tropical rainforest areas

To be able to produce a map of spatial data using a GIS package

To describe and explain the relationship between deforestation and other variables



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768,935 km² of tropical rainforest has been lost from
the Brazilian Amazon since 1970

**How many countries the size of England
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(England = 130,395 km²)



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= 6 countries the size of England



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**A standard football pitch
measures 64m x 100m**



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7,989 km² of tropical rainforest was lost from the
Brazilian Amazon in 2016

= 1,248,281 football pitches



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Assuming deforestation was happening at the same pace, 24 hours a day and on every day of the year, how many football pitches are we losing every hour in the Brazilian Amazon alone?

**1,248,281
football pitches a
year**



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= 3,420
football pitches a
day

(divide by 365)



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= 142
football pitches an
hour

(divide by 24)

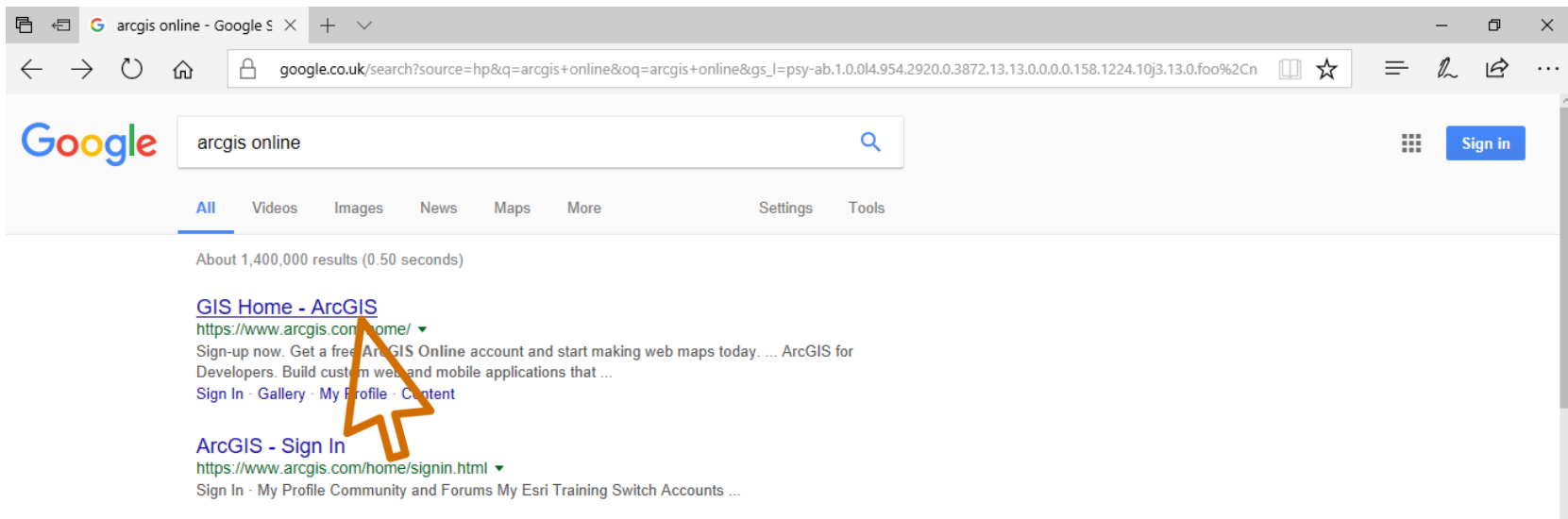


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Go onto **ArcGIS Online**:



A screenshot of a Google search for 'arcgis online'. The search results show 'About 1,400,000 results (0.50 seconds)'. The top result is 'GIS Home - ArcGIS' with the URL 'https://www.arcgis.com/home/'. Below the URL, there is a description: 'Sign-up now. Get a free ArcGIS Online account and start making web maps today. ... ArcGIS for Developers. Build custom web and mobile applications that ...'. There are also links for 'Sign In', 'Gallery', 'My Profile', and 'Content'. A second result is 'ArcGIS - Sign In' with the URL 'https://www.arcgis.com/home/signin.html'. Below this URL, there are links for 'Sign In', 'My Profile', 'Community and Forums', and 'My Esri Training Switch Accounts ...'. A red mouse cursor is pointing at the 'Sign In' link in the first result.

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Select **'Map'** :

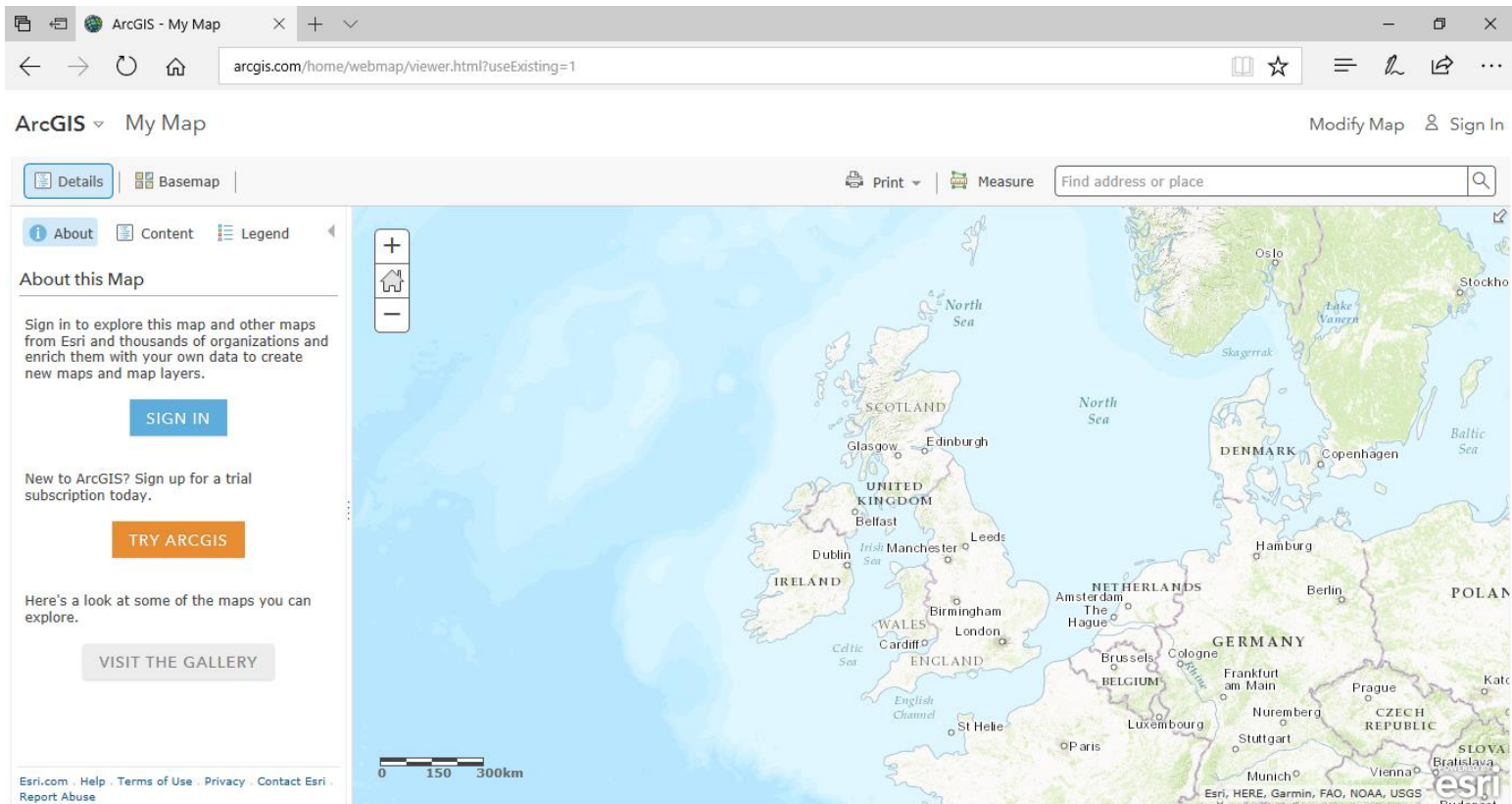
The screenshot shows the ArcGIS Online homepage in a web browser. The browser's address bar displays 'arcgis.com/home/index.html'. The navigation menu includes 'ArcGIS', 'Features', 'Plans', 'Gallery', 'Map', 'Scene', and 'Help'. The 'Map' item is highlighted with an orange mouse cursor. Below the navigation bar is a large blue banner with the 'ArcGIS' logo and the 'esri' logo. Underneath the banner is a carousel of four featured maps: 'Great Britain: More Roads Less Travelled', 'The Making of the British Landscape', 'UK Earthquakes Since 1970', and 'UK General Election Results 2017'. At the bottom of the page, there are four buttons: 'Sign-up now', 'Make a Map', 'ArcGIS for Developers', and 'Discover Lessons'.

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Drag the **CSV data file** onto the map:



The screenshot shows the ArcGIS web interface. The browser address bar displays 'arcgis.com/home/webmap/viewer.html?useExisting=1'. The interface includes a search bar with the text 'Find address or place', a 'Print' button, and a 'Measure' button. The main map area shows a satellite-style view of Europe with labels for various countries and cities. The left sidebar contains a 'Details' tab, 'About', 'Content', and 'Legend' sections. The 'About this Map' section includes a 'SIGN IN' button and a 'TRY ARCGIS' button. At the bottom of the sidebar, there are links for 'Esri.com', 'Help', 'Terms of Use', 'Privacy', 'Contact Esri', and 'Report Abuse'. A scale bar at the bottom of the map indicates 0, 150, and 300 km.



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Zoom out to a level where you can see Brazil most clearly:

ArcGIS - My Map

arcgis.com/home/webmap/viewer.html?useExisting=1

ArcGIS ▾ My Map

Modify Map Sign In

Details Basemap

Print Measure Find address or place

Change Style

Brazilian Amazon State Statistics

1 Choose an attribute to show

Show location only

2 Select a drawing style

Location (Single symbol) [checked]

Heat Map

Heat Map

DONE CANCEL

Esri.com Help Terms of Use Privacy Contact Esri Report Abuse

0 200 400km

POWERED BY esri

Esri, HERE, Garmin, FAO, NOAA, USGS

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Changing the **attributes** changes the data displayed:

The screenshot shows the ArcGIS web map interface. The browser address bar displays `arcgis.com/home/webmap/viewer.html?useExisting=1`. The page title is "ArcGIS - My Map". The main map area shows a geographical view of South America, focusing on the Amazon Basin. The map includes labels for countries like Brazil, Peru, Colombia, Venezuela, and Guyana, as well as major cities like Manaus, Belém, and Brasília. A scale bar at the bottom indicates 0, 500, and 1000 km. On the left side, there is a "Change Style" panel titled "Brazilian Amazon State Statistics". The panel has a dropdown menu set to "Show location only". Below it, a list of attributes is shown: "Forest Loss (km2) (2016)", "GDP (R\$) (2014 est.)", "HDI (2010)", and "Population (2012)". A mouse cursor is pointing at the "Population (2012)" attribute. There are "SELECT", "DONE", and "CANCEL" buttons at the bottom of the panel. The bottom right corner of the map area has the text "POWERED BY ESRI" and "Esri, HERE, Garmin, FAO, NOAA, USGS".

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Esri, HERE, Garmin, FAO, NOAA, USGS

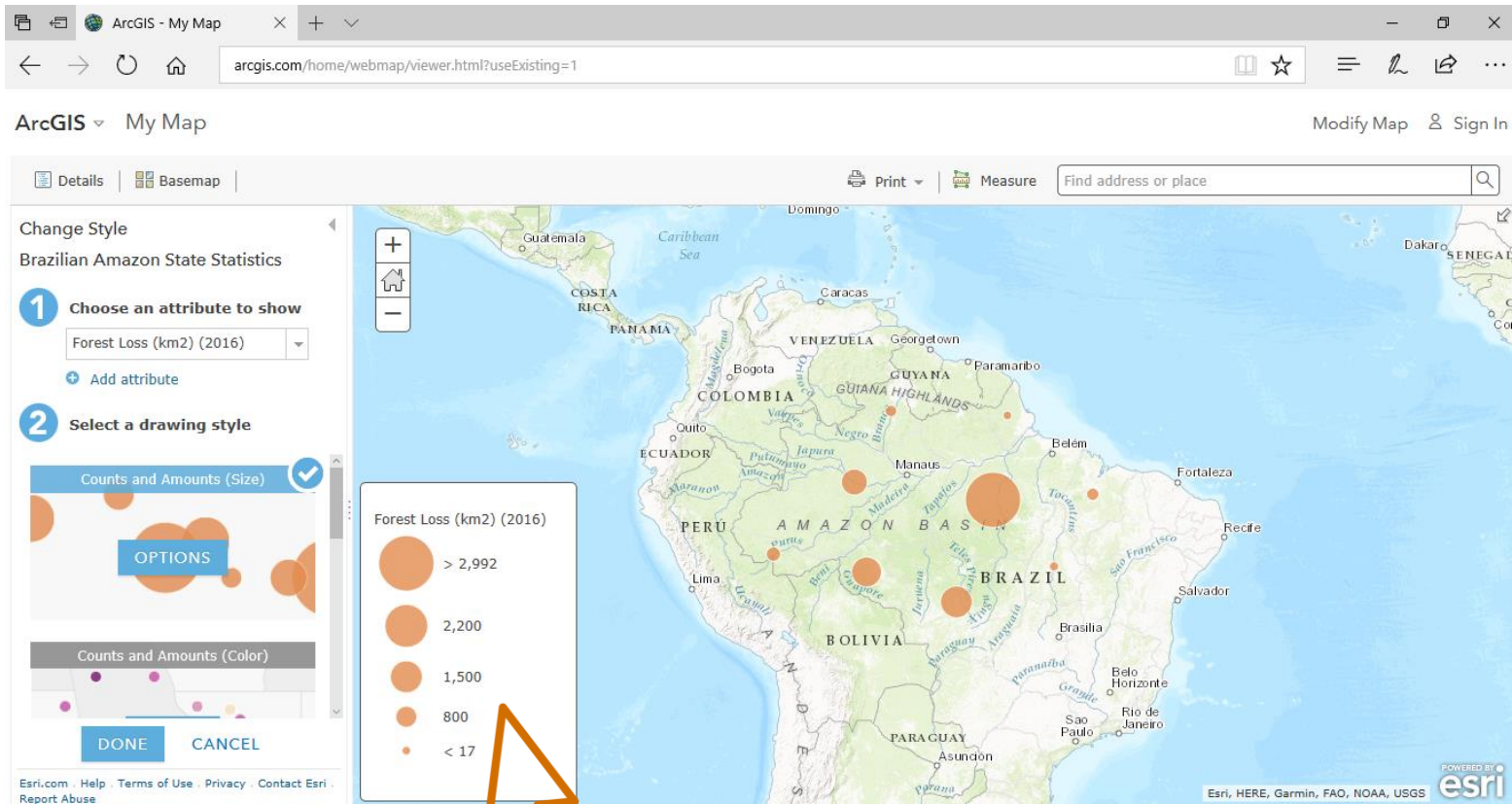
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The default presentation method is **proportional circles**:



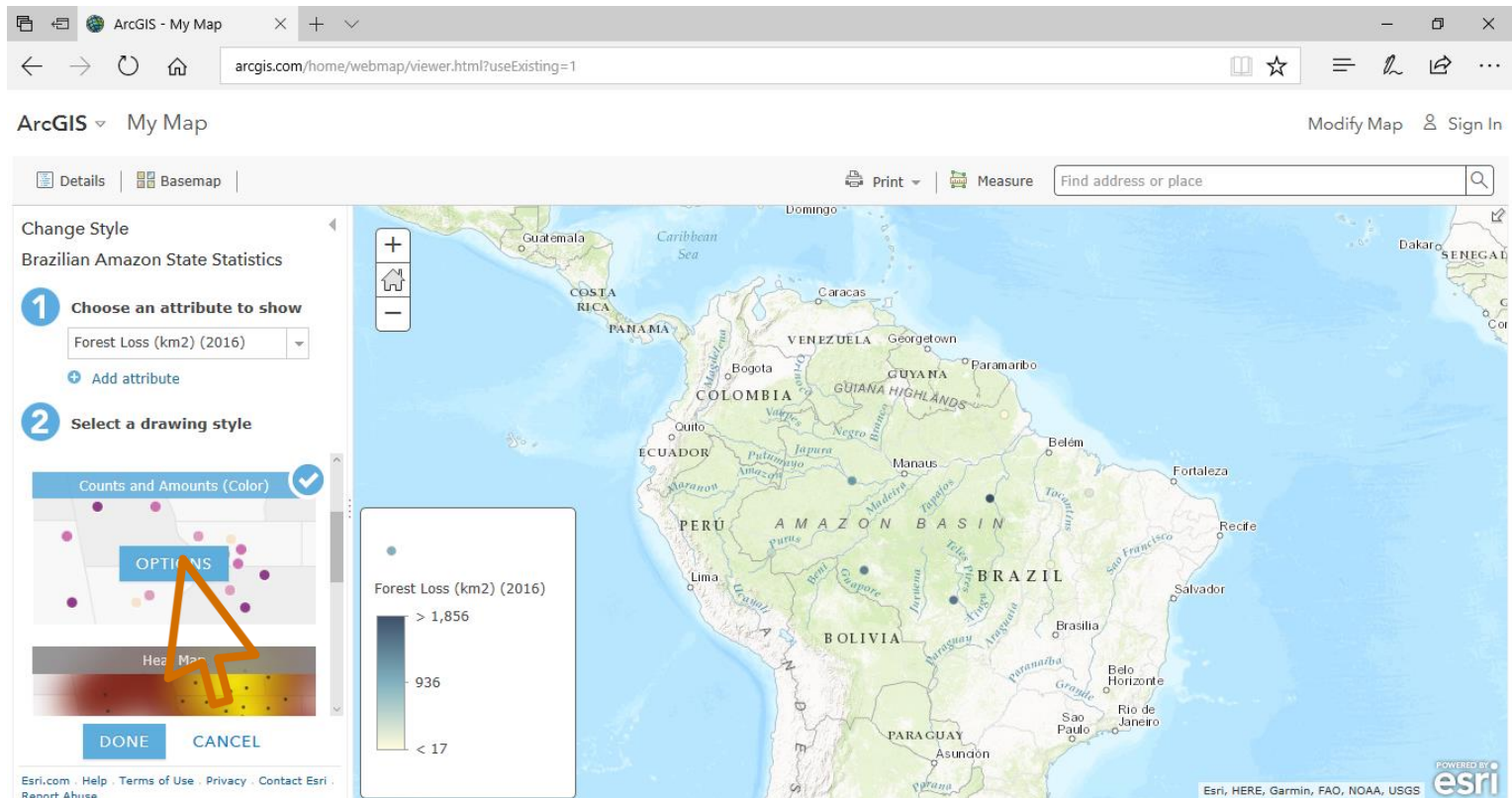
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Selecting 'Counts and Amounts (Color)' changes the map to choropleth shaded dots:



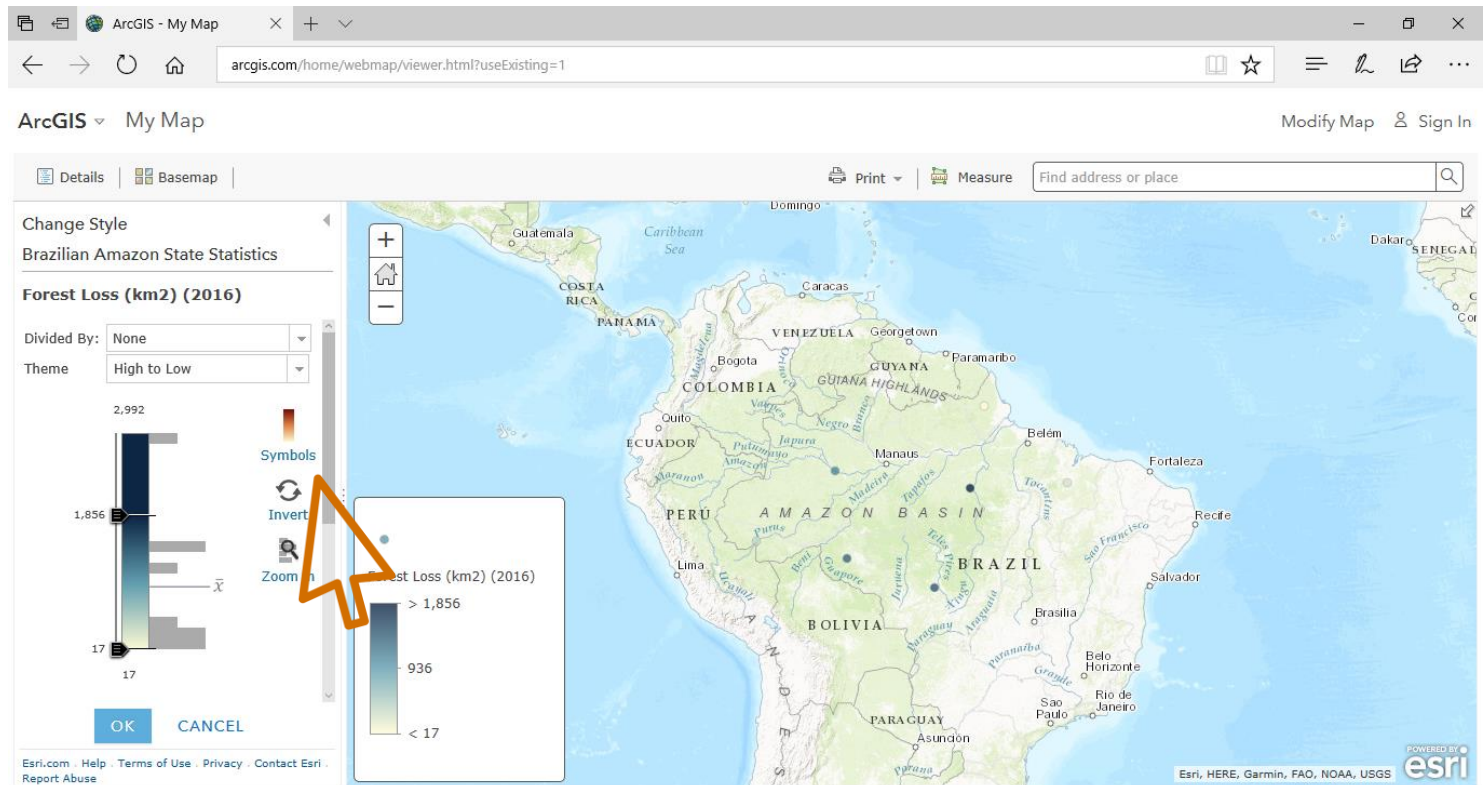
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Selecting **'Options'** and **'Symbols'** gives you the ability to change the size, shape and colour palette of the choropleth shapes:

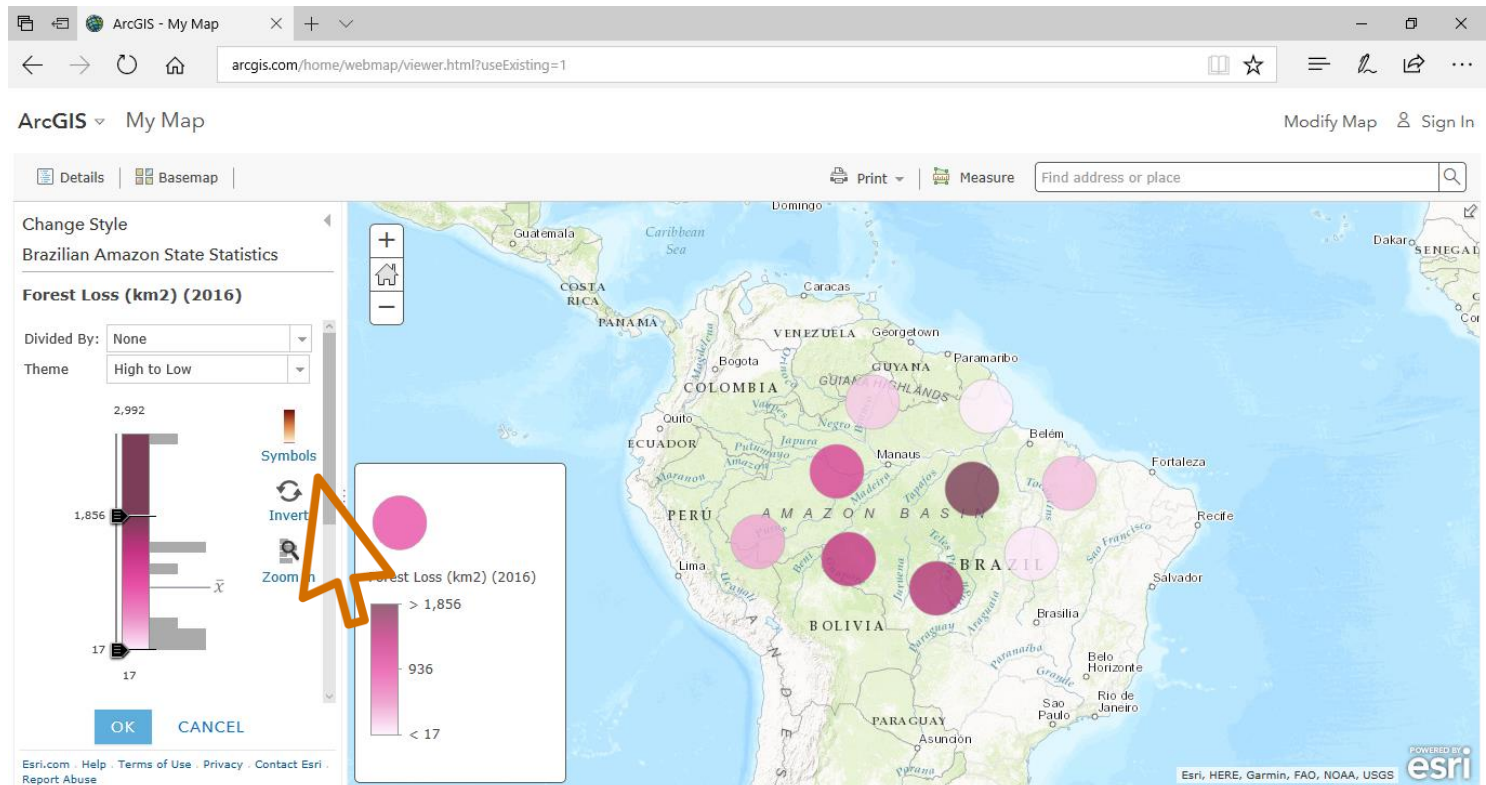


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Select **'Add attribute'** to compare more than one variable from the CSV file:

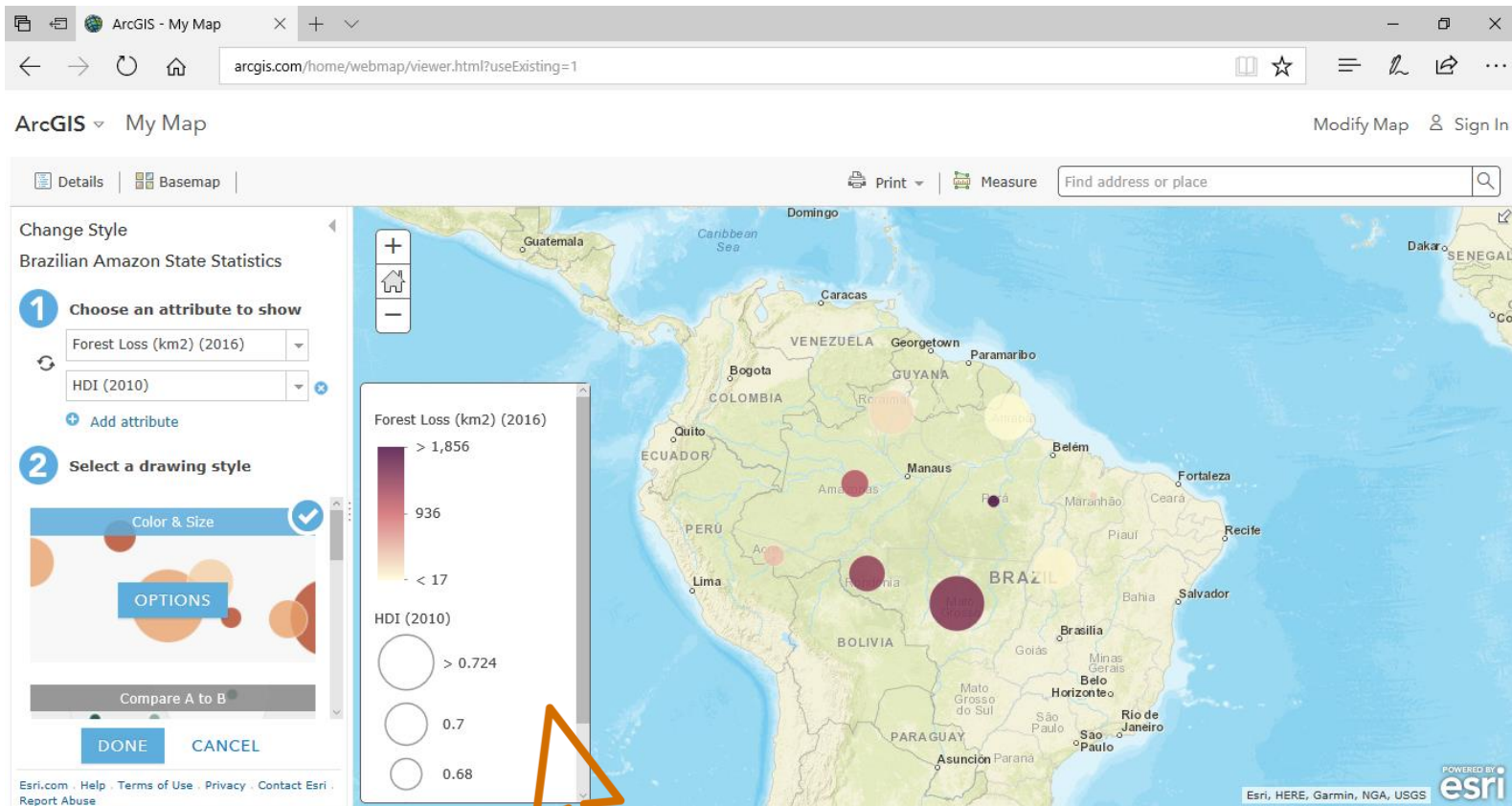
The screenshot shows the ArcGIS web interface. The browser address bar displays `arcgis.com/home/webmap/viewer.html?useExisting=1`. The page title is "ArcGIS - My Map". The main content area shows a map of South America with a legend for "Forest Loss (km2) (2016)". The legend has a color scale from light pink (< 17) to dark purple (> 1,856). The map shows various countries and cities, with a legend box overlaid on the Amazon Basin region. The interface includes a search bar, navigation controls, and a "Change Style" panel on the left. The "Change Style" panel has two steps: "1 Choose an attribute to show" (with a dropdown menu set to "Forest Loss (km2) (2016)") and "2 Select a drawing style" (with a dropdown menu set to "Counts and Amounts (Color)"). A mouse cursor is pointing at the "Add attribute" button in step 1. The "Change Style" panel also has "DONE" and "CANCEL" buttons. The bottom of the page has a footer with "Esri.com Help Terms of Use Privacy Contact Esri Report Abuse" and "POWERED BY esri Esri, HERE, Garmin, FAO, NOAA, USGS".

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In this case, size and colour represent the two different variables:



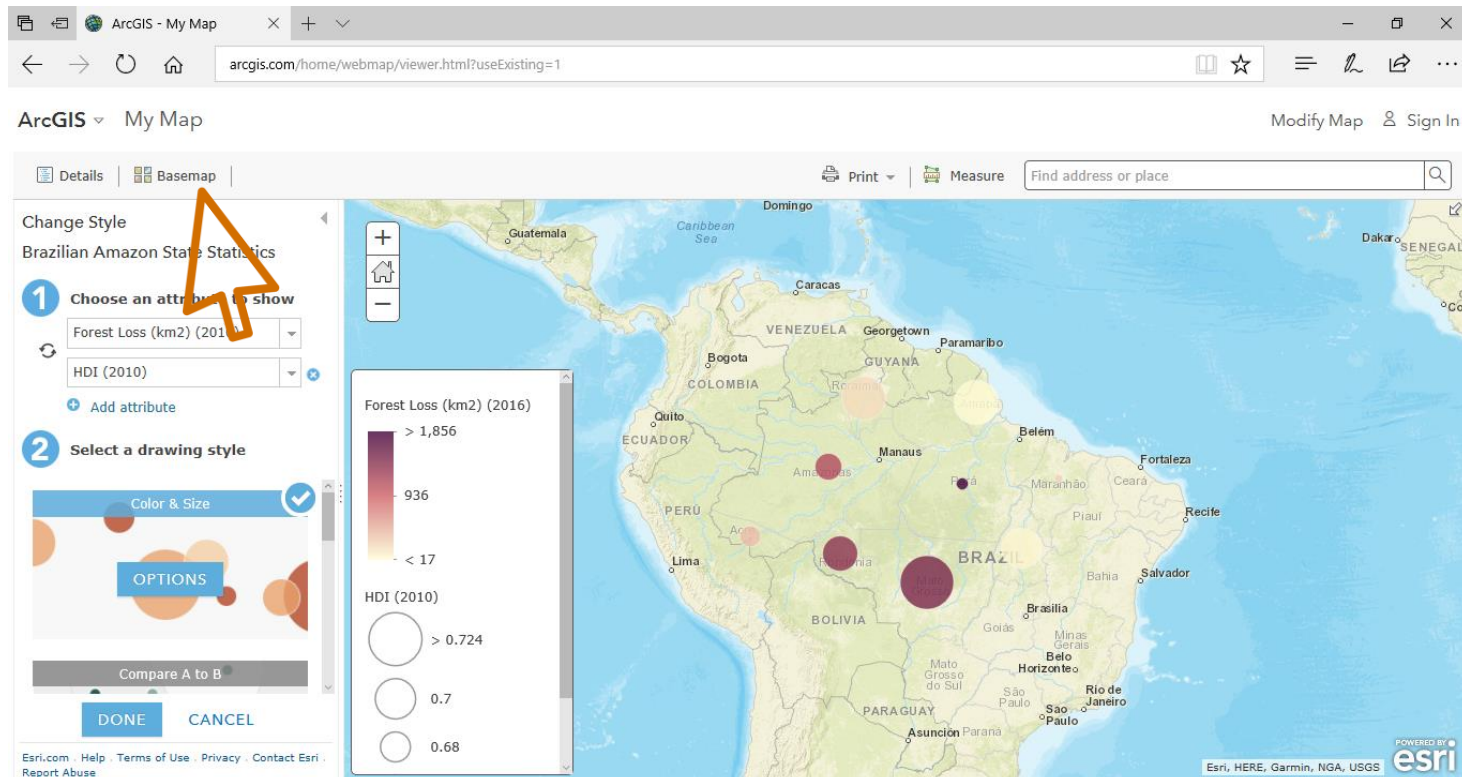
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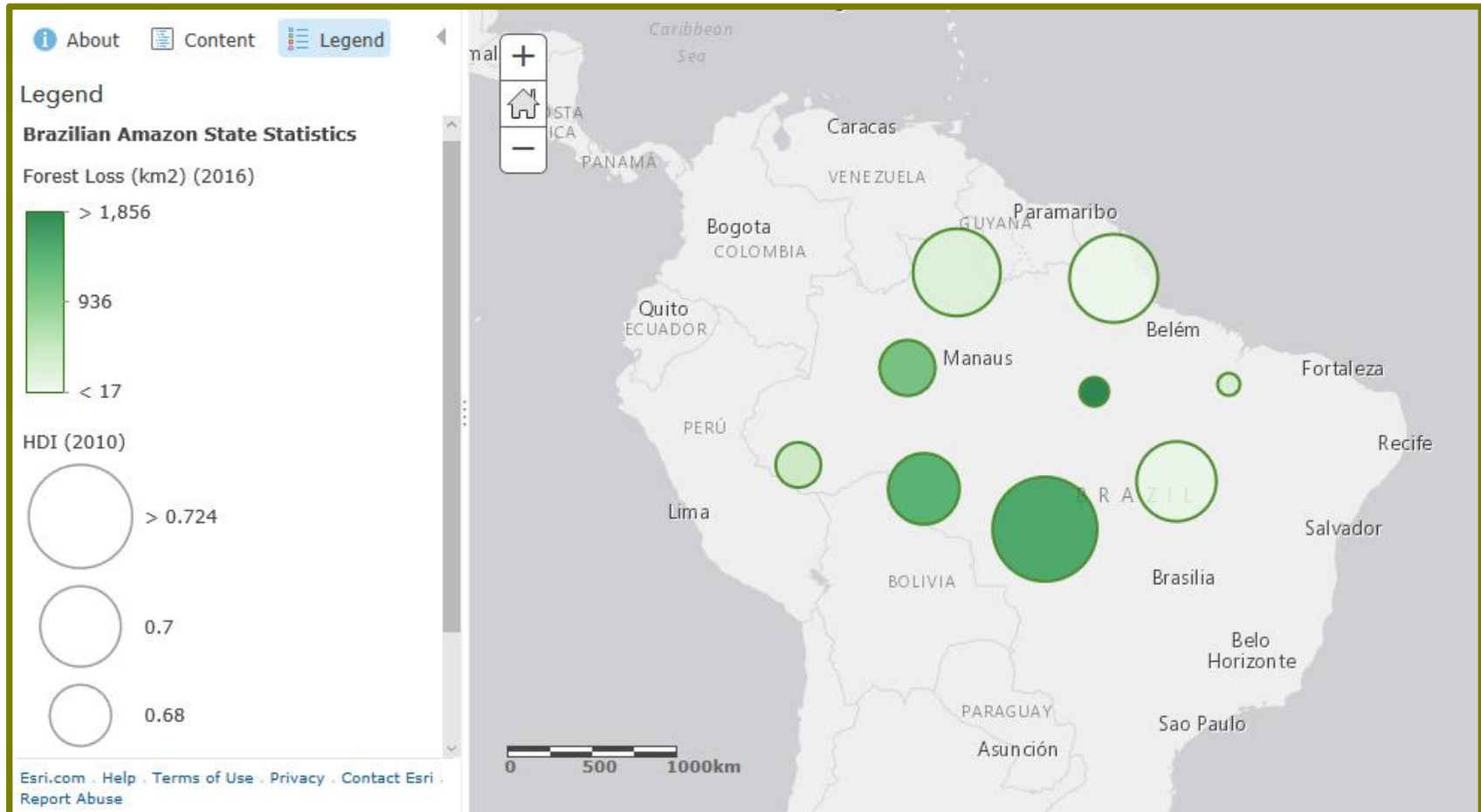
Experiment with changing the **basemap** to make the data stand out, as well as with scale, colour and attribute selected:



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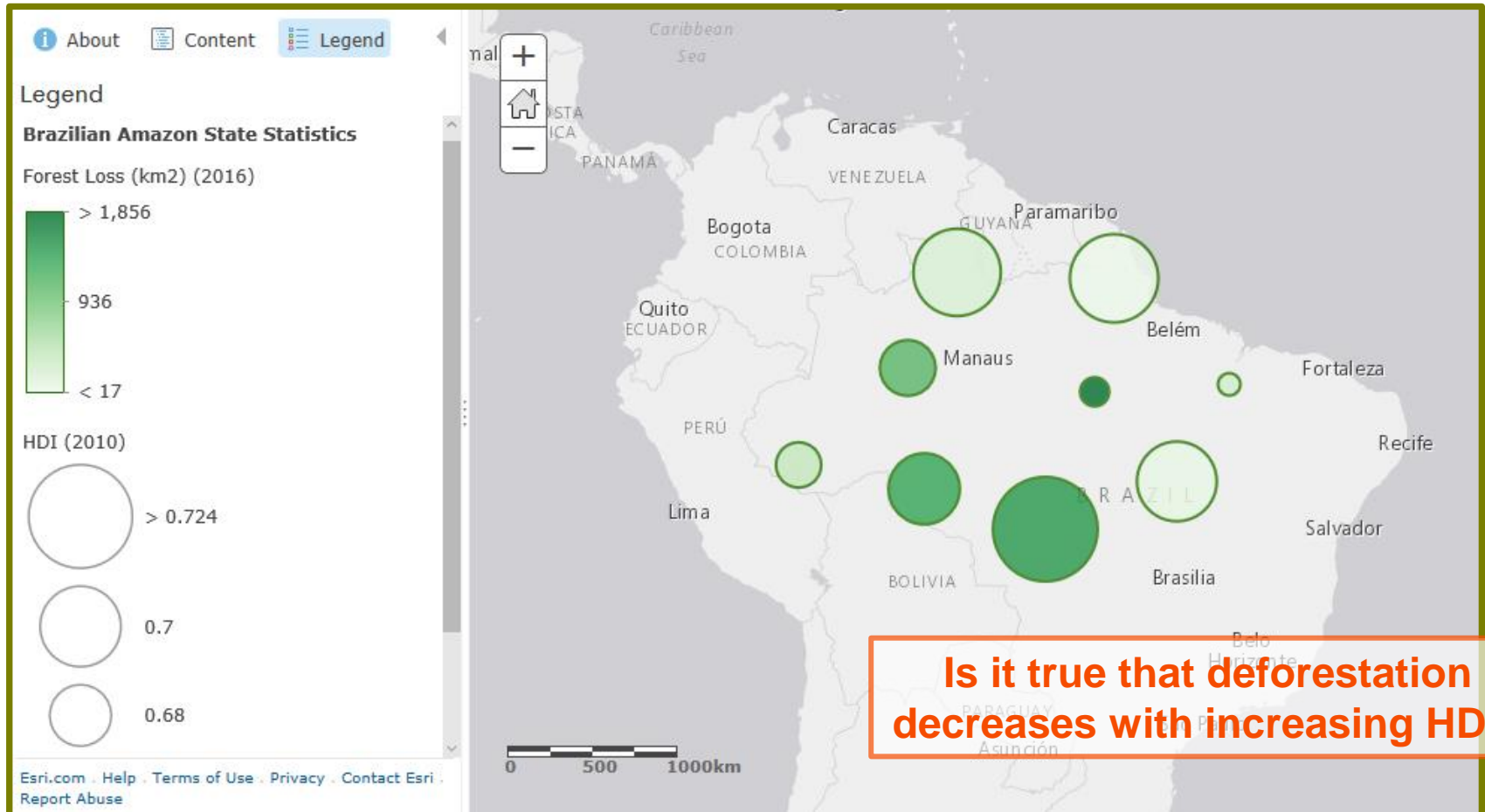
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Is it true that deforestation decreases with increasing HDI?



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What makes a good pie chart?



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What makes a good pie chart?

Easy to read?



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What makes a good pie chart?

Easy to read?

Do we need to see figures?



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Easy to read?

Do we need to see figures?

Clear categories?



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What makes a good pie chart?

Attractive?

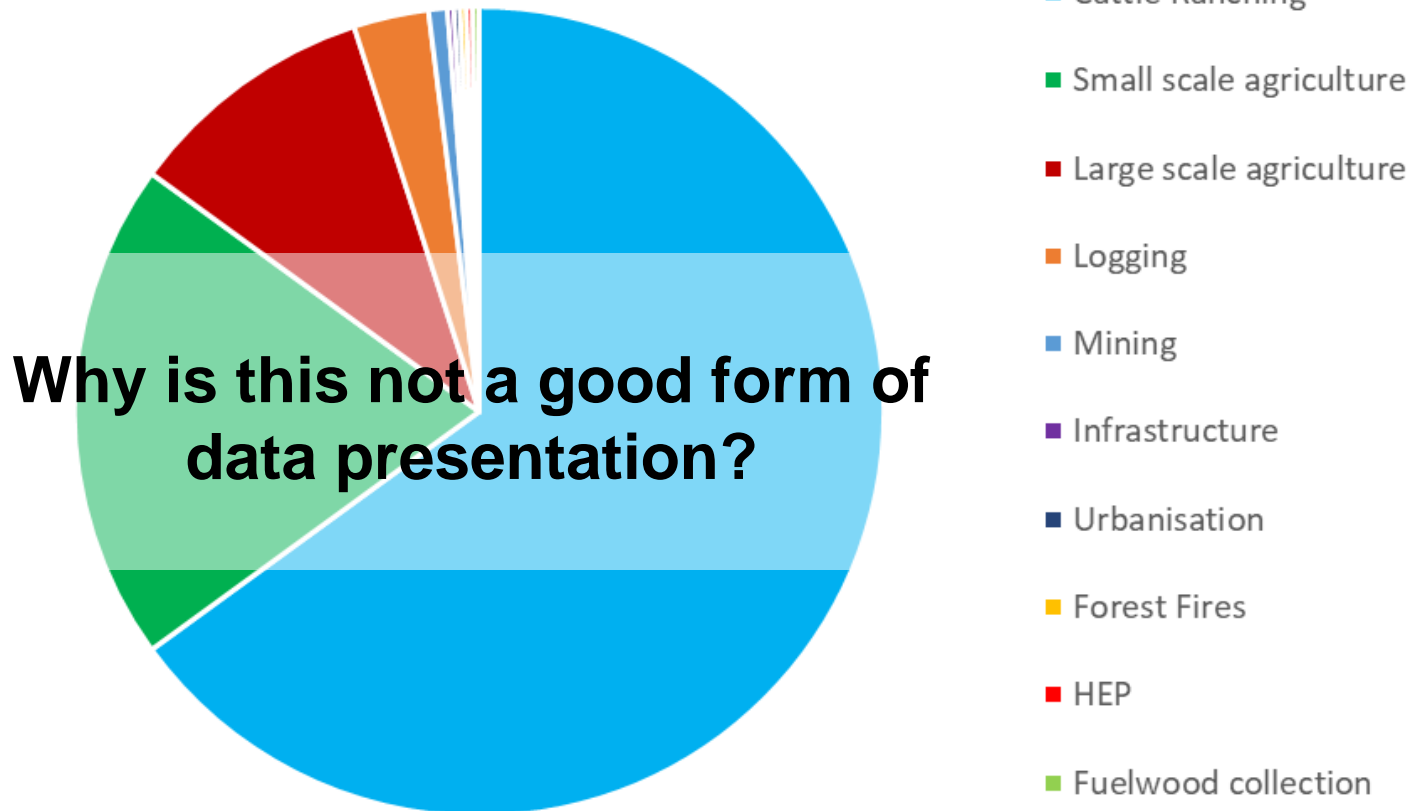
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Causes of deforestation in a Tropical Rainforest

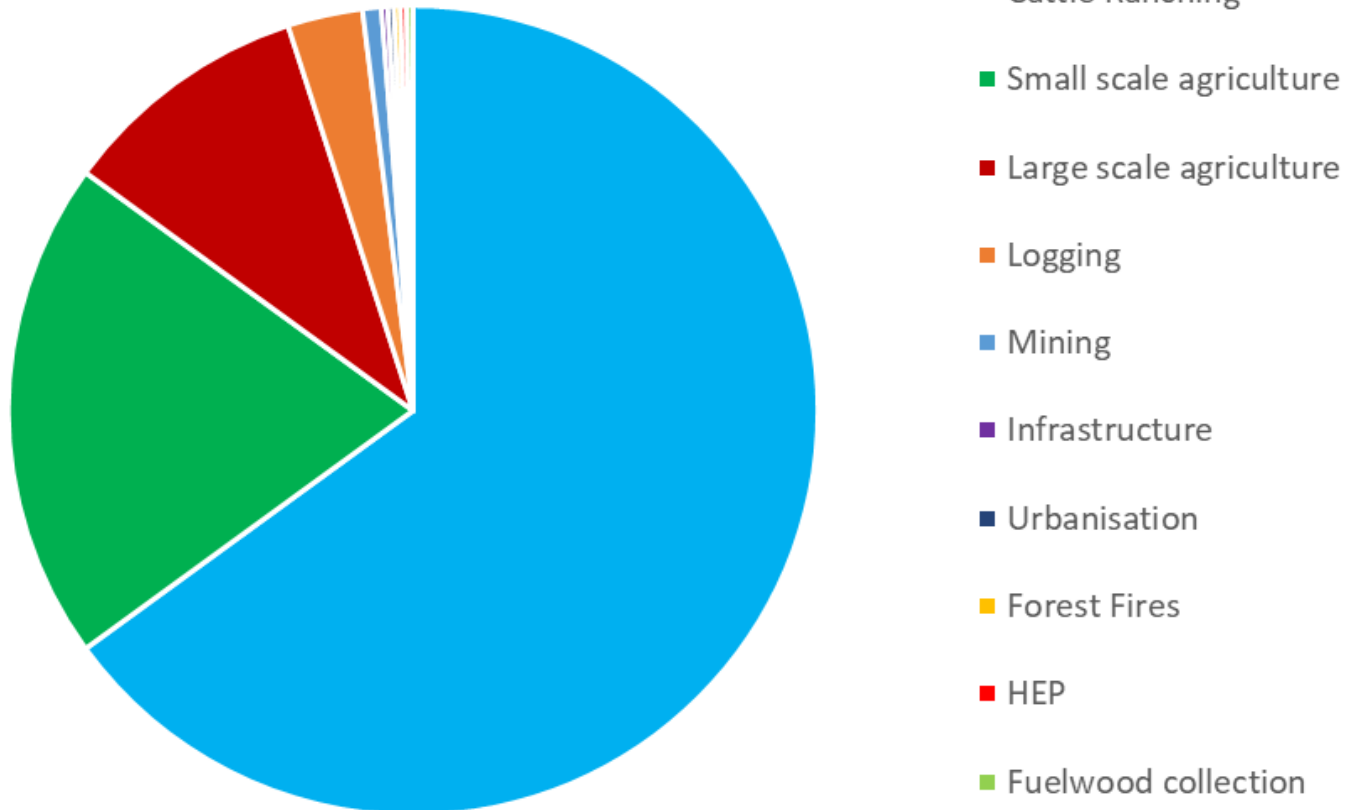


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Causes of deforestation in a Tropical Rainforest



■ Cattle Ranching

■ Small scale agriculture

■ Large scale agriculture

■ Logging

■ Mining

■ Infrastructure

■ Urbanisation

■ Forest Fires

■ HEP

■ Fuelwood collection



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Which measure shows the greatest concern looking back at how countries have treated their rainforest?



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Country	Area of forest cover (km ²)	Forest Cover	Loss as % of 2004 cover	Rate of deforestation change 2004 - 2014	Loss 2001-2014
Brazil	519,191,664	61.90%	4.90%	-6.00%	38,336,733
DR Congo	199,224,295	87.10%	3.20%	22.90%	7,977,010
Indonesia	160,978,096	85.80%	9.60%	2.40%	18,507,771
Colombia	81,779,083	72.60%	2.50%	-9.70%	2,822,694
Peru	78,069,516	60.90%	2.10%	16.40%	1,949,886
Bolivia	64,520,862	60.00%	4.20%	7.50%	3,394,108
Venezuela	56,531,450	62.80%	1.80%	-13.30%	1,376,709
Angola	55,315,474	44.40%	2.60%	19.40%	1,740,011
Mexico	53,182,952	27.40%	3.70%	-9.90%	2,587,661



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Which measure shows the greatest concern looking forward at how countries may manage their rainforest in the future?



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Which country has arguably been most destructive of its rainforest?



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Which country has arguably been most protective of its rainforest recently?



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Guess the Deforestation Rate



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(divide by 365)



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= 142
football pitches an
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Evaluating Pie Charts



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What makes a good pie chart?



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What makes a good pie chart?

Easy to read?



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Easy to read?

Do we need to see figures?



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Clear categories?



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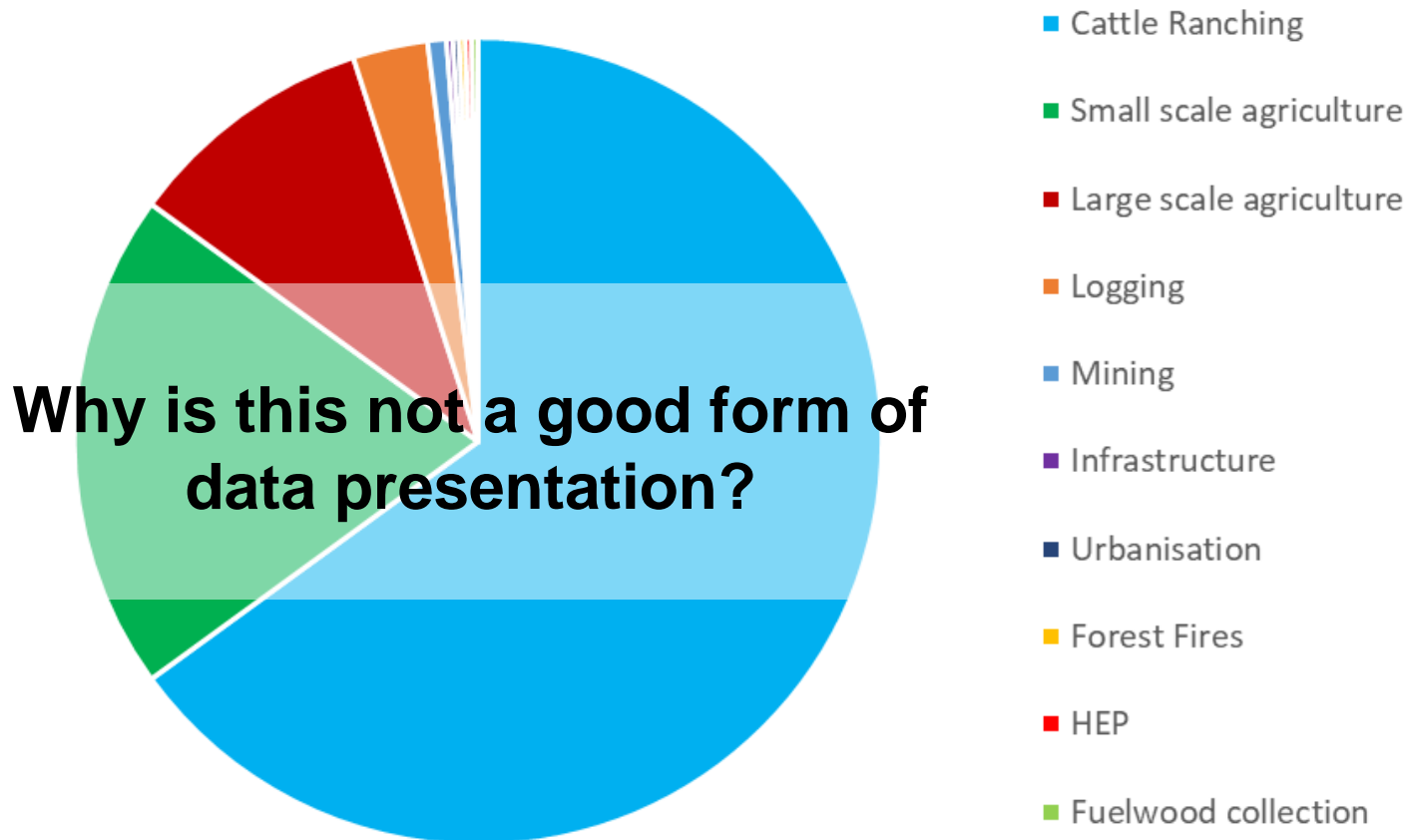
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Causes of deforestation in a Tropical Rainforest

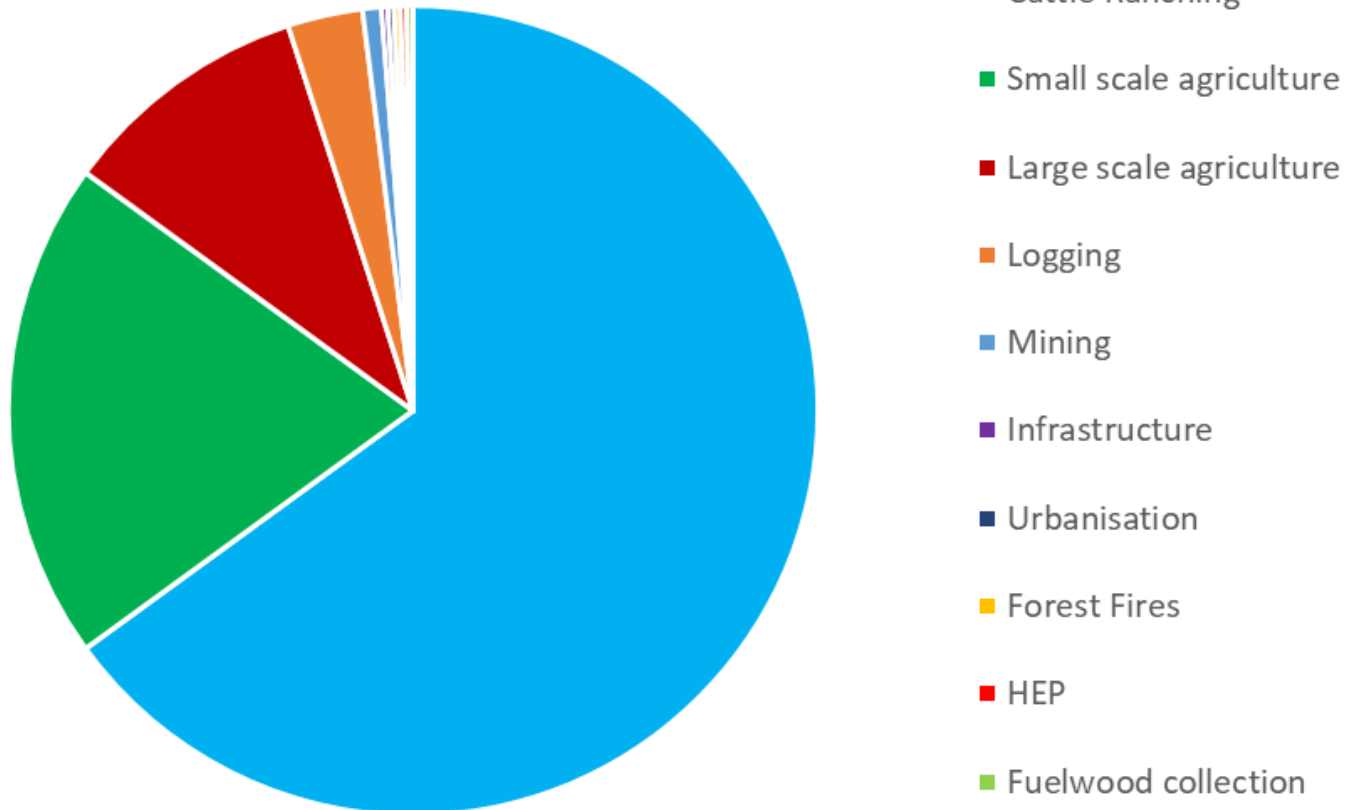


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■ HEP

■ Fuelwood collection



Deforestation in different countries



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Which measure shows the greatest concern looking back at how countries have treated their rainforest?



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Country	Area of forest cover (km ²)	Forest Cover	Loss as % of 2004 cover	Rate of deforestation change 2004 - 2014	Loss 2001-2014
Brazil	519,191,664	61.90%	4.90%	-6.00%	38,336,733
DR Congo	199,224,295	87.10%	3.20%	22.90%	7,977,010
Indonesia	160,978,096	85.80%	9.60%	2.40%	18,507,771
Colombia	81,779,083	72.60%	2.50%	-9.70%	2,822,694
Peru	78,069,516	60.90%	2.10%	16.40%	1,949,886
Bolivia	64,520,862	60.00%	4.20%	7.50%	3,394,108
Venezuela	56,531,450	62.80%	1.80%	-13.30%	1,376,709
Angola	55,315,474	44.40%	2.60%	19.40%	1,740,011
Mexico	53,182,952	27.40%	3.70%	-9.90%	2,587,661



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Which measure shows the greatest concern looking forward at how countries may manage their rainforest in the future?



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Which country has arguably been most destructive of its rainforest?



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Which country has arguably been most protective of its rainforest recently?



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