

BABU BANARSI DAS UNIVERSITY



Descriptive Analytics (BCADSN113201)

PROJECT

SUBMITTED BY:

(GROUP NUMBER 4)

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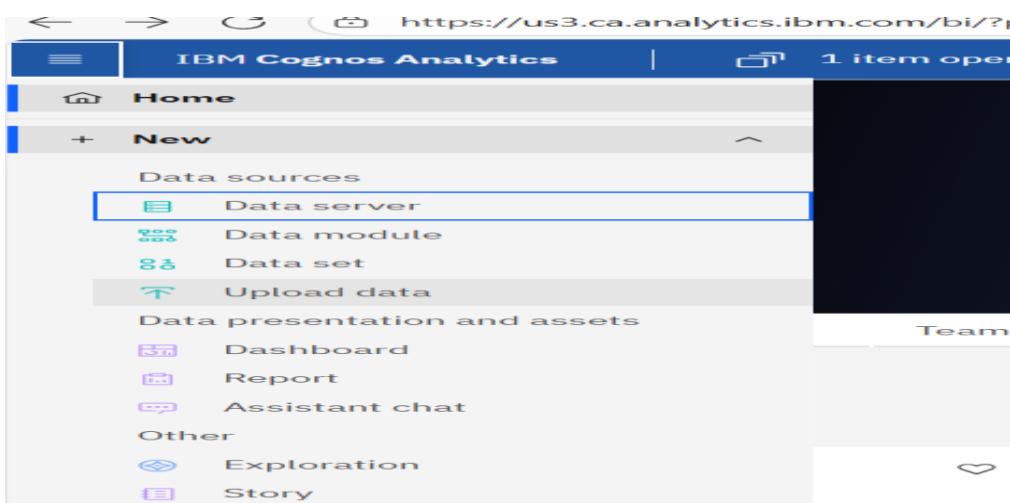
PROJECT

Problem Statement-1 : To analyze flood risk levels across different catchments to identify highly vulnerable areas and support effective flood management planning.

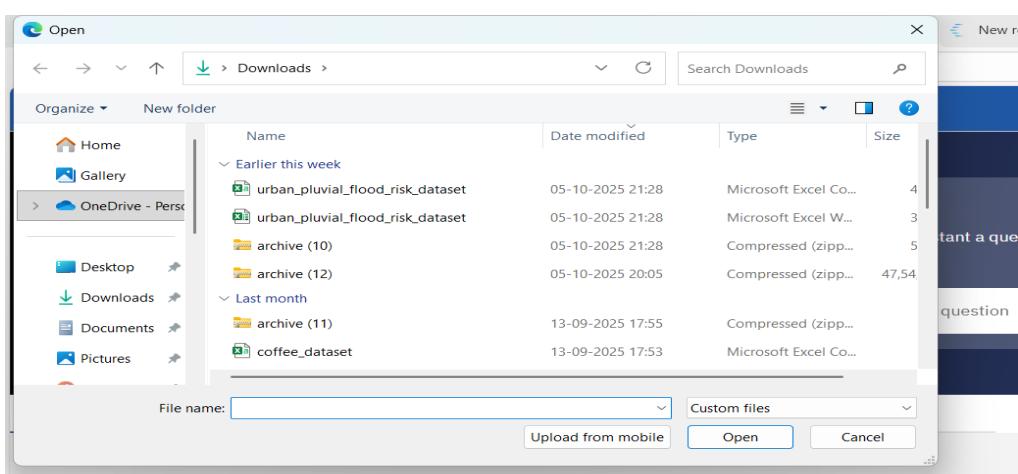
SOLUTION: “Catchment-Wise Flood Risk List Report”

Step 1: Open IBM Cognos Analytics .

Go to Then click on **+ New** → **Upload data**.

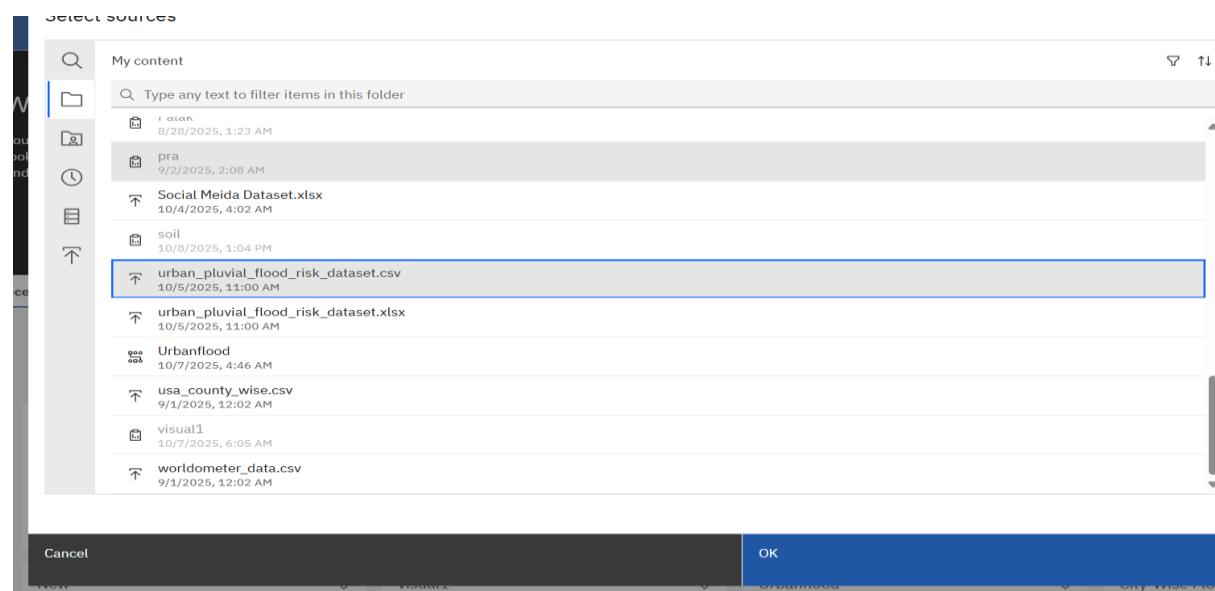


Step 2 : Add the data and click on **Open**. Data has been successfully uploaded.



Step 3: Go to Then click on **+ New** → **Data Module**.

Select data and Click on **OK**.

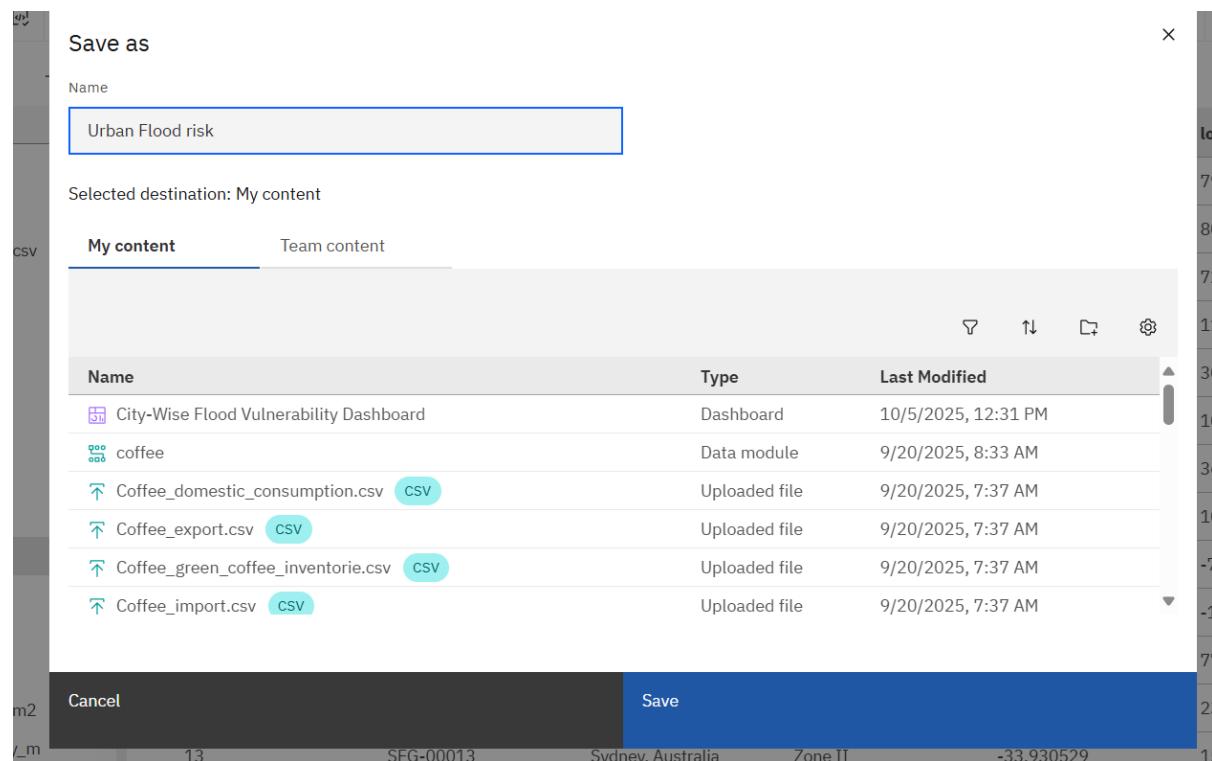


Step 4 : Data Module opened.

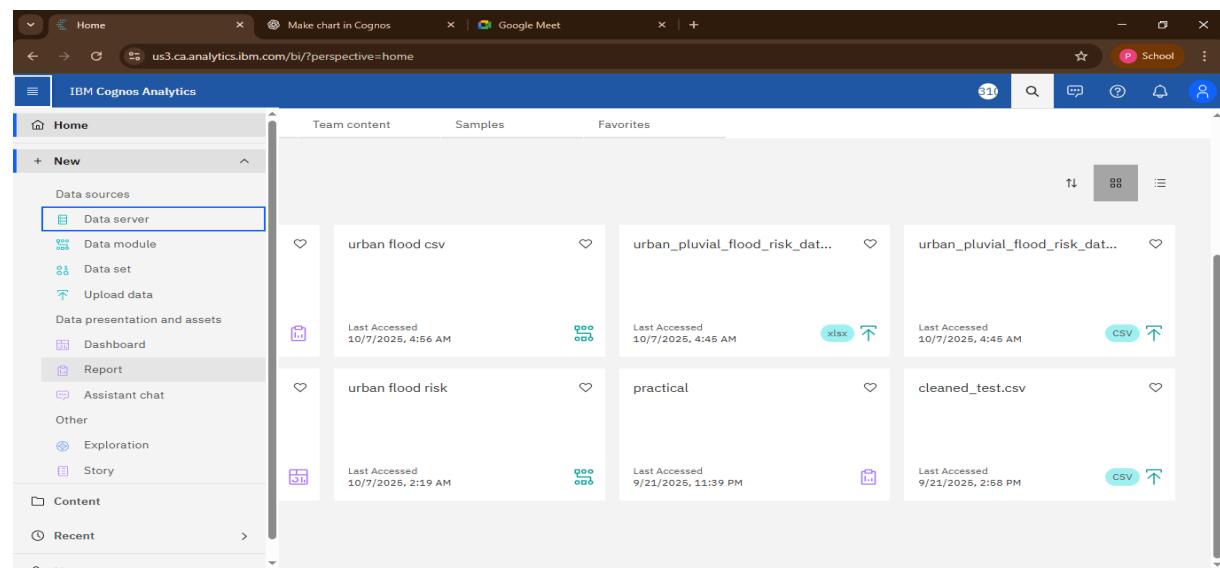
The screenshot shows the 'Data module' screen in IBM Cognos Analytics. The left sidebar has a tree view under 'Data module' with 'New data module' selected. Under 'New data module', there are several items: 'Navigation paths', 'urban_pluvial_flood_risk_dataset.csv', and several specific fields like 'Row Id', 'segment_id', 'city_name', etc. The main area is titled '* New data module' and contains a grid of data. The grid has columns: 'Row Id', 'segment_id', 'city_name', and 'admin_ward'. The data consists of 13 rows, each with a unique 'Row Id' and 'segment_id', and a city name and its administrative ward. The cities listed are Colombo, Sri Lanka; Chennai, India; Ahmedabad, India; Hong Kong, China; Durban, South Africa; Bangkok, Thailand; Nairobi, Kenya; Bangkok, Thailand; Washington DC, USA; Vancouver, Canada; Delhi, India; Athens, Greece; and Sydney, Australia.

| Row Id | segment_id | city_name | admin_ward |
|--------|------------|----------------------|------------|
| 1 | SEG-00001 | Colombo, Sri Lanka | Bc |
| 2 | SEG-00002 | Chennai, India | Wi |
| 3 | SEG-00003 | Ahmedabad, India | Se |
| 4 | SEG-00004 | Hong Kong, China | Se |
| 5 | SEG-00005 | Durban, South Africa | Se |
| 6 | SEG-00006 | Bangkok, Thailand | Bc |
| 7 | SEG-00007 | Nairobi, Kenya | Wi |
| 8 | SEG-00008 | Bangkok, Thailand | Zo |
| 9 | SEG-00009 | Washington DC, USA | Se |
| 10 | SEG-00010 | Vancouver, Canada | Se |
| 11 | SEG-00011 | Delhi, India | Wi |
| 12 | SEG-00012 | Athens, Greece | Di |
| 13 | SEG-00013 | Sydney, Australia | Zo |

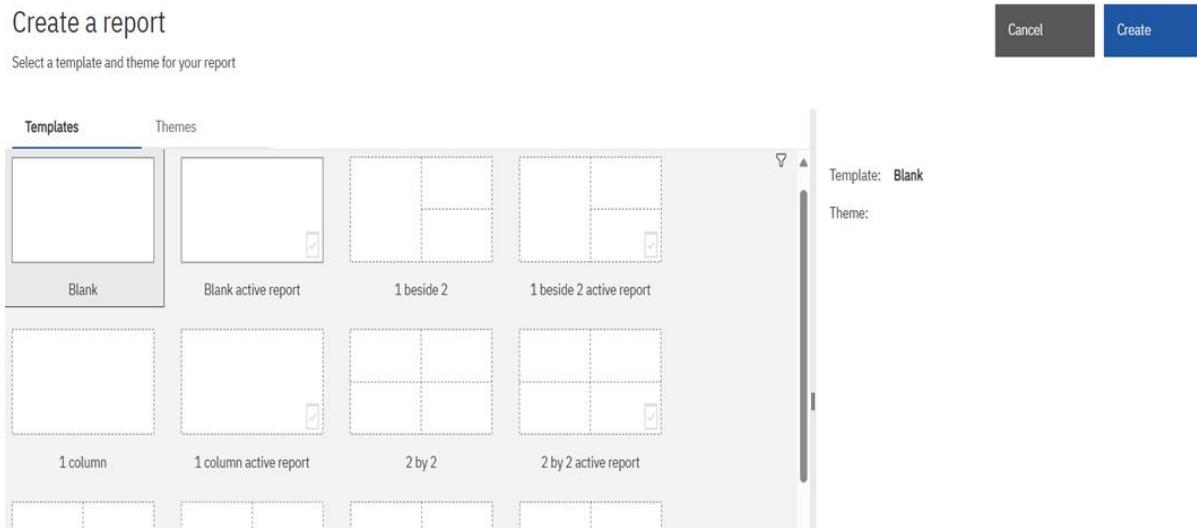
Step 5: Save it in **My content** . Name as **Urban Flood risk** then Click **Save**.



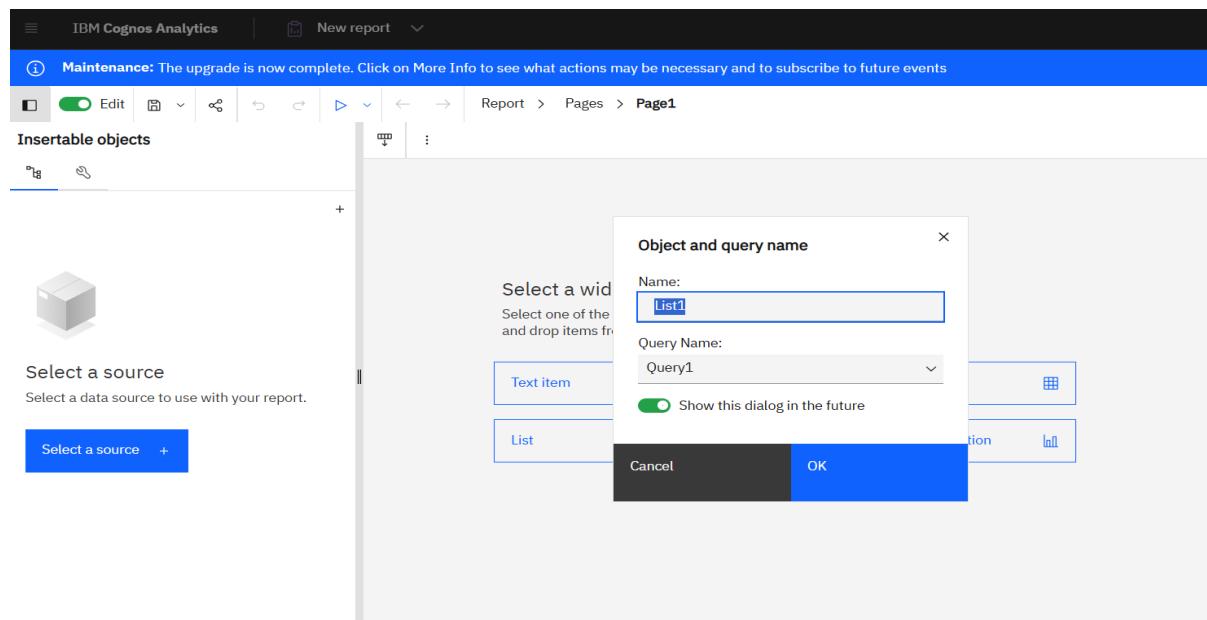
Step 6 : Go to **☰** Then click on **+ New → Report**.



Step 7 : Now we can select a blank template. By clicking on Create option .

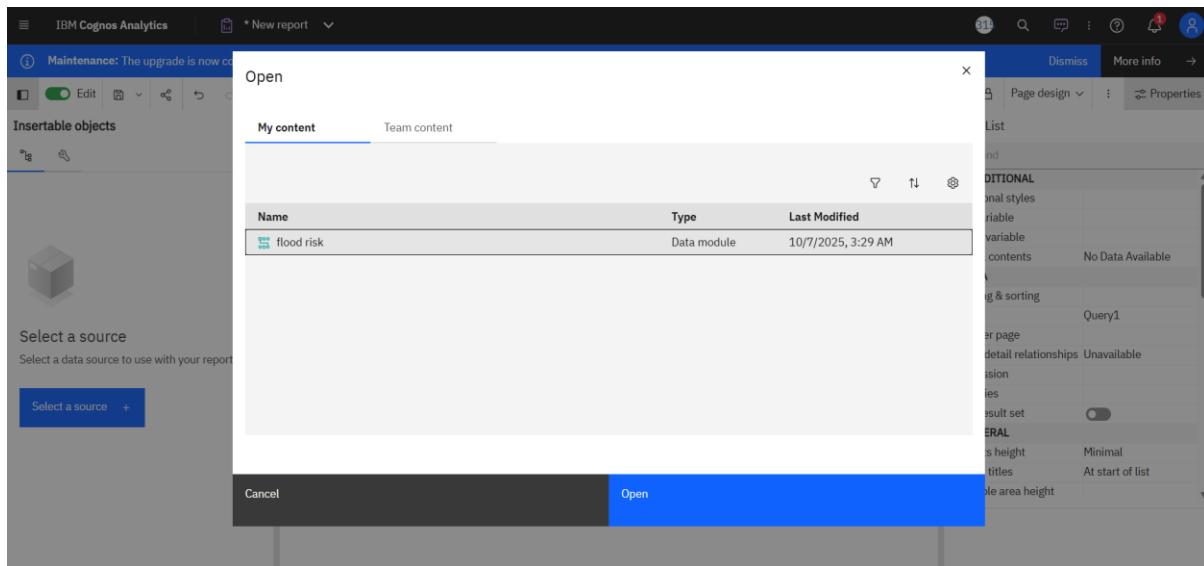


Step 8 : Select **List** from Widget type . Pop – up occurs name the list. Then Click **OK**.



Step 9: Click on Select a source and add data from **My Content**.

Click on **Open**.



Step 10: Add required columns by double clicking on it

Catchment_id , city_name , elevation_m and risk_labels.

The screenshot shows the report authoring interface in IBM Cognos Analytics. In the 'Insertable objects' pane, a dataset named 'urban_pluvial_flood_risk_dataset.csv' is selected. The 'List' pane on the right displays the columns of the dataset: 'catchment_id', 'city_name', 'elevation_m', and 'risk_labels'. The 'Find' search bar is located at the top of the list pane.

Step 11: Rename Column Headers

Click each column header → go to **Data item** → **rename** columns Rename them:

- a. **Catchment ID**
- b. **City Name**
- c. **Average Elevation (m)**
- d. **Flood Risk Label**

The screenshot shows a report titled "Catchment-Wise Flood Risk Report". The table has four columns: "Catchment ID", "City Name", "Average Elevation (m)", and "Flood Risk Label". The "Catchment ID" column header is selected and highlighted in yellow. The Properties panel on the right shows the "Name" field set to "Catchment ID".

Step 12:

1. To sort:

Right-click on a city column → **Sort** → **Ascending**.

The screenshot shows a report titled "Catchment-Wise Flood Risk Report". A context menu is open over the "Catchment ID" column header, with the "Sort in Layout" option selected. The submenu shows "Ascending" as the current selection. Other options include "Descending", "Don't sort", and "Edit layout sorting...".

2. To apply color or highlight

Click column → Properties → Data Style → Change color to improve readability.

The screenshot shows the Microsoft Power BI Data Editor interface. A table titled "Catchment-Wise Flood Risk Report" is displayed. The first column, "City Name", is selected and highlighted with a yellow background. A color palette dialog is open over the table, allowing the user to change the color of the selected column. The dialog shows a preview of the yellow color and its corresponding RGB values: Red: 254, Green: 206, Blue: 15. The saturation and brightness are also displayed as 94% and 100% respectively. The color palette includes basic colors, a color swatch, and a custom color section.

Step 13: Apply Grouping

If you want each **city** to its catchments:

1. Right column → click on **Group**.
2. Now all catchments within a city will be grouped together visually.

The screenshot shows the Microsoft Power BI Data Editor interface. A table titled "Catchment-Wise Flood Risk Report" is displayed. A context menu is open over the "City Name" column header, specifically over the first row cell. The menu is titled "Group / Ungroup" and contains the instruction "Group or ungroup selected data in a list." The menu has a dark gray background with white text.

Step 14: Add a Title to the Report

1. Click on the **Page Header** area.
2. Insert a **Text Item** → type:

"Catchment-Wise Flood Risk Report"

3. Center and bold it for clarity.

The screenshot shows the IBM Cognos Analytics interface. A report titled "Catchment-Wise Flood Risk Report" is open. In the top left, there's a toolbar with various icons. Below it is a ribbon menu with sections like "Edit", "Report", "Pages", and "Page1". On the left side, there's a sidebar titled "Insertable objects" with categories like "Pinned", "Text Item", "Block", "Table", "List", "Crosstab", and "Visualization". The main workspace contains the report title and some placeholder data in a table.

Step 15: Save the Report

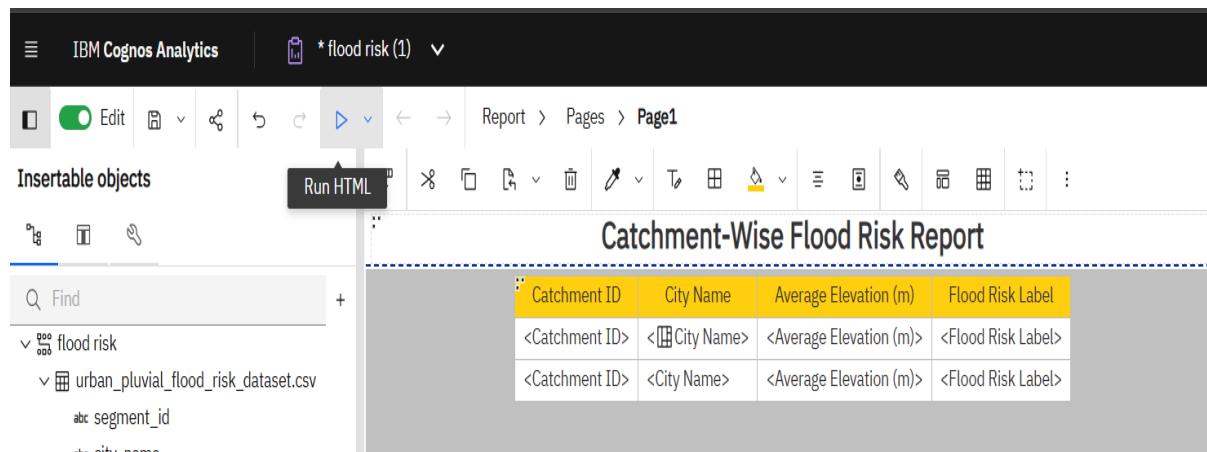
Click **File** → **Save As**.

Choose a location in your **My Content** folder

The screenshot shows the "Save as" dialog box. At the top, it says "Save as" and has a "Name" field containing "flood risk (1)". Below that, it says "Selected destination: My content" and shows a "My content" tab selected. To the right, there's a list of existing items in the "My content" folder, including "flood risk", "flood risk (1)", "flood risk (2)", "Flood Risk 3", and "New report". At the bottom of the dialog are "Cancel" and "Save" buttons.

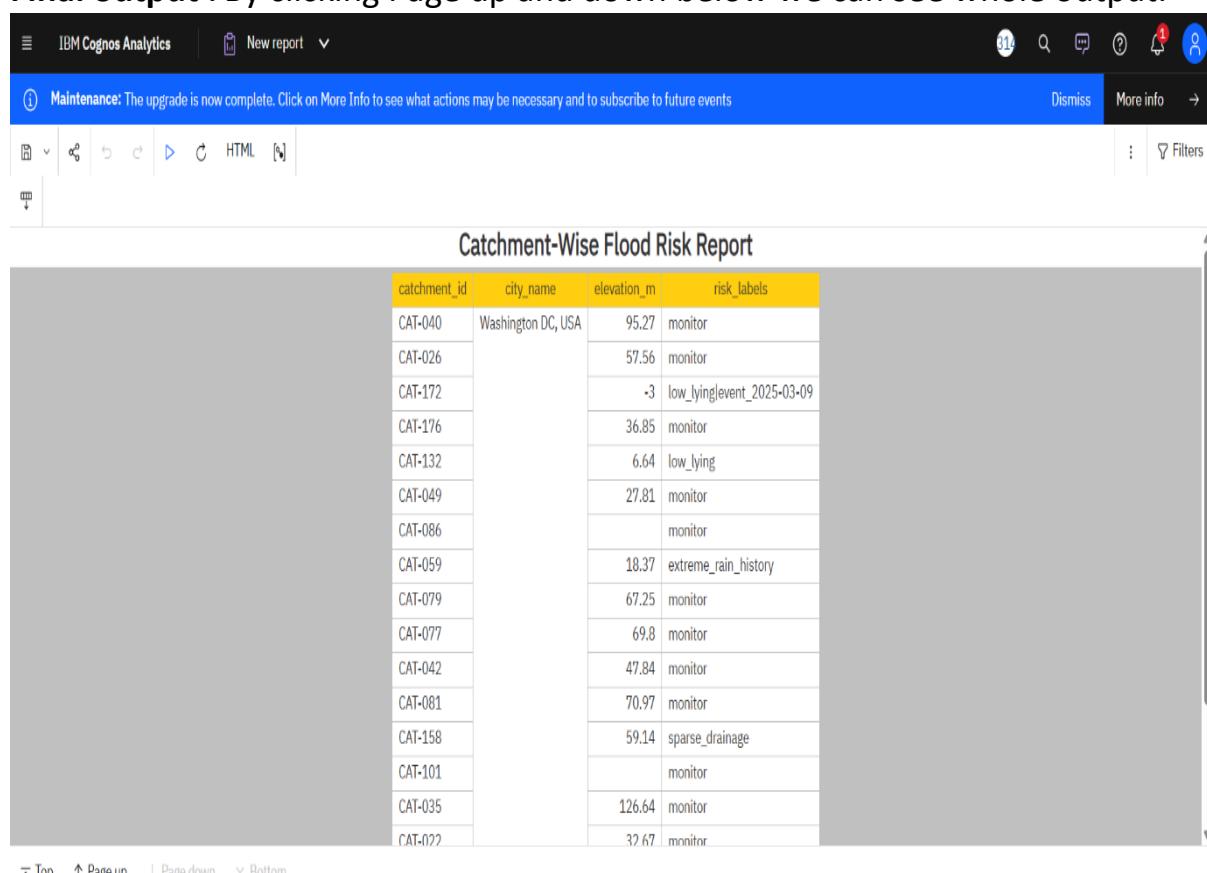
Step 16: Run the Report

1. Click the **Run** icon (▶) on the top toolbar.
2. Choose a format:
HTML → for interactive view.



The screenshot shows the IBM Cognos Analytics interface. The top navigation bar displays "IBM Cognos Analytics" and a report titled "* flood risk (1)". The toolbar includes various icons for editing, saving, and running reports. A dropdown menu above the toolbar has "Run HTML" selected. Below the toolbar is a section titled "Insertable objects" containing a search bar and a list of items under "flood risk". The main content area is titled "Catchment-Wise Flood Risk Report" and contains a table with four columns: "Catchment ID", "City Name", "Average Elevation (m)", and "Flood Risk Label". The table has three rows, each with placeholder text for the respective columns.

Final output : By clicking Page up and down below we can see whole output.



The screenshot shows the final output in the IBM Cognos Analytics viewer. The top navigation bar indicates a maintenance upgrade is complete. The toolbar includes icons for edit, save, run, and HTML format, with "HTML" selected. The main content area is titled "Catchment-Wise Flood Risk Report" and displays a table with four columns: "catchment_id", "city_name", "elevation_m", and "risk_labels". The table contains 22 rows of data. At the bottom of the table, there are navigation links for "Top", "Page up", "Page down", and "Bottom".

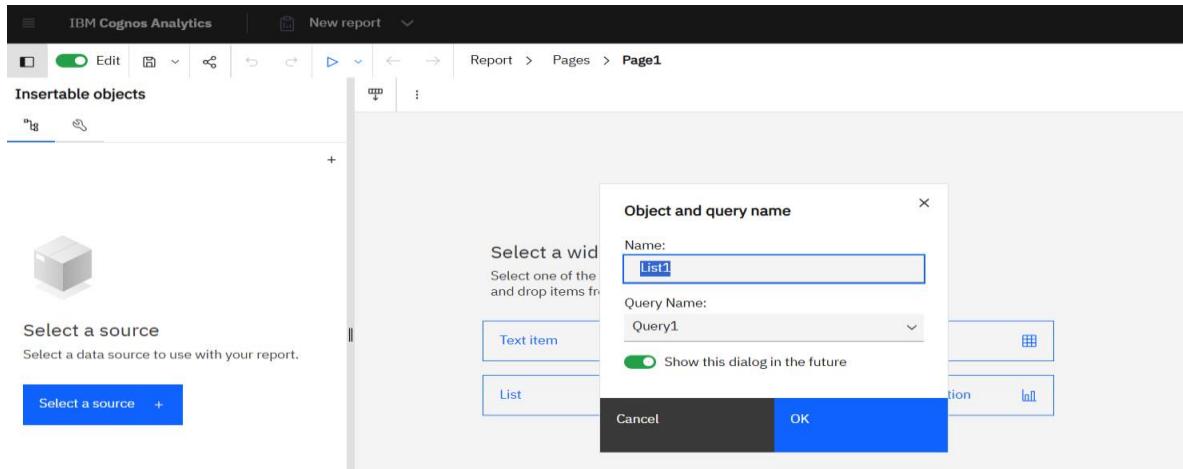
| catchment_id | city_name | elevation_m | risk_labels |
|--------------|--------------------|-------------|-----------------------------|
| CAT-040 | Washington DC, USA | 95.27 | monitor |
| CAT-026 | | 57.56 | monitor |
| CAT-172 | | -3 | low_living event_2025-03-09 |
| CAT-176 | | 36.85 | monitor |
| CAT-132 | | 6.64 | low_living |
| CAT-049 | | 27.81 | monitor |
| CAT-086 | | | monitor |
| CAT-059 | | 18.37 | extreme_rain_history |
| CAT-079 | | 67.25 | monitor |
| CAT-077 | | 69.8 | monitor |
| CAT-042 | | 47.84 | monitor |
| CAT-081 | | 70.97 | monitor |
| CAT-158 | | 59.14 | sparse_drainage |
| CAT-101 | | | monitor |
| CAT-035 | | 126.64 | monitor |
| CAT-022 | | 32.67 | monitor |

Project

Problem Statement-2 : List wards with their storm drain proximity and flood risk level to identify high-risk areas needing infrastructure improvement.

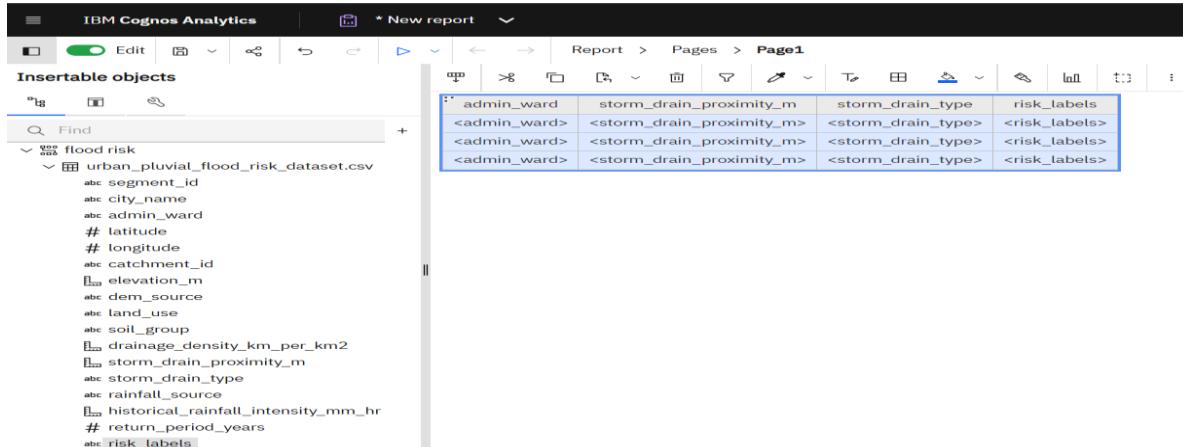
Solution : Strom Drain Proximity vs Flood Risk.

Step 1: Select List from Widget type. Pop – up occurs name the list. Then Click OK.



Step 2: Add required columns by double clicking on it

**admin_ward ,storm_drain_proximity_m,
storm_drain_type ,risk_labels**



Step 3: click each column header → **Rename Column Title**

Admin Ward

Distance to Nearest Storm Drain (m)

Storm Drain Type

Flood Risk Label

The screenshot shows a report editor interface with a toolbar at the top. Below the toolbar is a table with four columns. The fourth column, 'Flood Risk Label', has its header selected and is highlighted with a blue border. To the right of the table, there is a 'Properties' panel. In the 'Properties' panel, under the 'Data Item' section, the 'Name' field is set to 'Flood Risk Label' and the 'Expression' field contains the expression '[C].[C_flood_risk].[ur...]'.

Step 4: Format storm_drain_proximity_m

Right-click the `storm_drain_proximity_m` column → **Data Format** → **Number Format**

The screenshot shows a 'Data format' dialog box. The 'Format type:' dropdown is set to 'Number'. On the right side, there is a list of properties: 'Number of decimal places', 'Decimal separator', 'Scale', 'Negative sign symbol', 'Negative sign position', 'Use thousands separator', 'Thousands separator', 'Group size (digits)', 'Secondary group size (digits)', and 'Maximum number of digits'. At the bottom of the dialog box are two buttons: 'Cancel' and 'OK', with 'OK' being highlighted in blue.

Step 5: Group & sort

By ward: Right-click admin_ward → . This clusters each ward and its catchments.

A screenshot of a report interface showing a context menu for the 'Admin Ward' column. The menu items are:

- Group / Ungroup
- Group or ungroup selected data in a list.

Sort by proximity: Right-click storm_drain_proximity_m → Sort → Ascending

A screenshot of a report interface showing a context menu for the 'Distance to Nearest Storm Drain' column. The menu item 'Sort in Layout' is selected, and a submenu shows:

- Ascending
- Descending
- Don't sort

Step 6: Add summaries

To show average distance per ward or count of drains:

1. Click on **Summarize** → **Average**.

A screenshot of a report interface showing a context menu for the 'Distance to Nearest Storm Drain' column. The menu item 'Default summary' is selected, and a submenu shows:

- Total
- Count
- Count distinct
- Average
- Minimum
- Maximum
- Median
- Standard deviation
- Variance
- Calculated
- Custom...

2. For count of records: Summarize admin_ward → Count

The screenshot shows a report builder interface with a toolbar at the top. Below the toolbar is a summary table with several rows. A context menu is open over the third row from the top, which contains the text "Count". The menu includes options like "Total", "Count", "Count distinct", "Average", "Minimum", "Maximum", "Median", "Standard deviation", "Variance", "Calculated", and "Custom...".

Step 7: Add filters

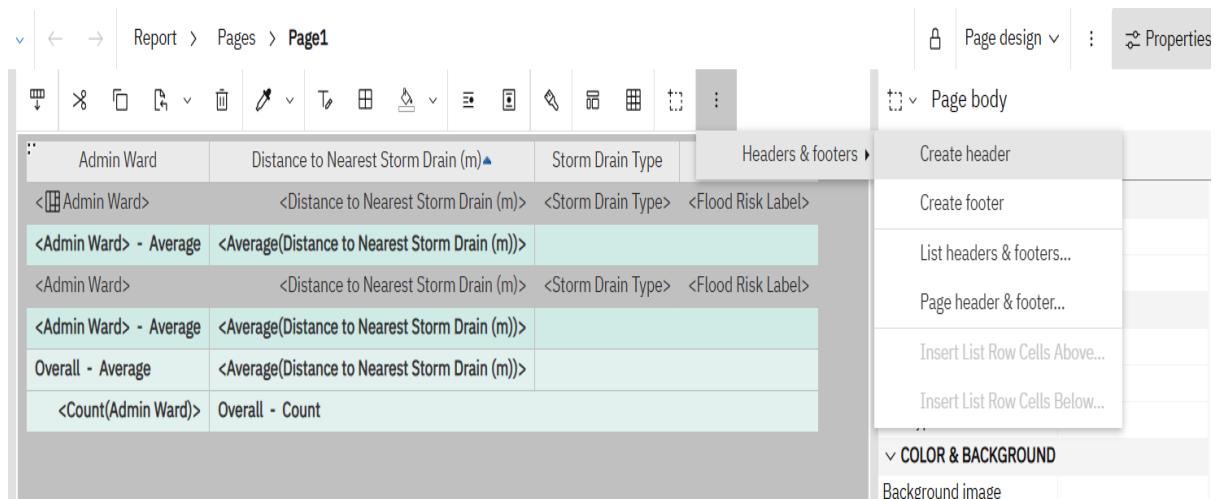
Click the **Filters** icon → **Add filter**.

`storm_drain_proximity_m > 100` to show wards more than 100 m from drains.

The screenshot shows a "Filter condition" dialog box titled "Filter condition - Distance to Nearest Storm Drain (m)". It has two tabs: "Range" (selected) and "Individual". Below the tabs is a dropdown menu "Add a condition" set to "Keep these values". Underneath is a dropdown "Greater than" set to "100". At the bottom are "Cancel" and "OK" buttons.

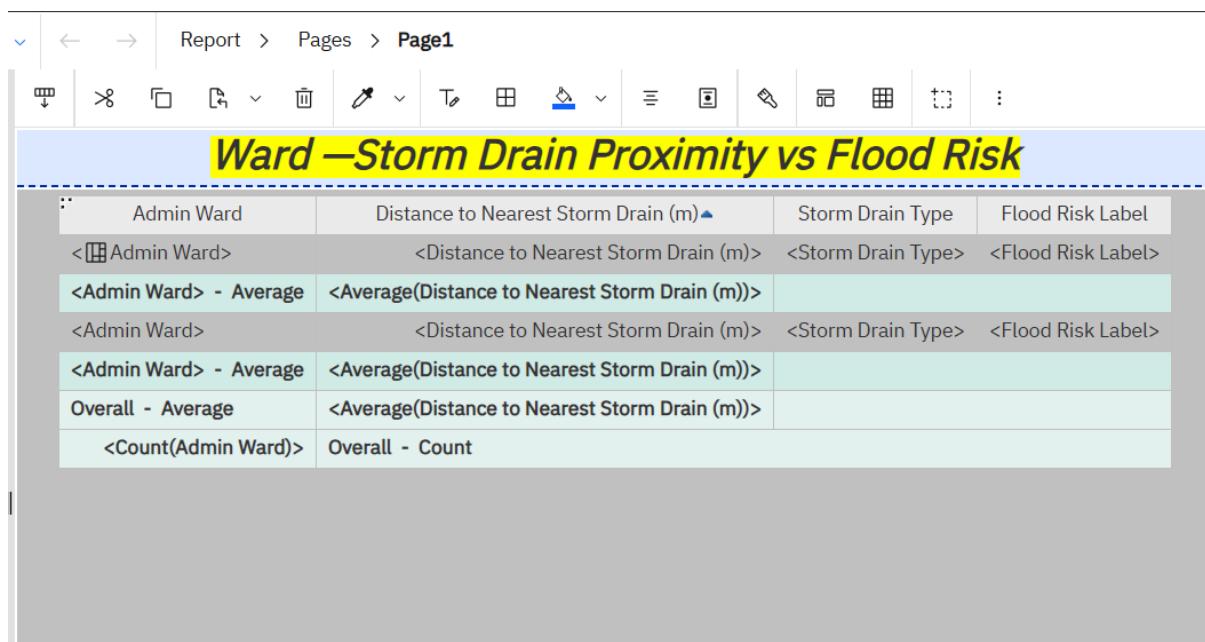
Step 8: Add a clear title

Click the Page Header → Add Text.



The screenshot shows the Microsoft Power BI Report view. The 'Page body' context menu is open, displaying various options for header and footer management. The 'Page design' tab is selected at the top right. The report content below shows a table with columns: Admin Ward, Distance to Nearest Storm Drain (m), Storm Drain Type, and Flood Risk Label. The table contains several rows of data, including summary rows for 'Admin Ward - Average' and 'Overall - Average'.

Title: Ward--Storm Drain Proximity vs Flood Risk

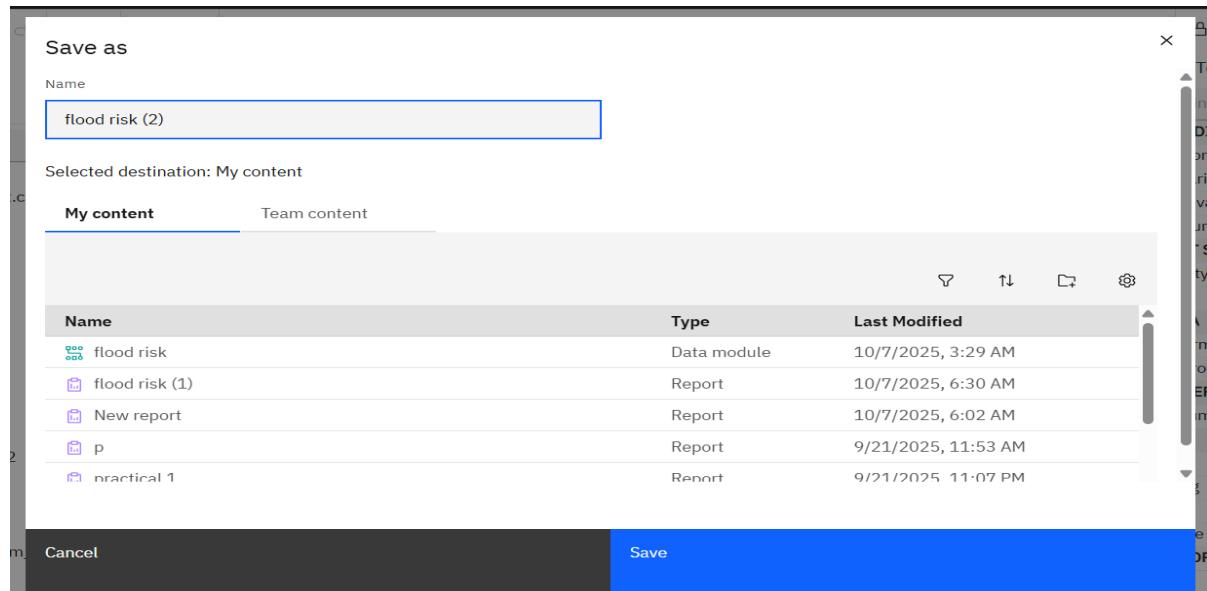


The screenshot shows the Microsoft Power BI Report view. The title 'Ward --Storm Drain Proximity vs Flood Risk' has been added to the page header and is highlighted in yellow. The report content below shows the same table structure as the previous screenshot, with columns: Admin Ward, Distance to Nearest Storm Drain (m), Storm Drain Type, and Flood Risk Label. The table contains several rows of data, including summary rows for 'Admin Ward - Average' and 'Overall - Average'.

Step 9: Save the Report

Click File → Save As.

Choose a location in your **My Content** folder And Run.



Output:

The screenshot shows a software interface with a blue header bar. The header contains a message: 'Maintenance: The upgrade is now complete. Click on More Info to see what actions may be necessary and to subscribe to future events' with a 'Dismiss' button, and 'More info' with a right arrow. Below the header is a toolbar with icons for search, refresh, and file operations. The main area features a table titled 'Ward - Storm Drain Proximity vs Flood Risk'. The table has columns: 'admin_ward', 'storm_drain_proximity_m', 'storm_drain_type', and 'risk_labels'. The data is grouped by 'admin_ward'. For 'Zone VIII', there are seven rows with values: 183.5 (Manhole, extreme_rain_history), 240.7 (OpenChannel, sparse_drainage|event_2022-09-20), 287.2 (OpenChannel, low_lying), 528.1 (None, sparse_drainage), 665.9 (Manhole, monitor), 689.3 (GratedInlet, monitor), and 1,029.7 (CurbInlet, monitor). For 'Zone VIII - Average', there is one row with a value of 527.88181818. For 'Zone X', there are six rows with values: 129.6 (OpenChannel, ponding_hotspot|extreme_rain_history|low_lying|event_2024-02-13), 145.7 (CurbInlet, low_lying), 146.9 (GratedInlet, low_lying|sparse_drainage|event_2023-11-02), 208.8 (None, ponding_hotspot|low_lying), 233.8 (Manhole, ponding_hotspot|low_lying), and 304.4 (None, low_lying). At the bottom left, there are navigation links: 'Top', 'Page up', 'Page down', and 'Bottom'. At the bottom right, there is a vertical scroll bar.

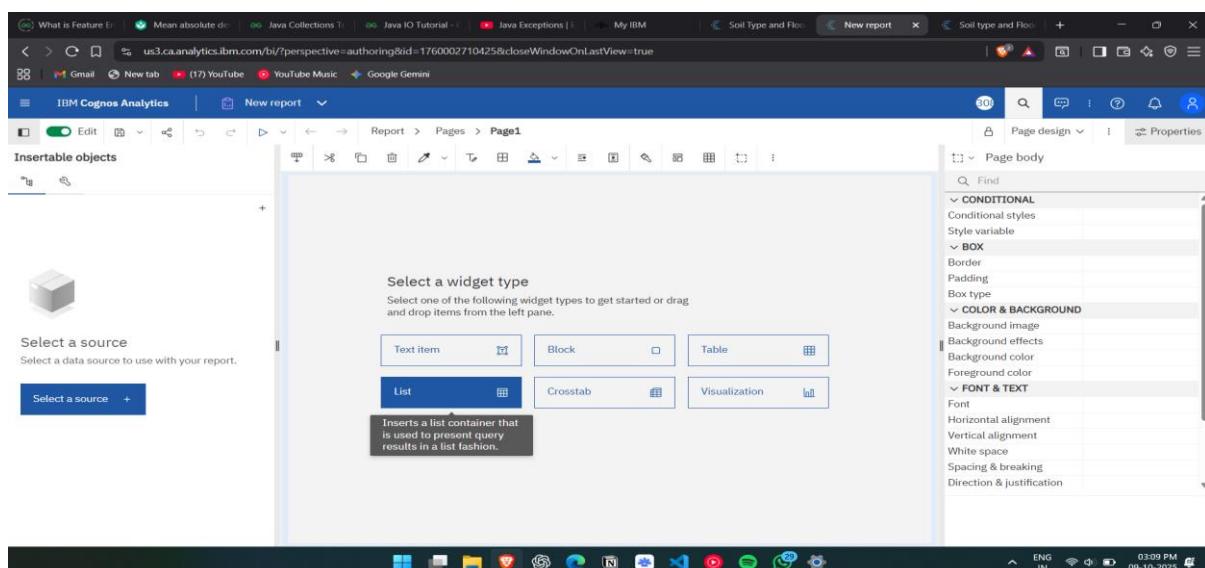
PROJECT

Problem Statement-3 : “Analyzing ward-wise flood risk based on soil type for targeted mitigation. Identifying vulnerable areas to support effective urban planning and disaster management.”

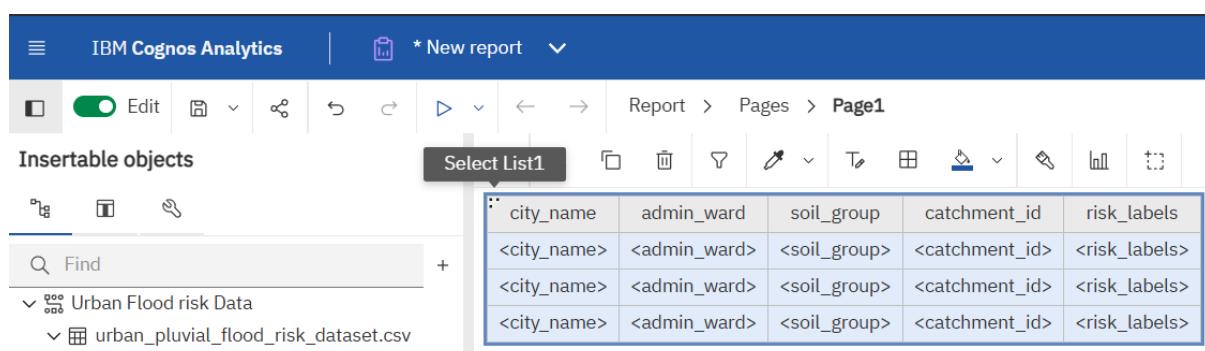
SOLUTION: Soil type and flood risk by ward List Report.

Step 1: Go to  Then click on **+ New → Report**.

Now we can select a **List** template.



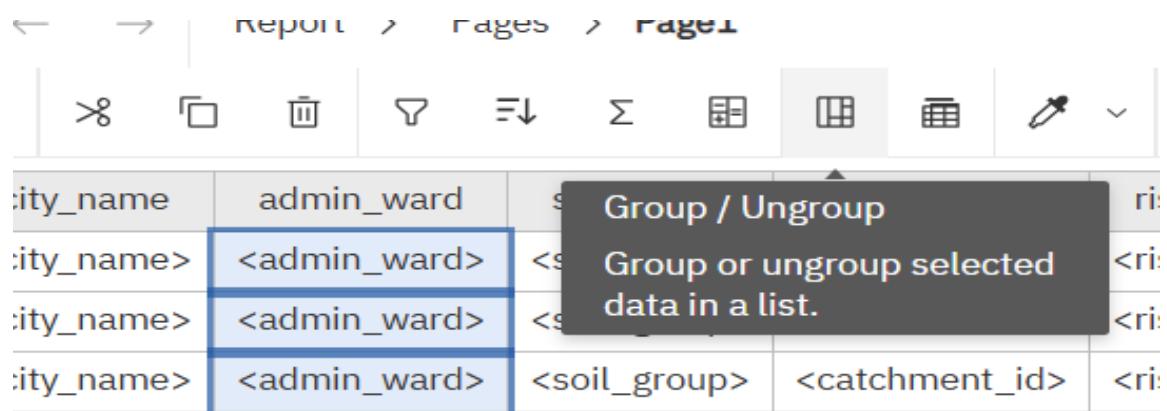
Step 2: Add required **columns** by dragging following fields in list: **city_name , admin_ward, soil_, catchment_id and risk_labels**.



The screenshot shows the IBM Cognos Analytics interface with the 'Report' tab selected. On the left, the 'Insertable objects' pane shows a 'Select List1' button. Below it, a table is displayed with five columns: city_name, admin_ward, soil_group, catchment_id, and risk_labels. Each row contains placeholder text: '<city_name>', '<admin_ward>', '<soil_group>', '<catchment_id>', and '<risk_labels>'. The table has a blue border. The top navigation bar includes 'Edit', 'Report', 'Pages', and 'Page1'.

Step 3: Grouping:

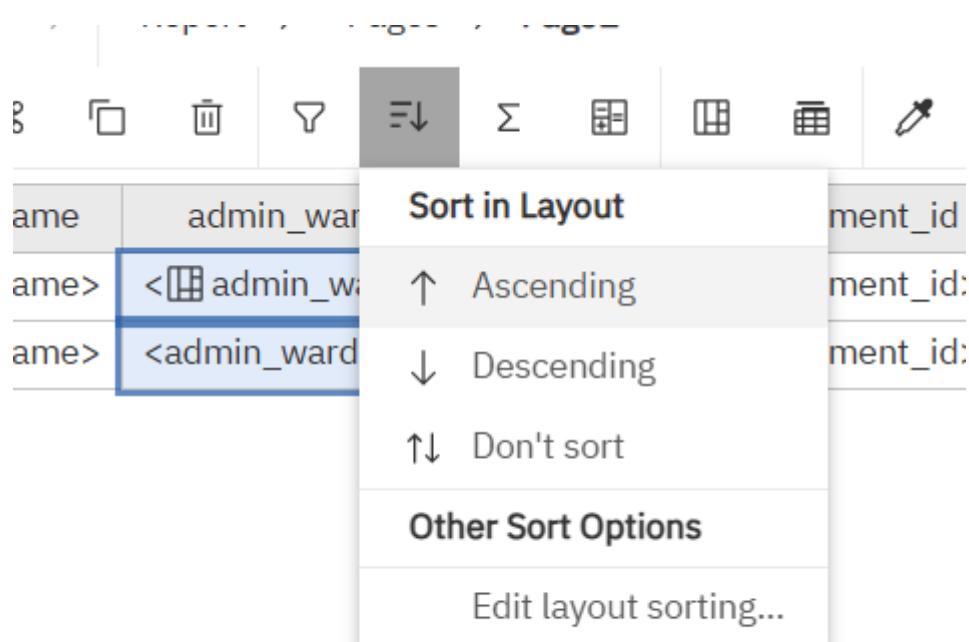
Select the **admin_ward** column then click on **Group** option.



| city_name | admin_ward | soil_group | catchment_id |
|-------------|--------------|--------------|----------------|
| :city_name> | <admin_ward> | <soil_group> | <catchment_id> |
| :city_name> | <admin_ward> | <soil_group> | <catchment_id> |
| :city_name> | <admin_ward> | <soil_group> | <catchment_id> |

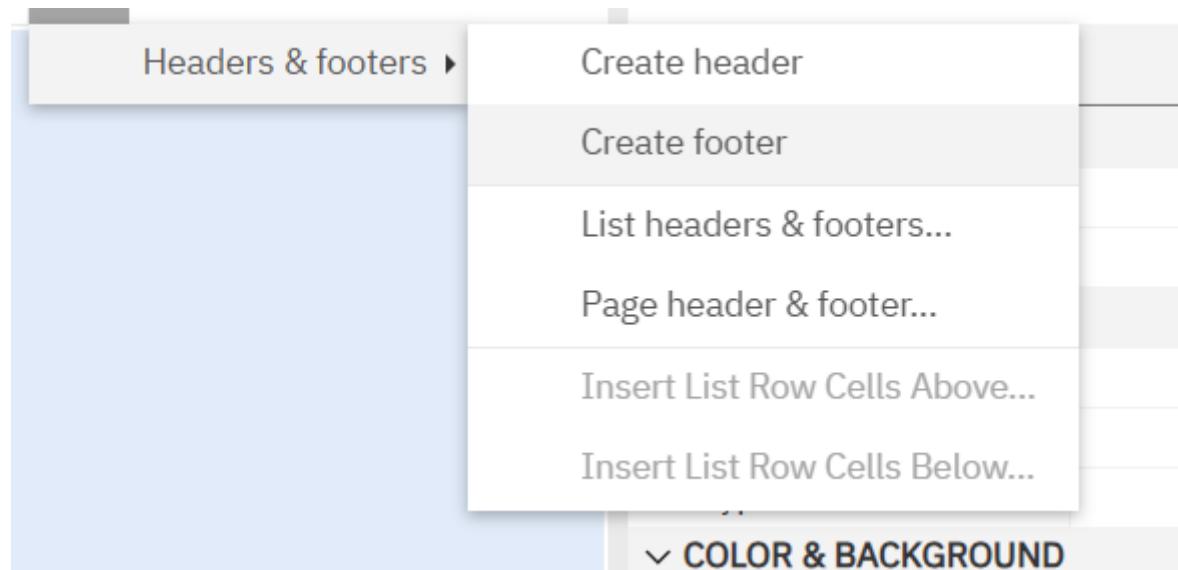
Step 4: Sorting By Ascending:

Click on **admin_ward** and **soil_group** then go to **Sorting** and then click on **Ascending**.

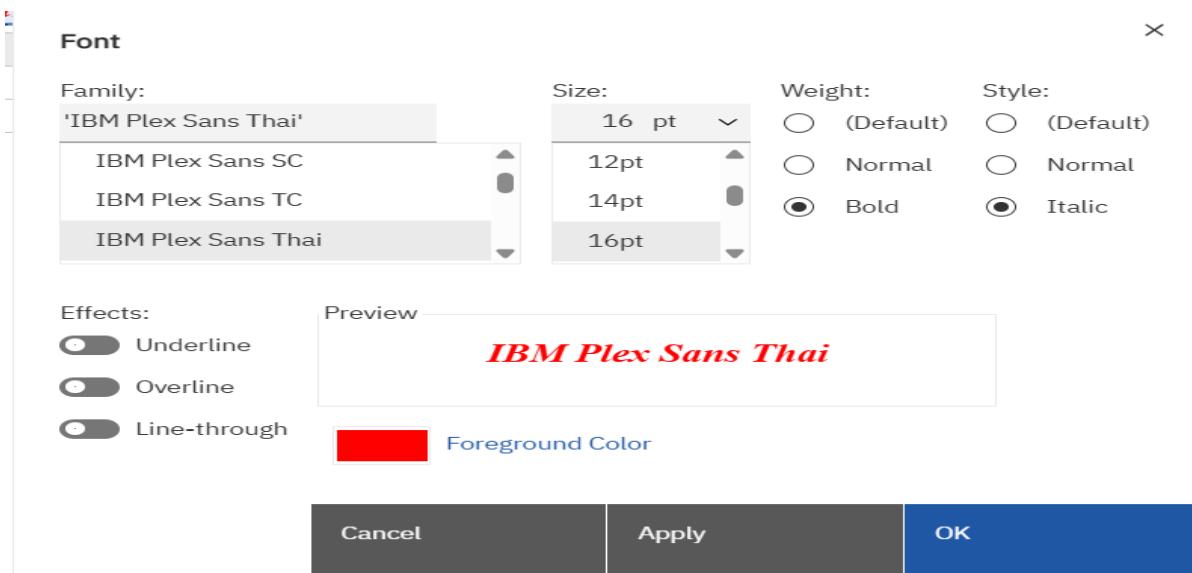


| name | admin_ward | soil_group | catchment_id |
|-------|--------------|--------------|----------------|
| :ame> | <admin_ward> | <soil_group> | <catchment_id> |
| :ame> | <admin_ward> | <soil_group> | <catchment_id> |

Step 5: Click on three dots on top Right corner -> **header & footer** -> Page header & Footer.



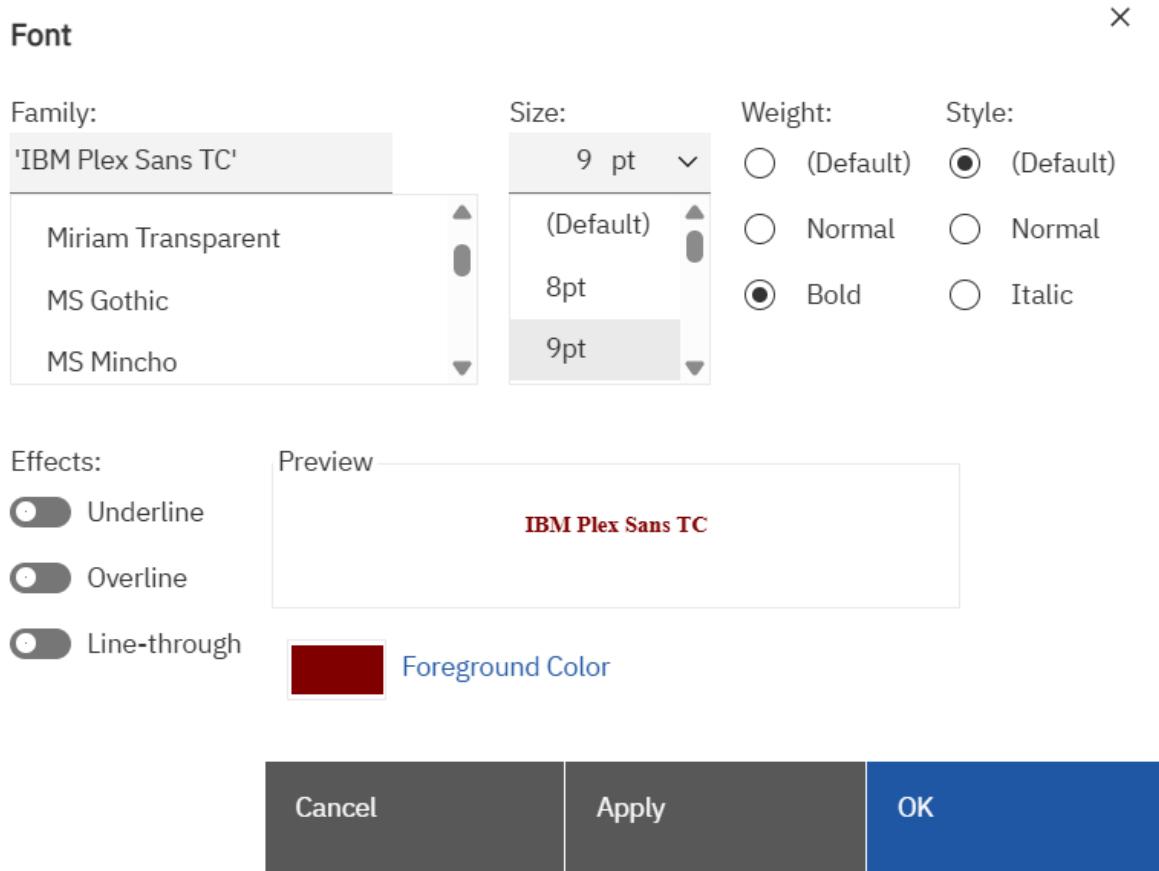
Step 6: After creating **Heading** Change its **font , size** etc . Click on **OK**.



You can see the header here.

| <i>Soil Type and Flood Risk by ward</i> | | | | |
|--|--------------|--------------|----------------|---------------|
| city_name | admin_ward▲ | soil_group▲ | catchment_id | risk_labels |
| <city_name> | <admin_ward> | <soil_group> | <catchment_id> | <risk_labels> |
| <city_name> | <admin_ward> | <soil_group> | <catchment_id> | <risk_labels> |

Step 7: Changing the **font** and changing the colour of each **columns heading**, apply and then click apply and **OK**.



Step 8: Now save the report and run it.

Soil Type and Flood Risk by ward

| city_name | admin_ward▲ | soil_group▲ | catchment_id | risk_labels |
|-------------|--------------|--------------|----------------|---------------|
| <city_name> | <admin_ward> | <soil_group> | <catchment_id> | <risk_labels> |
| <city_name> | <admin_ward> | <soil_group> | <catchment_id> | <risk_labels> |

Output:

Soil Type and Flood Risk by ward

| city_name | admin_ward | soil_group | catchment_id | risk_labels |
|---------------------------|-----------------|------------|--------------|--|
| Accra, Ghana | Borough Central | A | CAT-026 | monitor |
| Ho Chi Minh City, Vietnam | | A | CAT-170 | monitor |
| Washington DC, USA | | A | CAT-022 | monitor |
| Lima, Peru | | A | CAT-017 | low_lying |
| Lagos, Nigeria | | A | CAT-017 | extreme_rain_history |
| Buenos Aires, Argentina | | A | CAT-136 | monitor |
| Mumbai, India | | A | CAT-089 | low_lying |
| Hanoi, Vietnam | | A | CAT-015 | monitor |
| Bogotá, Colombia | | A | CAT-094 | monitor |
| New Orleans, USA | | A | CAT-135 | monitor |
| Seoul, South Korea | | A | CAT-087 | monitor |
| Washington DC, USA | | A | CAT-138 | monitor |
| Amsterdam, Netherlands | | A | CAT-056 | low_lying |
| Vancouver, Canada | | B | CAT-084 | low_lying sparse_drainage event_2025-04-11 |
| New York, USA | | B | CAT-025 | low_lying |
| Lima, Peru | | B | CAT-091 | monitor |

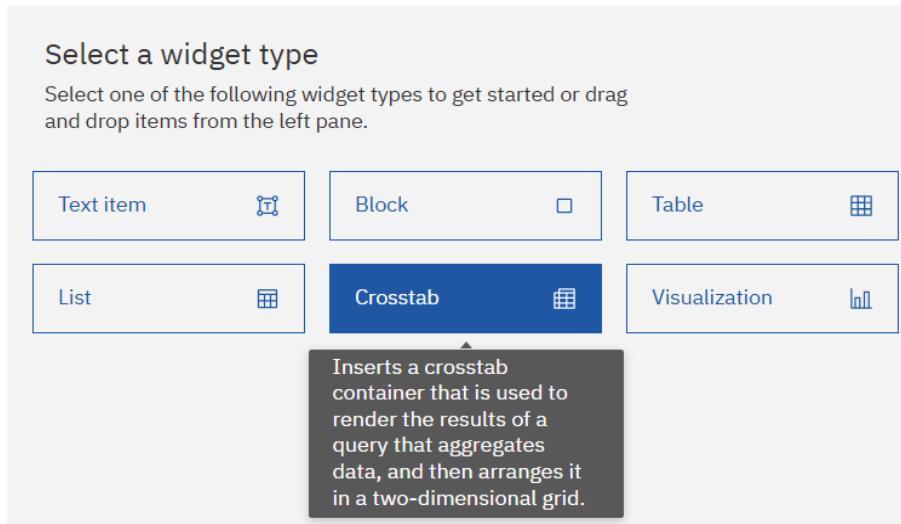
↖ Top ⏪ Page up ⏩ Page down ⏹ Bottom

PROJECT

PROBLEM STATEMENT-4: To study how flood risk levels vary across different land use types using elevation data to identify areas more prone to flooding.

SOLUTION: Risk level distributions by land use (using elevation).

Step 1: Choose **Crosstab** template



Step 2: Place fields into the Crosstab

- Drag **Rows** → `land_use`
- Drag **Columns** → `risk_labels`
- Drag **Measure / Cells** → `elevation_m`

The screenshot shows a data visualization interface with a toolbar at the top and a main workspace below. In the workspace, there is a Crosstab component with three columns. The first column is labeled `elevation_m`, the second is `<#risk_labels#>`, and the third is also `<#risk_labels#>`. The second and third columns each contain two rows, both labeled `<#land_use#>` and `<#1234#>`.

Insertable objects

- Urbanflood
- urban_pluvial_flood_risk_dataset.csv
- segment_id
- city_name
- admin_ward
- latitude
- longitude
- catchment_id
- elevation_m
- dem_source
- land_use
- soil_group

Step 3: Set the Aggregation

- Click inside the **cell (measure area)** of the Crosstab
- Click on **summarize** the cell → Count.
- Now, the Crosstab will show **count of records** (number of segments) for each land use & risk level combination.

The screenshot shows a Microsoft Power BI interface with a crosstab visualization. The crosstab has two columns: 'elevation_m' and '<#risk_labels>'. The cell at the intersection of the first row and second column is selected and has a summary dropdown menu open. The menu is titled 'Default summary' and includes the following options: Total (selected), Count (highlighted in grey), Count distinct, Average, Minimum, and Maximum. The 'Count' option is currently selected.

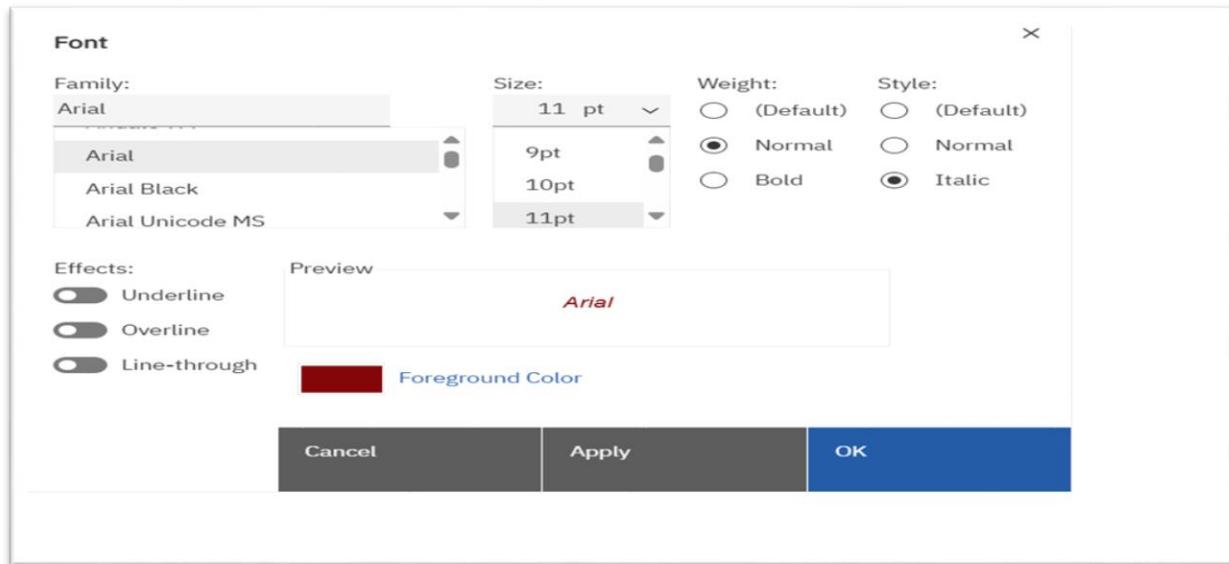
Step 4: Add Totals

- click the **row header** (land_use) → **Summarize→ Total**.
- click the **column header** (risk_labels) → **Summarize → Total**.

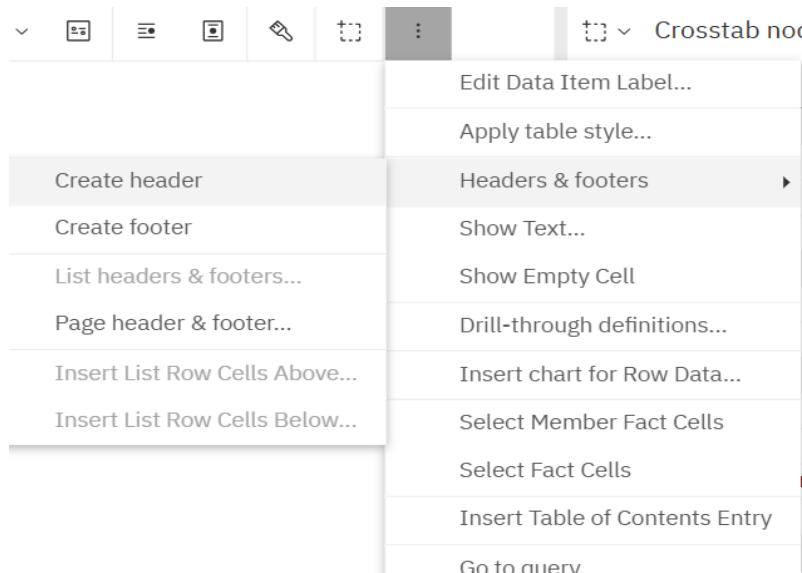
The screenshot shows the same Microsoft Power BI interface after adding totals. The crosstab now includes four additional rows at the bottom: 'Total' (under elevation_m) and 'Count' (under risk_labels). The 'Total' row under 'elevation_m' has a value of '4#>'. The 'Count' row under 'risk_labels' also has a value of '4#>'. The rest of the crosstab remains the same as in the previous step.

Step 5: Add Formatting → click Font (in the toolbar).

- Family - Arial
- Size - 11pt
- Weight – Normal
- Style – italic



Step 6: Go to toolbar then click 3 dots then select Headers & footers select Create Header

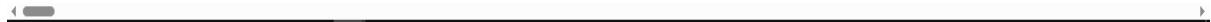


OUTPUT:



Risk level distributions by land use

| elevation_m | ponding_hotspot[extreme_rain_history]\low_lying\event_2024-09-25 | low_lying | ponding_hotspot[extreme_rain_history]\event_2022-10-11 | ponding_hotspot[low_lying]\event_2024-07-21 | extreme_rain_history |
|----------------------|--|-----------|--|---|----------------------|
| Residential | 3.29 | 159.14 | | | 1,283.7 |
| Roads | | 157.14 | | 0.17 | 977.5 |
| Informal | | 0.62 | | | 31.2 |
| Industrial | | 155.99 | | | 545.1 |
| Mixed | | 14.94 | | | 124.9 |
| Green | | 65.98 | | | 328.3 |
| Water | | 32.32 | | | 19. |
| Commercial | | 114.25 | | | 766.5 |
| Institutional | | 17.38 | | | 173.2 |
| Total | 3.29 | 717.76 | | 0.17 | 4,250.4 |
| Count | | 1 | 9 | 0 | 1 |

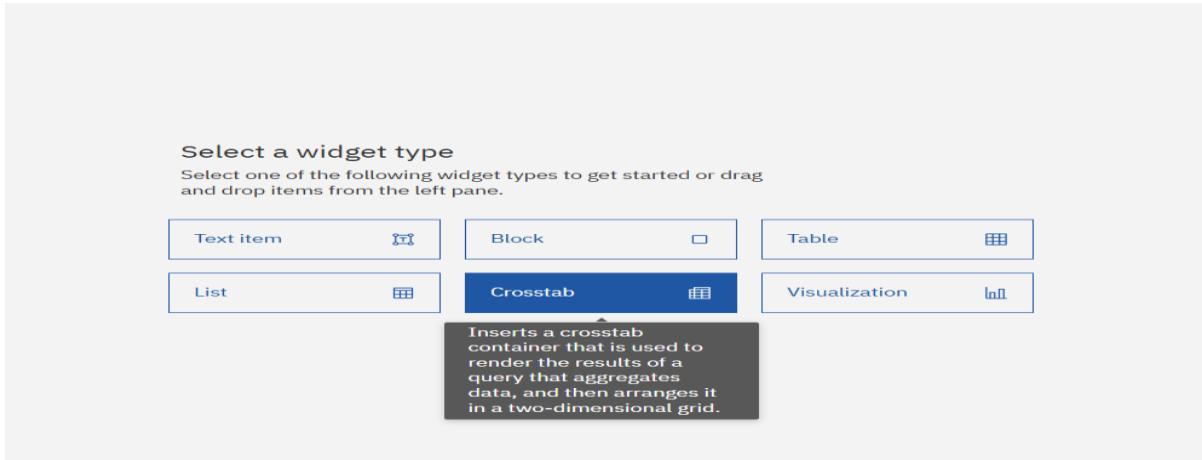


PROJECT

PROBLEM STATEMENT- 5: “Analyzing how storm drain types and their proximity influence city-wise flood risk to guide urban flood management.”

SOLUTION: Impact of Storm Drain Type and Proximity on Flood Risk by City.

Step 1: Choose the Crosstab template.



Step 2: Place fields into the Crosstab

- Drag **Rows** → city_name
- Drag **Columns** → storm_drain_type
- Drag **Measure / Cells** → storm_drain_proximity_m

Insertable objects

storm_drain_proximity_m storm_drain_type historical_rainfall_intensity_mm_hr

| storm_drain_proximity_m | <#storm_drain_type#> | <#storm_drain_type#> |
|-------------------------|----------------------|----------------------|
| <#city_name#> | <#1234#> | <#1234#> |
| <#city_name#> | <#1234#> | <#1234#> |

Step 3: summarization

- Drag `storm_drain_proximity_m` into the **Measures** area.
- Click **summary** → **Average**.

The screenshot shows the Tableau interface with a blue header bar labeled "report". Below it is a navigation bar with "Report > Pages > Page1". The main workspace contains a data view with two rows of data. The first row has the formula `:storm_drain_proximity_m <#storm_drain_proximity_m#>`. The second row has the formula `<#city_name#>`. A context menu is open over the first row, specifically over the "Default summary" button. The menu lists various aggregation options: Total, Count, Count distinct, Average, Minimum, Maximum, Median, Standard deviation, Variance, and Calculated. The "Average" option is highlighted.

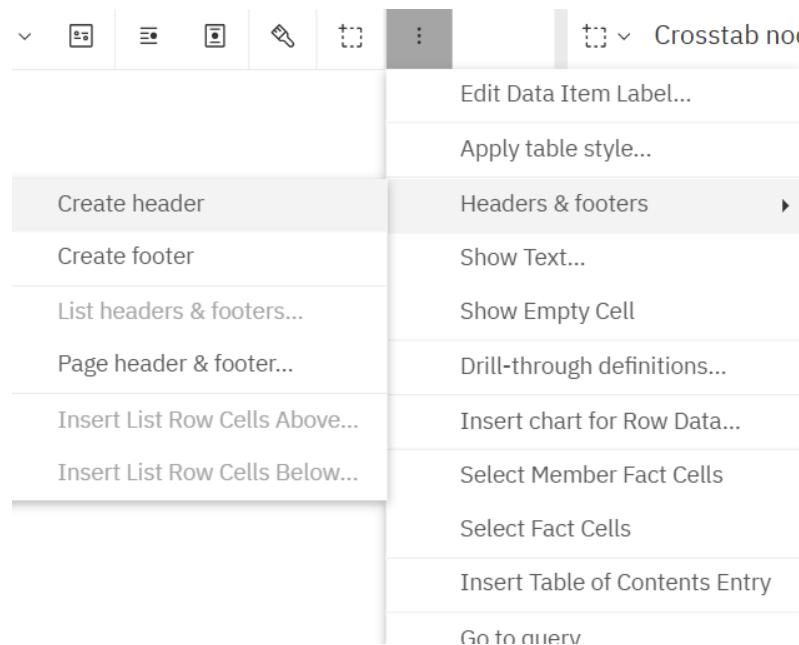
Step 4: Add Sorting

- Right-click on `city_name` → **Sort** → Descending by **High-Risk Count**.

The screenshot shows the Tableau interface with a blue header bar. Below it is a navigation bar with "Report > Pages > Page1". The main workspace contains a data view with three rows of data. The first row has the formula `:storm_drain_proximity_m <#storm_drain_proximity_m#>`. The second row has the formula `<#city_name#>`. The third row has the formula `Average`. A context menu is open over the second row, specifically over the "Sort in Layout" button. The menu lists sorting options: Ascending, Descending (which is highlighted), and Don't sort. Below these are "Other Sort Options" and "Edit layout sorting...".

Step 5: Add Title

Go to toolbar then click on **3 dots** then select **Headers & footers** select **Create Header**

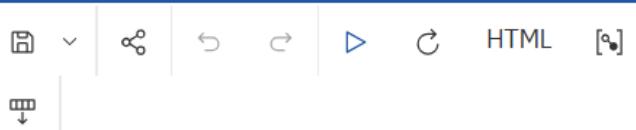


This is the header which we have to write

Impact of Storm Drain Type and Proximity on Flood Risk by City.

| :> storm_drain_proximity_m | <#storm_drain_type#> | Average |
|----------------------------|----------------------|----------|
| city_name | | |
| <#city_name#>▼ | <#1234#> | <#1234#> |
| Average | <#1234#> | <#1234#> |

OUTPUT:



Impact of Storm Drain Type and Proximity on Flood Risk by City.

| storm_drain_proximity_m | CurbInlet | GratedInlet | Manhole | None | OpenChannel | Average |
|-------------------------|-----------|-------------|---------|---------|-------------|-----------------|
| city_name | | | | | | |
| Washington DC, USA | 1,546.5 | 1,208.8 | 1,188.3 | 1,465.2 | 1,965.1 | 1,474.78 |
| Vancouver, Canada | 1,349.3 | 1,869.4 | 1,013.9 | 688.5 | 702.2 | 1,124.66 |
| Tokyo, Japan | 823.2 | 903.1 | 347 | 1,819.9 | 1,306.8 | 1,040 |
| Tehran, Iran | 1,228.1 | 298.6 | 665.6 | 1,140.7 | 2,348.3 | 1,136.26 |
| Taipei, Taiwan | 501 | 942.7 | 941.1 | 112.8 | 604.8 | 620.48 |
| Sydney, Australia | 1,234.9 | 503.5 | 831.9 | | 1,392.7 | 990.75 |
| Singapore, Singapore | 824.2 | 1,083.2 | 2,275.2 | 122.8 | 2,210.7 | 1,303.22 |
| Shenzhen, China | 769.6 | 902.7 | 779.7 | 525.6 | 1,993.2 | 994.16 |
| Shanghai, China | 1,520.7 | 370.8 | 911.4 | 185.8 | 151.2 | 627.98 |
| Seoul, South Korea | 1,577.3 | 902.3 | 1,479.8 | 1,431.5 | 1,681.1 | 1,414.4 |
| Sao Paulo, Brazil | 777.1 | 481.5 | 803.4 | | 790.1 | 713.025 |
| San Francisco, USA | 981.5 | 1,114.5 | 1,301.4 | 527.4 | 2,590.2 | 1,303 |
| Rotterdam, Netherlands | 767.8 | 1,468.6 | 2,917.8 | 887.2 | 1,357.8 | 1,479.84 |
| Rome, Italy | 1,358.9 | 1,027.8 | 1,718.5 | 793.3 | 1,699.8 | 1,319.66 |
| Riyadh, Saudi Arabia | 1,300.7 | 247.3 | 1,054.6 | 450.8 | 1,096.9 | 830.06 |
| Rio de Janeiro, Brazil | 980.9 | 537.7 | 1,400 | 1,207.1 | 1,366.3 | 1,098.4 |

PROJECT

PROBLEM STATEMENT- 6: Analyzing catchment-wise flood risk in relation to drainage density to identify areas prone to flooding."

SOLUTION: Drainage density v/s flood risk by catchment.

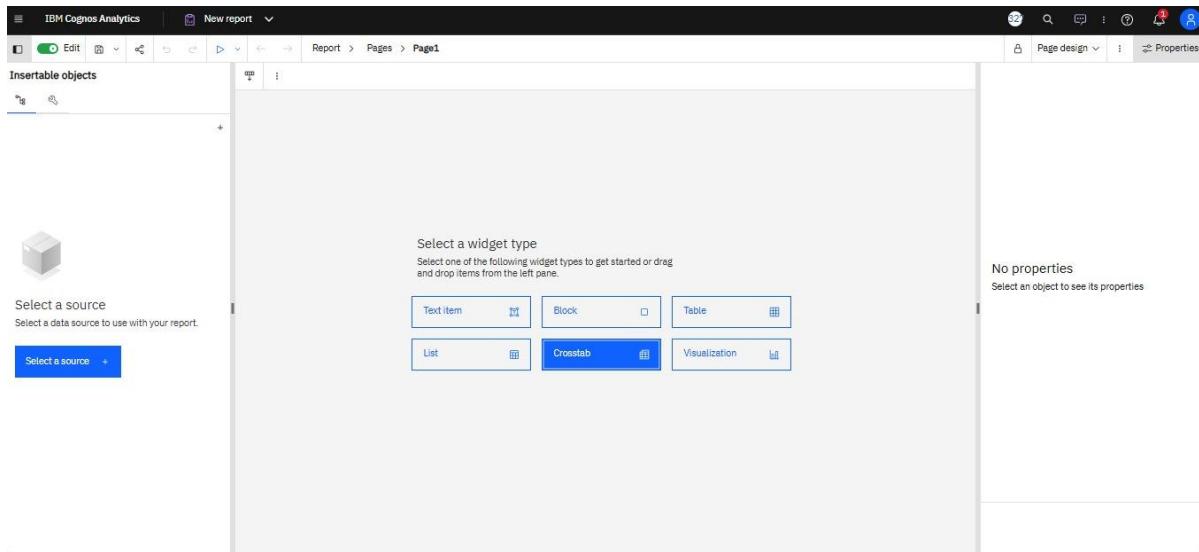
Step 1: Upload the data and make it a data module. Now, open the data module and locate the field **drainage_density_km_per_km2**. Right click on the selected field then click on **create data**.

The screenshot shows the IBM Cognos Analytics interface. On the left, there's a tree view of the data module structure. In the center, a grid displays several columns: longitude, catchment_id, elevation_m, dem_source, land_use, soil_group, and drainage_density_km_per_km2. The 'drainage_density_km_per_km2' column contains numerical values ranging from 4.27 to 10.62. A context menu is open over the last row of this column, with the 'Create data...' option highlighted.

Step 2: Name the data as **Drainage Density Ranges** in the Name section. Select **Groups= 3** and write the **group names** and **range border values** as show in the image below. Then click on **create**.

This screenshot shows the 'Create a data group (numeric style)' dialog box. The 'Name' field is set to 'drainage_density_km_per_km2 (Group)'. The 'Groups' dropdown is set to '3'. The 'Group names' section lists three ranges: '<5 km/km²', '5-10 km/km²', and '>10 km/km²'. The 'Range border values' section shows two levels of hierarchy: 'Higher' (10) and 'Lower' (5). At the bottom, there's a checkbox for 'Group NULL values as' and a 'Create' button.

Step 3: Now click on new -> report -> crosstab. Then click select a source -> My content -> Data ->Open.

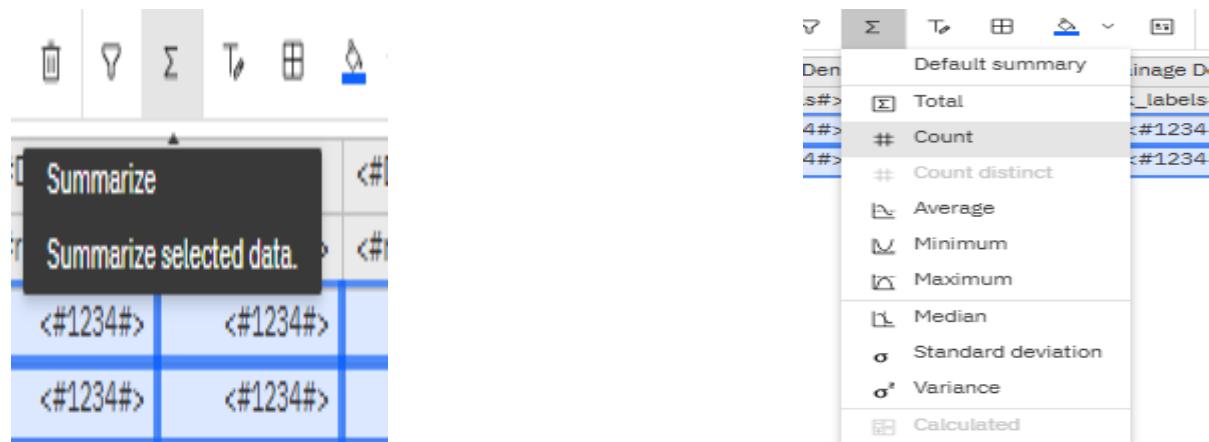


Step 4: Drag the data fields in the crosstab:

- **Rows:** catchment_id
- **Columns:** Drainage Density Range
- **Nested column(column under Drainage Density Range):** risk_labels
- **Measures :** segment_id

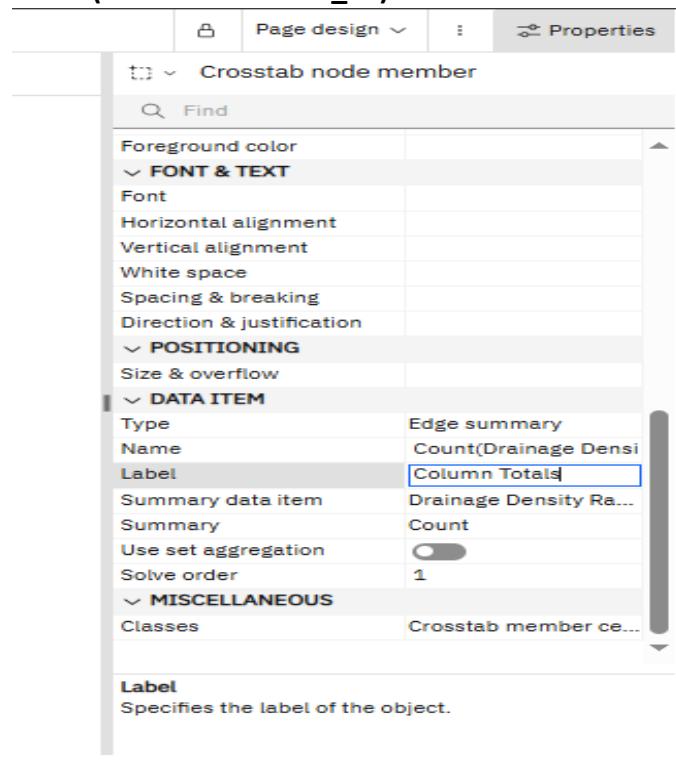
This screenshot shows the IBM Cognos Analytics interface with a report titled "Report > Pages > Page1". The left sidebar lists "Insertable objects" and "Urban Flood Risk" datasets, including "urban_pluvial_flood_risk_dataset.csv" which contains fields like "segment_id", "Drainage Density Range", "risk_labels", "catchment_id", "city_name", "admin_ward", "latitude", "longitude", "elevation_m", "dem_source", "land_use", "soil_group", "drainage_density_km_per_km2", "storm_drain_proximity_m", "storm_drain_type", "rainfall_source", "historical_rainfall_intensity_mm_hr", "return_period_years", and "risk_labels". The main area displays a crosstab with three columns: "segment_id", "Drainage Density Range", and "risk_labels". The "Drainage Density Range" column has two rows: "#catchment_id#" and "#catchment_id#". The "risk_labels" column has four rows: "#1234#", "#1234#", "#1234#", and "#1234#". The "segment_id" column has five rows: "#1234#", "#1234#", "#1234#", "#1234#", and "#1234#". The right side features a "Properties" panel for the "Crosstab" object, showing sections for Conditional, General, and Box settings. The "General" section includes "Default measure" set to "segment_id", "Fact cells precedence" set to "Rows", and "Has fact cells" checked.

Step 5: Select the data of `segment_id` then click on **summarize** icon in menu bar -> **count**.

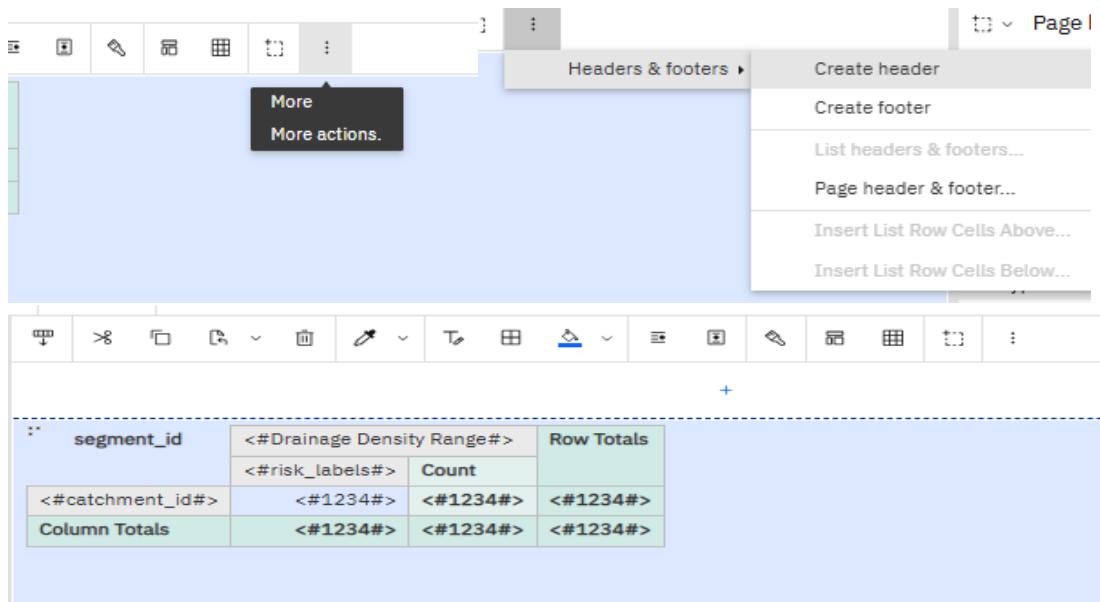


Step 6: Rename the columns by selecting column and then clicking on **properties** option in top right corner -> write name in label option present in data item section.

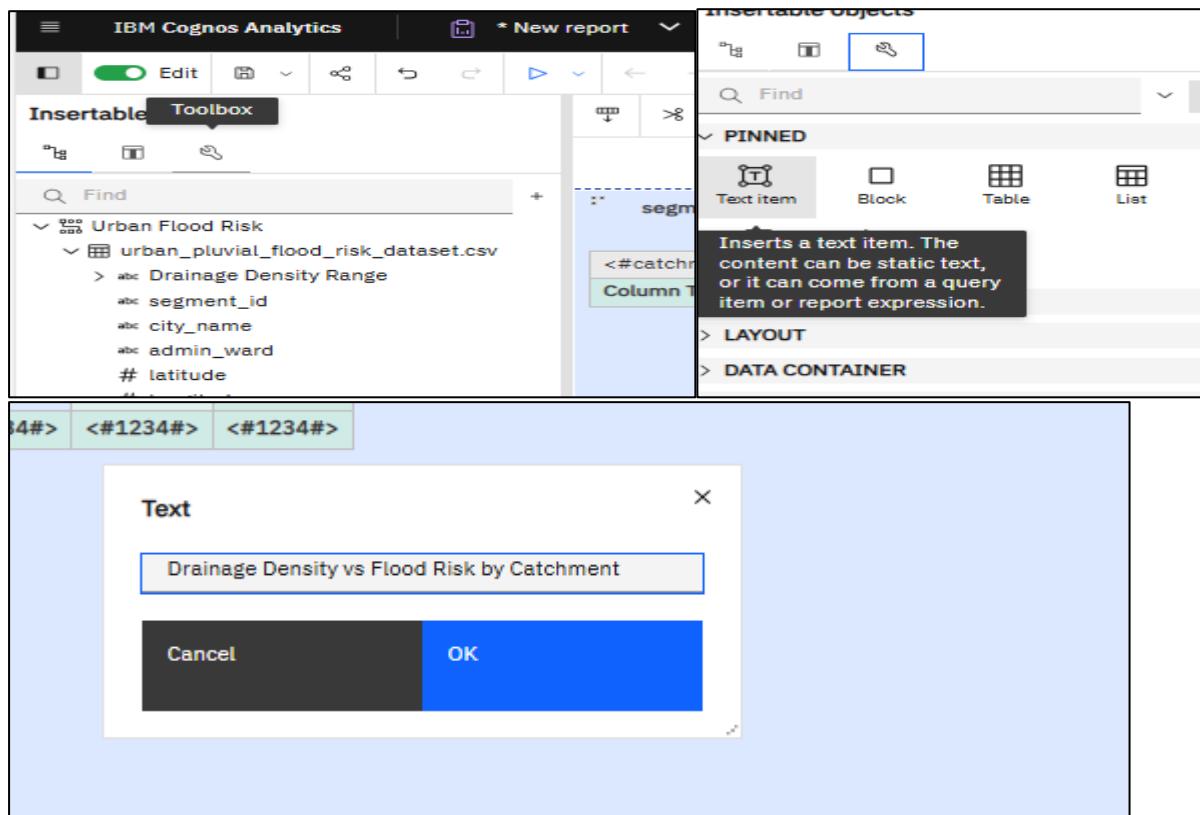
- **Count (in the right side of drainage density ranges column):** Row Totals
- **Count(below catchment_id):** Column Totals



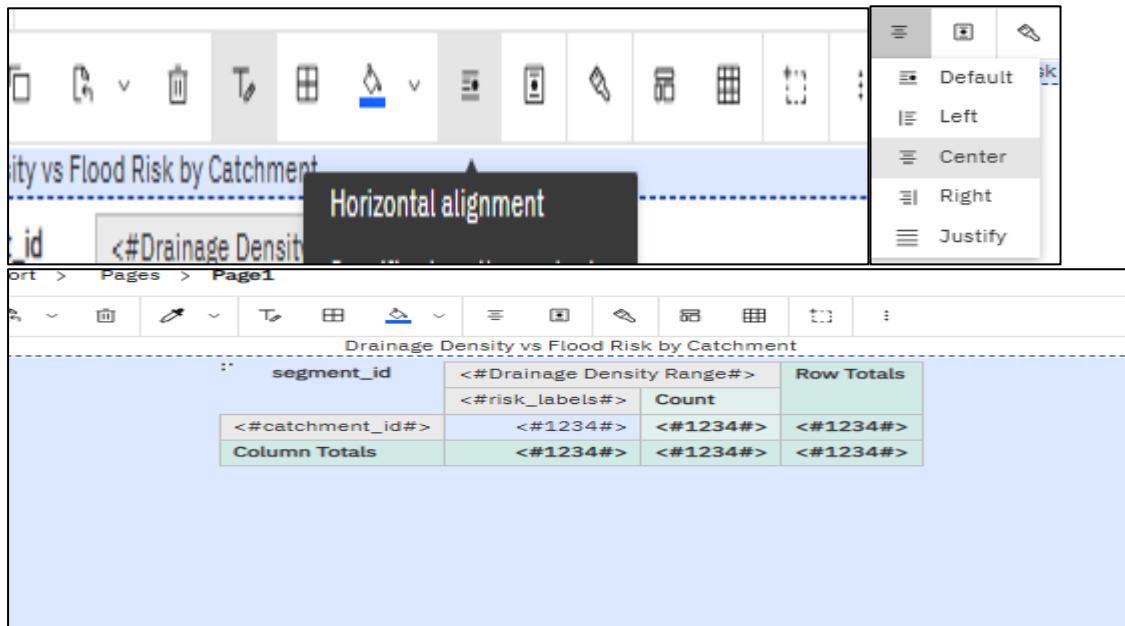
Step 7: Click on three dots in menu bar ->Header & Footer-> Create Header.



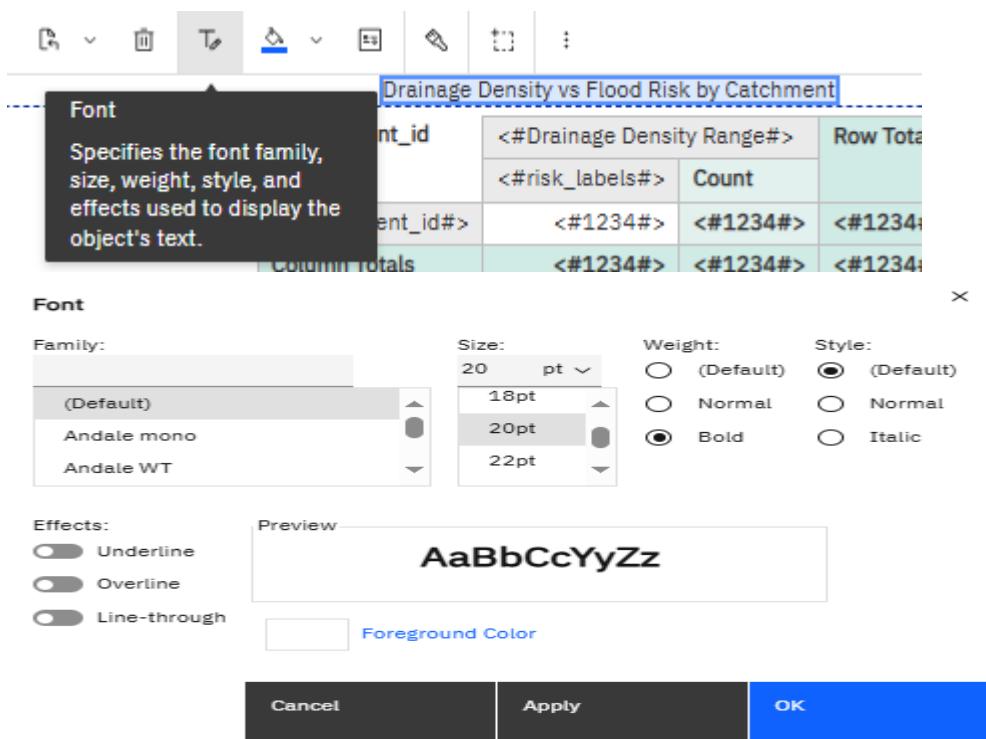
Step 8: Add **text item** from the option **toolbox** present in left corner just above the search bar. Write the **title(Drainage Density vs Flood Risk by Catchment)** of the Crosstab in the dialog box appeared after adding text item.



Step 9: Align the Title in **center** through **horizontal alignment icon** on menu bar after selecting text written in **header -> Center**.



Step 10: Change font(like size=20pt, weight= bold) with font icon present in menu bar.



Step 11: Change **background colour** of each column and **title** by background colour icon present in menu bar. Save the Report in my contents.

| segment_id | <#Drainage Density Range#> | Row Totals |
|------------------|----------------------------|------------|
| <#catchment_id#> | <#1234#> | <#1234#> |
| Column Totals | <#1234#> | <#1234#> |

OUTPUT:

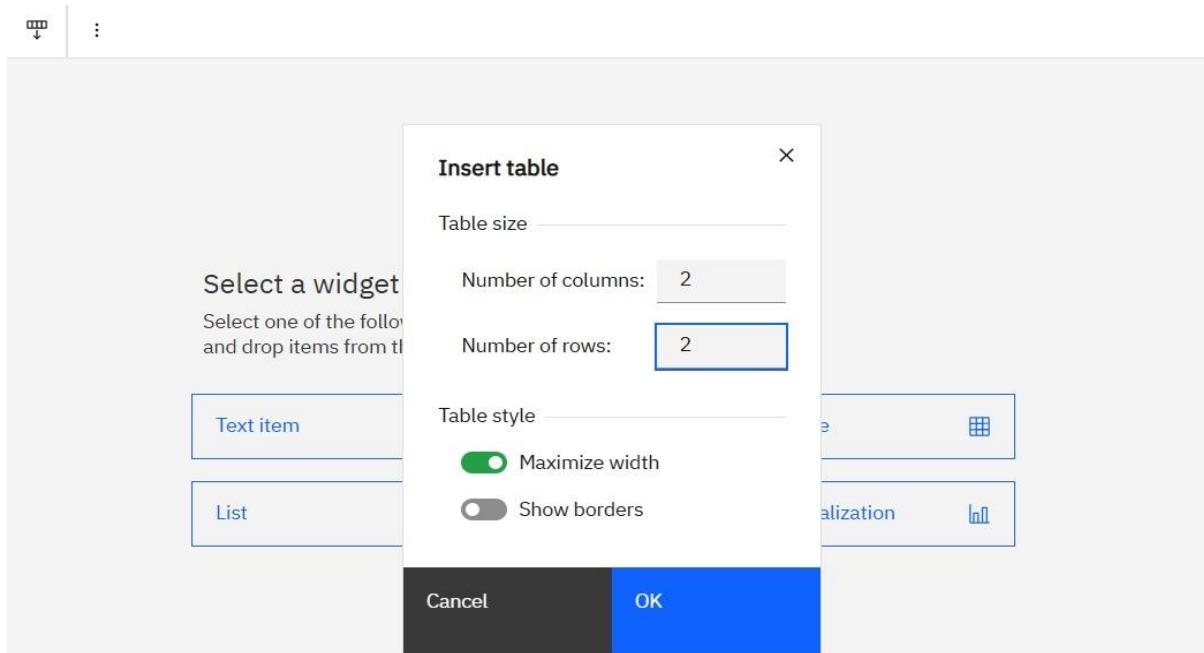
| segment_id | monitor | ponding_hotspot low_lying event_2024-03-31 | ponding_hotspot extreme_rain_history low_lying | low_lying | extreme_rain_history | ponding_hotspot | low_lying event_2023-12-17 | ponding_hotspot low_lying | ponding_hotspot low_lying event_2024-02-27 |
|------------|---------|--|--|-----------|----------------------|-----------------|----------------------------|---------------------------|--|
| CAT-001 | 4 | | | | | | | | |
| CAT-002 | 1 | | | | | | | | |
| CAT-003 | 2 | | | 1 | | | | | |
| CAT-004 | 2 | | | | | | | | 1 |
| CAT-005 | 3 | | | | | | | | |
| CAT-006 | 3 | | | | | | | | |
| CAT-007 | | | | 1 | | | | | |
| CAT-008 | 3 | | | 1 | | | | | |
| CAT-009 | 1 | | | | | | | | |
| CAT-010 | 2 | | | | | | | | |
| CAT-011 | 3 | | | | | | | | |
| CAT-012 | 1 | | | | | | | | |
| CAT-013 | | | | | | | | | |
| CAT-014 | | | | | | | | | |
| CAT-015 | | | | 1 | | | | | |
| CAT-016 | 2 | | | | | | | | |
| CAT-017 | 1 | | | | | | | | |
| CAT-018 | 2 | | | | 1 | | | | |
| CAT-019 | 2 | | | | | | | | |

PROJECT

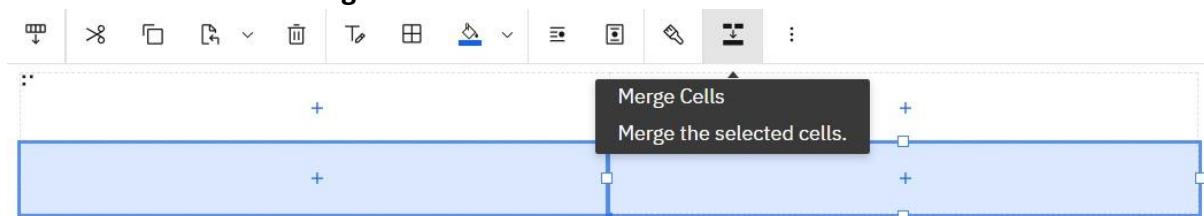
PROBLEM STATEMENT-7 : “Assessing city-wise flood risk by analyzing elevation and return period to identify vulnerable areas for effective planning.”

SOLUTION : City wise flood risk analysis based on elevation and return period.

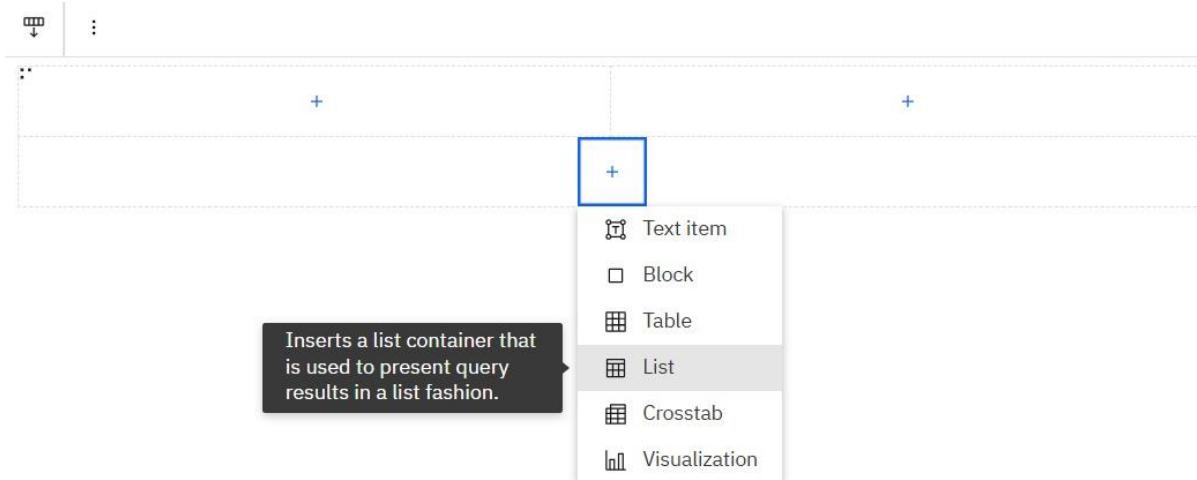
Step 1: Create a report by selecting a Template. Select **Table Report**. This **Pop-up** will come add no of columns and rows = 2 . Then click on **OK**.



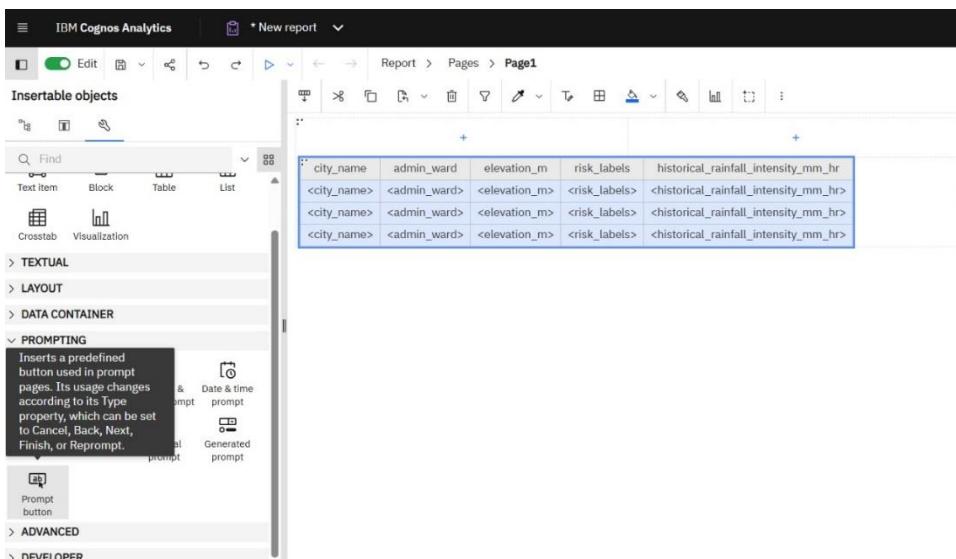
Step 2: Merge the last two cells by clicking on one cell and press **ctrl key** and click on 2nd cell and then click on **Merge cells**.



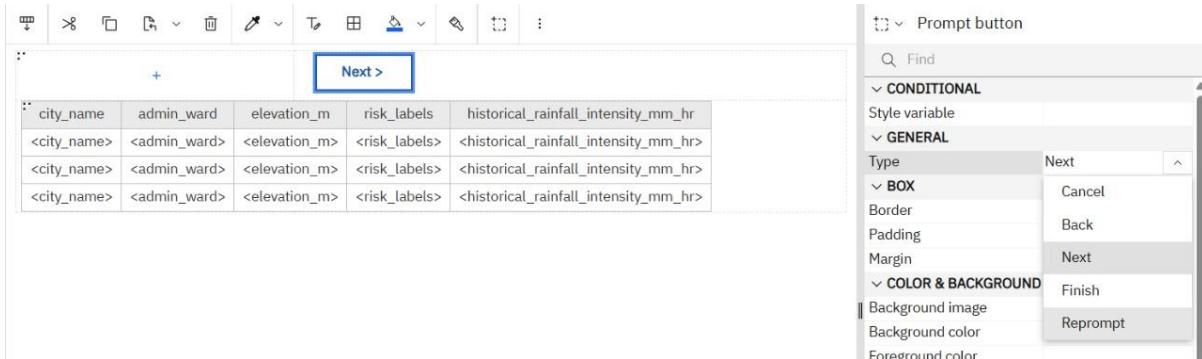
Step 3: Click on + and Then select **List**. And add all data in that by double clicking on fields.



Step 4: Go to Toolbar present on left side Then click on Prompting. Select Prompt button Drag and Drop it in the second column of first row cell.

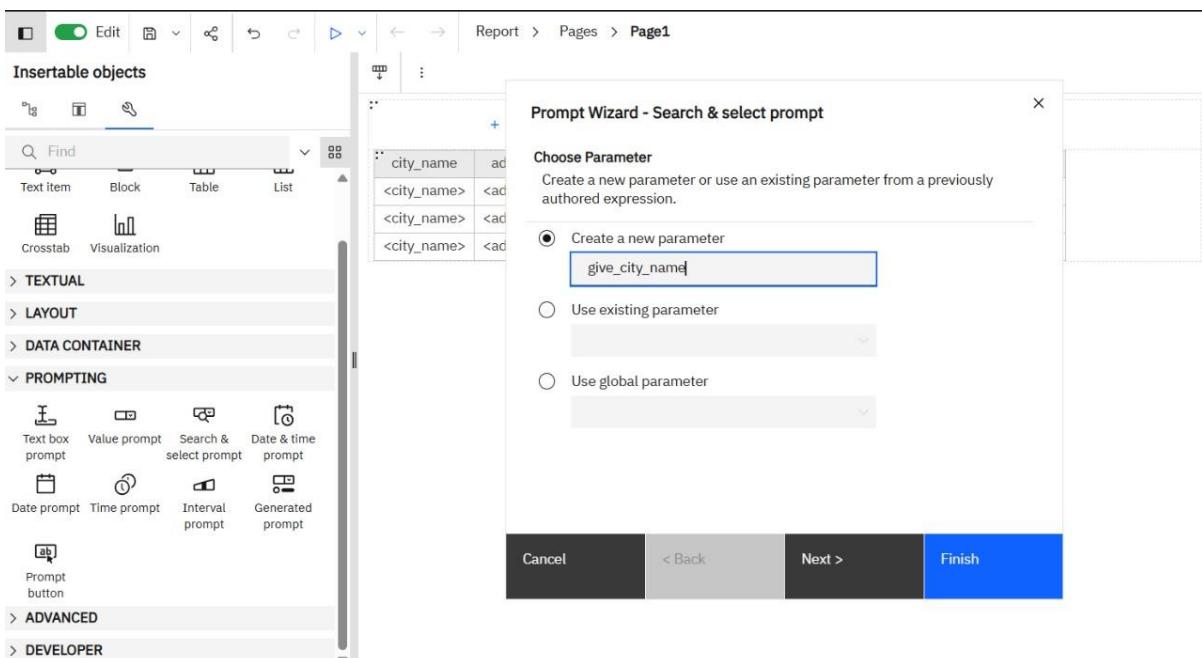


Step 5 : Then this **Next** will appear Now in **Right** side Click on **Next** Drop-down arrow then select **Reprompt** option.

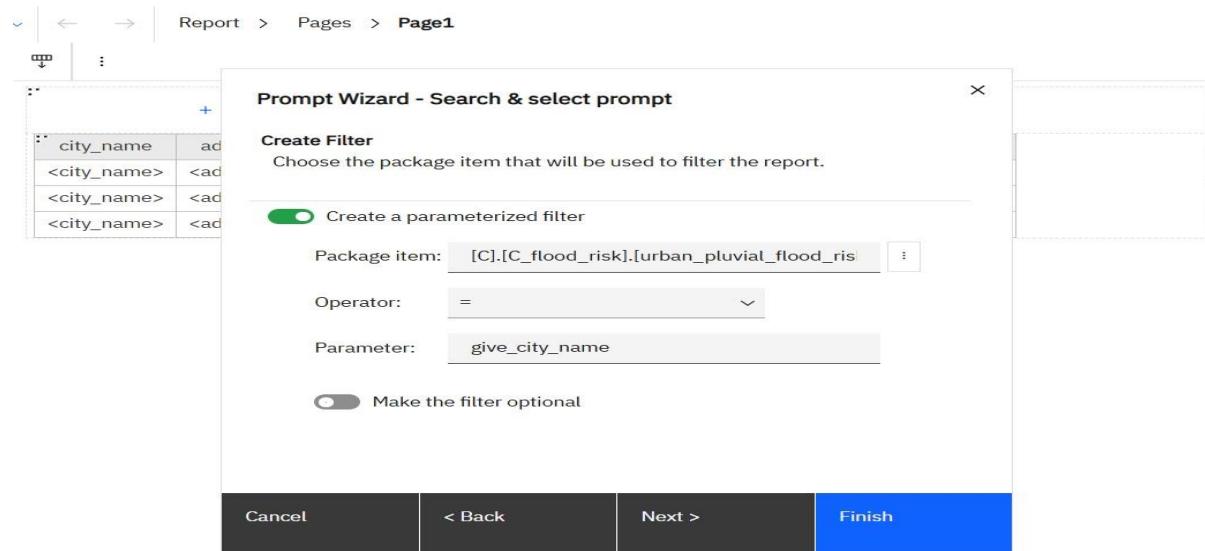


Step 6: Now click on **Select & Search prompt**. Pop – up occurs

Create a new parameter → give_city_name

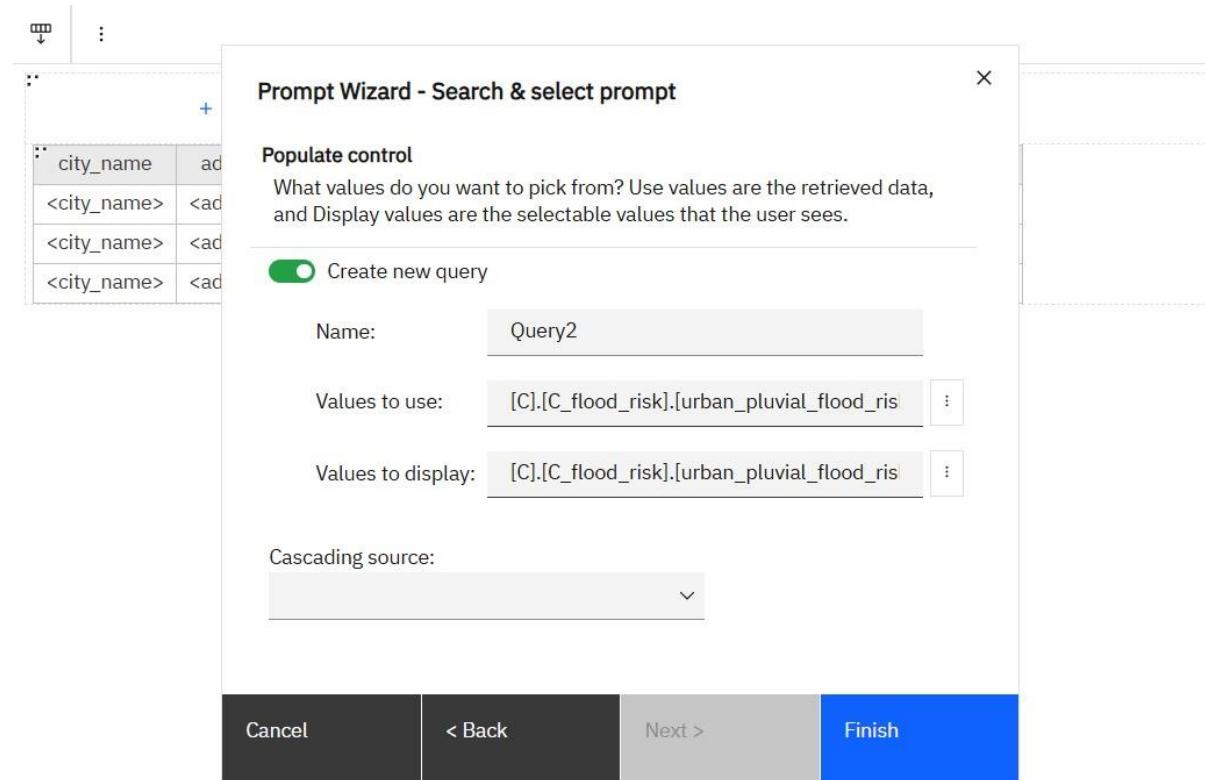


Step 7: Click on **next** This will occur and in this click on **Three dots** and Select **City_name** from the data.



Step 8: Again, click on Next and again select **city_name** from data on clicking on three dots.

Click on **Finish**.



Step 9: After clicking On **Finish** this how it will be at our screen.

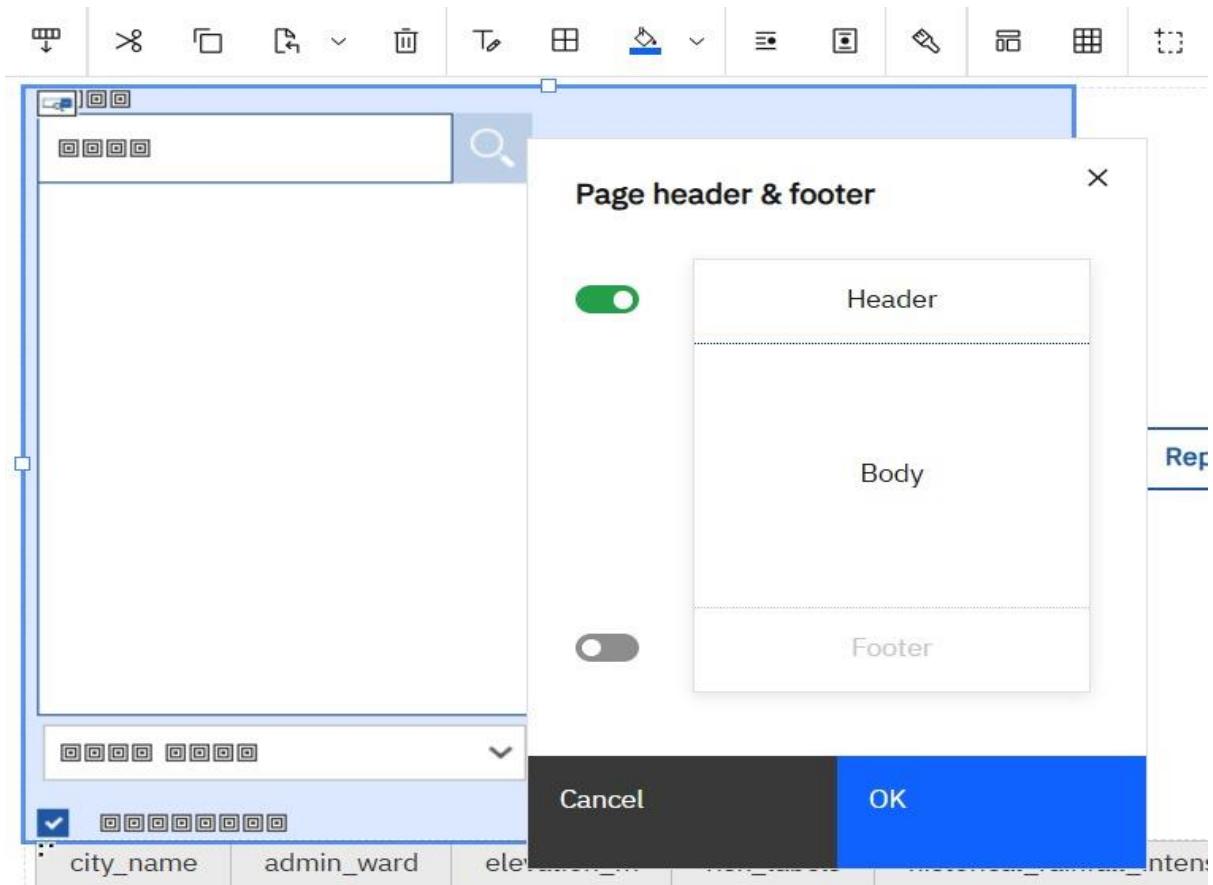
The screenshot shows the IBM Cognos Analytics interface. The top bar displays "IBM Cognos Analytics" and "Report > Pages > Page1". The left sidebar contains sections like "Insertable objects", "TEXTUAL", "LAYOUT", "DATA CONTAINER", "PROMPTING", "ADVANCED", and "DEVELOPER". The main area shows a table with columns: city_name, admin_ward, elevation_m, risk_labels, and historical_rainfall_intensity_mm_hr. A blue box highlights a "Reprompt" button in the bottom right corner of the table's container.

Step 10: Click on these three dots

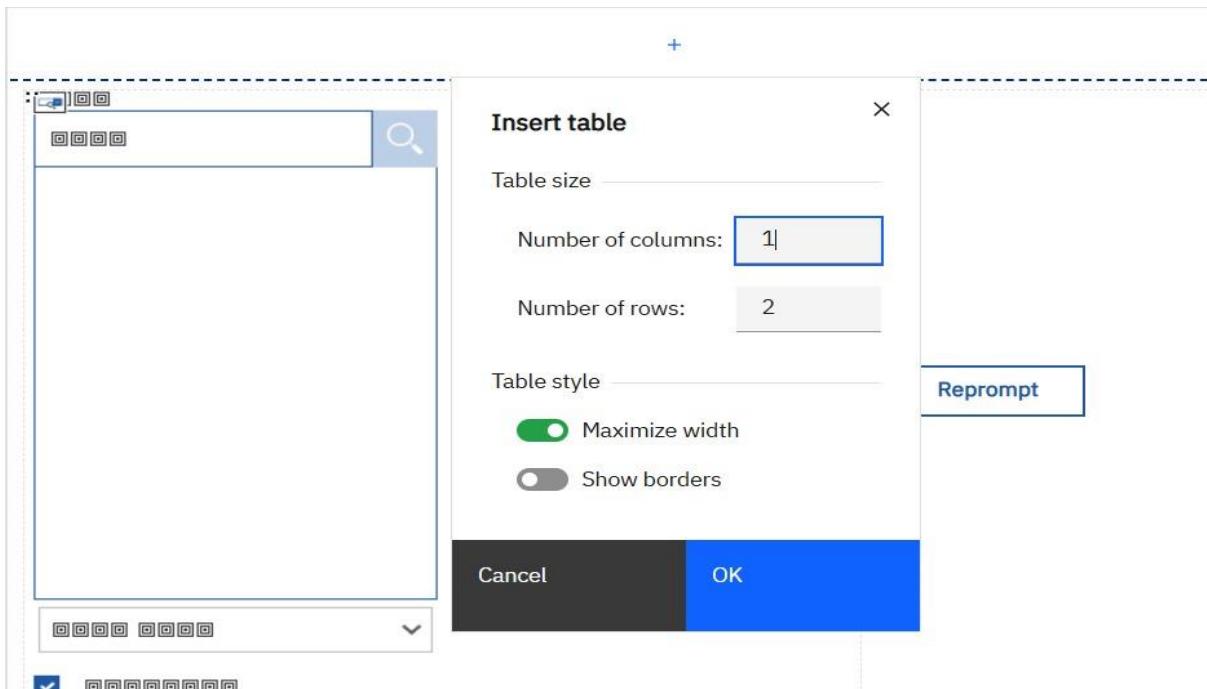
Header & Footer → Page header & footer

The screenshot shows the same IBM Cognos Analytics interface. A context menu is open over a table cell, with the "Headers & footers" option highlighted. Other options in the menu include "Insert", "Select", "Apply table style...", "Create header", "Create footer", "List headers & footers...", "Page header & footer...", "Insert List Row Cells Above...", and "Insert List Row Cells Below...". The "Page header & footer..." option is also highlighted. The "Reprompt" button is visible in the bottom right corner of the table's container.

Step 11: Enable Header option in the pop – up. Click on **OK**.

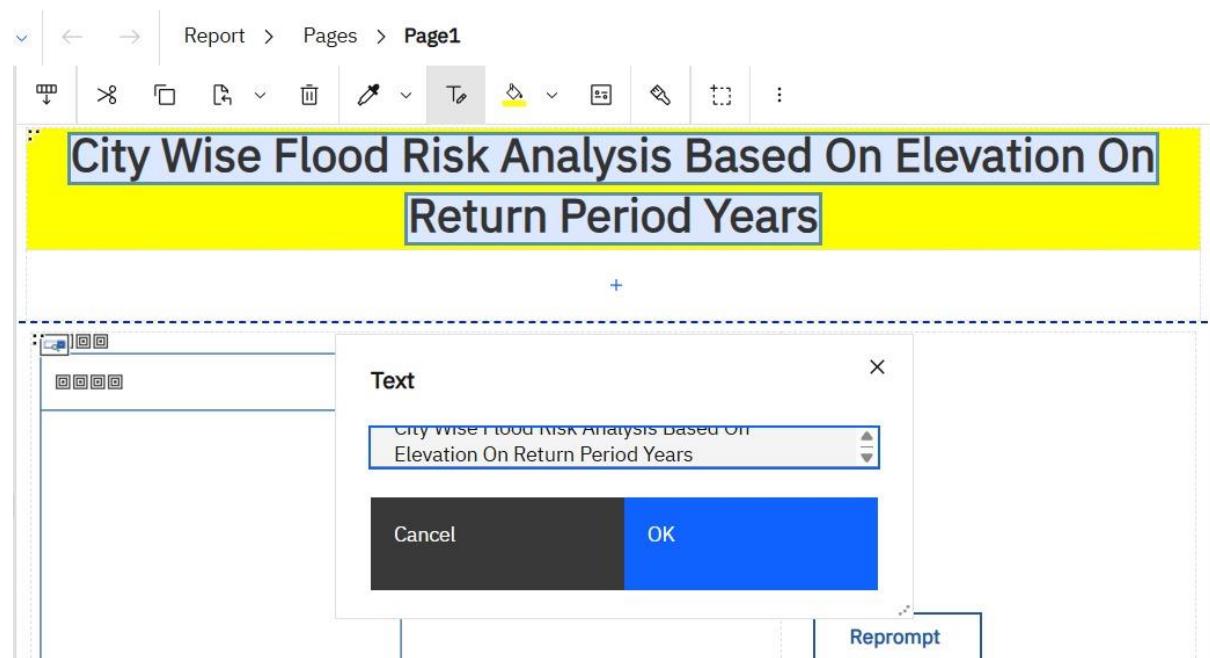


Step 12: Click on + and gave the table size below. Click on **OK**.



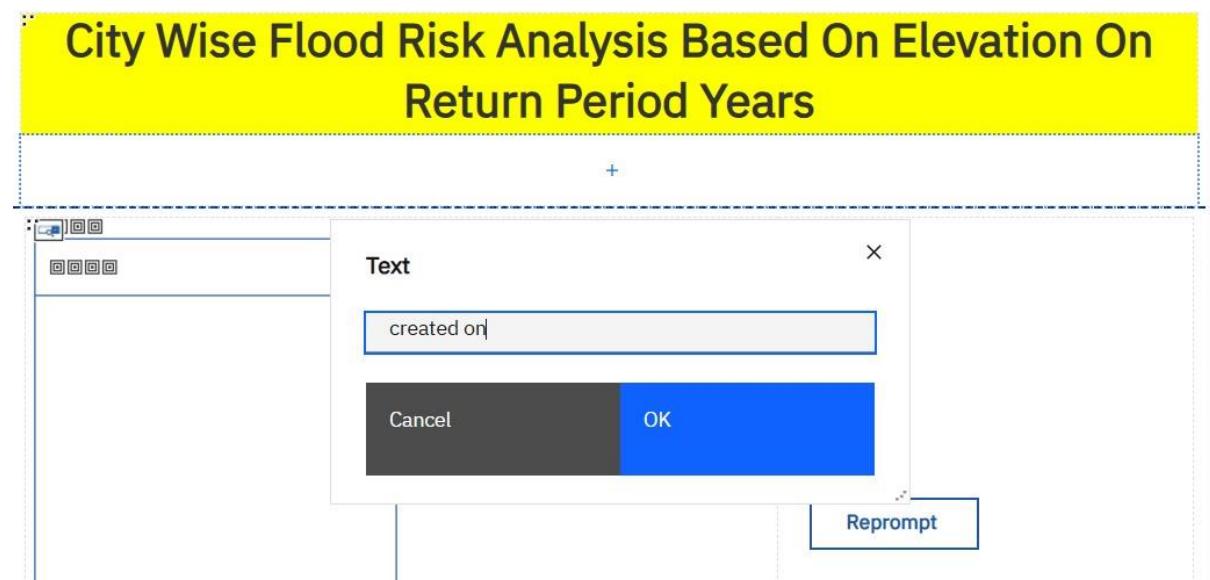
Step 13: Drag and drop **Text Item** to First cell Write the **header** given below and click **Ok**.

Do Formatting according to you.



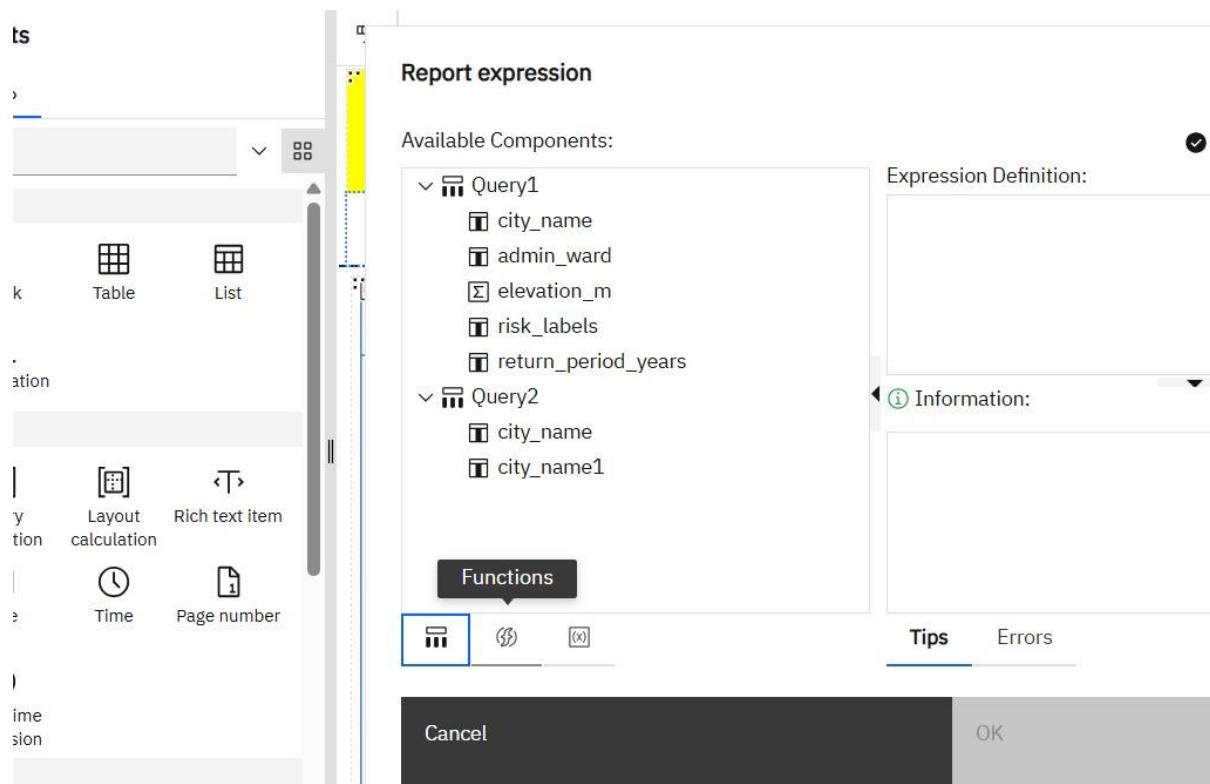
Step 14: Drag and Drop **Text item** in below cell and write “**Created on**”.

Then Click **OK**.

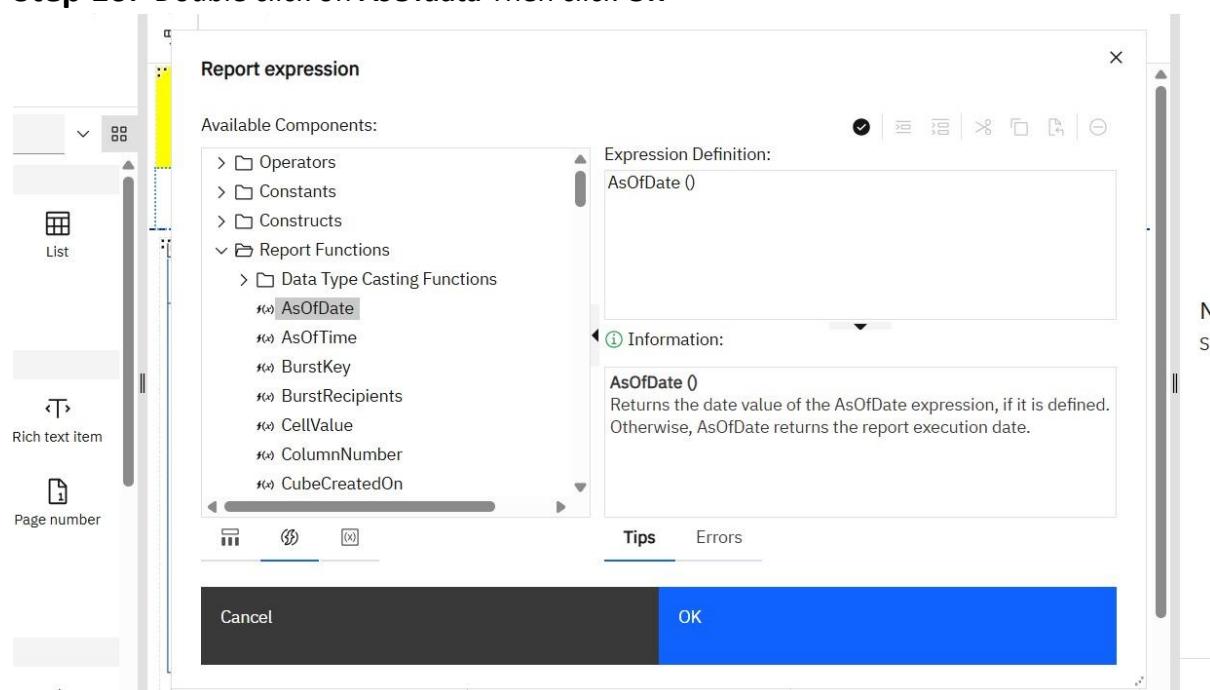


Step 15: Goto **Textual** at left side in Toolbox

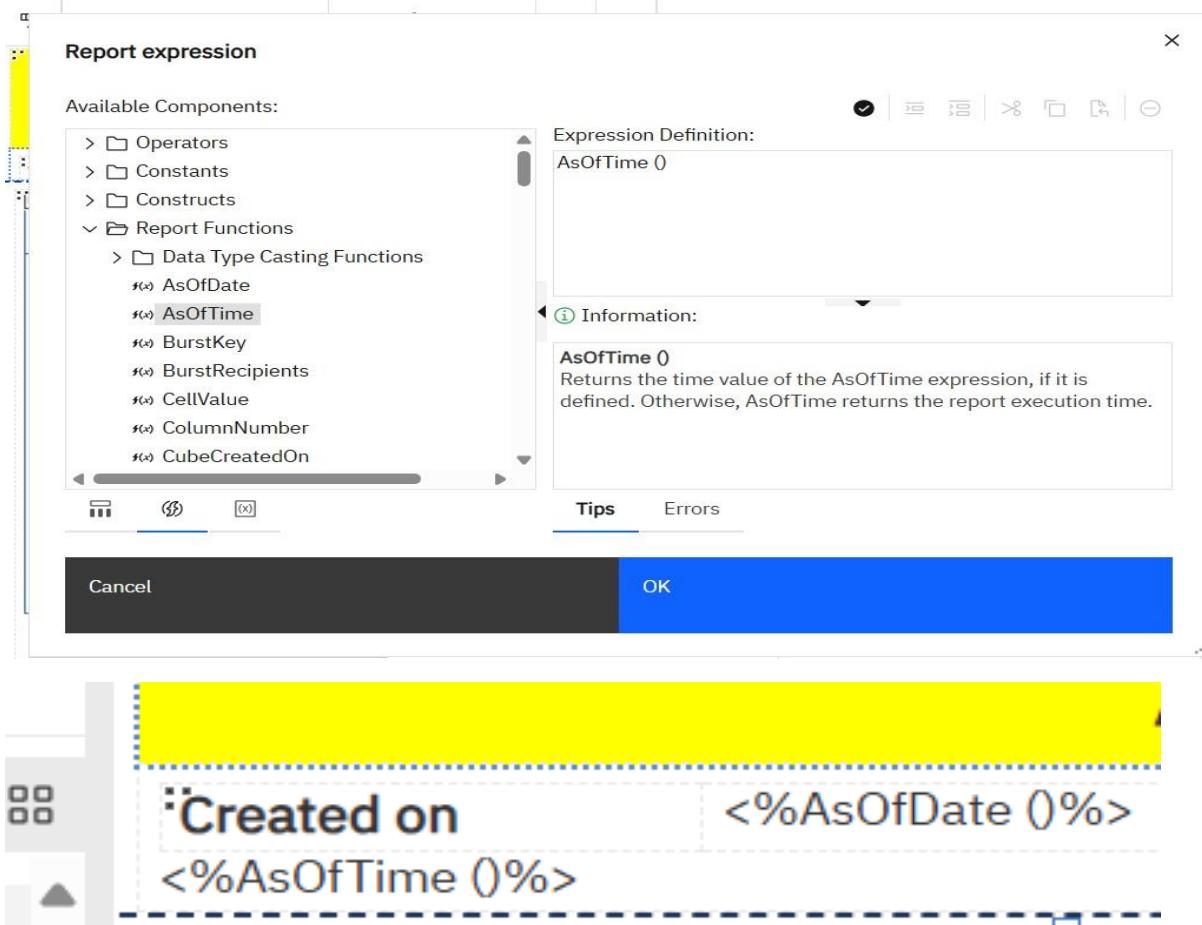
click on **Layout calculation** → **Functions** at bottom .



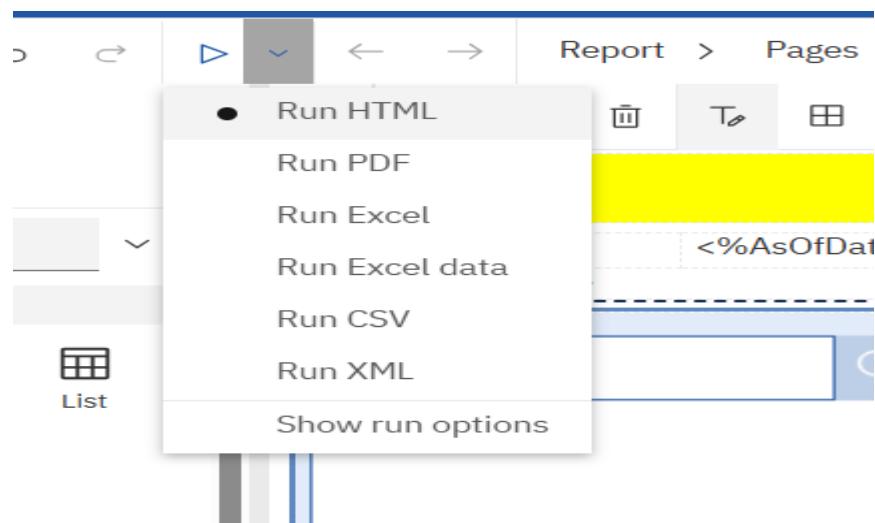
Step 16: Double click on **AsOfDate** Then click **OK**



Step 17 : Again do the same steps for **AsOfTime** and Click **OK**.



Step 18 : Save and run the report.



Step 19 : After Running we have to choose the city from drop down arrow.

After selecting click on Ok.

The screenshot shows the IBM Cognos Analytics interface. At the top, there's a blue header bar with the text "Maintenance: The upgrade is now complete. Click on More Info to see what actions may be needed". Below the header, there's a toolbar with various icons. The main area is titled "Prompt" and contains the instruction "Provide values for the report you are about to run." A dropdown menu is open, labeled "give_city_name". The dropdown list includes several city names, with "Ahmedabad, India" highlighted in blue, indicating it has been selected. Other options in the list include Accra, Ghana; Amsterdam, Netherlands; Athens, Greece; Auckland, New Zealand; Bangkok, Thailand; Barcelona, Spain; Bengaluru, India; Bogotá, Colombia; Brisbane, Australia; Buenos Aires, Argentina; Cape Town, South Africa; Chennai, India; Colombo, Sri Lanka; Copenhagen, Denmark; and Delhi, India.

Output : You can also use it again by clicking on Reprompt.

The screenshot shows the report output titled "City Wise Flood Risk Analysis Based On Elevation On Return Period Years". The report was created on Oct 9, 2025, at 2:39:27 AM. It features a search bar with the placeholder "Input keywords here" and a dropdown menu showing the selected keyword "Ahmedabad, India". A "Reprompt" button is located in the bottom right corner of the search area. Below the search area, there's a section titled "Starts with any of these keywords" with a dropdown menu. At the bottom, there's a table with a checkbox labeled "Case Insensitive". The table has columns: city_name, admin_ward, return_period_years, elevation_m, and risk_labels. The data in the table is as follows:

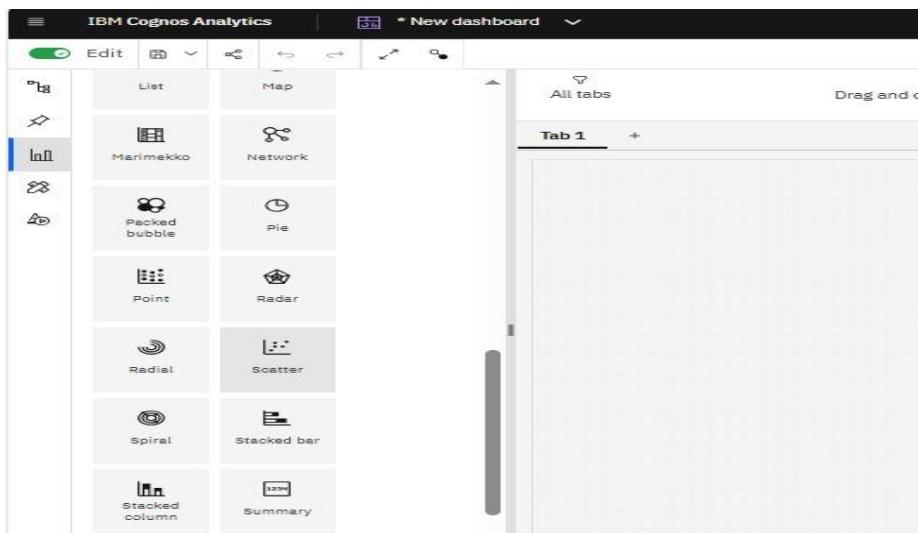
| city_name | admin_ward | return_period_years | elevation_m | risk_labels |
|------------------|--------------|---------------------|-------------|-----------------|
| Ahmedabad, India | Borough West | 5 | 125.51 | sparse_drainage |
| Ahmedabad, India | Ward E | 25 | 125.01 | monitor |

PROJECT

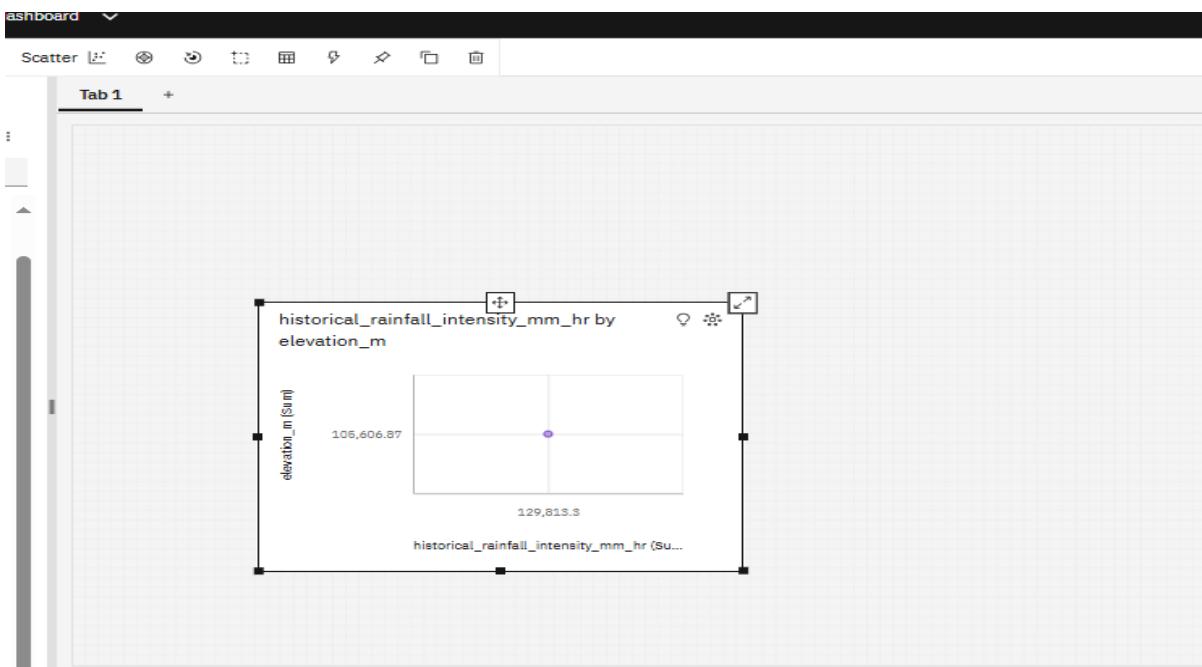
PROBLEM STATEMENT- 8: Visualizing the relationship between elevation and flood risk to identify high-risk areas in urban wards.

SOLUTION : Elevation v/s flood risk Heatmap.

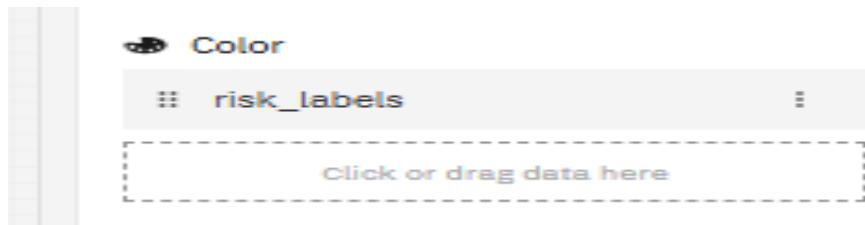
Step 1: Click on **New** then create a **Dashboard** and choose here **Scatter plot** by going to **visualization** option in left side of the screen.



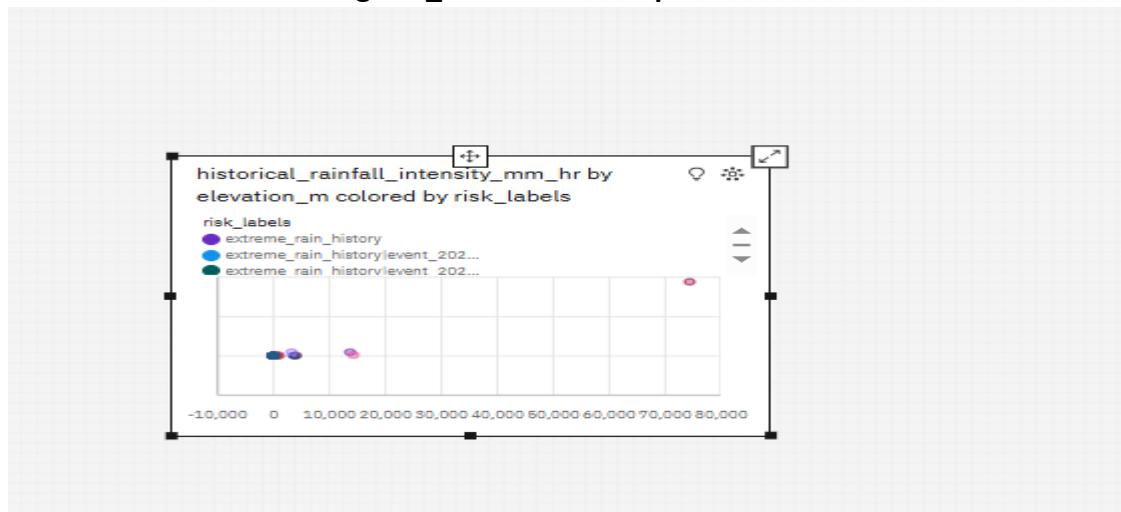
Step 2: Open the **data module**. Drag **elevation_m** field and **historical_rainfall_intensity_mm_hr** in y-axis and x_axis respectively.



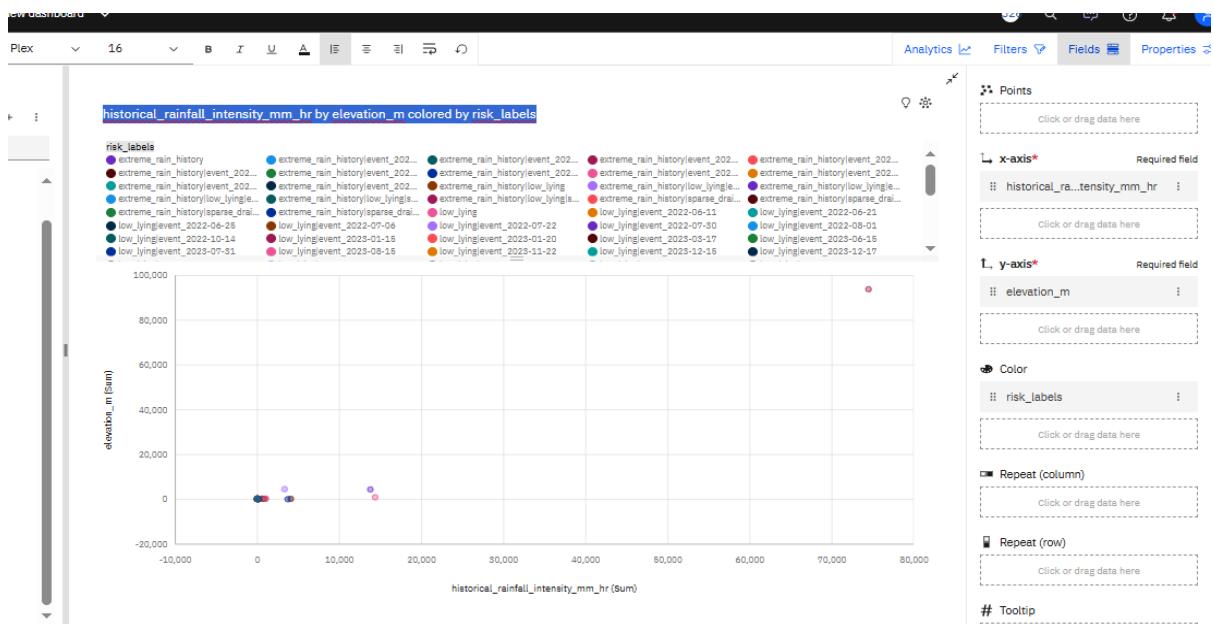
Step 3: Select risk_labels in color option by clicking on 3 dots.



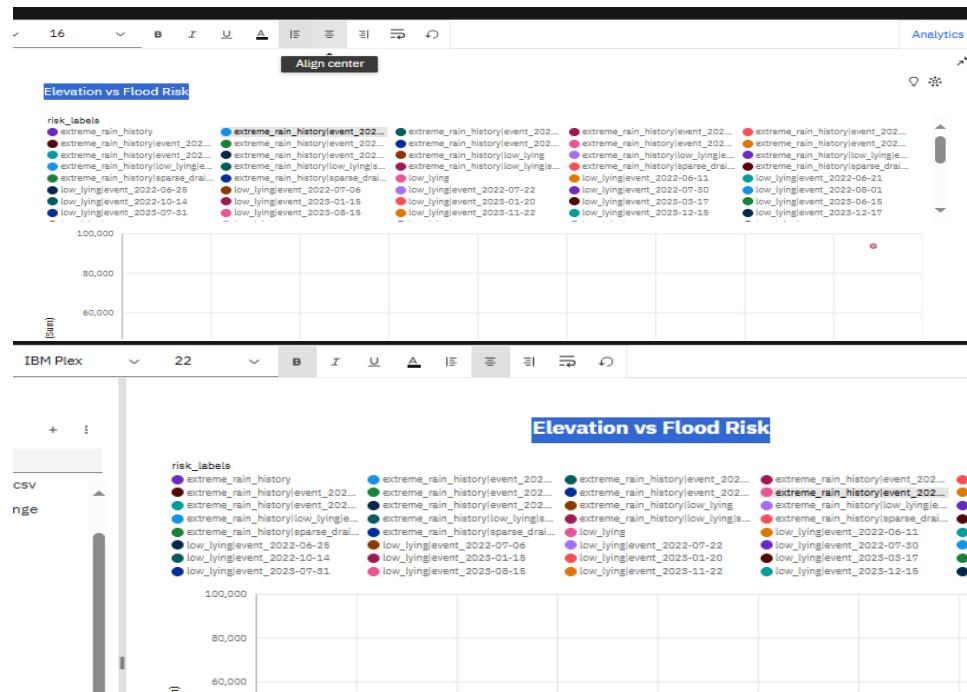
Scatter chart after selecting risk_labels in color Option:



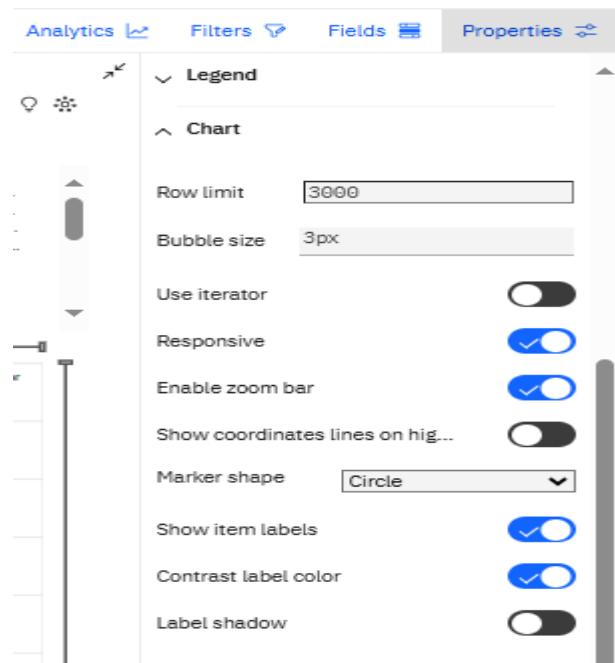
Step 5: Click on Expand and Rename the title as Elevation vs Flood Risk.



Step 6: Align the title in center by align icon in menu bar.



Step 7: Properties(top right corner) -> visualization -> chart -> On “enable zoom bar and show item labels” option.



Step 8: Properties -> General ->Fill color (choose any background colour).And save it.



You can see how our Scatter plot is been made above.

Step 9 :At right side click **Analytics** . You can see all **Insights**.

insight to add it as a favorite.

Suggested insights (5)

There is a **strong quadratic relationship** between **elevation_m** and **historical_rainfall_intensity_mm_hr**, being $elevation_m = 983.4 - 0.2322 * historical_rainfall_intensity_mm_hr + 0.00001981 * historical_rainfall_intensity_mm_hr^2$.

elevation_m has a fitted minimum value of **303.2** when **historical_rainfall_intensity_mm_hr** is **5,859**.

elevation_m is unusually high when **historical_rainfall_intensity_mm_hr** is **3,355** and **13,810**.

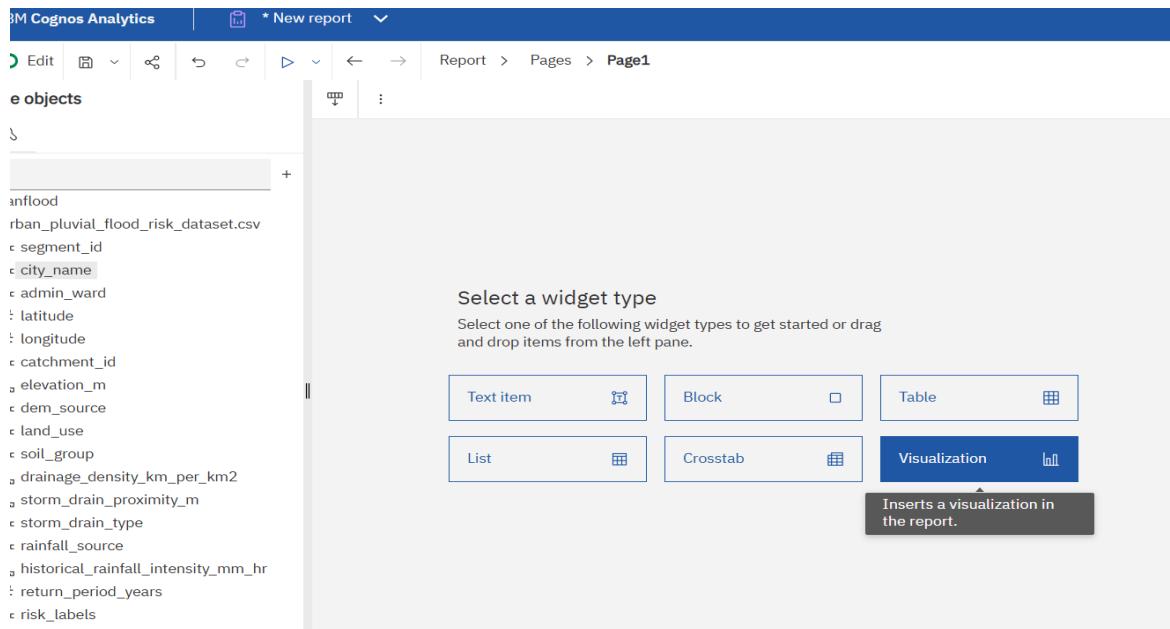
elevation_m ranges from **-109**, when **risk_labels** is **ponding_hotspot|low_lying**, to almost **94 thousand**, when

PROJECT

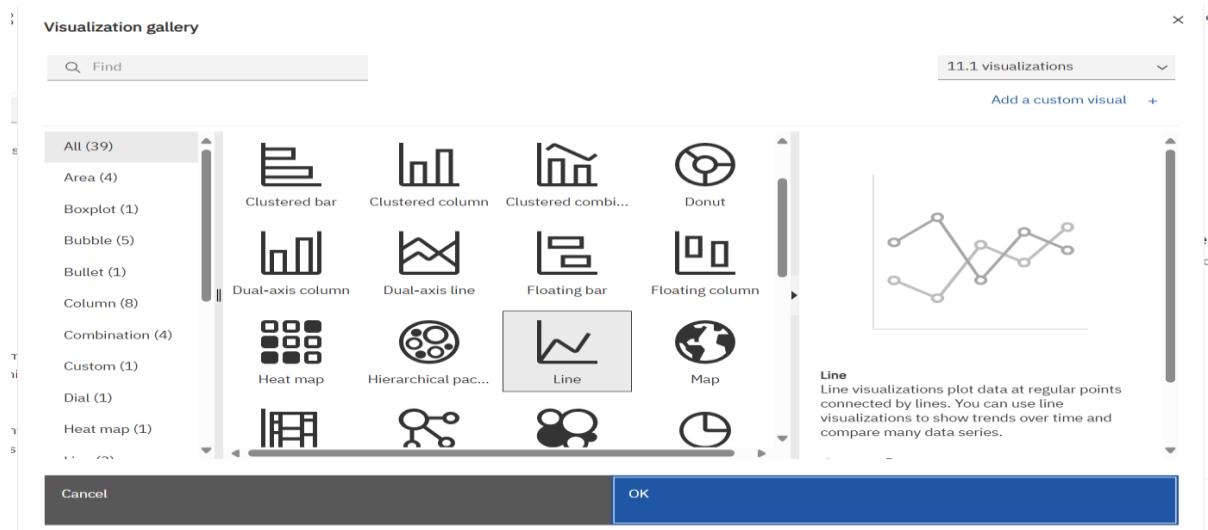
PROBLEM STATEMENT-. 9 : To analyze the relationship between drainage density and flood return periods to understand how drainage capacity affects flood occurrence and risk levels.

SOLUTION : Drainage Density Variation with Flood Return Periods.

Step 1: Make a **Visualization report** by selecting the option given in widget type.



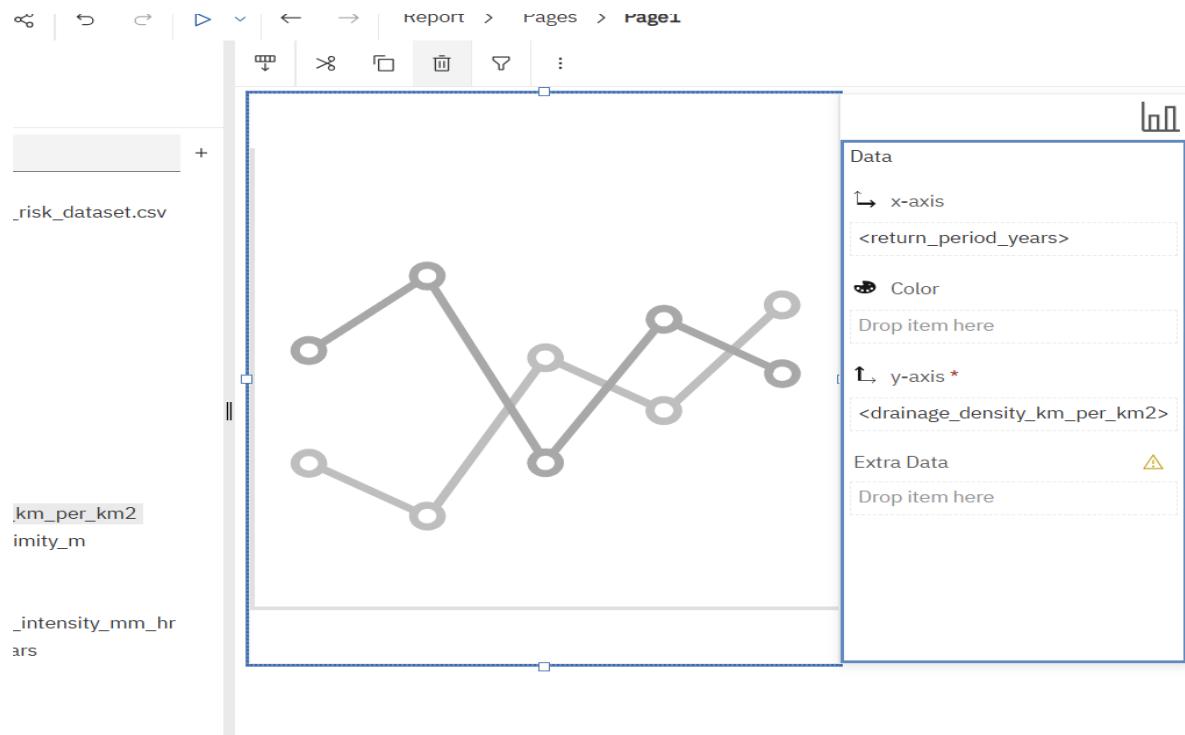
Step 2: Select **Line chart** then click on **OK**.



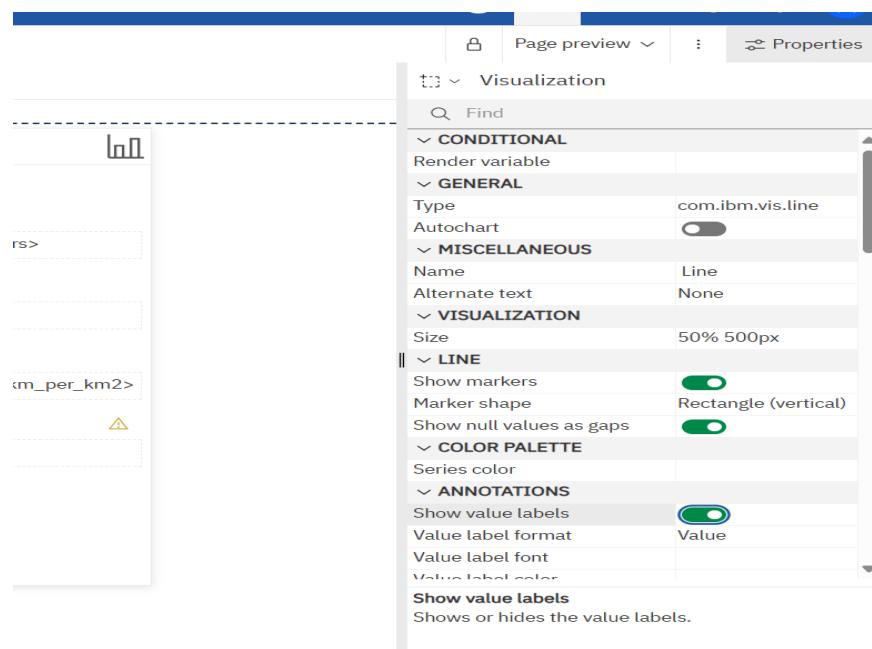
Step 3: Now Drag and Drop the column to specific field

X axis : return_period_years

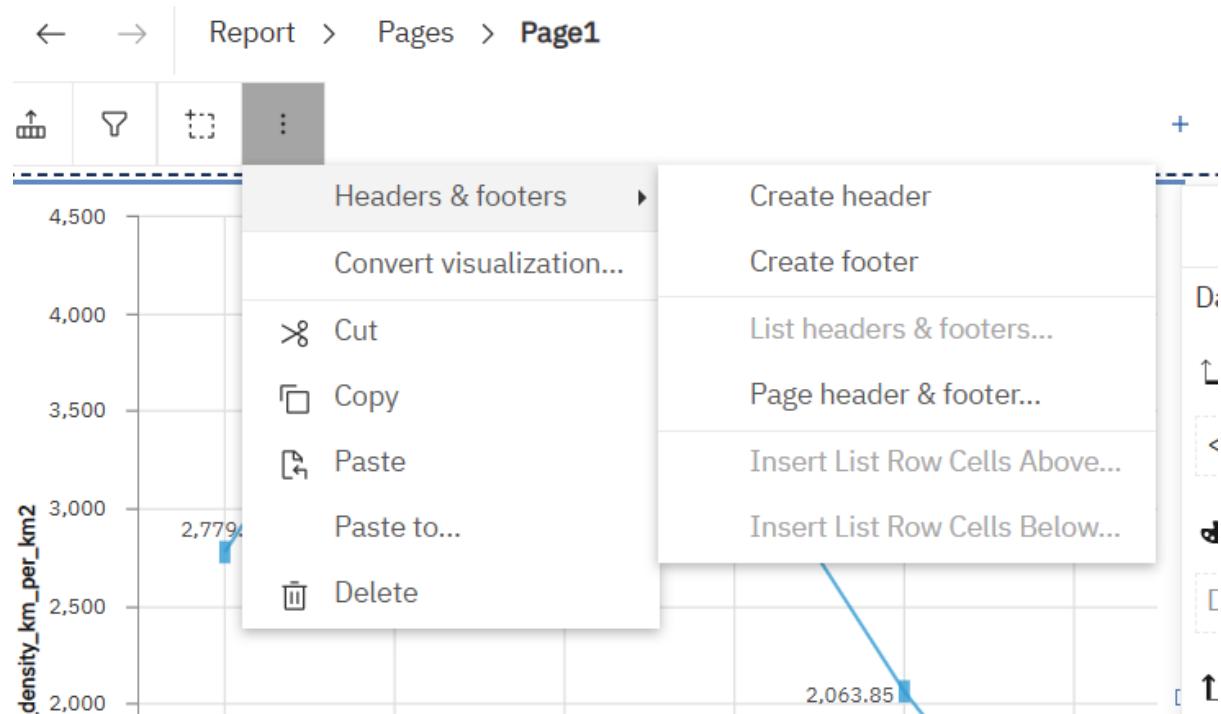
Y axis : drainage_density_km_per_km2



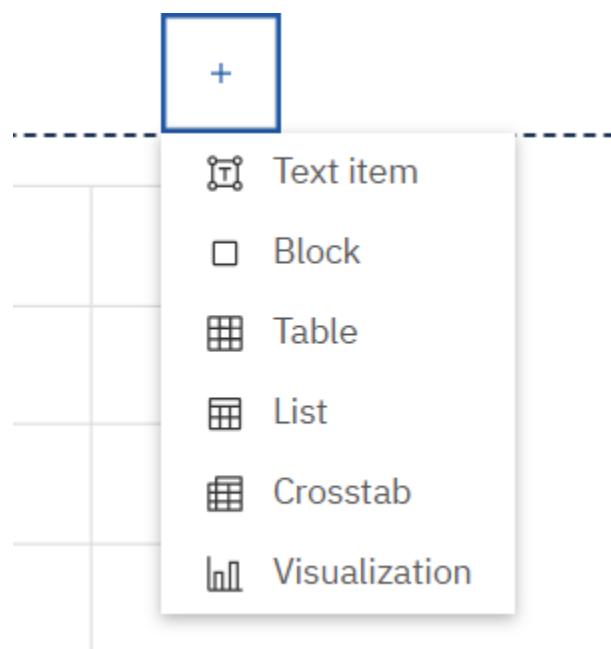
Step 4: you can go to **Properties** and change the **Marker shape** to **Rectangle(vertical)**.



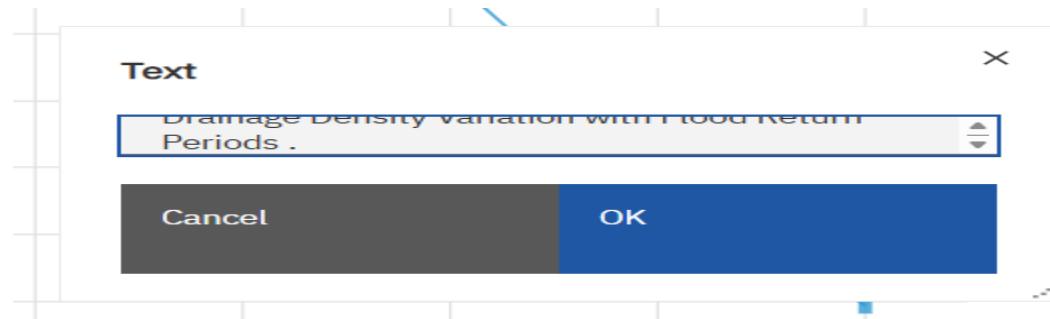
Step 5: Now by clicking on this three dot go to **Header & Footers** and create **Header**.



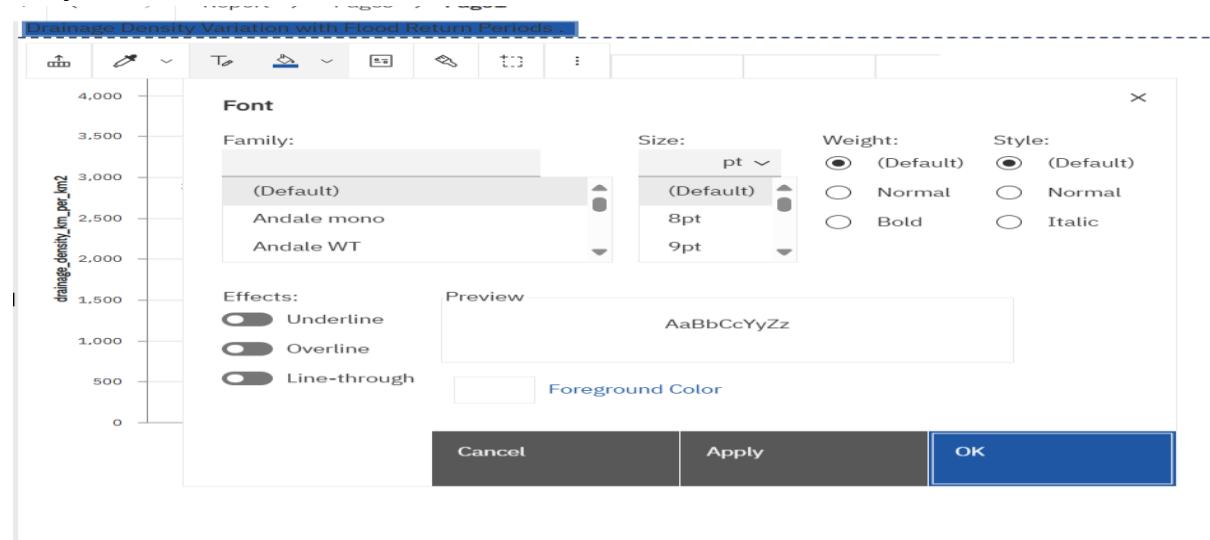
Step 6: These + sign occurs above click on that and select **Text item** .



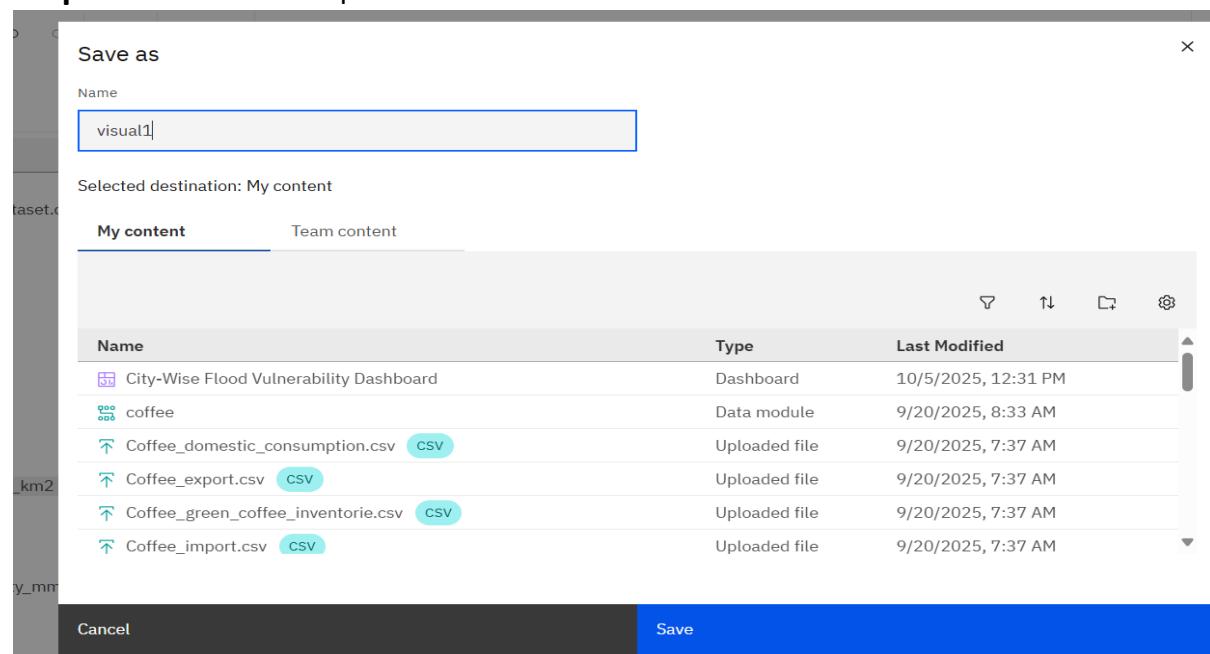
Step 7: Now write the **Text** you want to write in **Header** and click on **OK**.



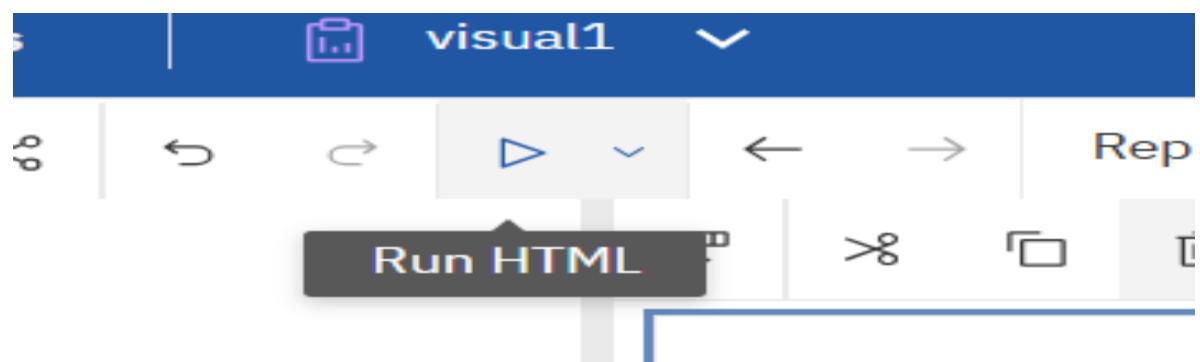
Step 8: You can **Format** the Header by doing it **Bold** and increase **Font size**. Click on **OK**.



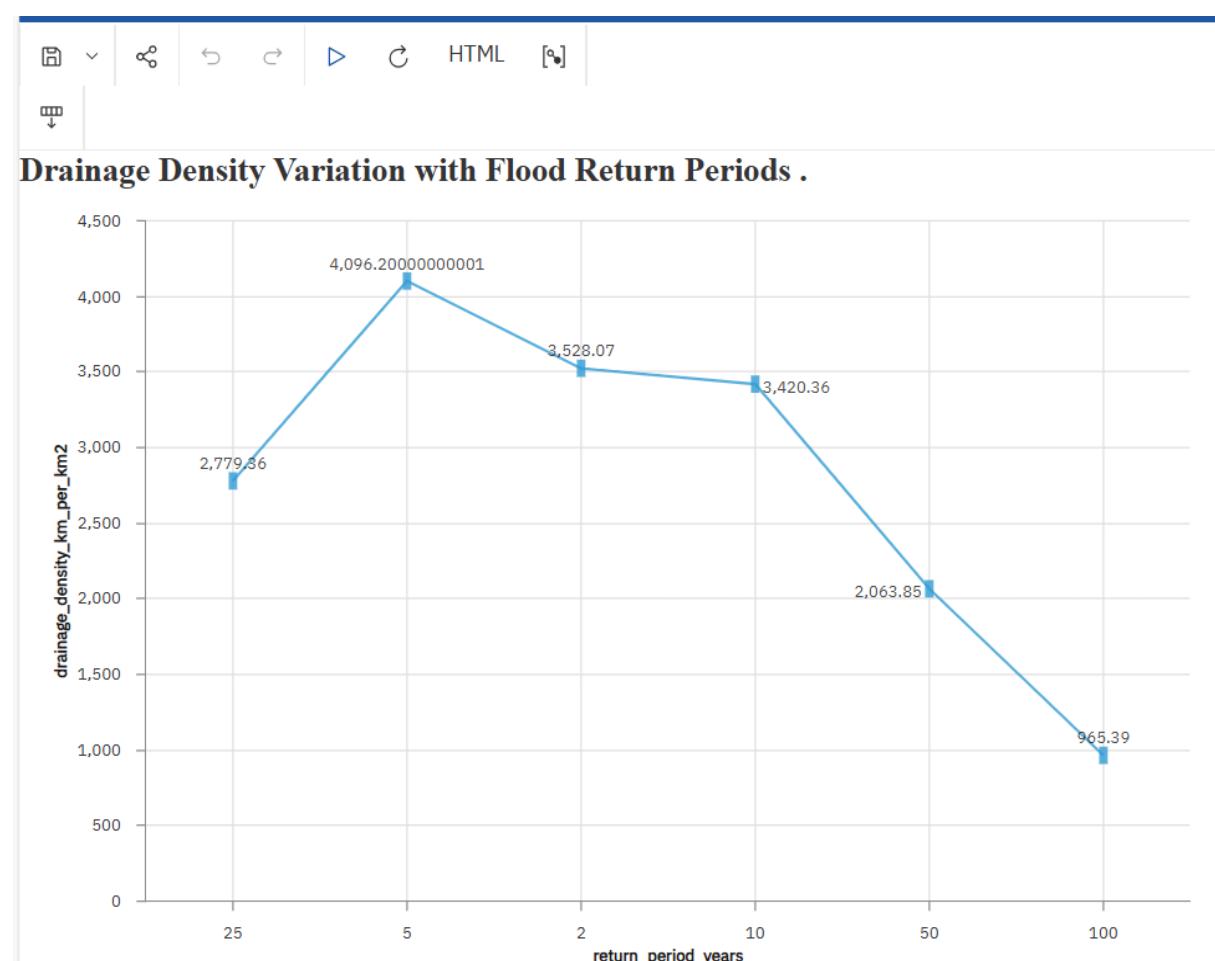
Step 9: Now **Save** the report name it and click on **save**.



Step 10: Now Run the report.



Output:

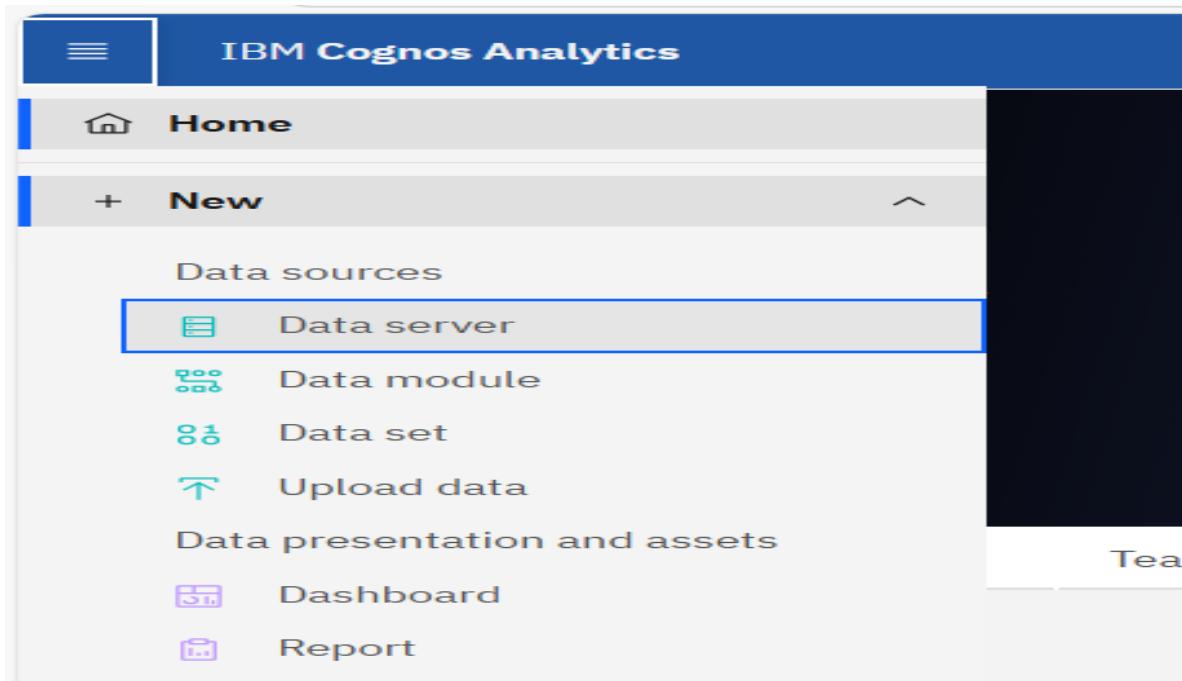


PROJECT

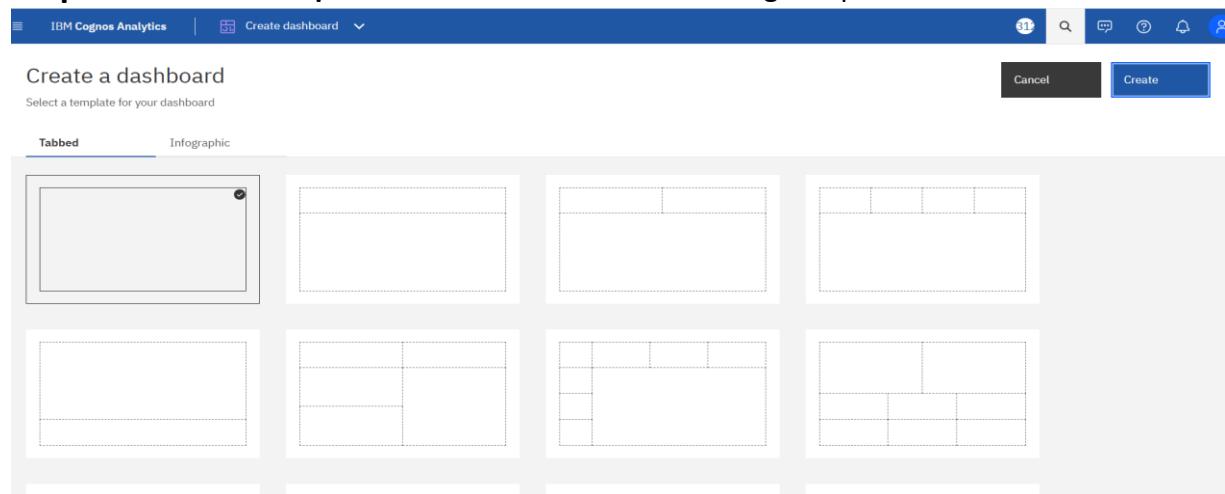
PROBLEM STATEMENT- 10 : To analyze and compare city-wise flood risk and rainfall intensity to identify high-risk areas for better planning and management.

SOLUTION : City-Wise Flood risk and Rainfall Intensity Analysis Dashboard.

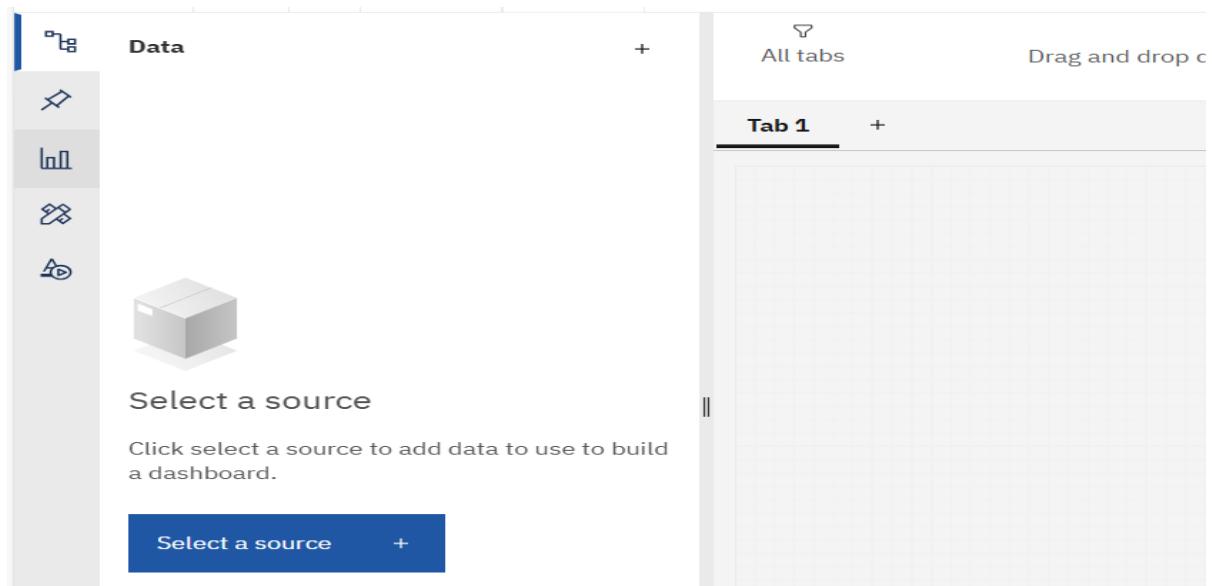
Step 1 : Go to  Then click on **+ New** in that choose **Dashboard** option.



Step 2: Select the **Template** and then click on **Create** at right top .

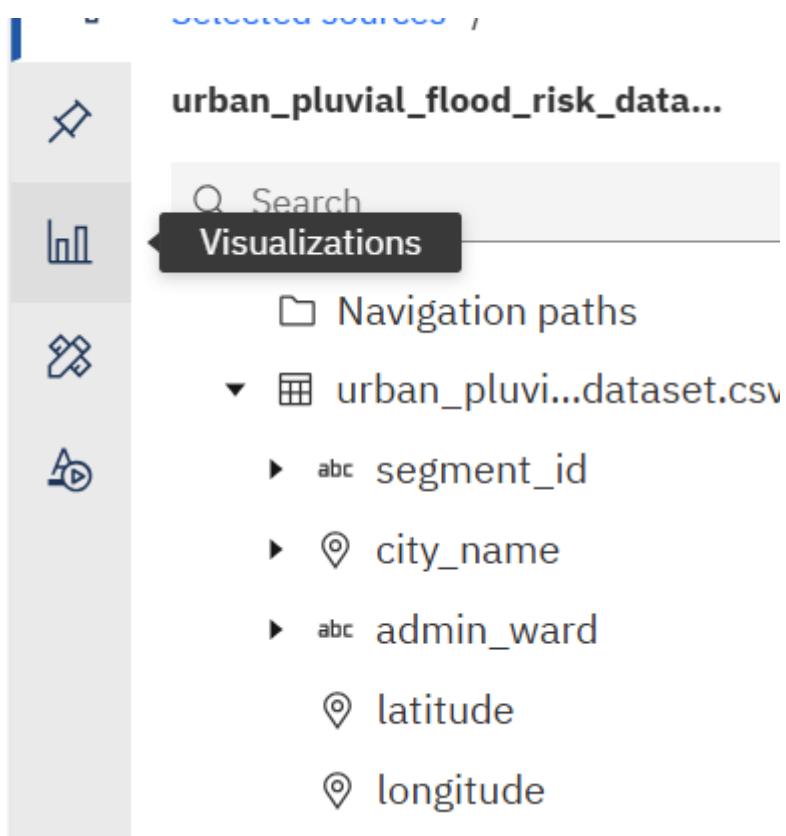


Step 3: Add the **Data module** by selecting Select a source option then by **My content**.



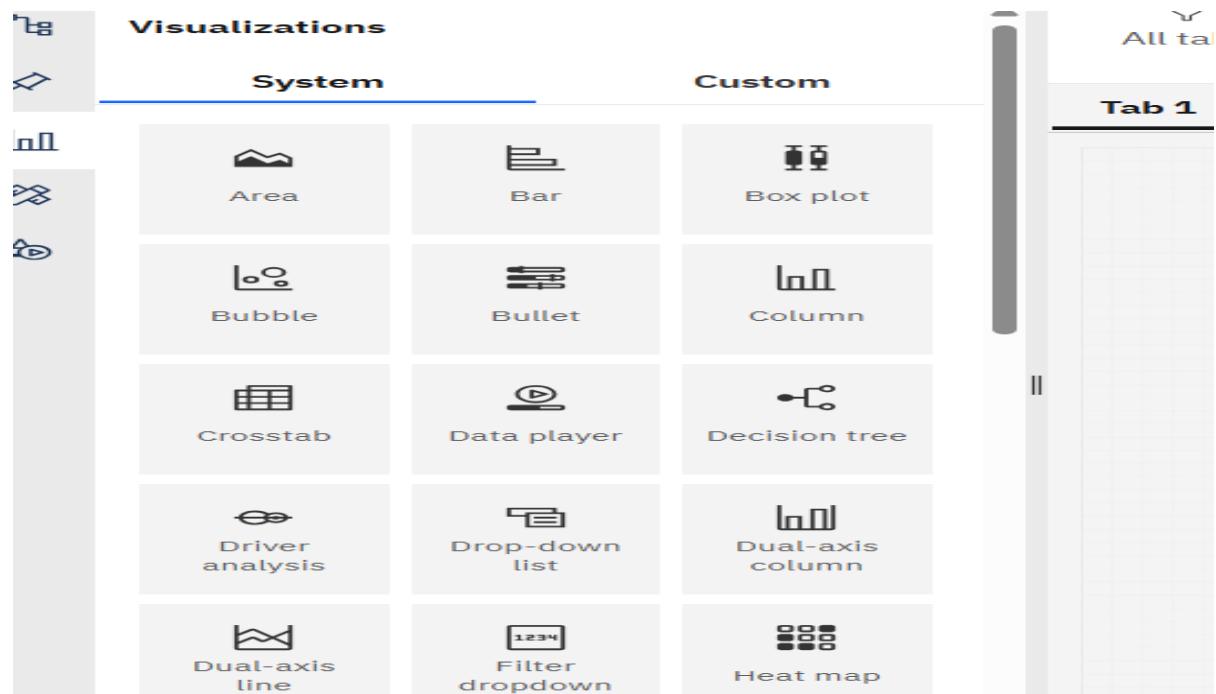
The screenshot shows the 'Data' module interface. On the left, there's a sidebar with icons for Data, Visualization, and other modules. The main area has a large 'Select a source' button with a 3D cube icon. Below it is a placeholder text: 'Click select a source to add data to use to build a dashboard.' At the bottom is a blue 'Select a source' button.

Step 4: Then there is **Visualization** option at left to make graph charts etc.



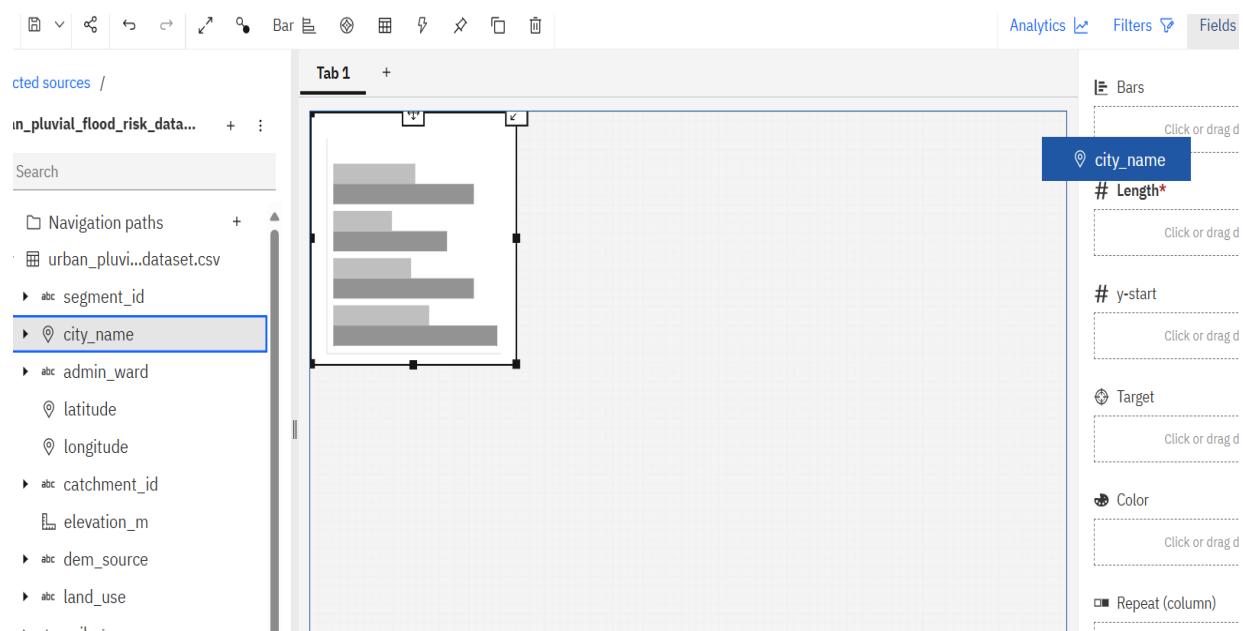
The screenshot shows the 'Visualizations' section of the module. It lists a dataset named 'urban_pluvial_flood_risk_data...'. Below it is a search bar with the placeholder 'Search'. A dropdown menu is open, showing 'Visualizations' and a list of columns from the dataset: 'Navigation paths', 'urban_pluvi...dataset.csv', 'segment_id', 'city_name', 'admin_ward', 'latitude', and 'longitude'. The 'dataset.csv' item is expanded, showing its sub-columns.

Step 5: There are many options for charts here so first click on **Bar chart**.



Step 6: Now Drag and Drop the columns to the specific field

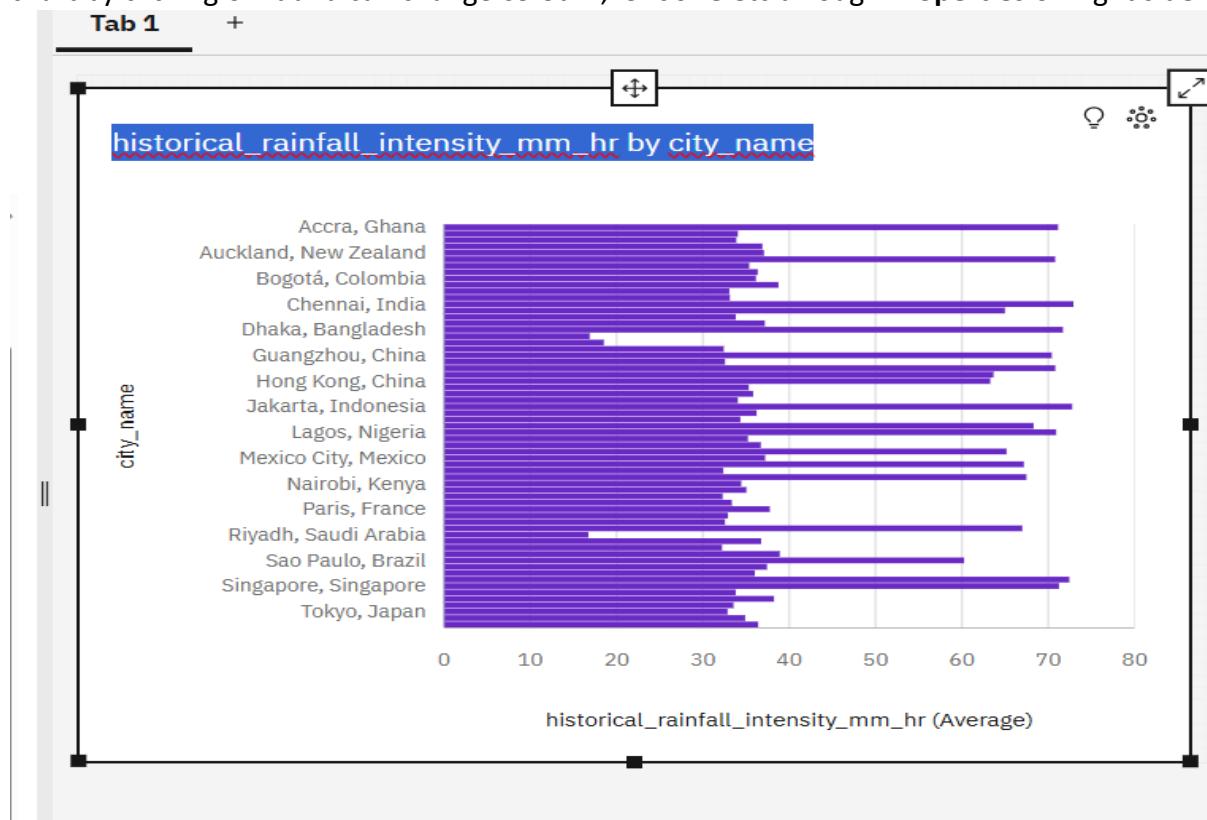
- **Bars** : city_name
- **Length** : historical_rainfall_intensity_mm_hr



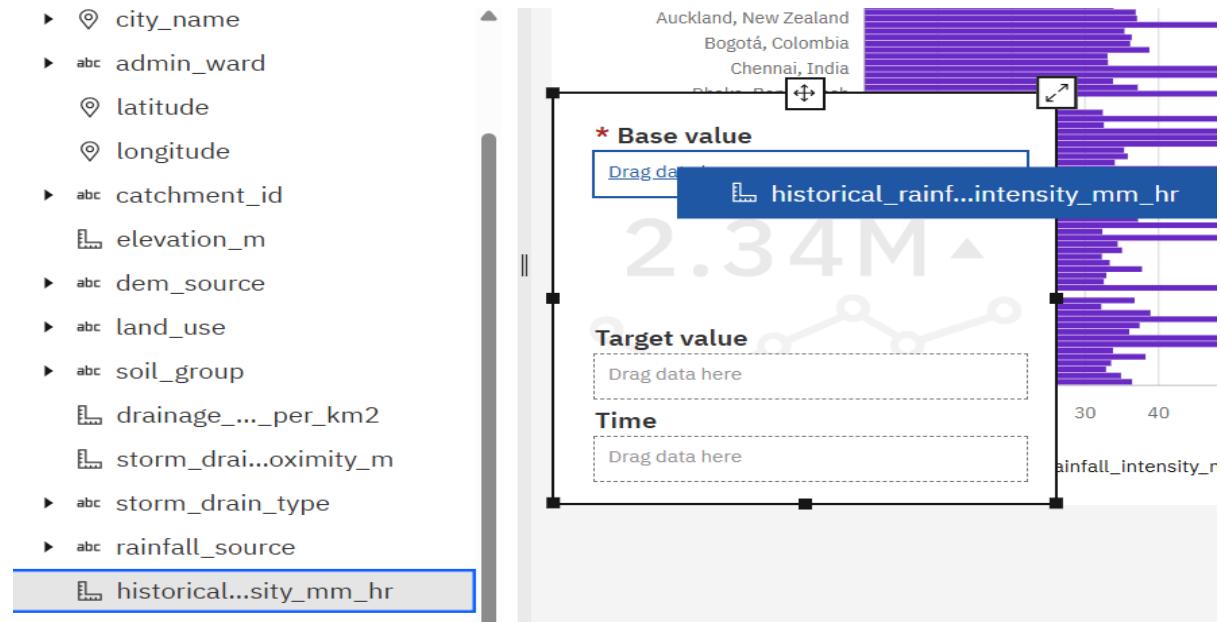
Step 7: Click on Three dot in the length then **Summarize →Average.**

The screenshot shows a data visualization tool's interface. A context menu is open over a column header labeled '# Length*'. The menu has several sections: 'Required field', 'Sort', 'Filter', 'Top or bottom', 'Format data', 'Summarize' (which is currently selected), 'Customize data name', 'Create calculation', and 'Remove column'. Under the 'Summarize' section, there are options for 'Average', 'Sum', 'Minimum', 'Maximum', 'Count', 'Count distinct', and 'Auto (Sum)'. 'Auto (Sum)' is highlighted with a checkmark. The background shows a table with columns like 'historical_rainfall_intensity_mm_hr' and 'city_name'.

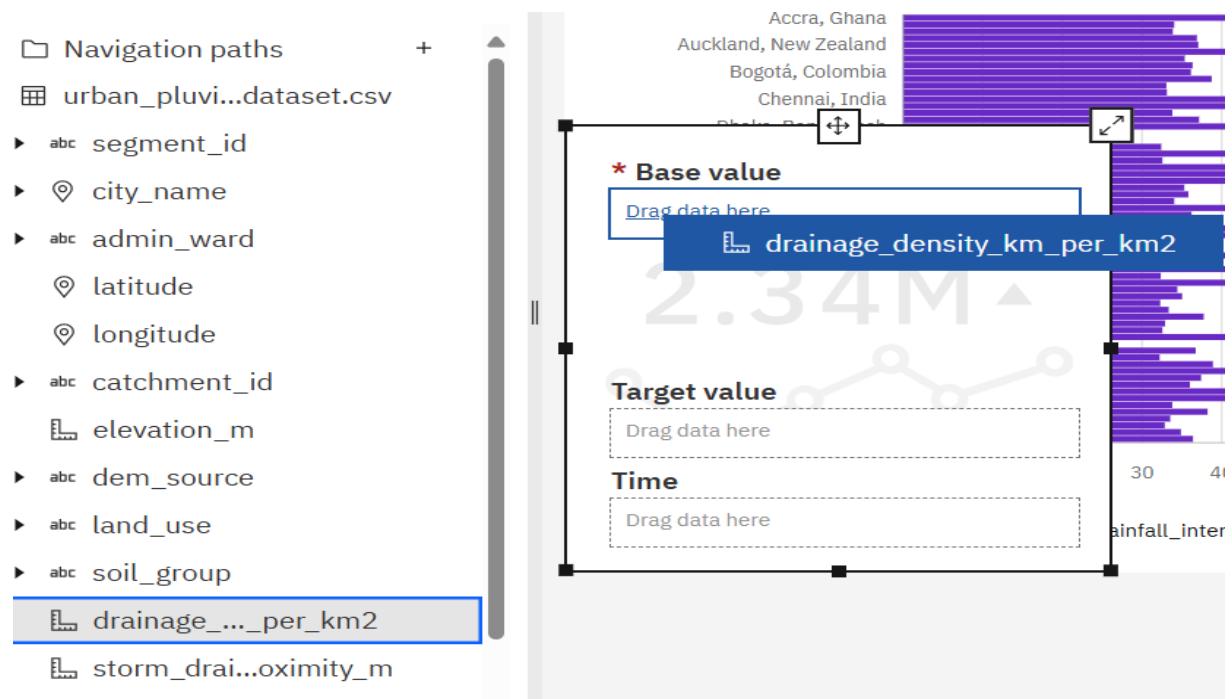
Step 8: You can see how **Bar chart** is created and now you can change the **Header** of the chart by clicking on it and can change **colour ,Font size** etc through **Properties** on right side.



Step 9: Now select KPI from the visualization and add the column by **Drag and Drop** historical_rainfall_intensity in base value option. Again Click on Three dot then **Summarize** →**Average**.So we will find the **Average Rainfall intensity**.



Step 10: Again Select KPI Here we will find **Average Drainage density** by the same procedure we have done above.



Step 11: And similarly we will also find **Average Elevation** by Same steps above .



Step 12: And Now we will make **Pie chart** by Drag and Drop the column to specific fields

- **Size** : segment_id
- **Segment** : risk_labels
- ▶ ↴ city_name
- ▶ abc admin_ward
- ↳ latitude
- ↳ longitude
- ▶ abc catchment_id
- ↳ elevation_m
- ▶ abc dem_source
- ▶ abc land_use
- ▶ abc soil_group
- ↳ drainage_density_per_km2
- ↳ storm_drainage_proximity_m
- ▶ abc storm_drain_type
- ▶ abc rainfall_source
- ↳ historical_rainfall_intensity_mm_hr
- ▶ # return_period_years
- ▶ abc risk_labels



Step 13: Click on three dots then **Summarize** → **Count in Fields**.

Size*

Required field

segment_id

Sort ▶

Filter

Top or bottom

Format data

Summarize ▶

Customize data name

Remove column

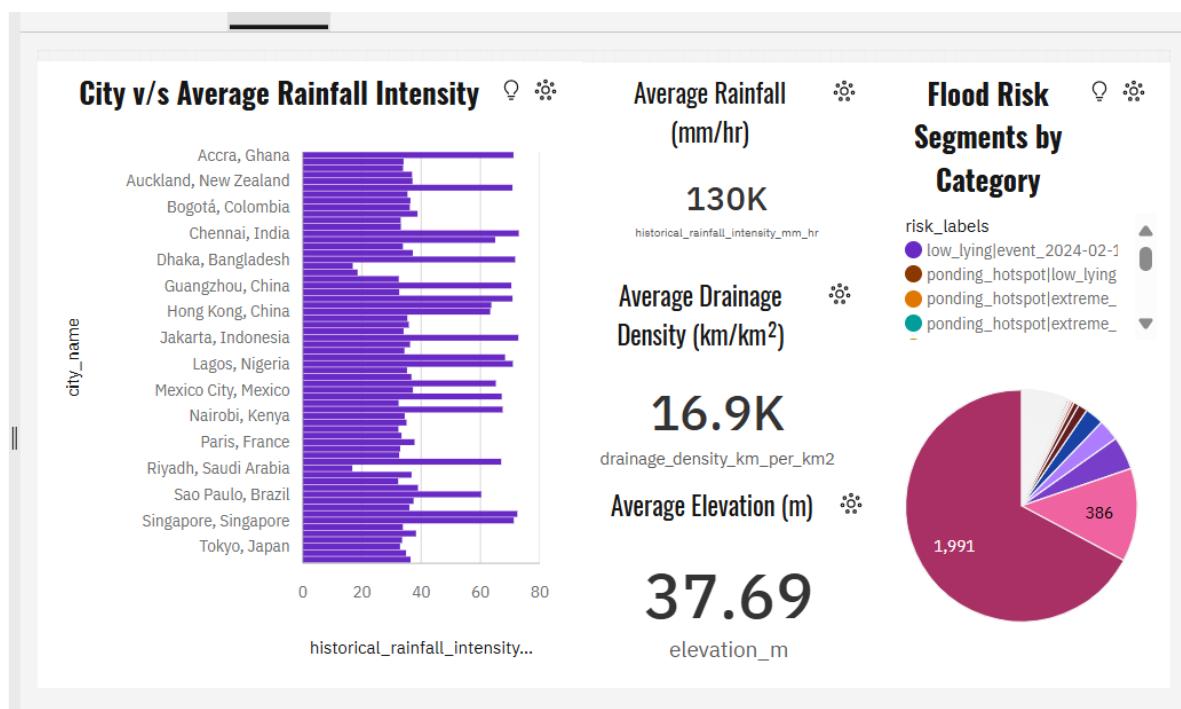
Count

Count distinct

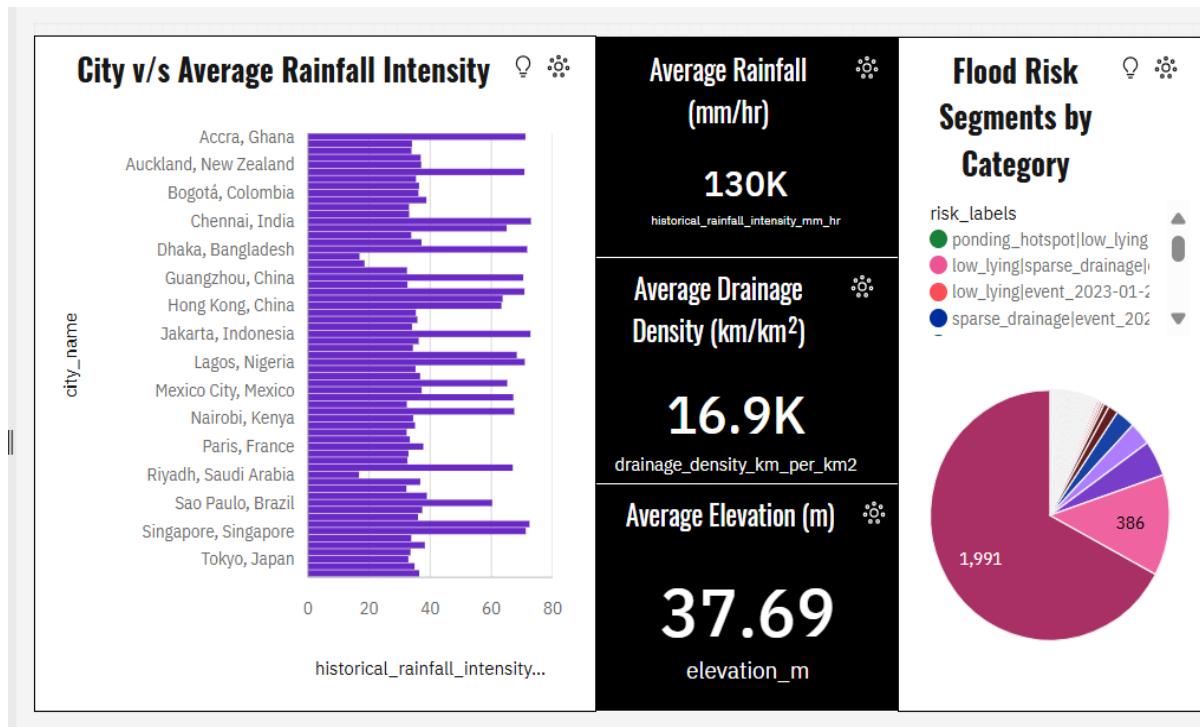
Click or

Tooltip

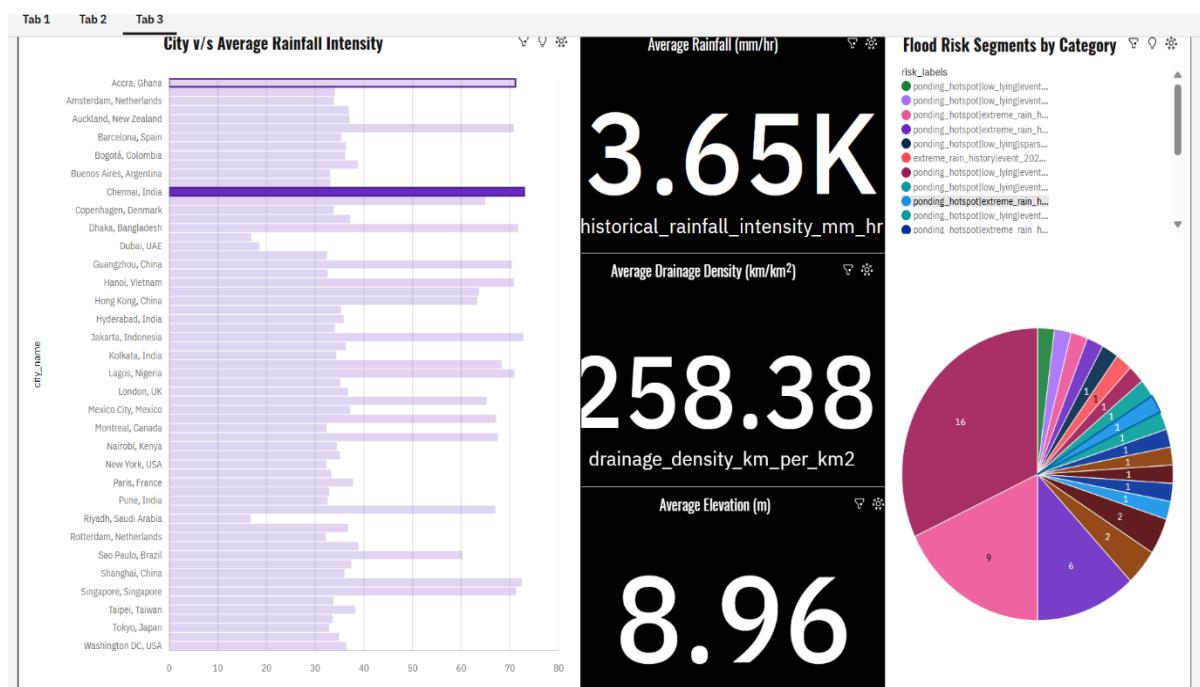
Step 14: And then **Pie chart** is also created and **Dashboard** has been created.



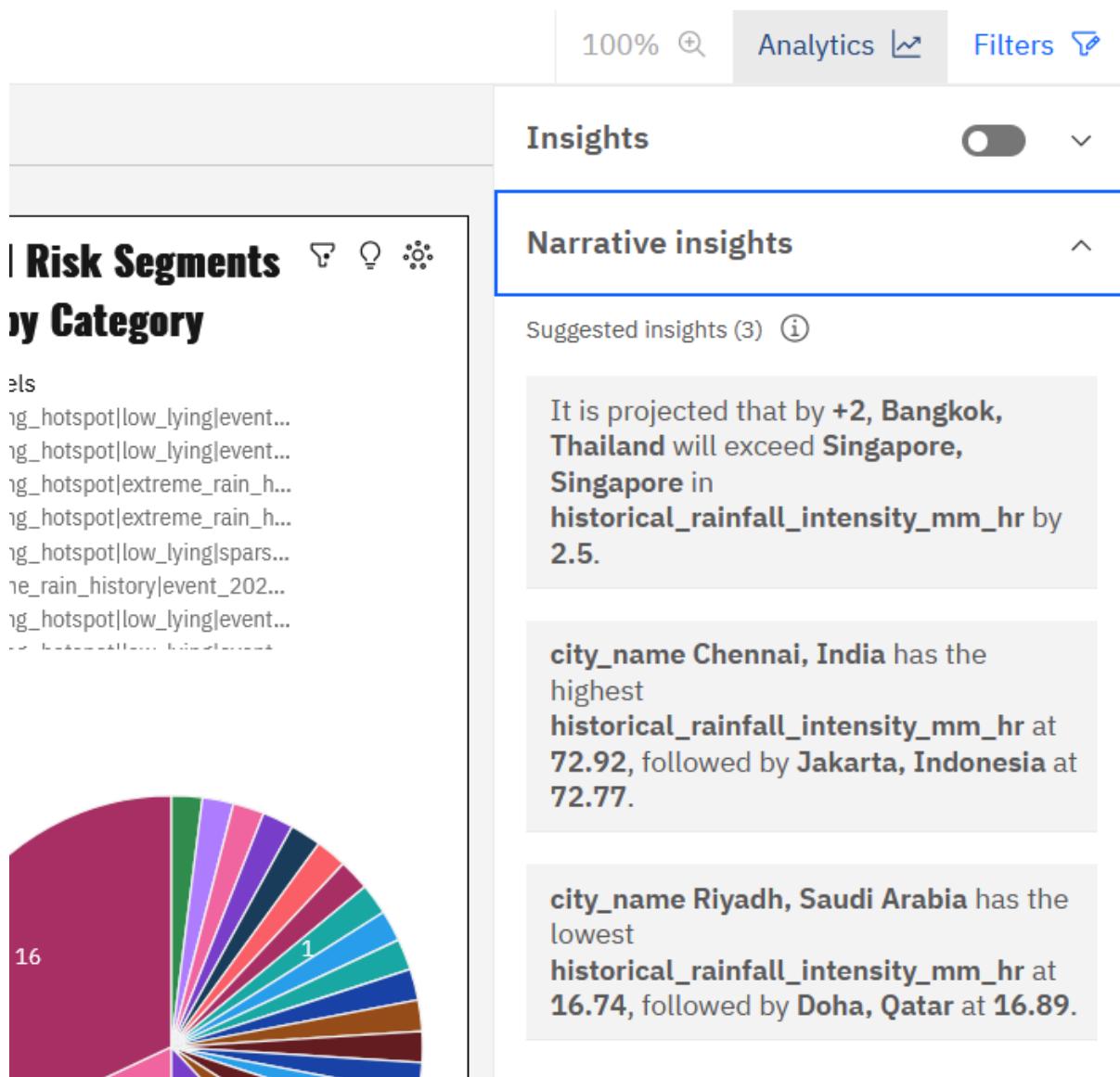
Step 15: We can fill the colour and do many **Formatting** to the Dashboard to make attractive Through **Properties Panel** in right side.



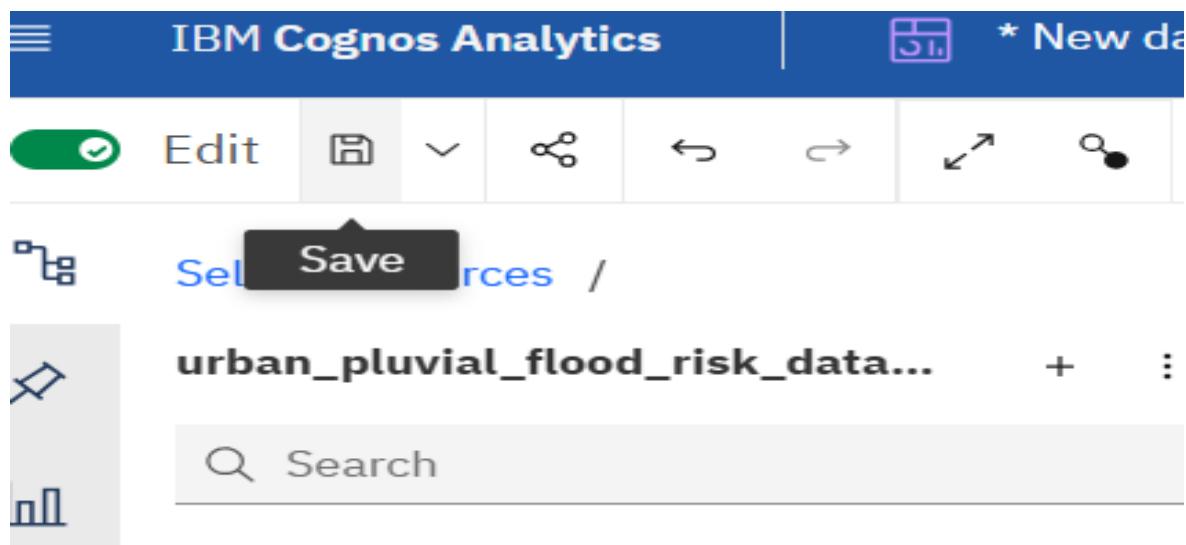
See how we can see **City wise** everything here we can see of **Chennai ,India** .



Step 16 : At right side click **Analytics** . You can see all **Insights**.



Step 17: Now we have to save the dashboard in **My content**.



Step 18: Keep the name of dashboard and then click on **Saveee** .

