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# EOCap4Africa

## 7 Vector Analysis



**INES Ruhengeri**  
Institute of Applied Sciences



# Learning Objectives



Apply buffer, intersect, and query functions in QGIS

Use vector analysis to study wetland areas

Evaluate how infrastructure and land use impact wetlands



# Recap: Vector Tools

Tool	Function	Example
Buffer	Creates a zone around features at a set distance.	Finding areas within 2 km of wetlands.
Intersect	Extracts overlapping areas between two layers.	Finding roads within protected wetland zones.
Union	Merges multiple layers while preserving all features.	Merging national parks and protected areas.
Clip	Trims one layer using another as a boundary.	Cutting land use data to fit within a country's borders.
Dissolve	Merges features with the same attribute value.	Merging wetland regions into one large feature.
Select by Attribute	Filters features based on attribute values.	Selecting only wetlands classified as "permanent".
Select by Location	Filters features based on spatial relationships.	Selecting cities that fall within 10 km of wetlands.
Difference	Removes overlapping areas from the first layer.	Finding land use types outside protected areas.



# Visualising Geospatial Data

- Use **clear and intuitive symbology** (avoid too many colors)
- Ensure **contrast and readability** (use appropriate basemaps)
- Choose the right **projection** for the study area
- Include **annotations** when necessary (labels, highlights)
- Consider the **target audience** (scientists, policymakers, public)



# Essential Map elements

- **Title:** Clearly describes the map's purpose
- **North Arrow:** Indicates orientation
- **Scale Bar:** Provides distance reference
- **Legend:** Explains symbology
- **Coordinate Grid:** for precise location referencing
- **Source & Date:** Ensure reproducibility and credibility



# Creating a Map in QGIS

Project -> New Print Layout -> Name your Map -> Layout view opens

Map making is as much about science as it is about  
being creative and communicative  
Be confident and try out your own ideas  
Look for inspiration online!

The screenshot shows the QGIS desktop environment. At the top, the menu bar includes 'Layout', 'Edit', 'View', 'Items', 'Add Item', 'Settings', and 'Help'. Below it is a toolbar with various icons for map manipulation. On the left, a vertical toolbar contains navigation tools like pan, zoom, and measure. The main workspace displays a map titled 'Roads intersecting Wetlands in Botswana', which includes a red rectangular selection box. To the right of the map are three panels: 'Items', 'Item Properties', and 'Page Properties'. The 'Items' panel lists map elements like 'Projection: UTM 32S Data...', 'North Arrow', and scale bars. The 'Item Properties' panel shows settings for the selected item, such as 'Size' (A4) and 'Orientation' (Landscape). The 'Page Properties' panel is partially visible at the bottom right.

**Add Map Elements**

**Map Navigation Tools**

**Map View**  
Shows you the map you are working on

**Layer Overview**  
Shows you all elements of the current map

**Item Properties**  
Lets you adjust any detail of singular layers (eg. add grids, adjust scale bar size, etc.)

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# Task



Which Roads intercept Wetlands in Botswana?







# Structuring your task

1. Start the RStudio Script of this Lecture and follow the Instructions
2. Assign your own variables and use them for more complicated calculations
3. Create your own Dataframe with any Data you like



# Summary & Key Takeaways

**Vector analysis tools** (buffer, intersect, query) are essential for spatial analysis

Proper map visualization **enhances scientific communication**

Including **key map elements** (north arrow, scale, legend) ensures clarity and professionalism

Applying these methods to real-world cases, like **wetlands in Africa**, helps inform **conservation and planning**

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# Thank you for your attention!

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