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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!

*Map

Layout Edit View Items Add Item Settings

Add map elements

Map navigation tools

Map view
Shows you the map you are working on

Layer overview
all elements of the current map

Item properties
adjust any detail of singular layers (eg. add grids, adjust scale bar size, etc.)

Roads intersecting Wetlands in Botswana

Projection: UTM 32S
Data Source: OSM
Author: Hanna Schulten

Size A4
Orientation Landscape

page: 1 38.0%

Task



Which roads intercept wetlands in Botswana?



Vector analysis in R

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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