

# Introduction to the use of GIS in Spatial Epidemiology using QGIS

---

## General information

Participants with no prior GIS-knowledge will be exposed to general concepts and principals of Geographic Information Systems during a 4-day workshop. They will elaborate this conceptual knowledge with hands-on exercises. The workshop is followed by a subsequent distance-learning course of 6 months. The software used for the exercises will be the open source QuantumGIS software ([www.qgis.com](http://www.qgis.com)). Participants will learn to use this GIS-software by performing well-delineated exercises, clustered around 15 themes. The level of difficulty of these exercises will be gradually increasing. An intensive follow-up through the distance-learning platform is guaranteed. Tasks and exercises have to be submitted and a highly interactive communication is envisaged (mail communication, discussion forum).

## Course philosophy

The course aims to help participants understand rather than just learn about applications of using GIS in an epidemiological context. This can only be achieved in a relaxed, informal and interactive environment using plenty of examples and hands-on exercises where participants apply and adapt what they have learned. The learning community, established during the workshop, is further supported through the distance-learning platform, making use of synchronous and a-synchronous communications tools between the participants and course leaders.

## Target audience

This workshop is designed for professionals and researchers involved in the control and management of animal disease outbreaks, i.e. risk managers, risk analysts, epidemiologists, microbiologists, diagnosticians, etc. Some experience in veterinary epidemiology is an asset but no requirement.

## Programme

### Workshop program

Day 1	Themes
08:30 - 09:00	Registration & welcome
09:00 - 10:30	Introduction
10:30 - 11:00	Coffee break
11:00 - 12:30	Introduction to QGIS
12:30 - 13:30	Lunch break
13:30 - 15:00	Case studies on GIS and epidemiology – part I

15:00	-	15:30	Coffee break
15:30	-	17:30	Case studies on GIS and epidemiology – part II

**Day 2**                      **Themes**

---

09:00	-	10:30	Data Formats
10:30	-	11:00	Coffee break
11:00	-	12:30	Data sources
12:30	-	13:30	Lunch break
13:30	-	15:00	Projection systems
15:00	-	15:30	Coffee break
15:30	-	17:30	Geo-processing of vector data – part I

**Day 3**                      **Themes**

---

09:00	-	10:30	Geo-processing of vector data – part II
10:30	-	11:00	Coffee break
11:00	-	12:30	Working with tabular data
12:30	-	13:30	Lunch break
13:30	-	15:00	Creating Raster Data – part I
15:00	-	15:30	Coffee break
15:30	-	17:30	Creating Raster Data – part II

**Day 4**                      **Themes**

---

09:00	-	10:30	Case study with application of all themes that were addressed – part I
10:30	-	11:00	Coffee break
11:00	-	12:30	Case study with application of all themes that were addressed – part II
12:30	-	13:30	Lunch break
13:30	-	15:30	Case study with application of all themes that were addressed – part III
15:30	-	16:00	Rap-up of the workshop

**Distance learning follow-up**

The distance-learning program will focus on the following themes:

- Working with Google Earth
- Raster geo-processing
- Complex raster modelling
- Design of a stratified random sampling
- Data preparation for statistical modelling
- Integration of R and GRASS into QGIS

## Learning outcomes residence training

### Theme 1: Introduction to QGIS

Participants

- Understand the different parts of the QGIS interface;
- Can open QGIS on their personal laptops;
- Manage to open some vector files and change their appearance;
- Can load and enable plugins;
- Have a general understanding of how the QGIS open source initiative compares with commercial GIS software.

### Theme 2: Case studies on GIS and epidemiology

Participants understand the role of GIS in epidemiological studies.

### Theme 3: Data formats

Participants

- Understand the vector data format (shape files);
- Understand the raster data formats (resolution, header, file size in relation to resolution);
- Advantages/disadvantages of vector and raster data;
- Are able to cope with different formats in QGIS.

### Theme 4: Data sources

Participants

- Are able to find GIS data on the internet;
- Basic steps for data standardization and cleaning;
- Understand meta-data.

### Theme 5: Projection Systems

Participants

- Understand the different coordination systems;
- Understand when to work with projected data;
- Are able to handle projection problems.

### Theme 6: Geo-processing of Vector Data

Participants can perform basic geo-processing.

### Theme 7: Working with tabular data

Participants can:

- Convert tabular data with coordinates into a shape file;
- Link tabular data with GIS data, based on a common field.

### Theme 8: Create Raster Data

Participants can:

- Perform an interpolation of point data;

- Make distance calculations;
- Make a density maps;
- Convert rasters to vector;
- Convert vectors to rasters.

### **Theme 9: Case study**

Participants can apply all the themes that have been previously addressed in a GIS project.

## **Learning outcomes distance learning training**

### **Theme 10: Working with Google Earth**

Participants can:

- Use Google Earth as a data source;
- Delineate vector data (points and polygons) using Google Earth;
- Export the vector data as kml-files and import them into QGIS.

### **Theme 11: Raster geo-processing**

Participants can:

- Classify surface rasters into thematic rasters;
- Perform raster calculation (cross-tabulation).

### **Theme 12: Complex Raster Modelling**

Participants can:

- Combine information of multiple rasters;
- Perform a simple multi-criteria decision analysis.

### **Theme 13: Design Sampling Strategy**

Participants can:

- Design a stratified random sampling;
- Perform a random sampling based on a grid.

### **Theme 14: Data preparation for statistical modelling**

Participants can:

- Retrieve raster information (pixel values) for a point layer;
- Export this information in an excel-file for further use in a statistical program.

### **Theme 15: QGIS: integration with GRASS and R**

Participants can:

- Understand the added value of GRASS and R in QGIS;
- Run GRASS from QGIS on their personal laptops;
- Run R from QGIS on their personal laptops.

## Registration fee

Participants can decide to attend the residence workshop only or cover both the residence training and the distance-learning follow-up. Registration fee for the residence workshop only is € 690, whereas the fee for both the residence workshop and the distance-learning platform is set at € 2,190. A binder and USB-stick with all workshop material and literature references, coffee and tea breaks, and lunches during the resident workshop are included in the fees. Access to the distance learning platform and daily support of course organisers are included when subscribing for both the residence and distance-learning follow-up.

## The history of the workshop

The workshop is based on the experience of Avia-GIS with the development several GIS distance-learning courses for different projects and curricula.

- The EC FP7 'Integrated Control of Neglected Zoonoses' project (ICONZ-Africa): <http://www.iconzafrica.com/training.html>.
- The EC FP7 'Biology and control of vector-borne diseases' project (EDENext): <http://www.edenextdata.com/?q=content/edenext-training-program-spatial-data-and-gis>.
- The EC FP6 'Emerging diseases in a changing European environment' project (EDEN): <http://ergodd.zoo.ox.ac.uk/eden/index.php?p=14&i=0>.
- The MSc training in Veterinary Tropical Medicine at the University of Pretoria: <http://web.up.ac.za/default.asp?ipkCategoryID=5237>.

## Short biographies and contact information of all the workshop organizers

**Guy Hendrickx** (Avia-GIS, Zoersel, Belgium)

MSc, PhD, Managing Director at Avia-GIS

Field of expertise: spatial epidemiology, the spatial modelling and spatial information systems for disease management

Email: [ghendrickx@avia-gis.be](mailto:ghendrickx@avia-gis.be)

**Els Ducheyne** (Avia-GIS, Zoersel, Belgium)

MSc, PhD, Scientific Director at Avia-GIS

Field of expertise: spatial species distribution/ abundance modeling, arthropod wind-spread models, large spatial time-series of meteorological and remotely sensed data

Email: [educheyne@avia-gis.be](mailto:educheyne@avia-gis.be)