Task One: Stormwater Drainage Infrastructure Survey and Data Entry

In Accra, June-July 2024, we carried out a stormwater drainage survey to identify exposed stormwater drainage points along street segments that were clogged with solid water (i.e., plastics and rubbish) and stagnated for the purpose of reducing the burden of poor environmental sanitation and risk of mosquito-borne infestation.

Following information has been captured in annotated images:

Use the information inside the images' text box to construct a data frame in RStudio.

1. Use the **c( )** function with assignment operator (<-) to create the following vector objects with the names:
   - **GoProID**: it contains the image ID numbers
   - **Latitude**: it contains the y-coordinate of surveyed location
   - **Longitude**: it contains the x-coordinate of surveyed location
   - **Sanitation**: it contains information about the sanitation state of drain
   - **SolidWaste**: it describes presence or absence of solid waste materials in drain
   - **Structure**: it describes whether the structure of the drain was damaged (or not) or it being a "run off" drain
   - **Stagnation**: refers to flow obstruction in drain resulting in it be stagnated
   - **Mosquitoes**: refers to evidence of mosquito breeding in drain due to condition

2. Use the **data.frame( )** with the assignment operator (<-) to create the data frame object `drainage_data`.
3. Use the following row conditions i.e., drains classified as having **Poor** sanitary state **AND** it is a **Breeding Spot** for mosquitoes to perform a filter on the `drainage_data` object. At the same time, limit the filtered data to the following columns: `GoProID`, `Latitude`, `Longitude`, `Sanitation` and `Mosquitoes`
4. Use the **write.csv( )** to save your new filtered dataset.

Notes:

For this task, the students are expected to know the following:

- Assignment operator (<-) to assigning values, or data frames to objects
- How to use the combine function c( ) for listing observations into a vector object
- How to build a data frame

These elements were taught in Week 1. You can gently refer them to the various sections in Introduction I chapter (section 1.4 and 1.6).

In Week 2, the students should have learnt the following:

- Sub-setting a data frame by rows and columns
- Further sub-setting a data frame using logical operators
- Saving a CSV using write.csv() function

These latter points, they can be referred to the following sections in Introduction II chapter (section 1.4 and 1.5).

Solutions codes for task 1

```
# 1. R syntax for creating the vector objects

GoProID <- c("GOPRO0042", "GOPRO0061", "GOPRO0077", "GOPRO0098")
Latitude <- c(5.5547, 5.5545, 5.5552, 5.5538)
Longitude <- c(-0.2390, -0.2383, -0.2368, 0.2356)
Sanitation <- c("Clean", "Poor", "Poor", "Poor")
SolidWaste <- c("None", "Present", "Filled with Plastic", "Present")
Structure <- c("Not Damaged", "Not Damaged", "Not Damaged", "Run off")
Stagnation <- c("None", "Present", "None", "Present")
Mosquitoes <- c("None", "Breeding Spot", "None", "Breeding Spot")

# 2. R syntax for creating the data frame
drainage_data <- data.frame(GoProID, Latitude, Longitude, Sanitation, SolidWaste,
Structure, Stagnation, Mosquitoes)

# 3. R syntax for subsetting on rows and columns
drainage_data_filter <- drainage_data[drainage_data$Sanitation == "Poor" &
drainage_data$Mosquitoes == "Breeding Spot", c(1, 2, 3, 4, 8)]

# 4. R syntax for saving your new dataset
write.csv(drainage_data_filter, file = "Filtered_Drainage_Data.csv", row.names = FALSE)
```