# **Theme: Good use and management of water, energy and solid waste in Ecuador**

**Programs:**

* PYTHON (Spyder)
* QGIS or GeoPandas

1. **Which database files to read**
2. Download files from [**https://www.ecuadorencifras.gob.ec/hogares/**](https://www.ecuadorencifras.gob.ec/hogares/) at the label of Statistic Information as “Informacion Estadistica” in Database as “Base de Datos”. The webpage would show the current year during 2022. In the future all files would be in the label of Additional Documentation as “Documentacion Adicional” and the label of Information of past years as “Informacion de Años Anteriores” where it year would open its one web page. The years researched 2018, 2019 and 2022. Original files in spss, converted to csv.

**Years: 2018, 2019 and 2022**

1. enemdu\_ambiente\_2022\_10
2. BDD\_MOD\_amb\_hogar\_ESPND\_2019
3. 201812\_multibdd\_ambiente\_DEAGA\_2018
4. Codes of Ecuador per province and city (“cantones”)
5. **What calculations should be done with which variables?**

Sample Description:

* Number of household per yeara
* Survey sources

Levels of location that can be use:

* National
* Urban and Rural
* Province (like states for US)

Note: it is needed a factor of expansion to be representative which is included for each household that answered the survey

Variables:

* Waste
* Water and energy use
* Use of plastic bags
* Environmental events

**FIVE QUESTIONS:**

1. **Environmental Problems:** What environmental problems affect neighborhoods?: Households that were affected by at least one environmental problem in their neighborhood

* Visual pollution: Advertising, billboards, cables, antennas, poles.
* Contaminated water
* Excessive noise
* Garbage accumulation
* Air pollution (smog)
* The presence of stray animals and their droppings (dogs, cats, pigeons, etc.)
* Animal droppings in public spaces

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Variables:**

|  |  |
| --- | --- |
| s101p121 | ¿cuales son los que afectan a su barrio: Contaminación visual: Publicidad, carteles, cables, antenas, postes? |
| s101p122 | ¿cuales son los que afectan a su barrio: Agua contaminada ? |
| s101p123 | ¿cuales son los que afectan a su barrio: Ruidos excesivos ? |
| s101p124 | ¿cuales son los que afectan a su barrio: Acumulación de Basura ? |
| s101p125 | ¿cuales son los que afectan a su barrio: Contaminación del aire (smog) ? |
| s101p126 | ¿cuales son los que afectan a su barrio: Presencia de animales callejeros (Perros, gatos, palomas etc.)? |
| s101p127 | ¿cuales son los que afectan a su barrio: Excretas de animales en espacios públicos? |

**Graph 1: HOGARES QUE FUERON AFECTADOS AL MENOS CON UN PROBLEMA AMBIENTAL (3 years)**

**HOUSEHOLDS THAT WERE AFFECTED BY AT LEAST ONE ENVIRONMENTAL PROBLEM (3 years)**

* Count the number the households that has registered an environmental problem in their neighborhood for the years of 2018, 2019 and 2022, national aggregation
  + Include the answers that at least have 1 event for the variables: s101p121, s101p122, s101p123, s101p124, s101p125, s101p126, s101p12
  + Use the expantion factor fexp4 for national representation
  + Aggregate National
* Result: BarePlot per year

**Graph 2: HOGARES QUE FUERON AFECTADOS SEGÚN AREAS (3 years)**

**HOUSEHOLDS AFFECTED BY AREAS (3 years)**

* Count the number the households that has registered an environmental problem in their neighborhood for the years of 2018, 2019 and 2022, Urban and Rural (Area Variable)
  + Include the answers that at least have 1 event for the variables: s101p121, s101p122, s101p123, s101p124, s101p125, s101p126, s101p12
  + Use the expantion factor fexp4 for national representation
  + Aggregate Urban and Rural
* Result: BarePlot per year

**Graph 3: HOGARES QUE FUERON AFECTADOS SEGÚN EL TIPO PROBLEMA AMBIENTAL (3 years)**

* Count the number the households that totalizing all the environmental problems registerd in their neighborhood for the years of 2018, 2019 and 2022, National and Variables
  + Count all the events for the variables: s101p121, s101p122, s101p123, s101p124, s101p125, s101p126, s101p12
  + Use the expantion factor fexp4 for national representation
  + Distribute in percentage of share being all the variables 100%

Results: BarePlot seaborn or Radar Chart from Python

* Per Year and Variables (National) Per Area and Variable

Chart, bar chart

Description automatically generated Chart, radar chart

Description automatically generated

1. **Waste Sorting:** Households that sorted or separated some type of waste. Households that sorted at least one waste

* Organic
* paper / cardboard
* plastic
* vidrior
* metal
* tetrapack

**Variables:**

|  |  |
| --- | --- |
| s101p11 | Clasificó durante los últimos 12 meses, residuos: 1. Orgánicos? |
| s101p12a | Clasificó durante los últimos 12 meses, residuos: 2. Inorgánicos: A - Papel, cartón? |
| s101p12b | Clasificó durante los últimos 12 meses, residuos: 2. Inorgánicos: B - Plástico? |
| s101p12c | Clasificó durante los últimos 12 meses, residuos: 2. Inorgánicos: C- Vidrio? |
| s101p12d | Clasificó durante los últimos 12 meses, residuos: 2. Inorgánicos: D- Metal (latas de atún , conservas, bebidas, etc.)? |
| s101p12e | Clasificó durante los últimos 12 meses, residuos: 2. Inorgánicos: E- Tetrapak? |

**\_\_\_\_\_\_\_\_\_\_\_**

**Graph 1: HOGARES QUE CLASIFICARON RESIDUOS (3 years)**

**Graph 2: HOGARES QUE CLASIFICARON RESIDUOS SEGÚN AREAS (3 years)**

**Graph 3: HOGARES QUE CLASIFICAN SEGÚN EL TIPO DE RESIDUO (3 years)**

**Graph 1: HOUSEHOLDS THAT SORRED WASTE (3 years)**

* Count the number the households that has registered at least a practice of classifying waste years of 2018, 2019 and 2022, national aggregation
  + Include the answers that at least have 1 event for the variables: s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for national representation
  + Aggregate National
* Result: BarePlot per year

**Graph 2: HOUSEHOLDS THAT CLASSIFIED WASTE ACCORDING TO AREAS (3 years)**

* Count the number the households that has registered at least a practice of classifying waste years of 2018, 2019 and 2022, urban and rural
  + Include the answers that at least have 1 event for the variables: s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for Urban and Rural representation
  + Aggregate Urban and Rural, Variable Area
* Result: BarePlot per year

**Graph 3: HOUSEHOLDS THAT CLASSIFY ACCORDING TO THE TYPE OF WASTE (3 years)**

* Count the number the households that totalizing that have classified wasted per type or waste for the years of 2018, 2019 and 2022, National and Variables
  + Count all the events for the variables: : s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for national representation
  + Distribute in percentage of share being all the variables 100% (pet type of waste)

Results: BarePlot seaborn or Radar Chart from Python

* Per Year and Variables (National) Per Area and Variable

Chart, bar chart

Description automatically generated Chart, radar chart

Description automatically generated

1. **Water-saving practice:** Households that routinely. How do Ecuadorian households save water? Water use practices carried out by households.

* Usually - they reuse the water
* Usually - use bucket instead of hose for certain activities
* Usually - close the taps while soaping the dishes, bathing, etc.
* Usually - shower in less than ten minutes
* Usually - regularly check the pipes

Variables:

|  |  |
| --- | --- |
| s101p61 | 1- ¿Reusan el agua (para regar, fregar, tirar al baño)? |
| s101p62 | 2- ¿Utiliza balde en lugar de manguera para ciertas actividades? |
| s101p63 | 3- ¿Cierran las llaves mientras jabonan los platos, se bañan, se cepillan los dientes, etc.? |
| s101p64 | 4- ¿Se duchan en menos de 10 minutos ? |
| s101p65 | 5- ¿Revisan regularmente las tuberías? |
| s101p66 | 6- ¿Disponen de economizadores de chorro (reductores de flujo del agua)? |
| s101p67 | 7- ¿Disponen de inodoro doble descarga ? |
| s101p68 | 8- ¿Colocan una botella de agua u otro objeto dentro del tanque del inodoro? |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Graph 1: HOGARES CON PRÁCTICAS DE AHORRO DE AGUA REALIZADAS (3 years)**

**Graph 2: HOGARES CON PRÁCTICAS DE AHORRO DE AGUA REALIZADAS SEGÚN AREAS (3 years)**

**Graph 3: HOGARES CON PRÁCTICAS DE AHORRO DE AGUA SEGÚN ACTIVIDAD REALIZADA (3 years)**

**Graph 1: HOUSEHOLDS WITH WATER SAVING PRACTICES CARRIED OUT (3 years)**

* Count the number the households that has registered at least a practice of water carryout for the years of 2018, 2019 and 2022, urban and rural
  + Include the answers that at least have 1 event for the variables: s101p71, s101p72, s101p73, s101p74, s101p75, s101p76, s101p77
  + Use the expansion factor fexp4 for national representation
  + Aggregate National
* Result: BarePlot per year

**Graph 2: HOUSEHOLDS WITH WATER SAVING PRACTICES CARRIED OUT ACCORDING TO AREAS (3 years)**

* Count the number the households that has registered at least a practice of water carryout for the years of 2018, 2019 and 2022, national aggregation
  + Include the answers that at least have 1 event for the variables: s101p71, s101p72, s101p73, s101p74, s101p75, s101p76, s101p77
  + Use the expansion factor fexp4 for national representation
  + Aggregate Urban and Rural, Variable Area
* Result: BarePlot per year

**Graph 3: HOUSEHOLDS WITH WATER SAVING PRACTICES ACCORDING TO ACTIVITY CARRIED OUT (3 years)**

* Count the number the households that totalizing all the practices for water carryout for per practice for the years of 2018, 2019 and 2022, National and Variables
  + Count all the events for the variables: : s101p71, s101p72, s101p73, s101p74, s101p75, s101p76, s101p77
  + Use the expansion factor fexp4 for national representation
  + Distribute in percentage of share being all the variables 100% (pet type of waste)

Results: BarePlot seaborn or Radar Chart from Python

* Per Year and Variables (National) Per Area and Variable

Chart, bar chart

Description automatically generated Chart, radar chart

Description automatically generated

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Energy saving practice:** How do Ecuadorian households save energy?

**Variables:**

|  |  |
| --- | --- |
| s101p71 | 1- ¿Desconectan los aparatos electrónicos y electrodomésticos cuando no los usan? |
| s101p72 | 2- ¿Apagan los focos al salir de una habitación? |
| s101p73 | 3- ¿Introducen los alimentos calientes en el refrigerador? |
| s101p74 | 4- ¿Planchan la mayor cantidad de ropa posible en una sola vez? |
| s101p75 | 5- ¿Abren las cortinas y persianas para aprovechar la luz del sol? |
| s101p76 | 6- ¿Dispone de aparatos electrodomésticos ahorradores de energía (Refrigerador, lavadora, secadora)? |
| s101p77 | 7- ¿Dispone de paneles solares? |

**Graph 1: HOGARES CON PRÁCTICAS DE AHORRO DE ENERGIA (3 years)**

**Graph 2: HOGARES CON PRÁCTICAS DE AHORRO DE ENERGIA SEGÚN AREAS (3 years)**

**Graph 3: HOGARES CON PRÁCTICAS DE AHORRO DE ENERGIA SEGÚN ACTIVIDAD REALIZADA (3 years)**

**Graph 1: HOMES WITH ENERGY SAVING PRACTICES (3 years)**

* Count the number the households that has registered at least a practice of energy saving for the years of 2018, 2019 and 2022, urban and rural
  + Include the answers that at least have 1 event for the variables: s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for national representation
  + Aggregate National
* Result: BarePlot per year

**Graph 2: HOMES WITH ENERGY SAVING PRACTICES ACCORDING TO AREAS (3 years)**

* Count the number the households that has registered at least a practice of energy saving for the years of 2018, 2019 and 2022, national aggregation
  + Include the answers that at least have 1 event for the variables: s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for national representation
  + Aggregate Urban and Rural, Variable Area
* Result: BarePlot per year

**Graph 3: HOUSEHOLDS WITH ENERGY SAVING PRACTICES ACCORDING TO ACTIVITY CARRIED OUT (3 years)**

* Count the number the households that totalizing all the practices for energy saving for per practice for the years of 2018, 2019 and 2022, National and Variables
  + Count all the events for the variables: : s101p61, s101p62, s101p63, s101p64, s101p65, s101p66, s101p67
  + Use the expantion factor fexp4 for national representation
  + Distribute in percentage of share being all the variables 100% (pet type of waste)

Results: BarePlot seaborn or Radar Chart from Python

* Per Year and Variables (National) Per Area and Variable

Chart, bar chart

Description automatically generated Chart, radar chart

Description automatically generated

**OBJECTIVE:**

* Plan:

1. Merge the base of geographic codes of by cities and provinces with the bases of the three years.
2. Calculate each of the questions explained before and extrapolate the data per household
3. Make general analysis with column charts for the three years in a national and area (urban and rural) level.
   1. Column Chart Analysis (% participation) with the three years each question
      1. General (4 charts)
      2. Variables (4 charts)
      3. Urban and Rural ((4 charts)
4. Period 2022: Good use and management of water, energy and solid waste in Ecuador vs area (Seaborn **Heatmap**, four questions)

**Environmental problems affecting neighborhoods vs Area**

|  |  |
| --- | --- |
| Households that sorted or separated some type of waste (organic, paper/cardboard, plastic, glass, metal, tetrapack). | Urban and Rural |
| **Water saving practice,** Households that usually shower in less than 10 minutes. |  |
| **Energy saving practice,** Households that usually turn off the bulbs when leaving a room. |  |
| Type of bags used by households to make their purchases by region (fabric, paper, plastic) |  |

1. Period 2022: Environmental Impact Analysis vs. Action in Homes? (Seaborn **Heatmap**, four questions)

**Environmental problems affecting neighborhoods vs Mitigation Actions (Variables/Questions)**

|  |  |
| --- | --- |
| Visual pollution: Advertising, posters, cables, antennas, poles. | Households that sorted or separated some type of waste (organic, paper/cardboard, plastic, glass, metal, tetrapack). |
| Contaminated water | Water saving practice, Households that usually shower in less than 10 minutes. |
| Excessive noise | Energy saving practice, Households that usually turn off the bulbs when leaving a room. |
| Accumulation of garbage | Type of bags used by households to make their purchases by region (fabric, paper, plastic) |
| Air pollution (smog) |  |
| Presence of stray animals and their excrement (dogs, cats, pigeon, etc.) |  |
| Animal excreta in public spaces |  |

1. Period: 2022, With Geopandas include the shapefiles of Ecuador and work in provinces – General Questions of Yes and No (%). For example:

Map

Description automatically generated

1. Results:

* Script, basic description (versions of . py)
* Graphs in Qgis (geopandas)
* CSV of the file joined with the calculations of the questions.