WORLD EVENTS & *CARBON EMISSIONS*

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(a bit of) CONTEXT ...

Carbon (CO_2) Emissions | Key Global Warming contributor

The Paris Agreement | 2015 International Treaty on Climate Change

Current State of the World | Pandemic -- Coronavirus/COVID-19, since 2020

Silver Lining | Global Carbon Emissions are down by 6%, (International Energy Agency, (IEA))

Back To Reality | 2021: Global Carbon Emissions are set rebound at a record setting 5% (1.5 billion tonnes) as the World "re-opens", (IEA)

Record Setting | 2010: Carbon Emissions increased by 5.9% (30 billion tonnes, (TIME, Reuters, IEA), at the turn of the Great Recession, 2007-2009

Is there a *link* between Carbon Emission activity *and* World Events?

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FOCUS *AREA(s)*:

- Carbon Emissions By Geographical Region
- Time Period: 2007 - 2012
- World Events:
  - Great Recession 2007-2009
  - Economic Crisis of 2012

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(THE) PROCESS

RESEARCH

SOURCE DATA

EDA

FINDINGS

RESEARCH

Starting Point | Carbon Emission & Pandemic
Information | Review of various articles/reports, data sources
Making Sense (of Research) | Formulate Questions, redefined/"flushed-out" topic specifics & analysis focus

SOURCE DATA

Data Source | Our World Data
Initial Dataset | Over 20,000 rows , 60 columns

(E)XPORATORY (D)ATA (A)NALYSIS

ETL (Extract –Transform - Load**)** | data clean-up, created schema, housed in SQL database,
Analysis Dataset: 4,000+ Rows, 29 Columns
Testing Code: Trail & Error |
Data Visualization |

Methods & Tools

pgAdmin4 v5, PostgreSQL 11 | Python, Python Libraries: Pandas, Matplotlib, SQLAlchemy, Psycopg2
QuickDBD | Microsoft Excel, PowerPoint | Jupyter Notebook | VS Code 1.54.3

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(THE) PROCESS CON'T...

SCHEMA

ENTITY RELATIONSHIP DIAGRAM

IMPORT/LOAD DATA

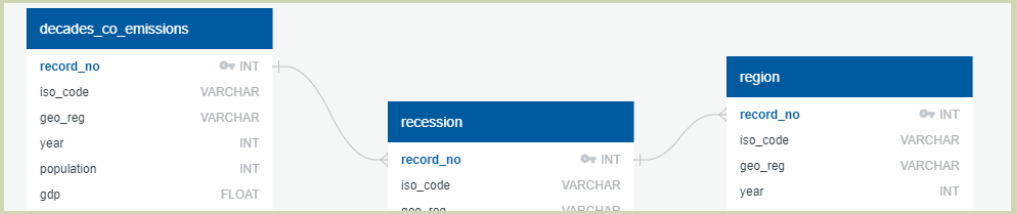
SCHEMA

Tables & Columns | Create tables, and columns with appropriate datatype, i.e., geo_reg: VARCHAR

```
CREATE TABLE "decades_co_emissions" (
    "record_no" INT   NOT NULL,
    "iso_code" VARCHAR   NOT NULL,
    "geo_reg" VARCHAR   NOT NULL,
    "year" INT   NOT NULL,
    "population" INT   NOT NULL,
```

ENTITY RELATIONSHIP DIAGRAM

Find Relationships | Establishing "relationships" among the tables via primary & foreign keys



LOAD DATA

PostgreSQL | Data import via Pandas , 3 Tables

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THE *TABLES*

(DATABASE)

```
117
118  --
119  SELECT * FROM decades_co_emissions;
120  --
121
```

Data Output | Explain | Messages | Notifications

	record_no [PK] integer	iso_code character varying	geo_reg character varying	year integer	population integer	gdp double precision
1	0	AFG	Afghanistan	2000	20780000	16508834816
2	1	AFG	Afghanistan	2001	21607000	15574844416
3	2	AFG	Afghanistan	2002	22601000	25676800000
4	3	AFG	Afghanistan	2003	23681000	27805560832

```
118  --
119  SELECT record_no, geo_reg, year,  co2, co2_per_capita, coal_co2,coal_co2_per_capita FROM region;
120  --
121
```

Data Output | Explain | Messages | Notifications

	record_no [PK] integer	geo_reg character varying	year integer	co2 double precision	co2_per_capita double precision	coal_co2 double precision	coal_co2_per_capita double precision
1	7	Afghanistan	2007	2.269	0.084	0.749	0.028
2	8	Afghanistan	2008	4.2	0.151	1.077	0.039
3	9	Afghanistan	2009	6.74	0.237	1.513	0.053
4	10	Afghanistan	2010	8.398	0.288	2.246	0.077

```
118  --
119  SELECT geo_reg, year,  co2, co2_per_capita FROM recession;
120  --
121
```

Data Output | Explain | Messages | Notifications

	geo_reg character varying	year integer	co2 double precision	co2_per_capita double precision
1	Afghanistan	2007	2.269	0.084
2	Afghanistan	2008	4.2	0.151
3	Afghanistan	2009	6.74	0.237

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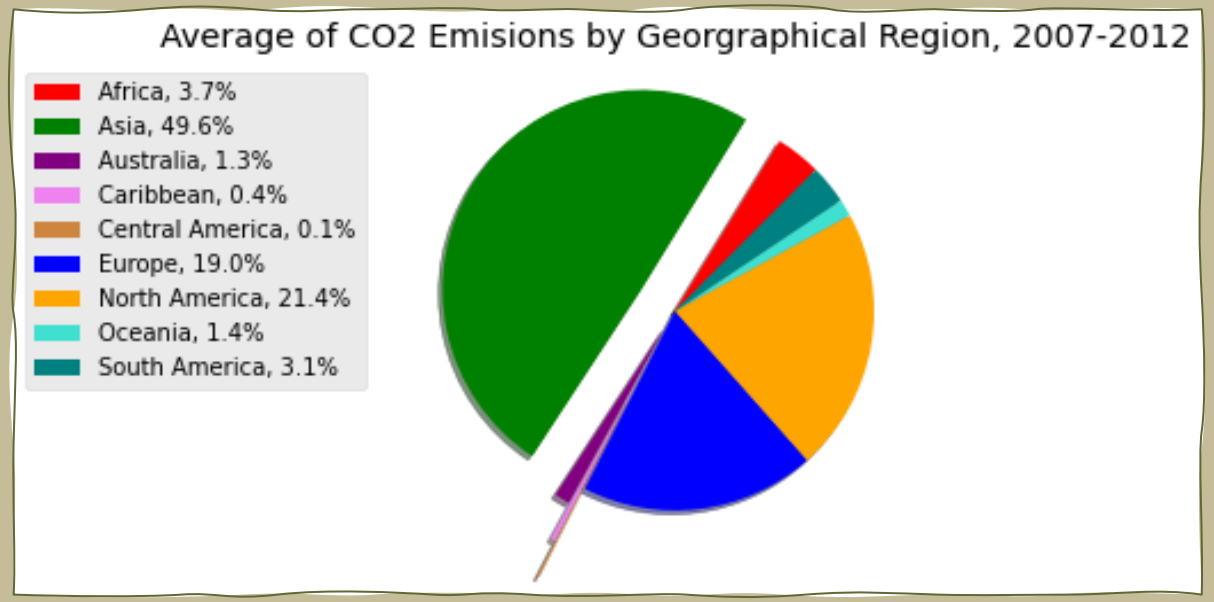

FINDINGS

Asia, North America, and Europe ranked among the *Top 3 emitters* of Carbon Emissions

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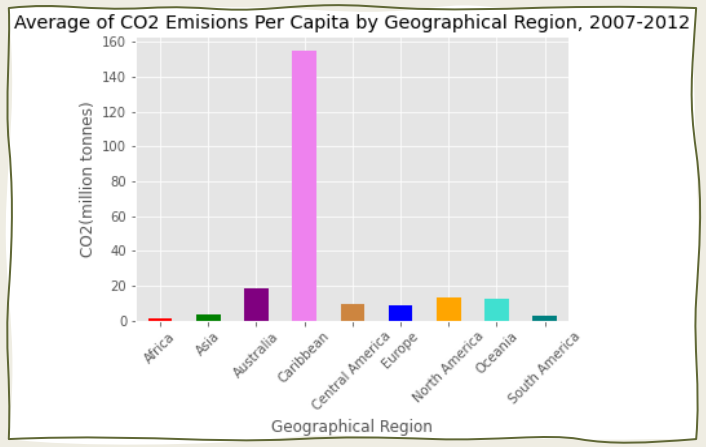
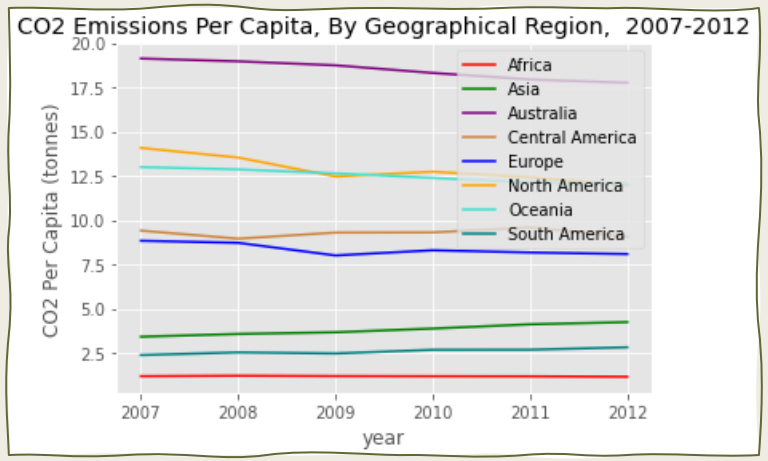
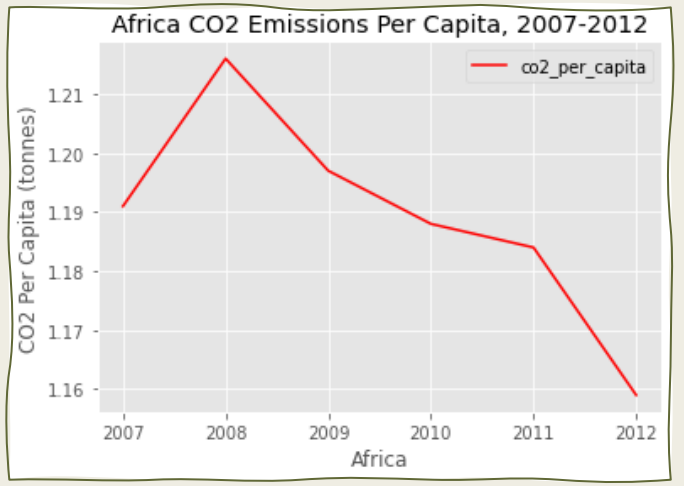
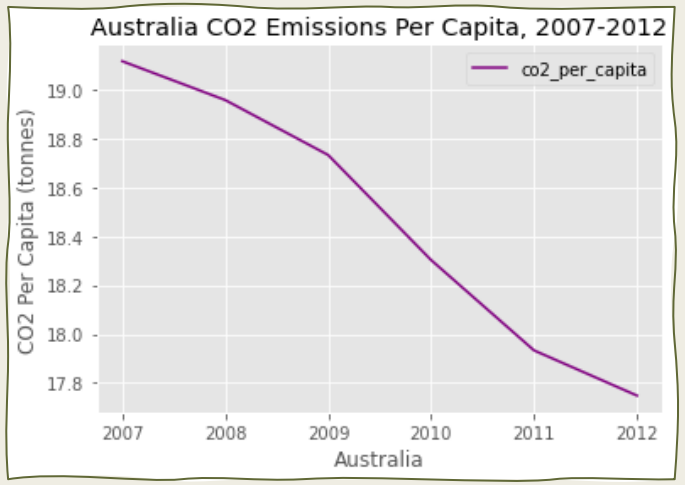
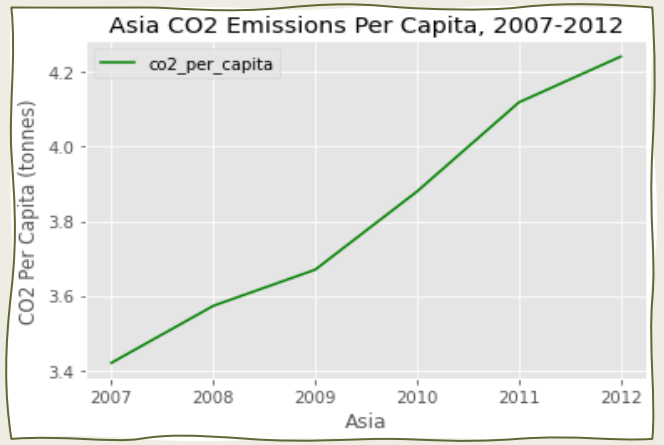
ADDITIONAL FINDINGS, 2











Africa's CO_2 output were *quite strong* in 2008

Asia had a *slight dip* in 2009

While high levels on record, **Australia** too, has seen *carbon emissions decline*

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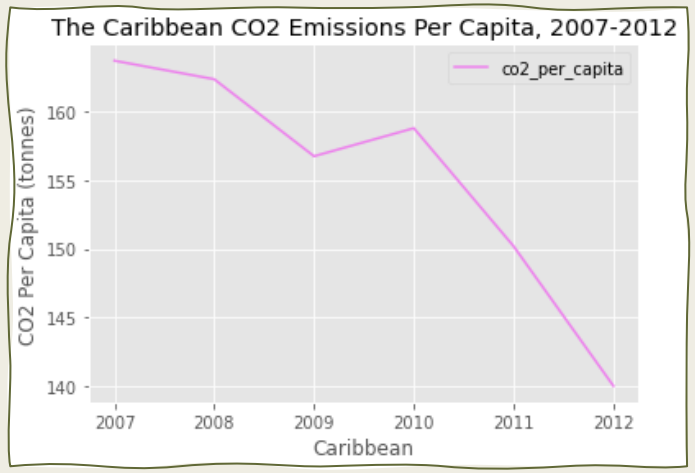
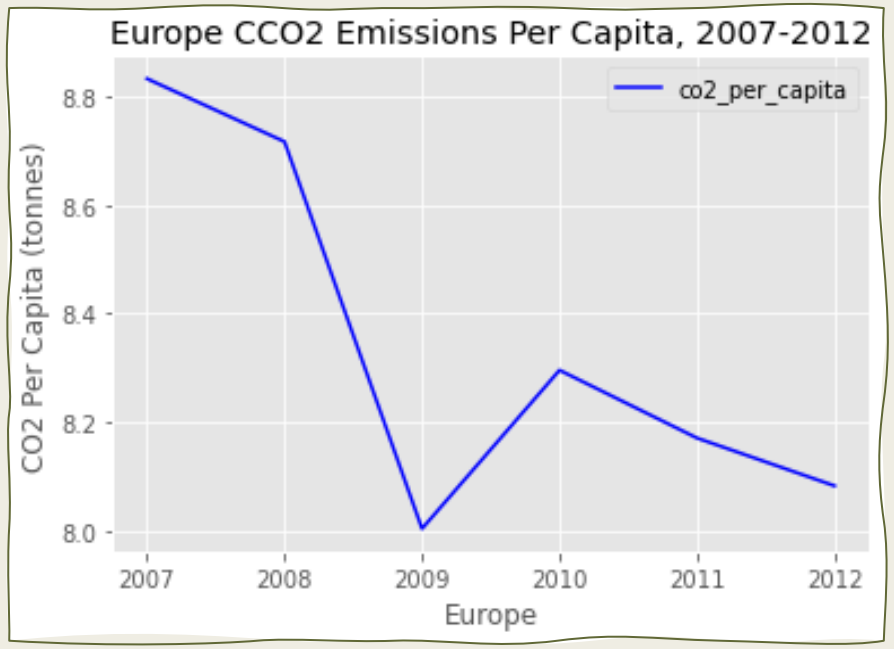
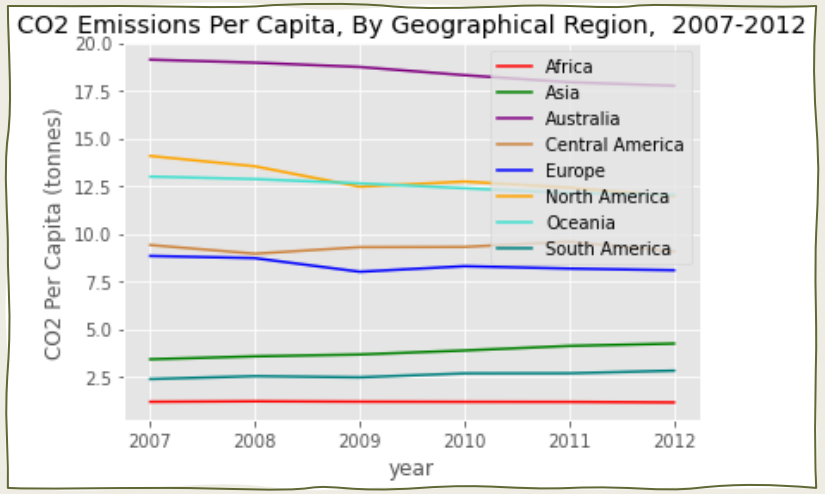
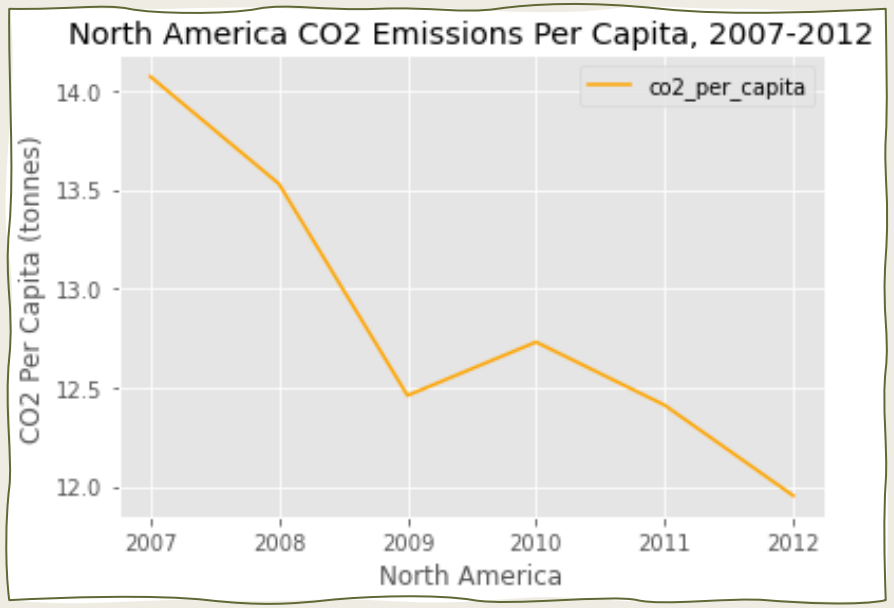
ADDT'L FINDINGS, 3









The Caribbean, North America & Europe, *peaked* emissions in 2010, but showed steady decline the following year

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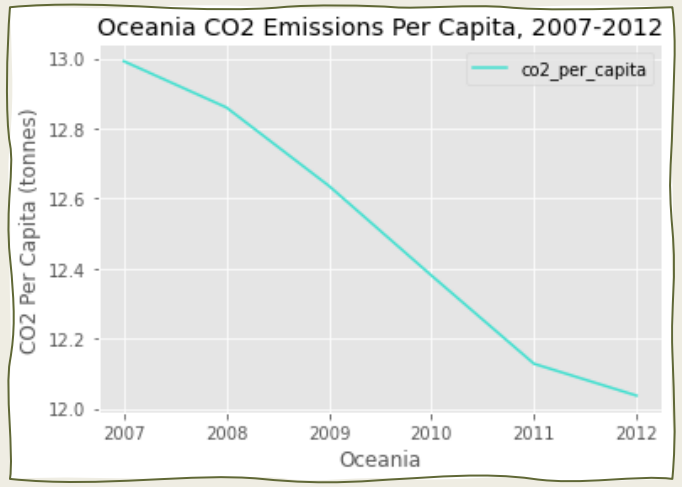
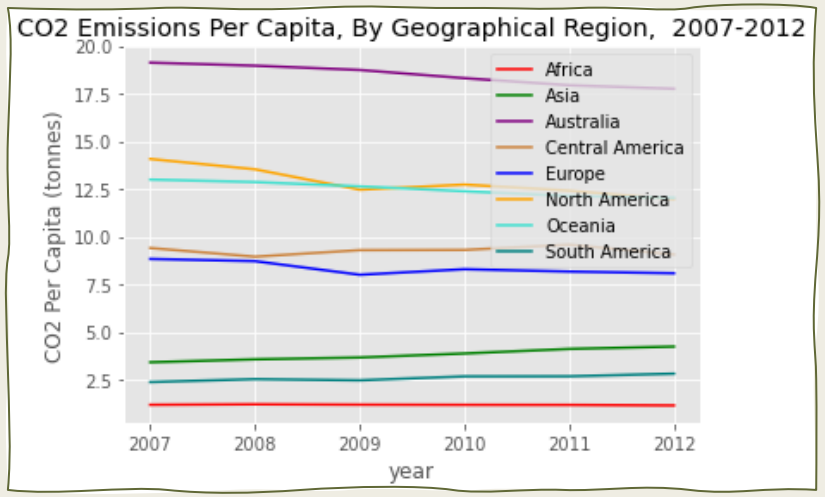
ADDT'L FINDINGS, 4

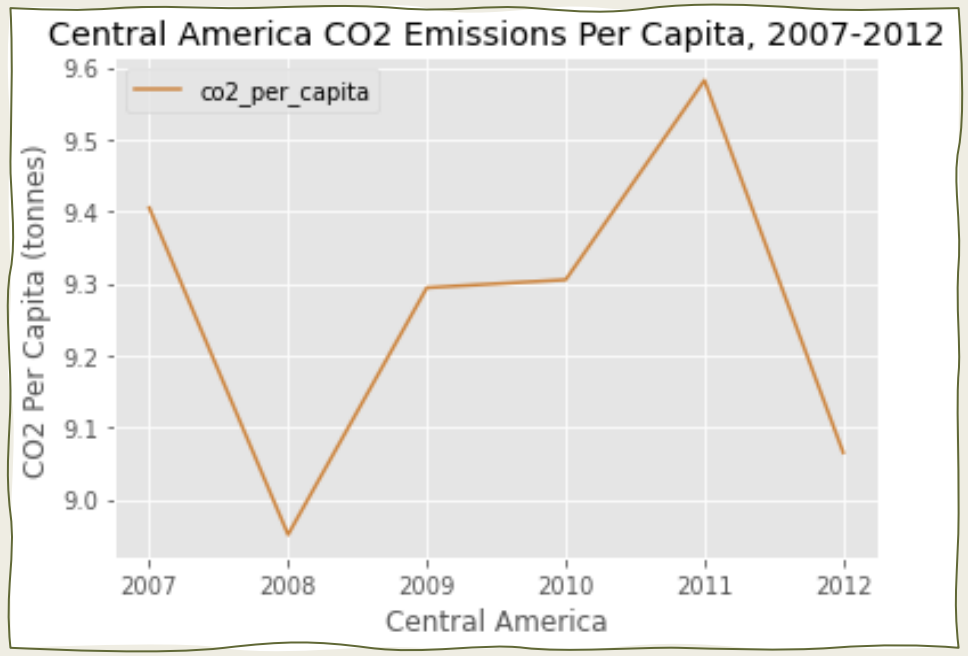


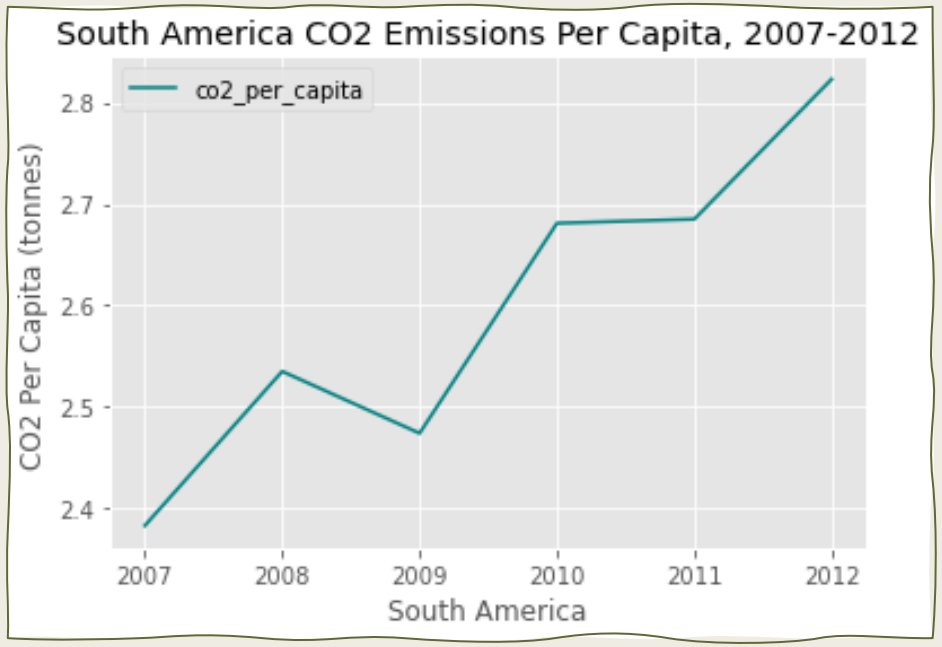
Oceania has showcased a *steady decline*, since 2007



Central America's emissions *increased in 2009*, and remained in 2010

While South America presented a *step-shaped progression* between 2009 - 2011





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NEXT *ITERATION OF ANALYSIS*

FOCUS *AREA(s)*:

- Carbon Emissions By Geographical Region
  - By Carbon Emissions Type
- Time Period: 2007-2012
- World Events:
  - Great Recession 2007-2009
  - Economic Crisis of 2012

MACHINE *LEARNING MODEL*

- Predict “Popularity” By Carbon Emissions Type (By Region)
  - Top CO_2 Emitters
  - Regression – Based
- Carbon Emissions Type (with current dataset):
  - Coal
  - Oil
  - Trade
  - Gas
  - Consumption
  - Flaring
  - Cement
  - Industry

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... REWIND

World Events Impacting Carbon Emissions | Carbon Emissions are dependent on human behavior. If there is an event that alters the former, human activity, positively or negatively, Carbon Emission will, too, become affected.

Old Habits Die Hard | Many industries and countries still rely heavy on traditional sources of energy for production, trade, and consumption.

Is there a *link* between Carbon Emission activity *and* World Events?

Short answer -- *yes!*

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