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Leveraging Online Data Sources to Evaluate Food Losses

Summer Camp | July 7 – 11, 2025 | Marseille, France



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Agri-food Waste Management for Sustainable bio-economy through Higher Education curricula and upskilling

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Goal

AGRIMA aims to foster universities' **capacity building** for the **green transition** through **innovative practices** and **higher education curricula updating** in **agri-food waste**

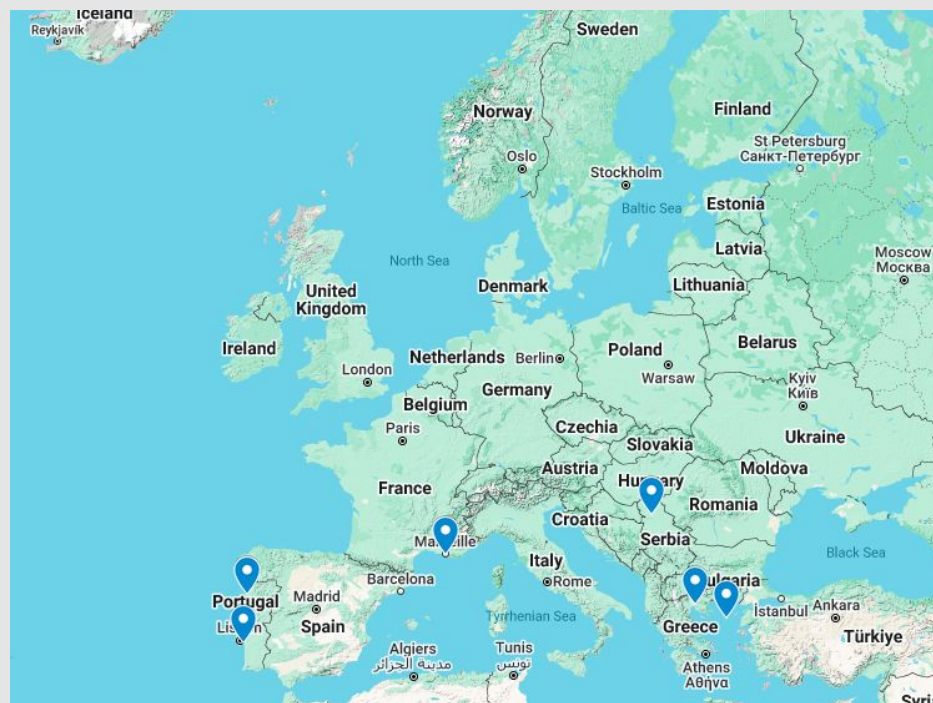
management and **the circular bioeconomy**.

1. **Advancing pedagogical methods** for industrial agri-food waste valorisation **based on business-academia synergies**.
2. **Integrating citizen science** in bio-economy-enhanced waste valorisation as a means of **civic engagement and environmental advocacy**.





Partners



Why Food Loss Matters?



~1/3 of all food is lost or wasted



\$1 trillion annual global cost



Food loss = ~8-10% of GHG emissions



Yet 800 million people remain hungry



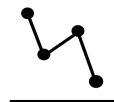
1/3 of global food production never reaches the plate



Lost food = wasted land, water, energy, labor

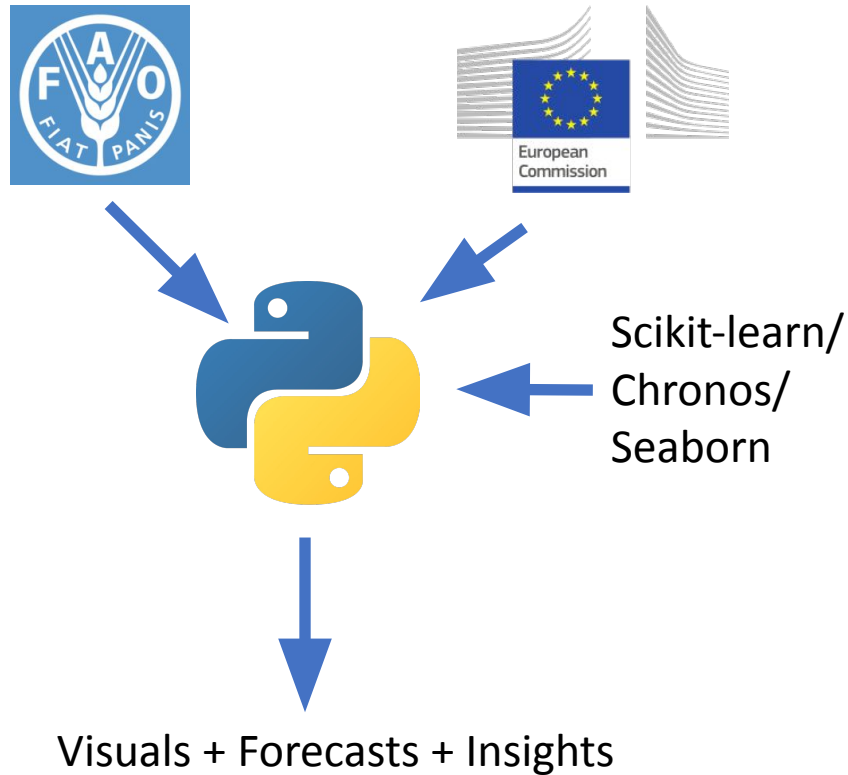


Major driver of emissions, hunger and economic loss



We can't reduce what we don't measure,
data is key

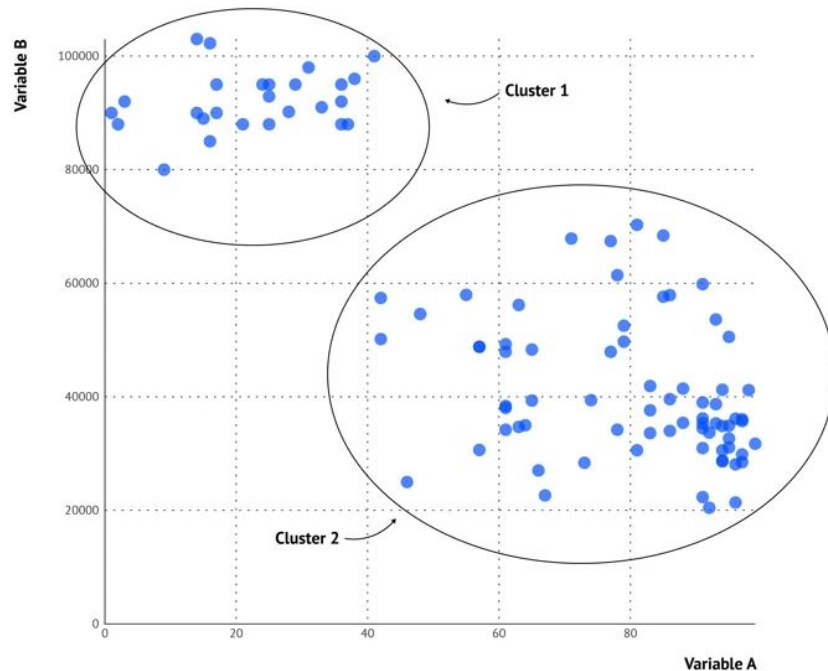
Open Data, Open Tools, Open Impact



-  Based on FAO Food Loss & Waste Database + European Commission Food Waste Database
-  Processed using Python, Pandas & Seaborn
-  Forecast built with Chronos by Amazon
-  Reproducible, open-source, and ready for education or policy

Machine Learning in Food Analysis: From Data to Patterns

Raw Data $\xrightarrow{\text{ML}}$ Cluster $\xrightarrow{\text{Cluster}}$

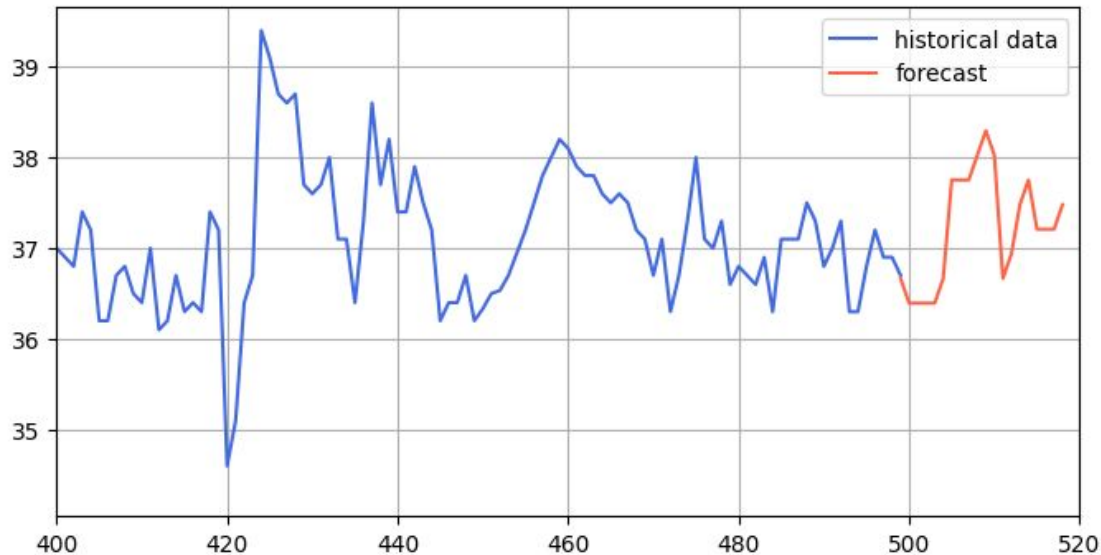


- ML enables pattern discovery in complex datasets.
- We used unsupervised learning (clustering)
- K-means from scikit-learn to group EU countries
- Inputs: GDP per Capita + food waste (kg/capita)

Bringing AI into Agriculture: What is Time Series?

What is Chronos?

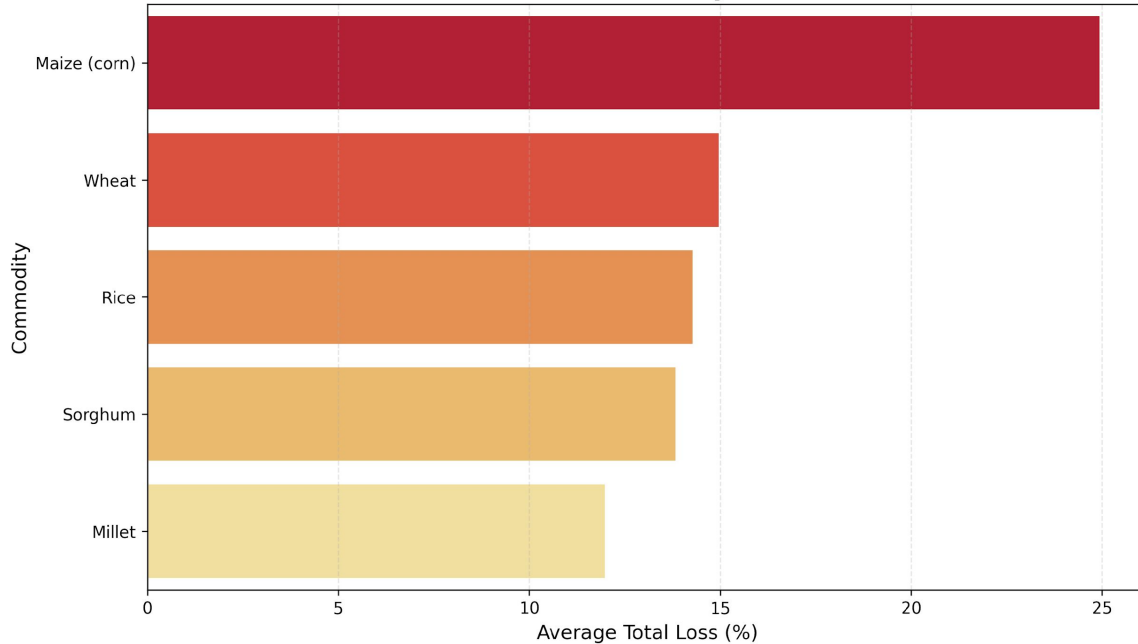
Time Series & Forecasting with Chronos



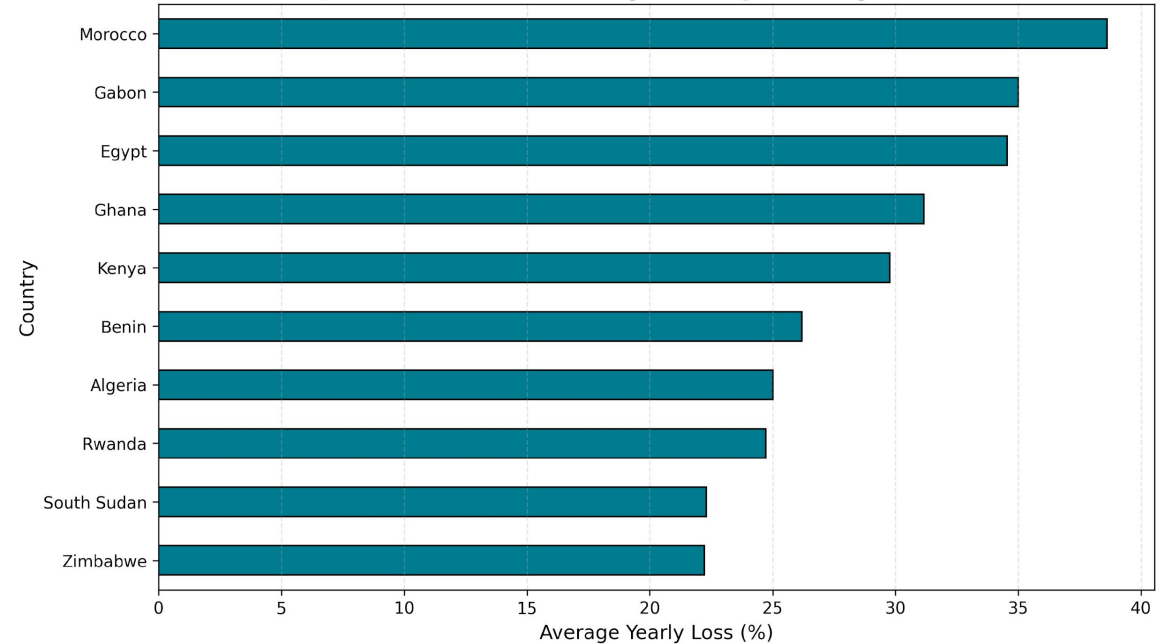
- A time series is data tracked over time
- Chronos = Amazon's deep learning time series toolkit
- Accepts past data, returns future forecasts + uncertainty

Where and What is Lost in Africa?

Most Affected Commodities by Food Loss in Africa

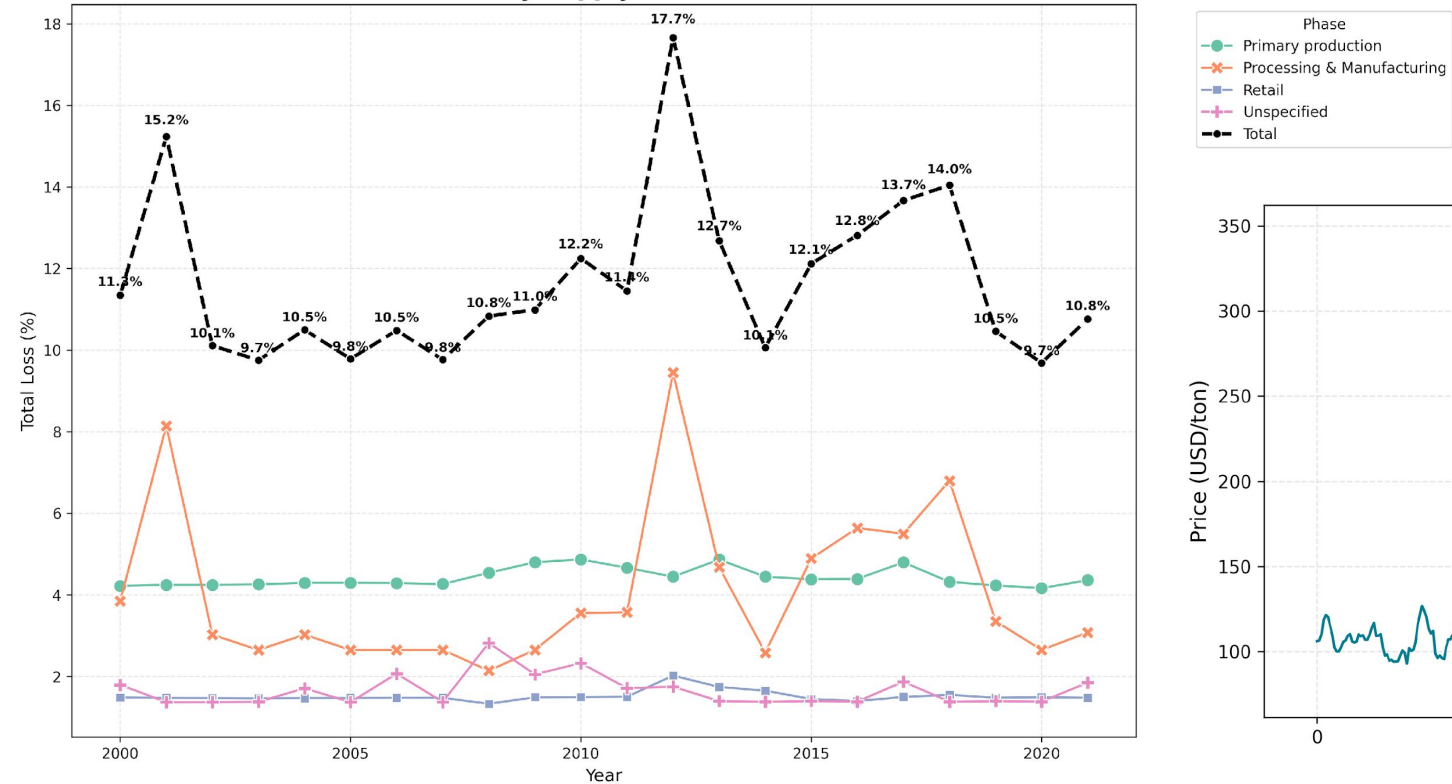


Top African Countries by Average Yearly Food Loss

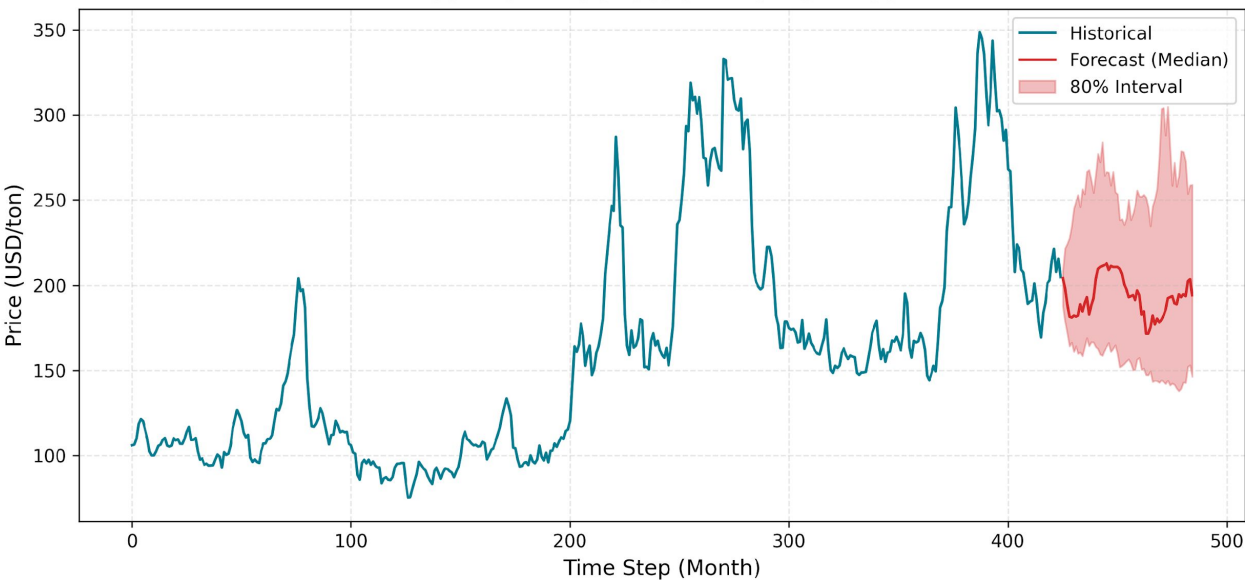


Comparing Food Losses to Food Prices

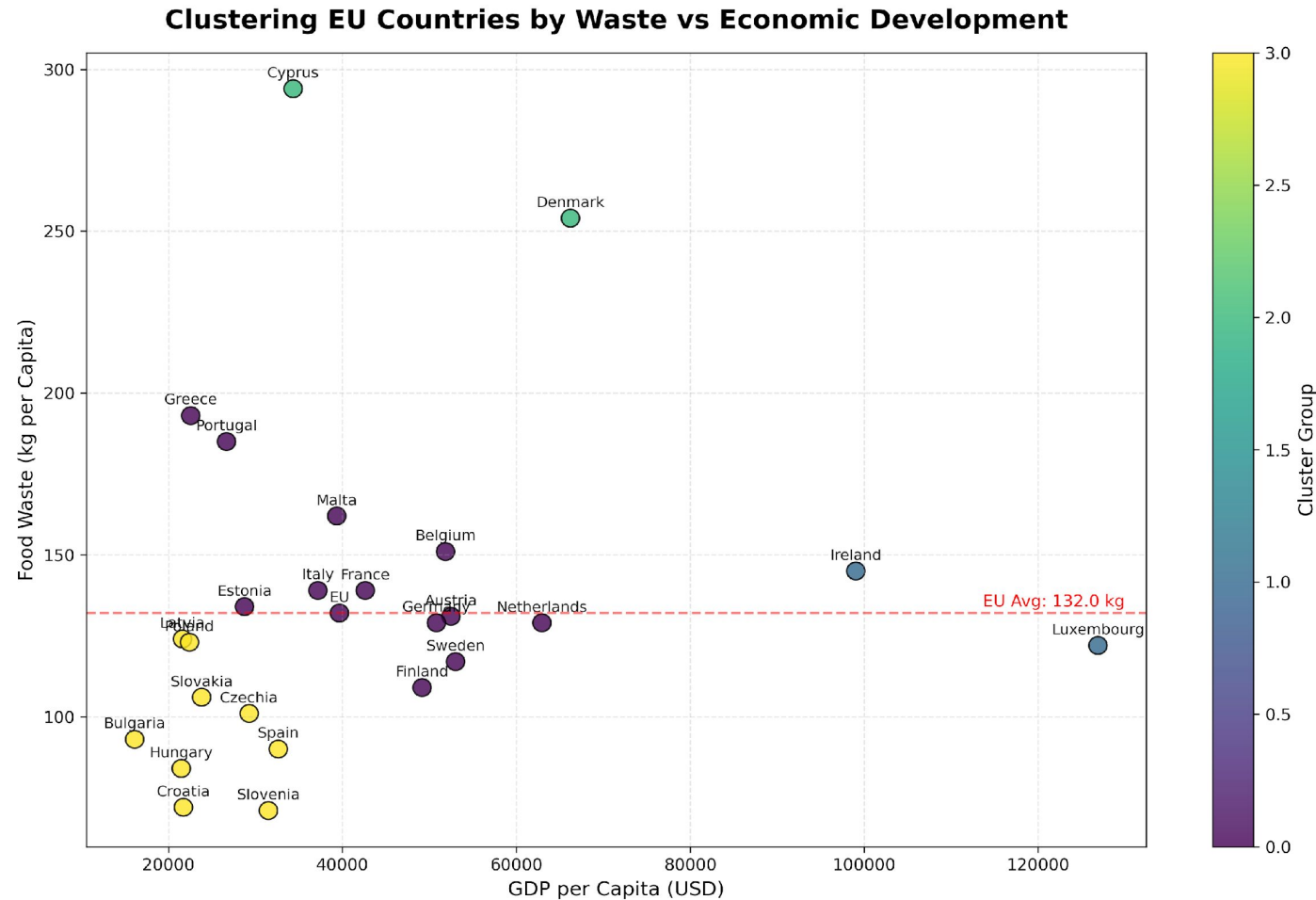
Maize Loss in Africa by Supply Chain Phase (2000-2020)



60-Month Forecast: Maize Price



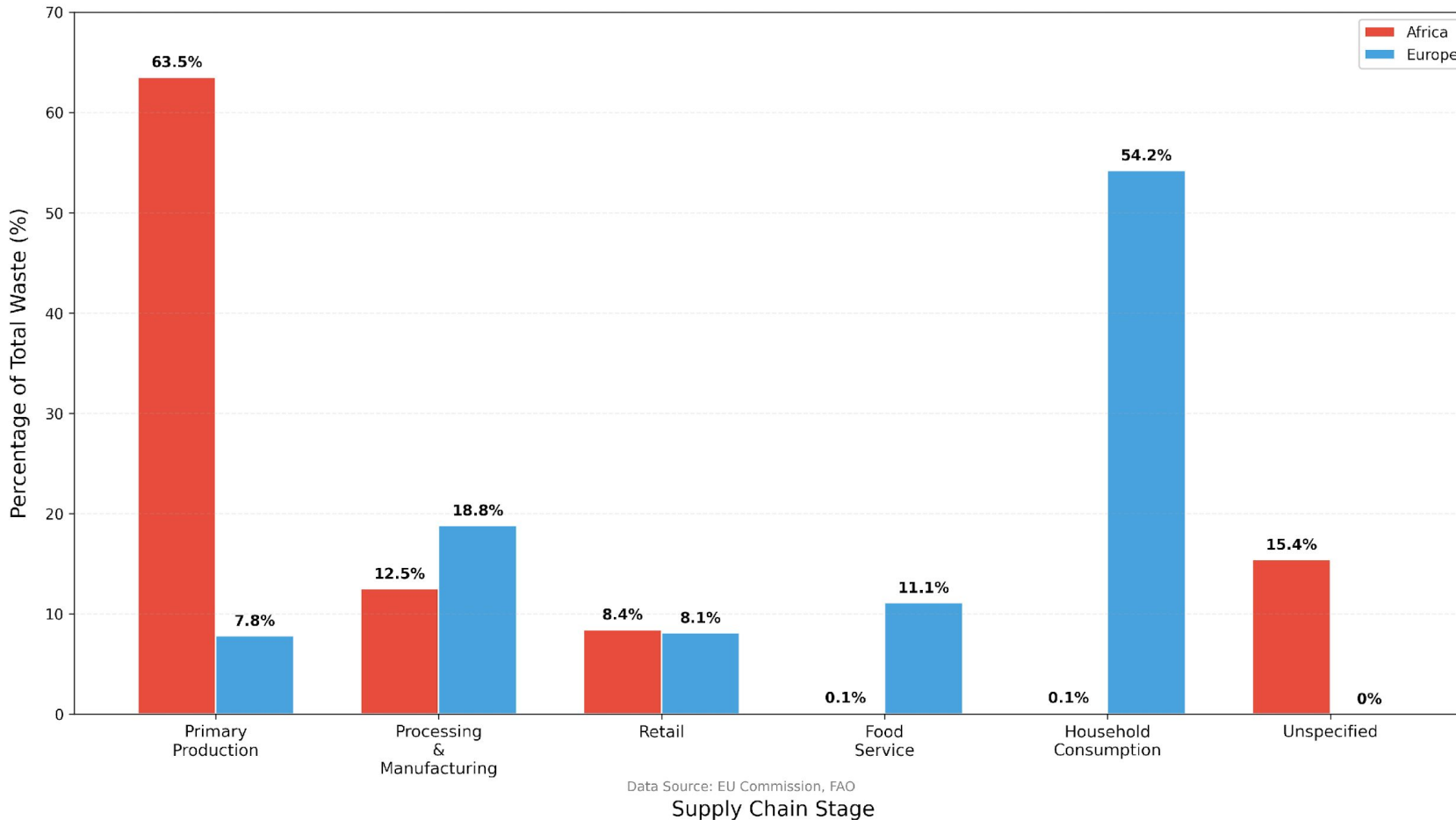
A European View: Waste, Wealth & Where it Happens



- 4 different groups depending on Food Waste (kg/Capita) and GDP/Capita
- Different groups = different patterns, maybe different ways to minimize food waste

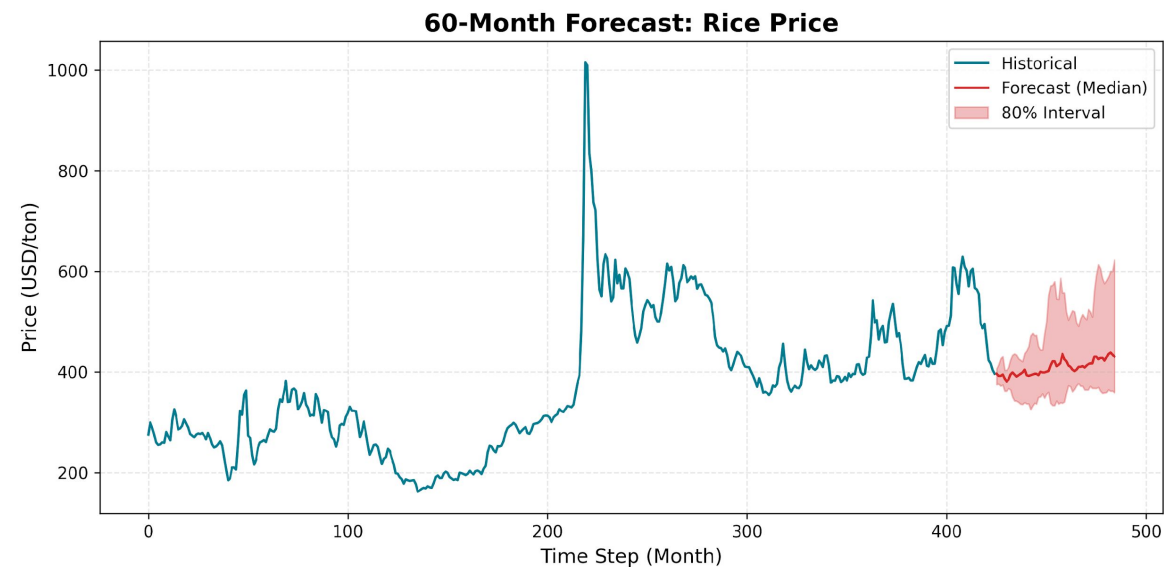
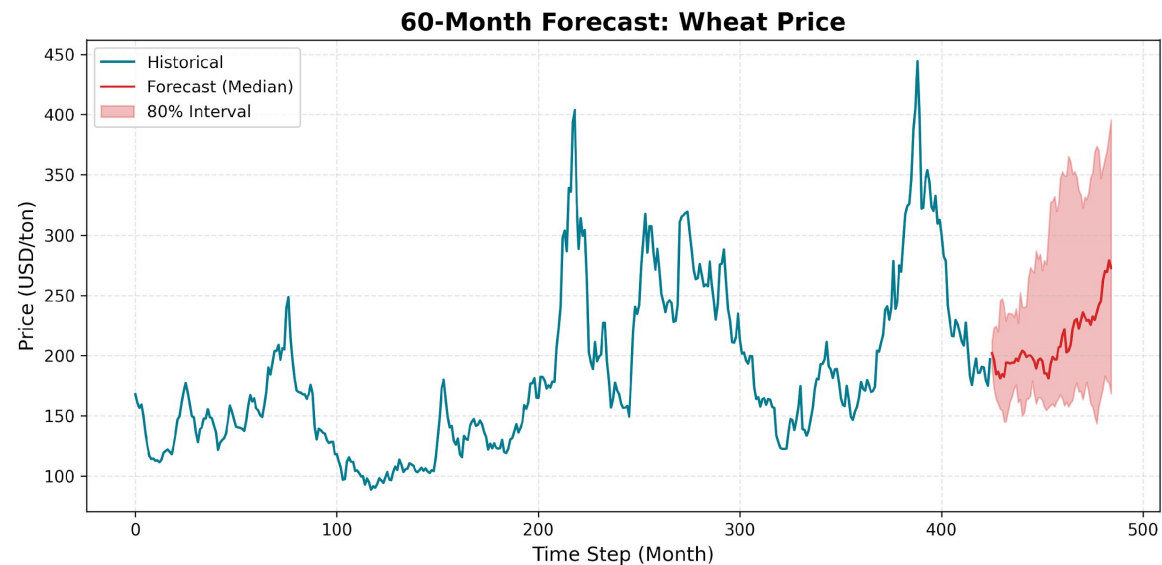
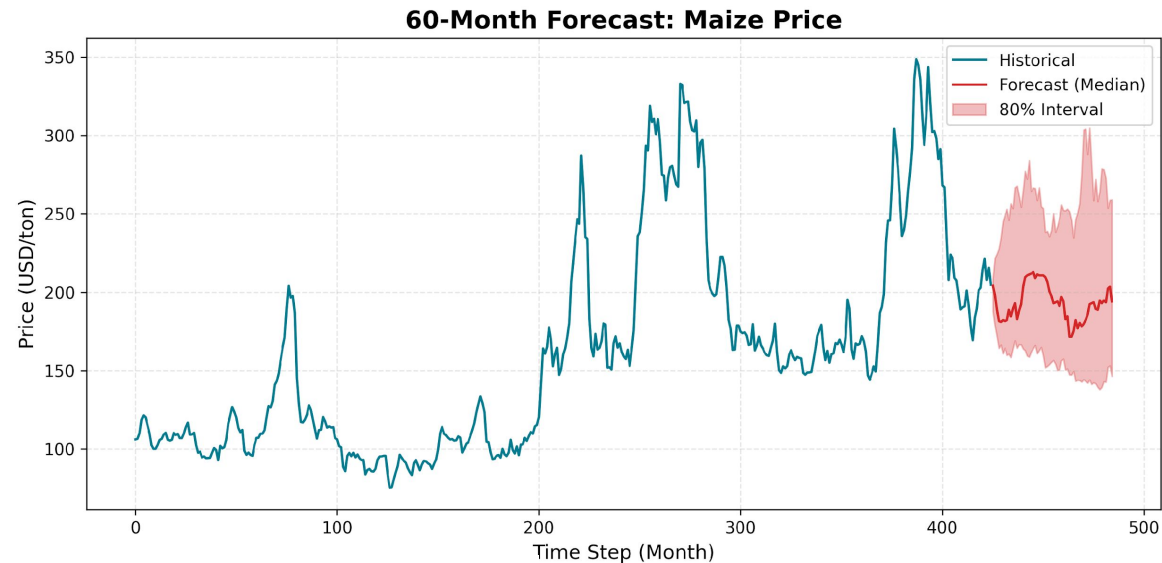
Comparing Where Food Losses Happen in Africa VS Europe

Food Waste Distribution: Africa vs Europe



- More waste production in Primary Production for Africa and almost no production from food services and households
- EU has very little waste on the supply stage of the food but a lot of waste in households.

Deep Dive into Forecasting with Chronos



Summary/Reflection

- Open databases can be leveraged with the use of computational tools like Python to extract more insightful information.
- Machine Learning can be used in the Food Sector to help gain deeper understandings of situations for better planning and executions.
- Time series tools and especially AI like models can be used to predict future prices so investors, professors and researchers alike can plan ahead and be ahead of the curve.

Thank you!

We can't fix what we don't measure