Food and Agriculture Organization of the United Nations

WOOD FUEL AND WOOD CHARCOAL PRODUCTION MODEL

JOINT WOOD ENERGY ENQUIRY: TRAINING WEBINARS

17 APRIL 2023

Wood Fuel

Exports

Imports

Removals

Coniferous

Non-coniferous

Wood Charcoal

Exports

Imports

Production

FAOSTAT

FAO's on-line database

https://www.fao.org/faostat/en/#data/FO

Wood Fuel


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© Korea Forest Service


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Wood Fuel

- Non-repeating official data for ≥ 10 years since 1960

- Official data < 10 years since 1960
- Often, these countries have a high reliance on wood fuel

FAO uses a model to **estimate** national wood fuel production

FAOSTAT

FAO's on-line database
https://www.fao.org/faostat/en/#data/FO

Problem Statement

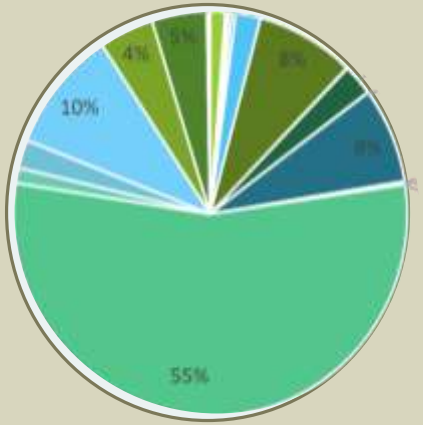
We need a method for estimating wood fuel removals (and wood charcoal production) in the “current” year for countries that do not submit data in that year.

Expert Working Group Wood Fuel Modeling

Initial group members: UNECE, Thünen Institute of International Forestry and Forest Economics, IRENA, IEA, FAO Forestry, FAO Statistics, La Sapienza University (statistics), McGill University (statistics), UN Statistics, Ghana Statistical Service, University of Oregon (forestry statistics), WHO. Added: AFREC, U of Glasgow (modeling for WHO), specialists in wood energy from various NGOs.

30 Sept 2020

Problem formulation & History of past models

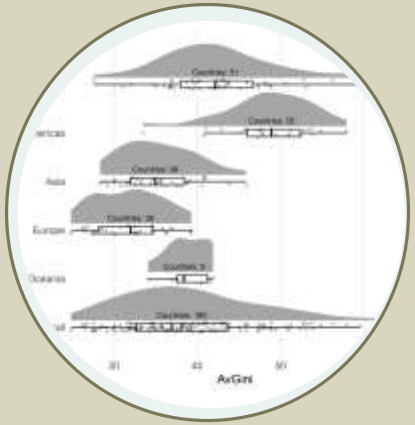


29 Oct 2020

Data & Initial Conceptual Model

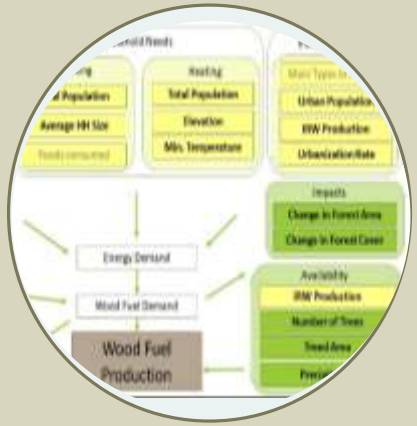
10 Dec 2020

Clusters & Conversions



21 Jul 2021

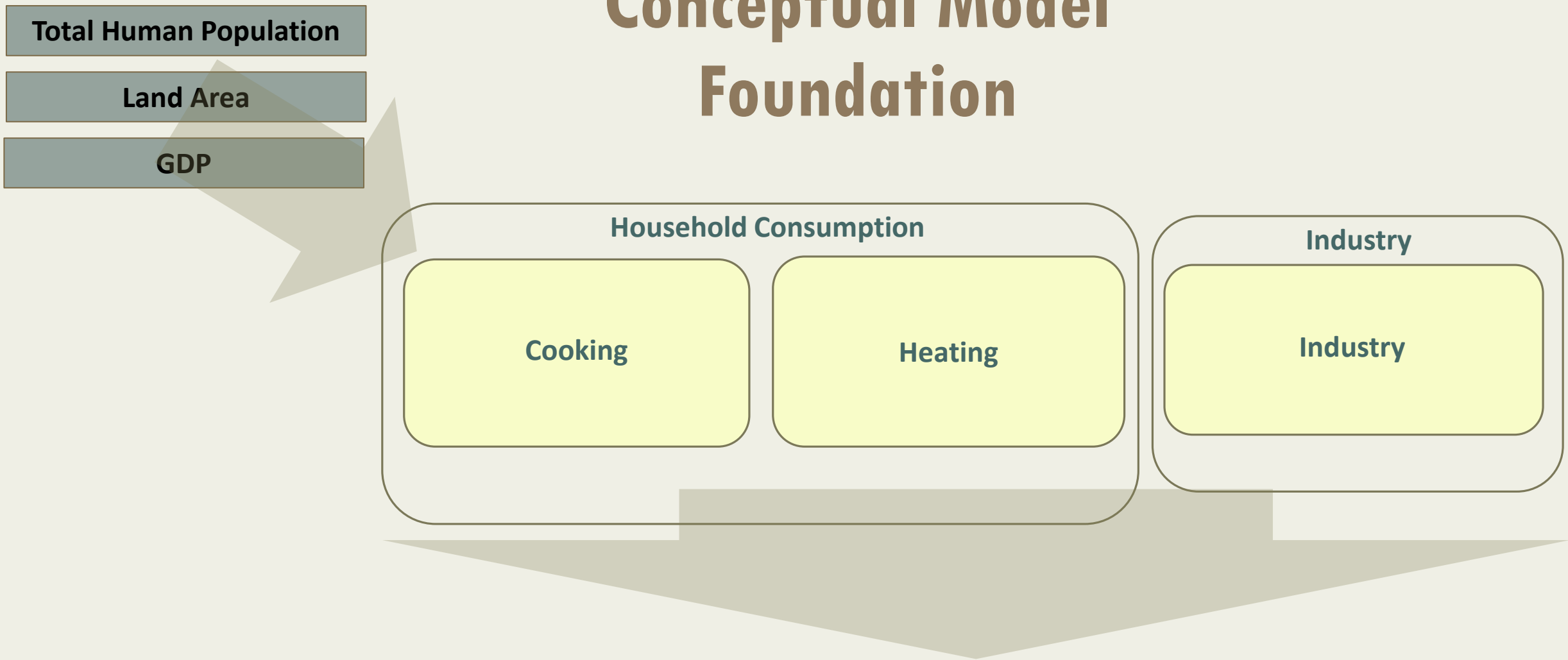
Covariates & Conceptual Model



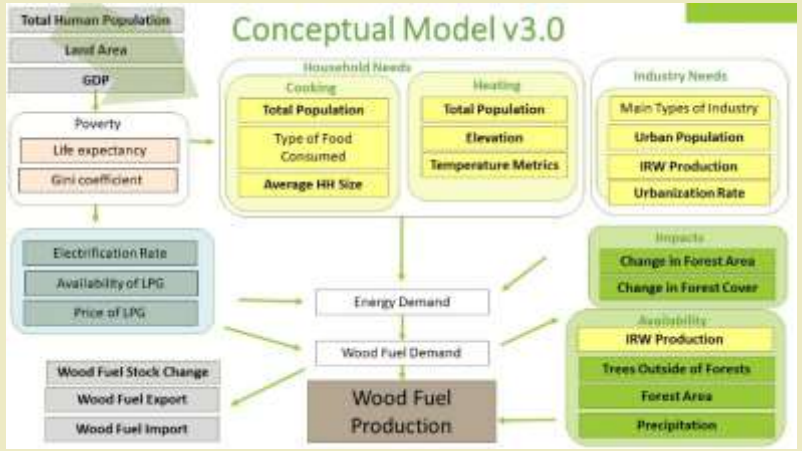
Individual Meetings

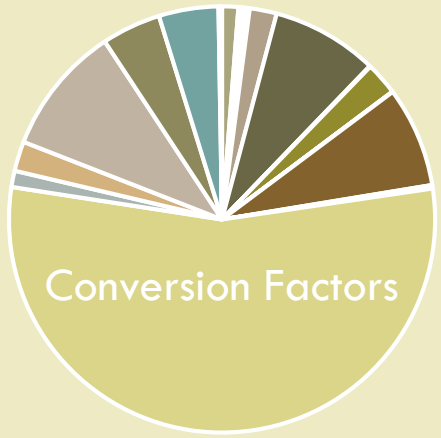
Final modeling approach

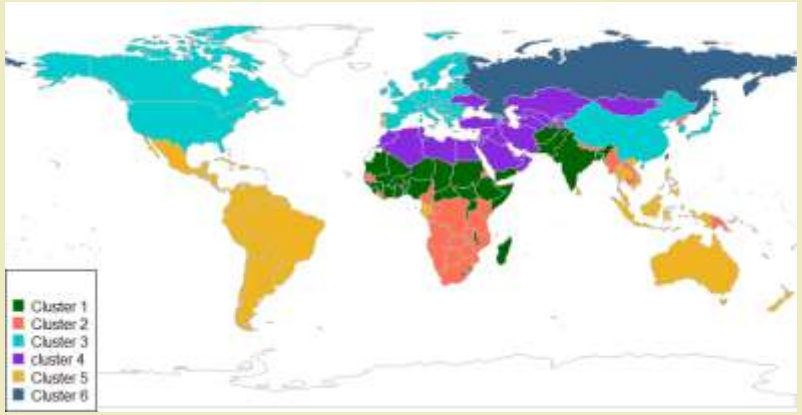
Conceptual Model Foundation



2309 observations + 1139 AFREC







per capita wood fuel demand

fraction of demand met with wood charcoal (national)

What is likely to happen?

- Estimates will go up but not everywhere
- Threshold of 10m^3 pp

When?

- Estimates for preview in early fall

Data series management?

- Revise backwards 5-10 years?
- Break in series?

Main challenges

- Conversions and thresholds
- Resources (time and focus)

NEXT STEPS

- Complete the review of results
- Publishing the new models and estimates
- Calculating and coordinating indicators (and related estimates e.g. labor, energy)
- Capacity-building in data production (estimation)
- Model automation

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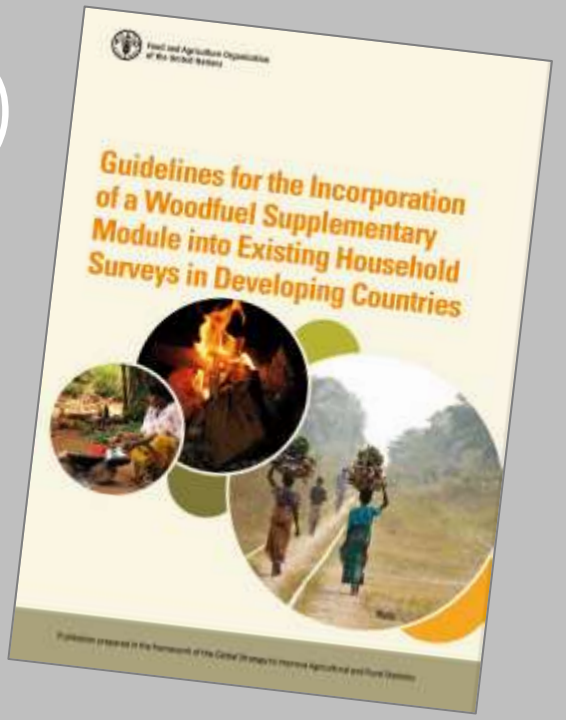


THANK YOU

- Are there concerns about revising estimates of wood fuel removals?
- Will countries be able to cross-check national data with modeled estimates?
- What other next steps are needed?

"*There is nothing new except what has been forgotten*."

~ Marie Antoinette

Ostia Antica, © Bill Richards

Conceptual Model

Total Human Population

Land Area

GDP

Household Consumption

Household consumption for cooking

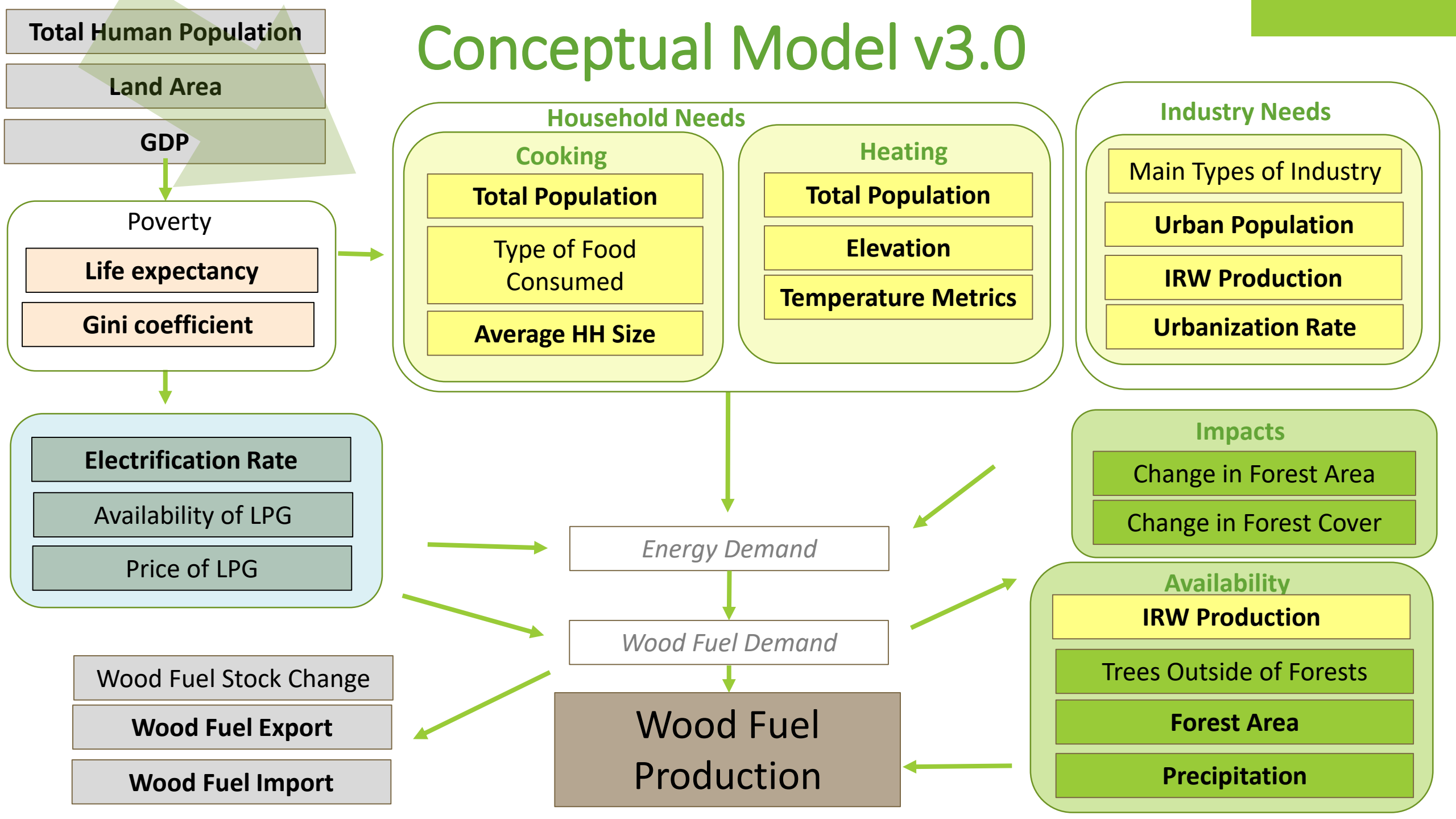
Household consumption for heating

Industry

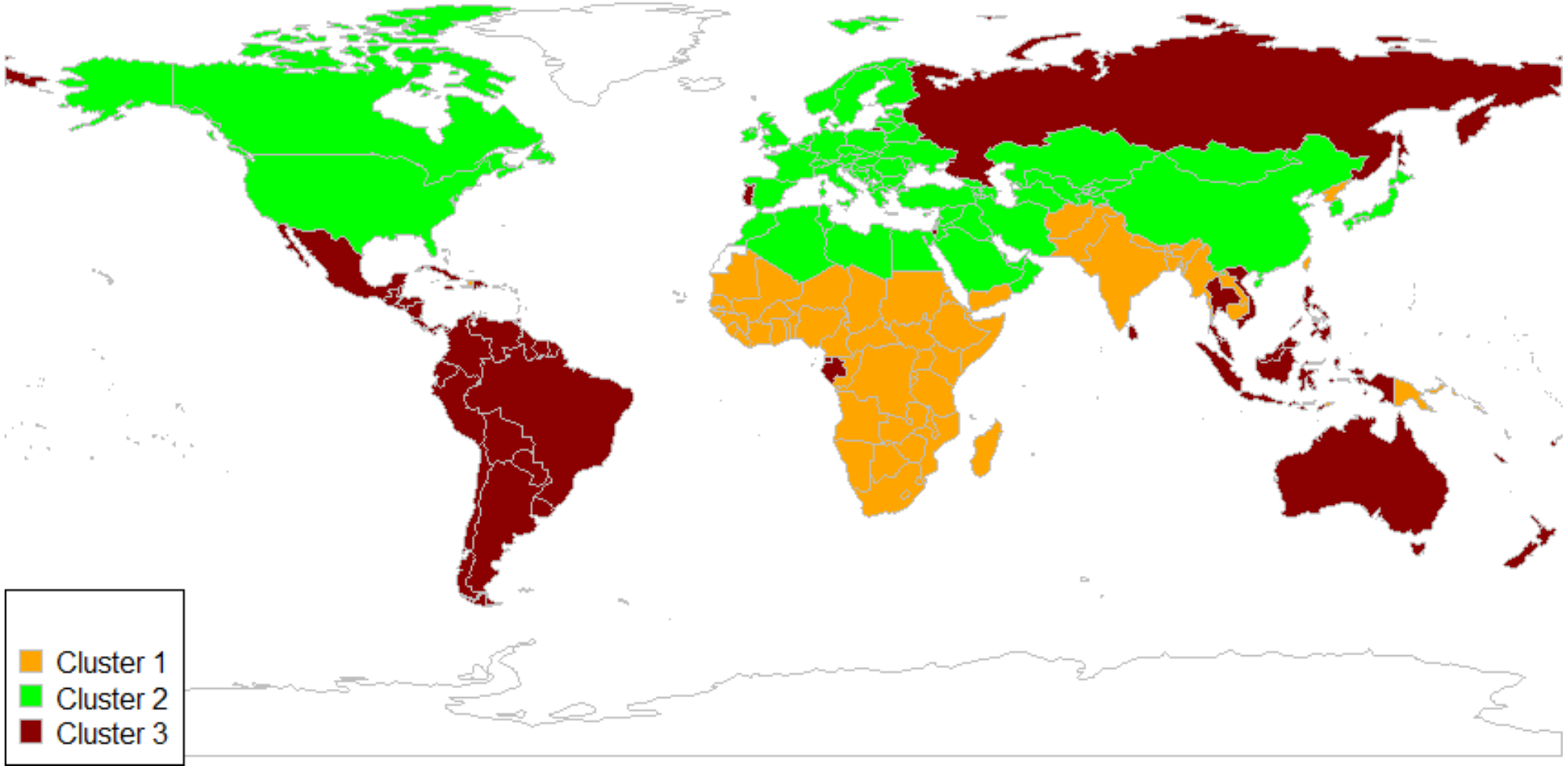
Industry

Wood Fuel Production = Wood Fuel Import + Wood Fuel Consumption - Wood Fuel Export

Conceptual Model v3.0

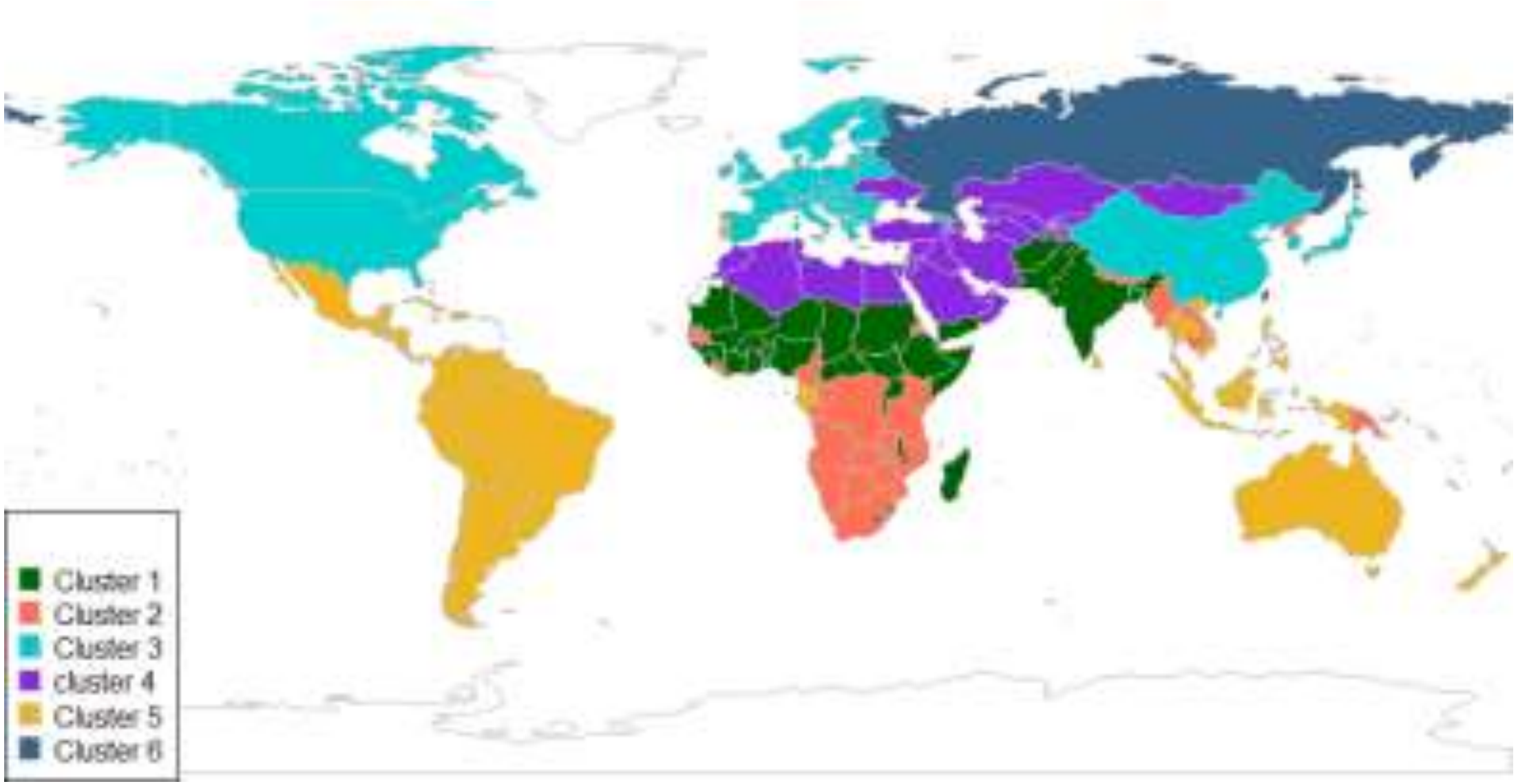


First level clustering



Time series clustering using tsclust in the package dtwclust (Sarda, Espinosa, 2019)

Second level clustering



The Simple Model

MODELED

1) Calculate per capita WF demand (in volume)

Per Capita Consumption WF = (Production WF + Import WF - Export WF) / Total Population

2) Model per capita WF demand (conceptual model)

Per Capita Consumption WF ~ Poverty Indicators + Forest Indicators + Climate Indicators + Landform Indicators + Social Indicators + Industry Indicators

3) Calculate national charcoal demand (in weight)

Consumption C = Production C + Import C - Export C

4) Model the proportion of WF demand met with charcoal.

Proportion of WF Demand met with Charcoal ~ Prop of Population Urban + GDP/Person + Other wood energy production

5) Convert back to production of WF (volume) and charcoal (weight).