Scope of Work to Global Footprint Network for:

CLUM Data Validation and Interpretation Project

Problem Statement

The Global Footprint Network (GFN) has established a sophisticated global accounting system for the Earth’s carrying capacity and humanity’s consumption demands on that capacity. In their on-going efforts to make their accounting system more understandable to the public and policymakers GFN has developed a dataset, the Consumption Land Use Matrix (CLUM), that provides a more readily understandable set of consumption categories than their original dataset (the National Footprint Accounts, (NFA)).

GFN has not publicly released the CLUM data because of concerns over the accuracy and interpretability of this dataset. We propose a scope of work that will (i) assist GFN in identifying CLUM results that appear to be erroneous, and (ii) provide greater interpretability to the CLUM data. We will use the CLUM7 data, which reports on 7 consumption categories per country.

To identify erroneous CLUM results we will conduct a series of visualization of the CLUM data. We will attempt to identify outlying and/or counterintuitive results. We have already produced a few initial visualizations that we currently analyzing. Proposed visualizations are described further in the scope below.

To provide greater interpretability of the CLUM data we will attempt to identify means of measuring the Footprint efficiency or intensity within the CLUM categories. A country could have a very low level of consumption of housing, for example, but it is currently unknown whether this is the result of extremely poor-quality housing (as might be expected in Sierra Leone) or because the country provides quality housing through extremely efficient, low-intensity means (as might be expected in Singapore). GFN uses the UN Human development Index as a means of normalizing a country gross consumption from the NFA results, but does not appear to have an equivalent index for its CLUM categories of consumption. We will propose datasets or other strategies that could provide country-level normalization data for the CLUM categories.

**Scope Items:**

**Identifying Oddities in CLUM Results**

**We have received CLUM and NFA data from GFN and are currently analyzing the data. We are currently using** MRIO-FA 2017, but expect to switch to the latest 2018 version when GFN releases it. **We are analyzing the data in R and R Shiny, a package in R that allows for dynamic visualizations including dropdown menus similar to those used on GFN’s** [Open Data Platform](file://localhost/(http/::data.footprintnetwork.org:#/)). We anticipate providing our analytical code to GFN at the conclusion of this project and hope that the visualizations we produce are useful in informing GFN’s publically-facing presentations. To identify oddities and problems in the CLUM results we propose the following:

1. **We have produced draft scatterplots of CLUM7 data that plot the data in the CLUM7 expenses by country. We are currently analyzing these plots and intend to share the plots and initial findings soon.**
2. **Examining the ratios of expenses by land type within CLUM categories across countries. This should provide insight into the “fish consumption for personal transportation” categories of problems.**
3. **Producing maps of CLUM data to identify regional variations**
4. **We will produce stratifications by data quality to examine if data problems are limited to countries with poor data quality.**
5. **We will may produce other visualizations and analyses to identify odd CLUM results, in consultation with GFN.**
6. **We will summarize our findings into a research brief with accompanying visualizations.**

**Potentially Adding Interpretive Metrics for CLUM Results**

**In order to improve the interpretation of a county’s per-capita consumption in the 7 CLUM categories we will explore different means of understanding the amount and quality of goods and services consumed per capita of the 7 consumption categories. It is possible that the per capita COICOP expenditure in dollars is sufficient for this normalization. If it is not we will attempt to find appropriate nation-scale data sources for the CLUM7 categories of: Goods, Services, Housing, Transportation, Food, Government, and Gross Fixed Capital Formation. We intend to do so by:**

1. **Discussing potential metrics with GFN**
2. **Talking with experts on country-level data**
3. **Conducting an academic literature review**
4. **Producing a final research brief of our recommendations for normalizing metrics**

**Project Timeline:**

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| **January 10** | **Kickoff meeting with GFN, discuss project ideas** |
| **Week of February 26** | **Meeting to discuss Scope of Work and present initial CLUM visualizations and findings** |
| **End of March** | **Check-in meeting to discuss interim findings** |
| **Mid-April** | **Check in meeting to discuss draft research briefs** |
| **May** | **Delivery of final research briefs and analytical scripts** |

**Sincerely,**

**Eli Lazarus**

**Nat Decker**

**Scott Kaplan**