



Update on Biocapacity Accounting

Presented by David Lin
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Global Footprint Network
Advancing the Science of Sustainability

Presentation Outline



- Introduction
- Biocapacity Accounting methodology
- Results
- Extended Applications
- Current Status
- Relevance



Global Footprint Network



Our mission is to end ecological overshoot by making **ecological limits central to decision making**. By institutionalizing resource accounting in national governments, Global Footprint Network **influences major investments and policy shifts** to support global sustainability



What is the driving research question?



“Renewable resources should not be used faster than the rate at which they regenerate.” -Daly

How much of the Biosphere’s regenerative capacity is demanded by human activities?

- How much biological capacity is available?

Biocapacity

- How much do biological capacity we use?

Ecological Footprint



What is measured?



- Demands of a population on renewable resources and absorption of CO₂
- Mutually exclusive demands for land are measured in terms of the bioproductive area needed to generate renewable resources and absorb (global hectares - gha).

The Ecological Footprint



MEASURES

how fast we consume resources and generate waste



Energy



Settlement



Timber & paper



Food & fibre



Seafood

COMPARED TO
how fast nature can absorb our waste and generate new resources.



Carbon Footprint



Forest

Cropland & pasture



Fisheries

Datasets



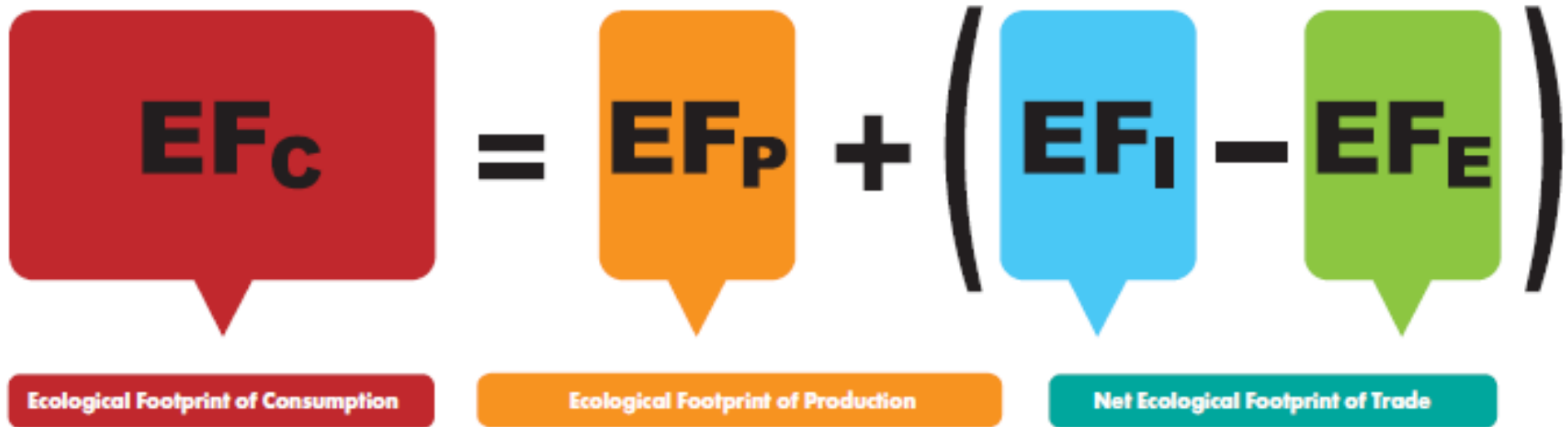
DATASET	SOURCE	DESCRIPTION
Production of primary agricultural products	FAO ProdSTAT	Physical quantities (tonnes) of primary products produced in each of the considered countries
Production of crop-based feeds used to feed animals	Feed from general marketed crops data is directly drawn from the SUA/FBS from FAOSTAT Data on crops grown specifically for fodder is drawn directly from the FAO ProdSTAT	Physical quantities (tonnes) of feeds, by type of crops, available to feed livestock
Import and Export of primary and derived agricultural and livestock products	FAO TradeSTAT	Physical quantities (tonnes) of products imported and exported by each of the considered countries
Import and Export of non-agricultural commodities	Comtrade	Physical quantities (kg) of products imported and exported by each of the considered countries
Livestock crop consumption	Calculated by Global Footprint Network based upon the following datasets: <ul style="list-style-type: none"> FAO Production for primary Livestock Haberl et al., 2007. 	Data on crop-based feed for livestock (tonnes of dry matter per year), split into different crop categories
Production of primary forestry products as well as import and export of primary and derived forestry products	FAO ForeSTAT	Physical quantities (tonnes and m ³) of products (timber and wood fuel) produced, imported and exported by each country
Production of primary fishery products as well as import and export of primary and derived fishery products	FAO FishSTAT	Physical quantities (tonnes) of marine and inland fish species landed as well as import and export of fish commodities
Carbon dioxide emissions by sector	International Energy Agency (IEA)	Total amounts of CO ₂ emitted by each sector of a country's economy
Built-up/infrastructure areas	A combination of data sources is used, in the following order of preference: <ol style="list-style-type: none"> CORINE Land Cover FAO ResourceSTAT Global Agro-Ecological Zones (GAEZ) Model Global Land Cover (GLC) 2000 Global Land Use Database, SAGE, University of Wisconsin 	Built-up areas by infrastructure type and country. Except for data drawn from CORINE for European countries, all other data sources only provide total area values

Within SEEA



Land Use		NFA	SEEA Physical Flow(s)
Forest Land	FAO Forestat	Annual harvest of fuel wood and timber products	Natural Timber Resources 1. Natural inputs of wood products 2. Output of wood products from cultivated sources
Fishing Grounds	FAO Fishstat	Annual catch of all commercially fished marine and inland fish	Natural Aquatic Resources 1. Annual catch of fish* from natural fisheries 2. Annual catch of fish* from cultivated or actively managed fisheries
Grazing Land	FAO Prodstat	Total number and weight of animal products	Output of animal products
Crop Land	FAO Cropstat	Total weight of all crop products	Output of crop products
Carbon	IEA	Carbon emissions produced by ISIC industry sectors	Air Emissions by ISIC industry sectors
Built-up	Geospatial Data	Area demand	

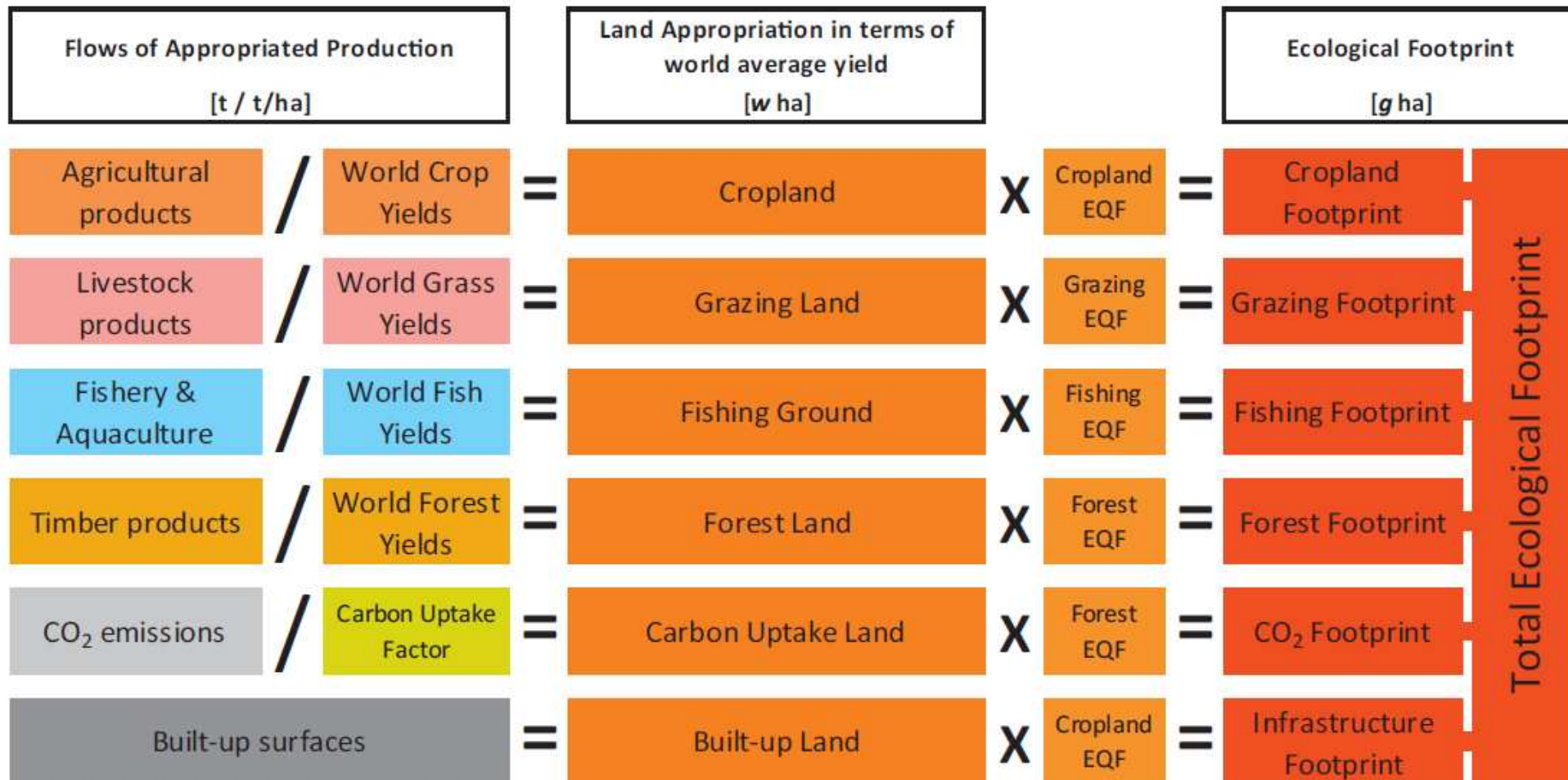
Consumption Approach



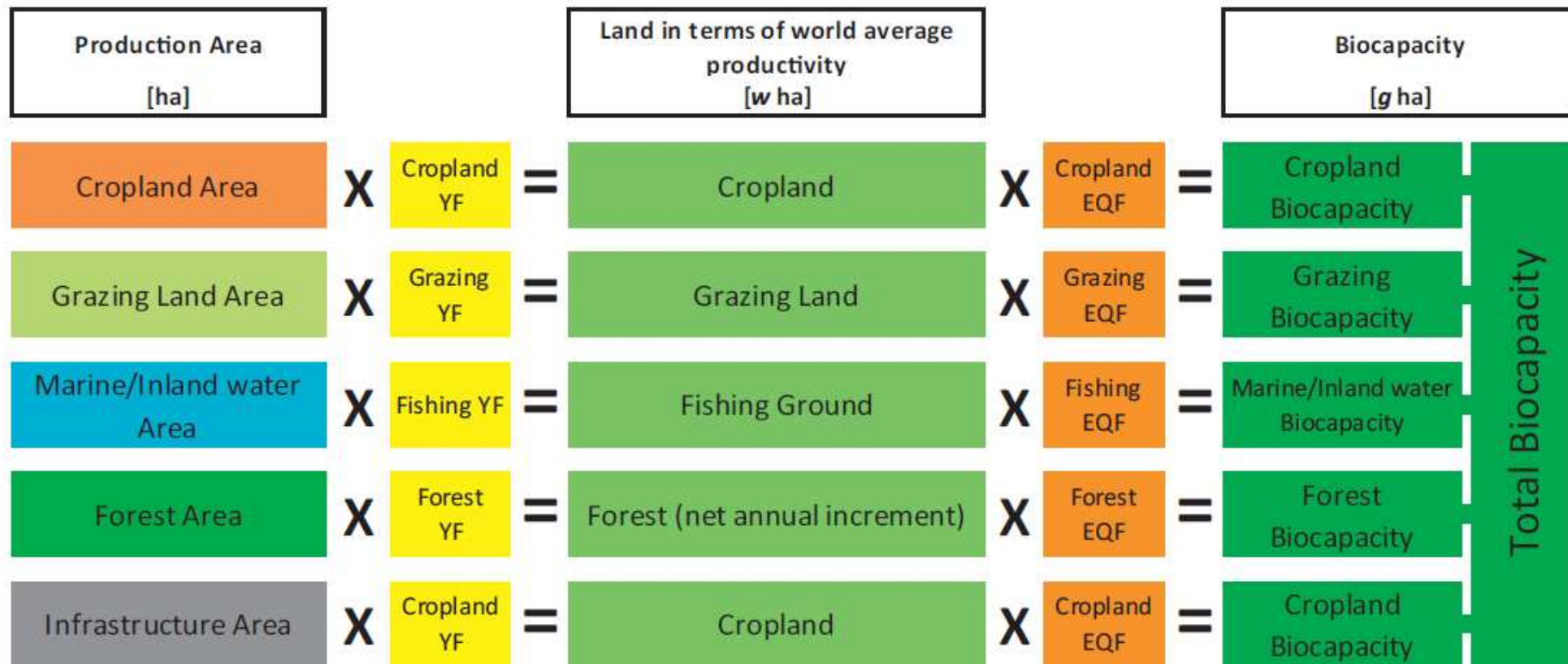
$$EF = \frac{P}{Y_N} \cdot YF \cdot EQF$$

Production is converted to area required for production.
then normalised to world average yield (YF)
and world average land type (EQF)

The Ecological Footprint



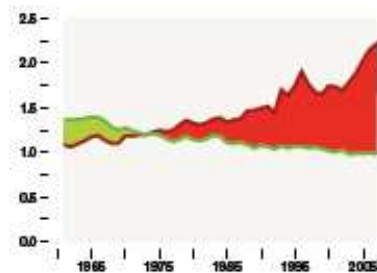
The Ecological Footprint



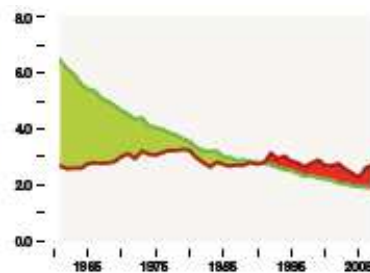
The National Footprint Accounts (NFA)



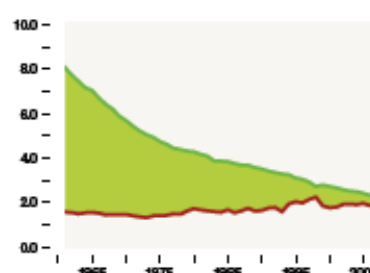
- Produced annually, using updated datasets and following approved changes methodology.
- Ecological Footprint and Biocapacity values for 250 + countries (and the World), from 1961-2008.



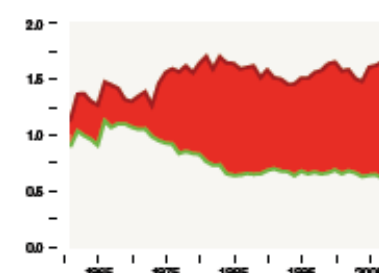
China



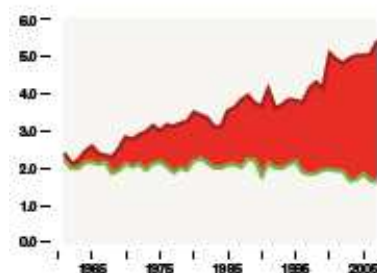
Costa Rica



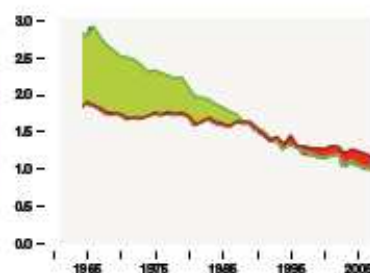
Ecuador



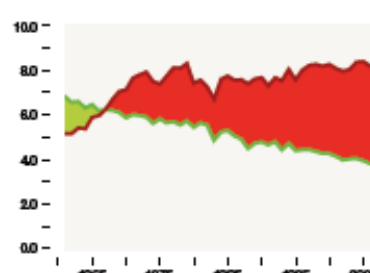
Egypt



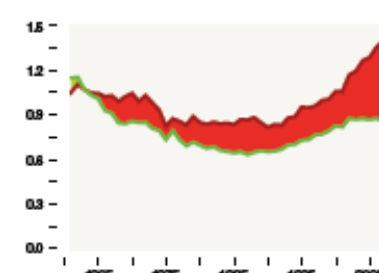
Greece



Tanzania



United States



Vietnam



Results



Can be presented at multiple levels of aggregation:

1. Aggregate national EF and BC values
2. EF and BC values by land type
3. EF values by variable
4. EF values for all individual products
5. Values are provided both per capita and total
6. Results in both wha(yf) and gha(eqf)



MRIO: Linking Economic Sectors



Models/Account

Results

Ecological Footprint Analysis

National Footprint Account (NFA)

Land based Analysis



1. World
2. National level
3. With Other Indicators (HDI, etc)

Multi Regional Input Output Analysis (MRIO)

Socio-Economic Analysis

1. Consumption Land Use Matrix (CLUM)
2. Industrial /Final Demand based analysis
 - 57 industries
 - Household consumption, Government consumption, Gross Fixed Capital Formation
3. In-depth Trade Analysis

Computable General Equilibrium Model (CGE)

Scenario Analysis



Consumption Land Use Matrix (CLUM)



Gha person ⁻¹		Crop Land	Grazing land	Forest Land	Fishing Grounds	Built-up Land	Carbon	Total
Household	Food							
	Housing							
	Transportation							
	Goods							
	Services							
Government								
GFC								
Total								

Six Footprint land uses: (columns)

Three final demand categories: Household, government, and gross fixed capital formation (GFCF) row headings.

Household final demand components: food, housing, maintenance and operations, personal transportation, goods, and services (rows)



Challenges, Improvements, and development



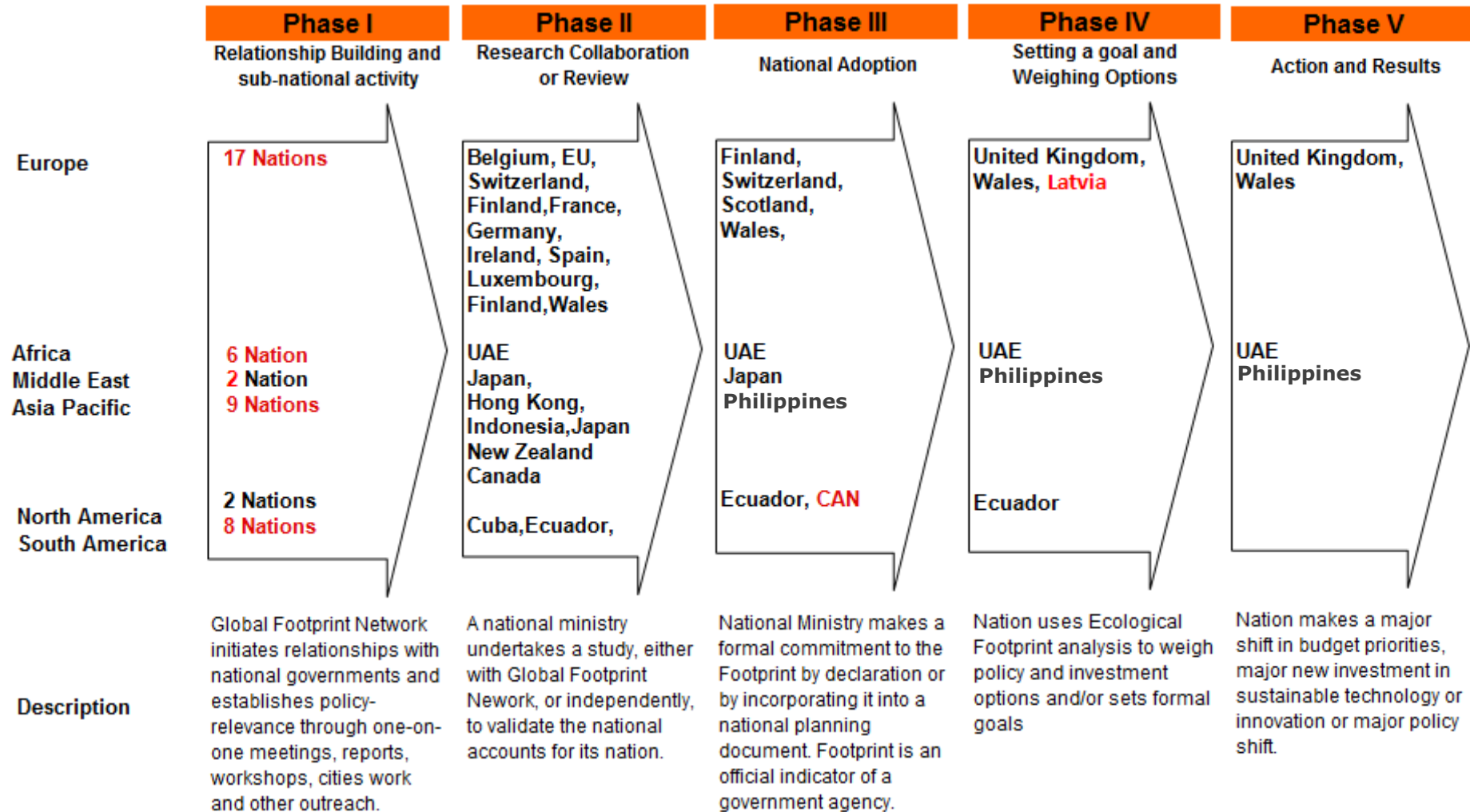
- Data limitations
- Understanding differences: MRIO and NFA
- How close are we in practice to measuring what we want?

- Improved methodology for Carbon Sequestration
- Minor revision and improvements to cropland and fish trade methodology.

- Incorporating Bilateral trade
- Incorporating more detailed spatially explicit data (EQF)



Our work with countries

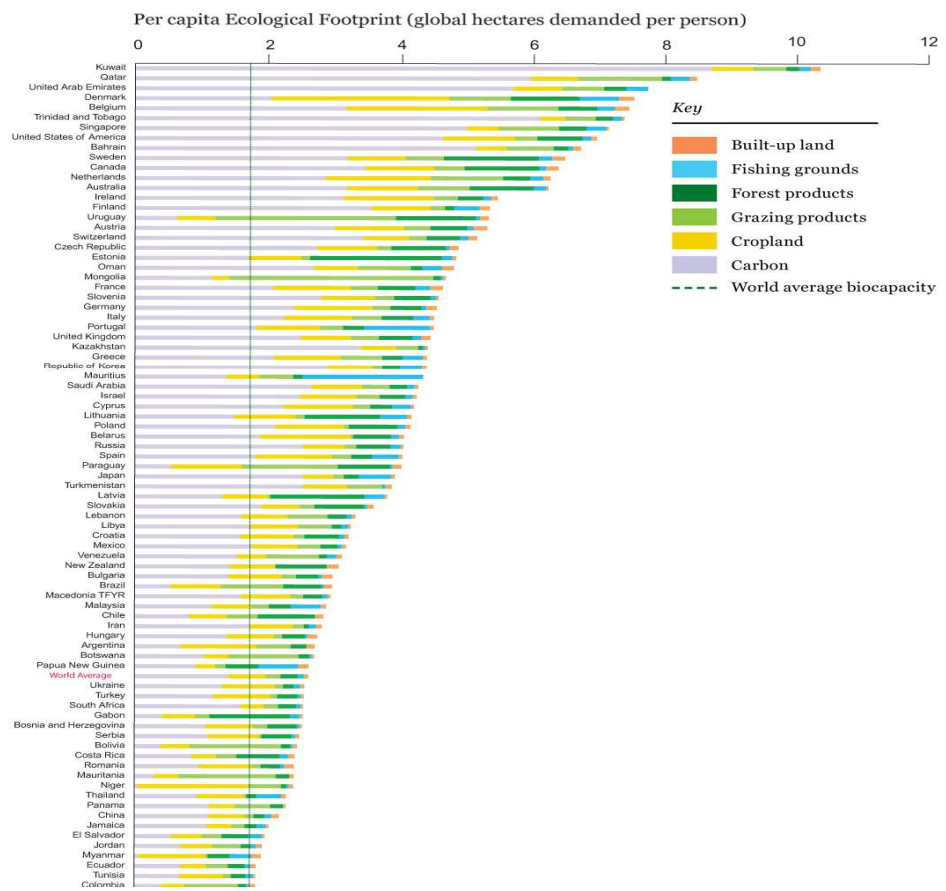


Partnerships



FOOTPRINT BY COUNTRY

This comparison includes all countries with a populations greater than 1 million for which complete data is available (Global Footprint Network, 2014)



Successes

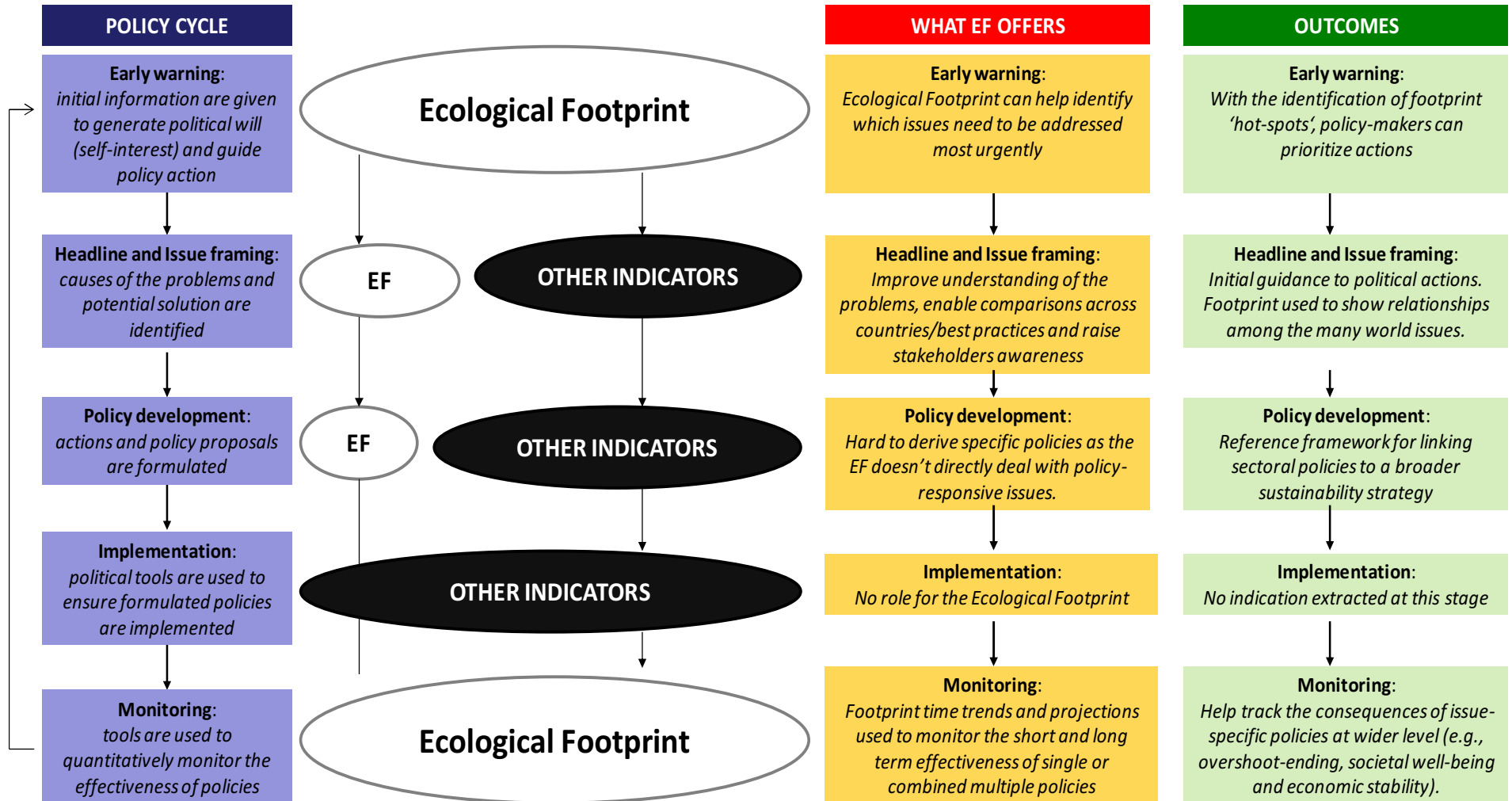


Effectiveness

- Intuitive
- Simple
- Dataset
 - Current availability
 - Historic time series



Relevance



(Knill and Tosun, 2008)



Looking forward



- Where can we help advance SEEA goals and visa versa
- National Accounts Review Committee
- SEEA alignment?



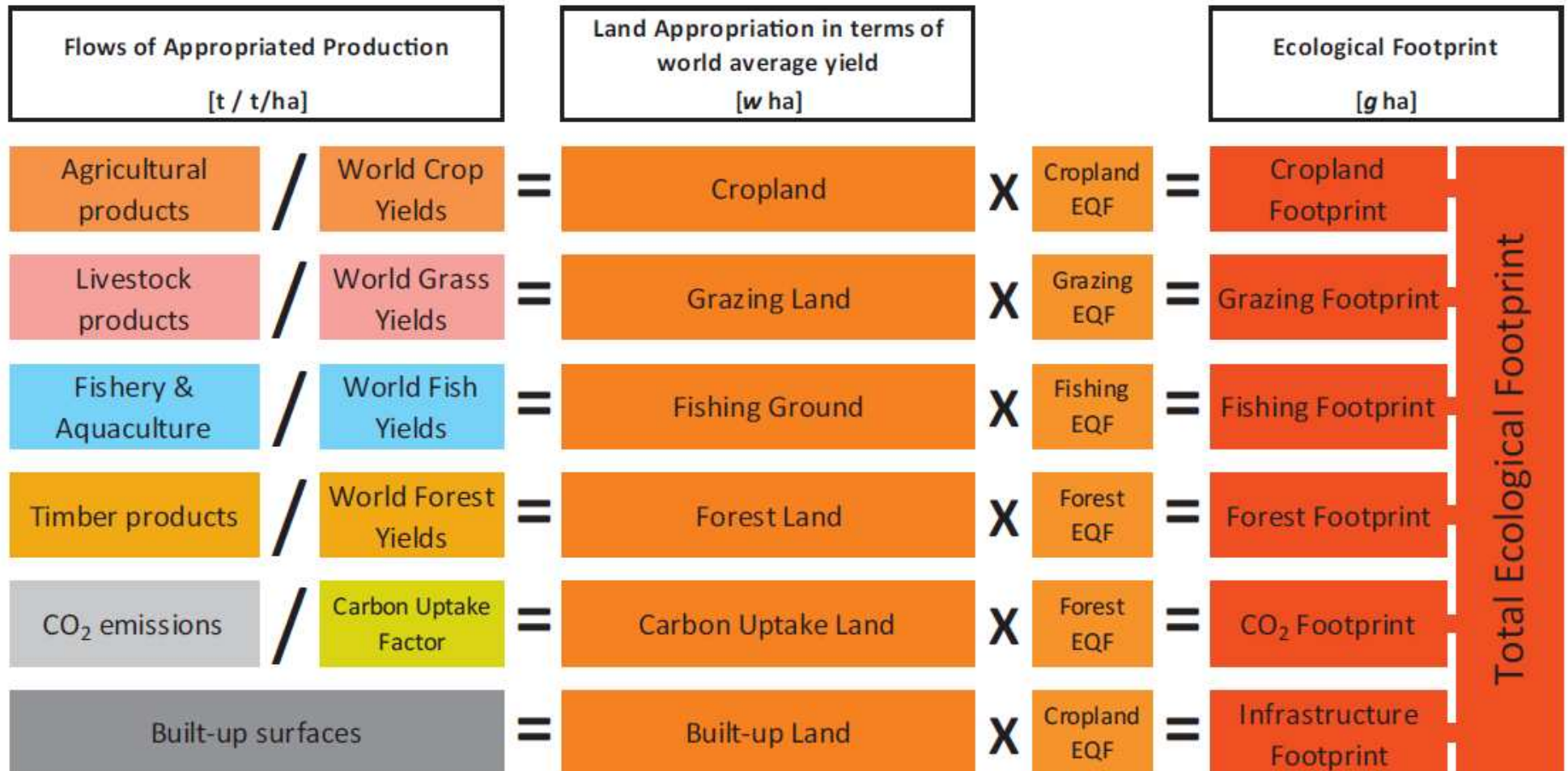


Thank You.

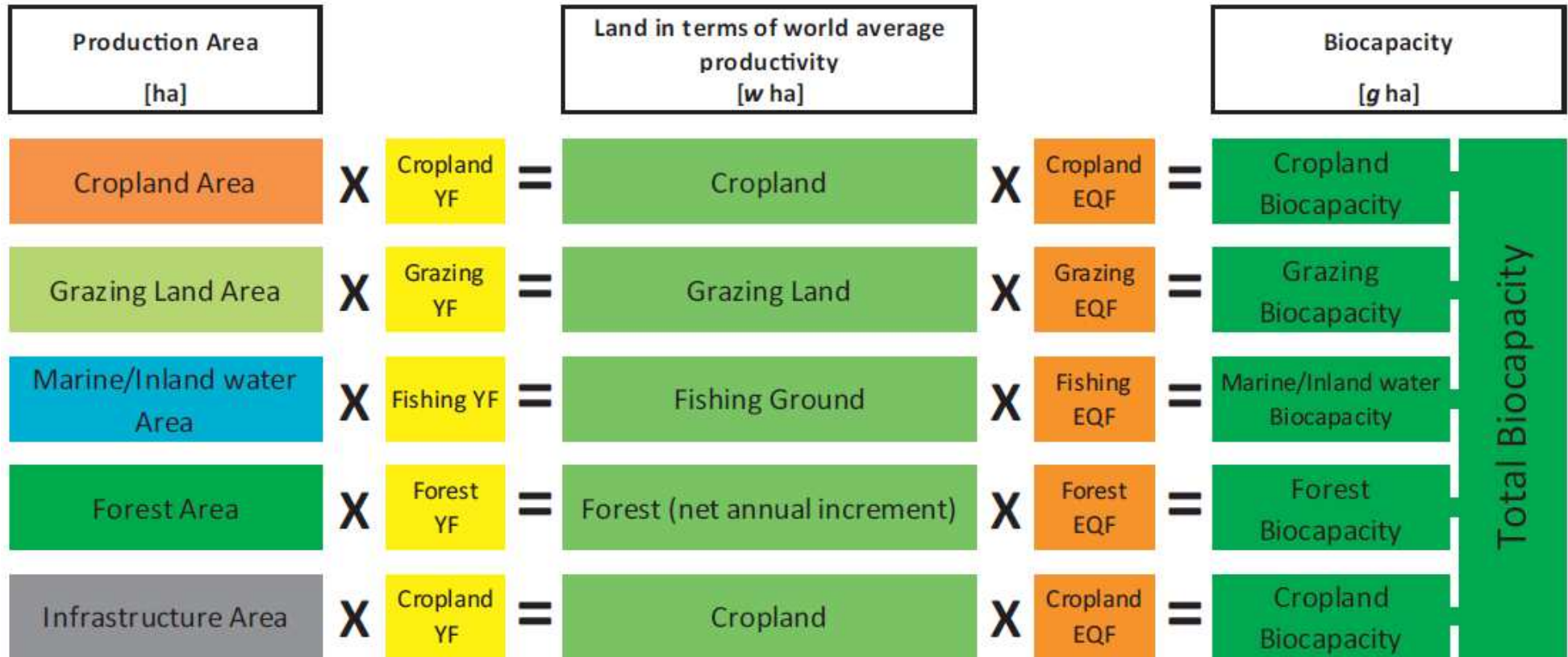
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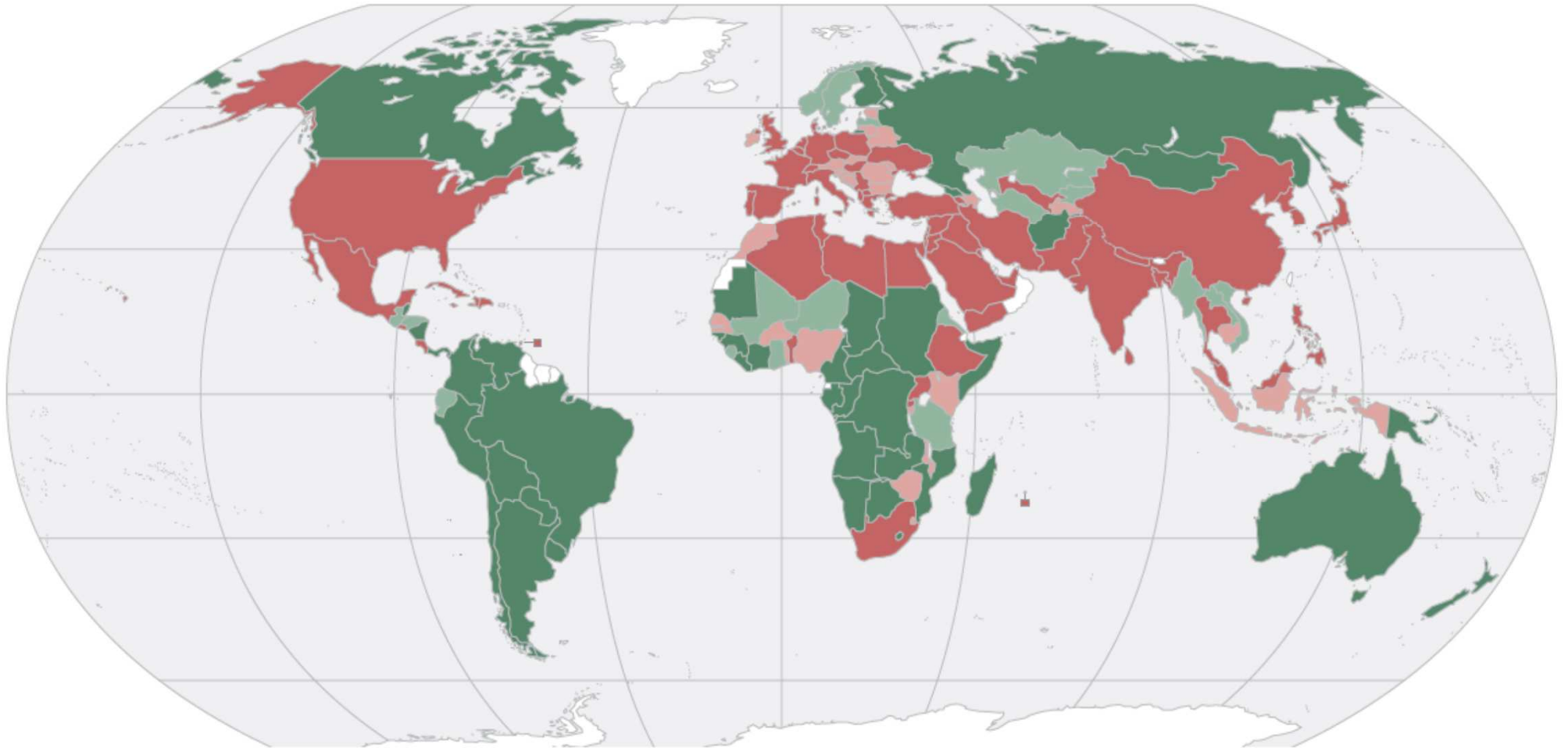
The Ecological Footprint

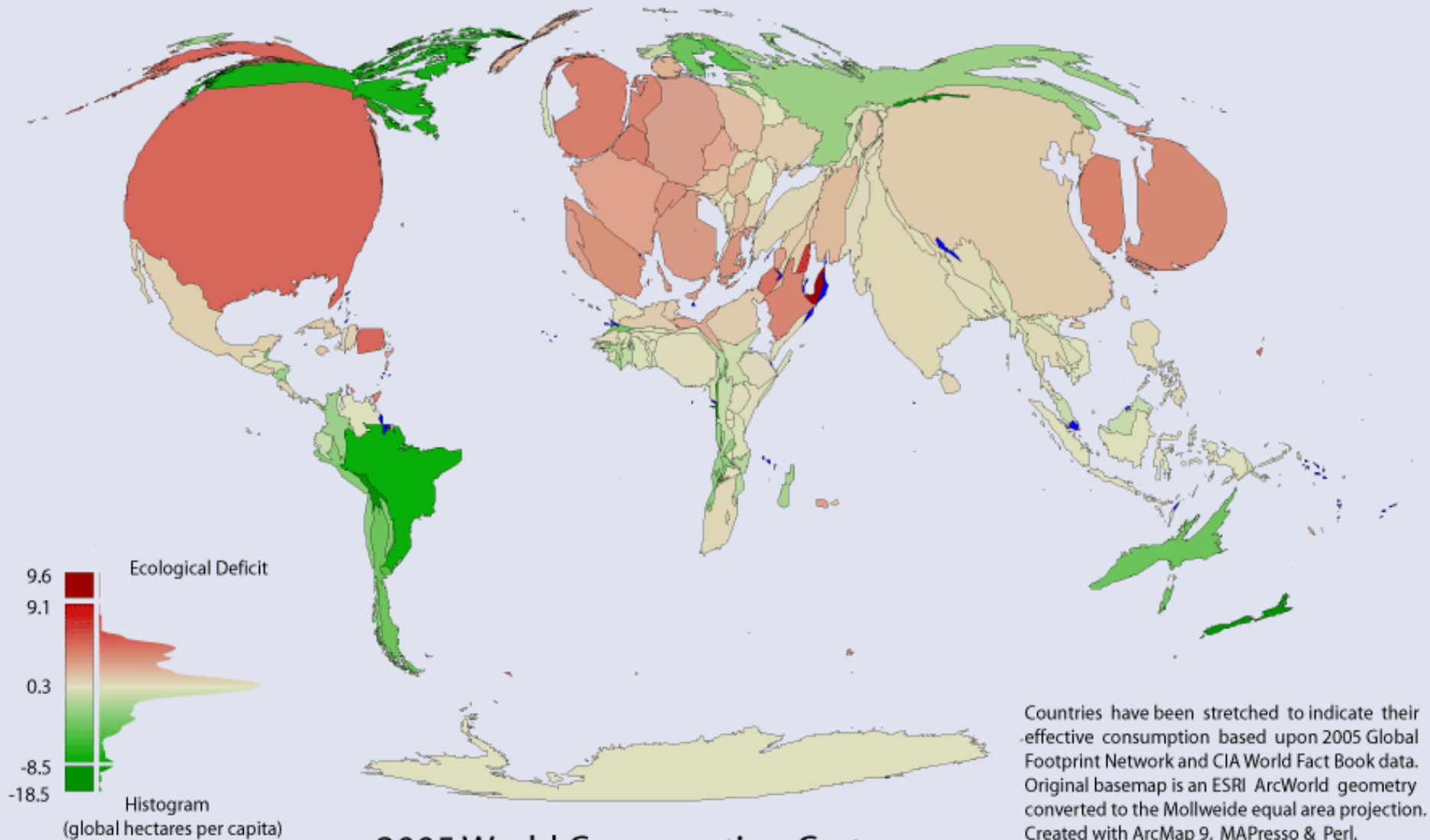


The Ecological Footprint



Ecological Creditors and Ecological Debtors





-Jerrad Pierce 12/05 jpierce@cpan.org

Model and Results for Footprint Analysis



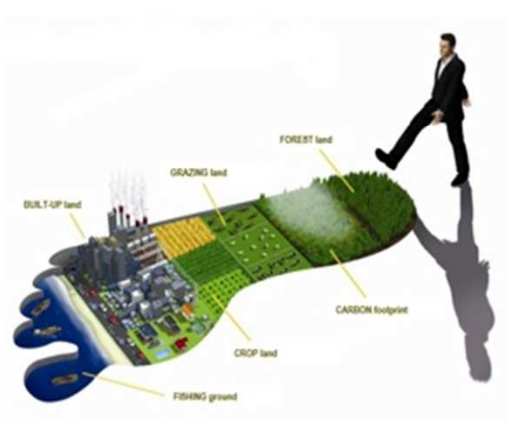
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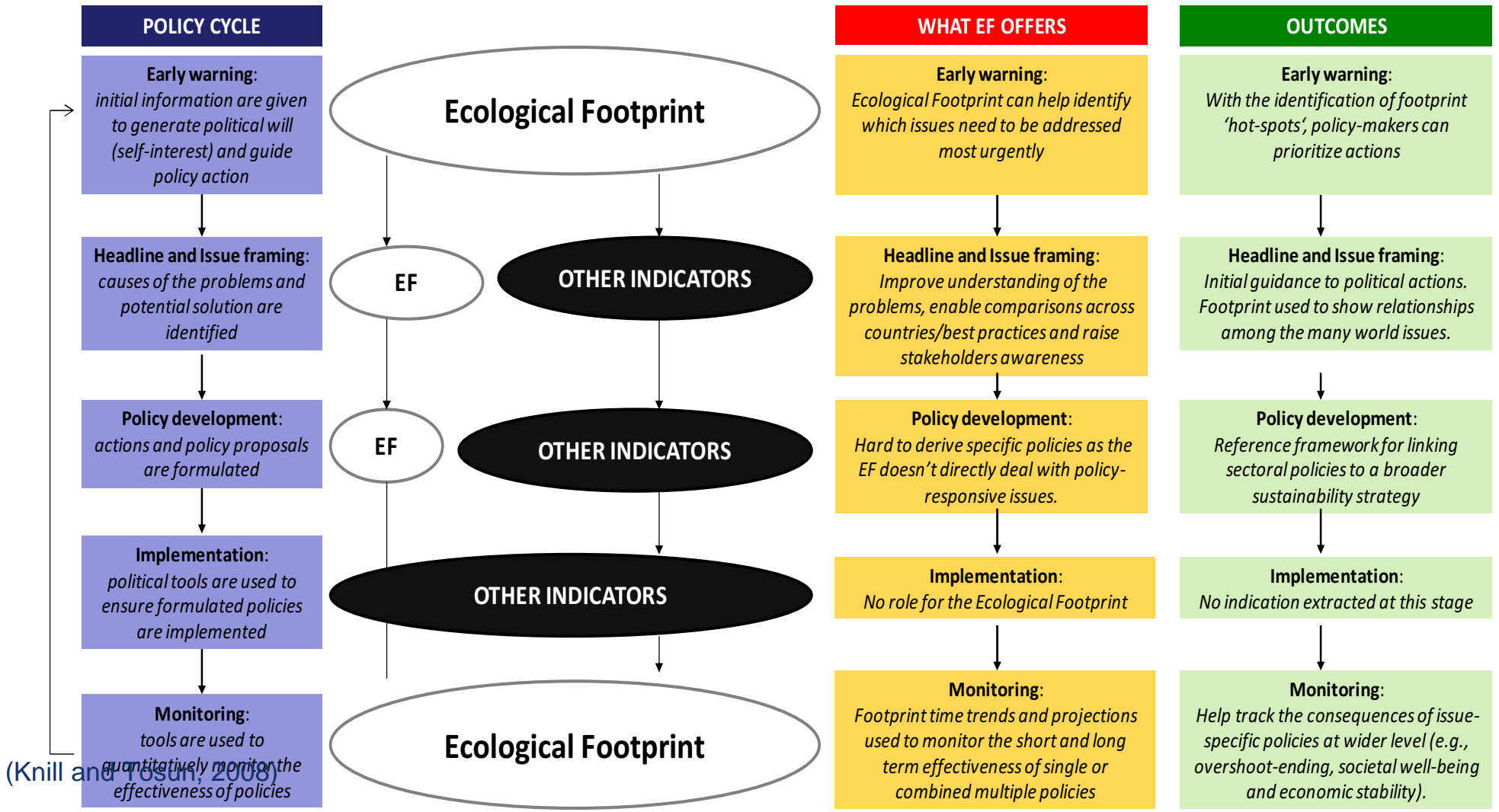
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(Knill and Tosun, 2008)



Ecological Footprint of selected nations, with population (2003)

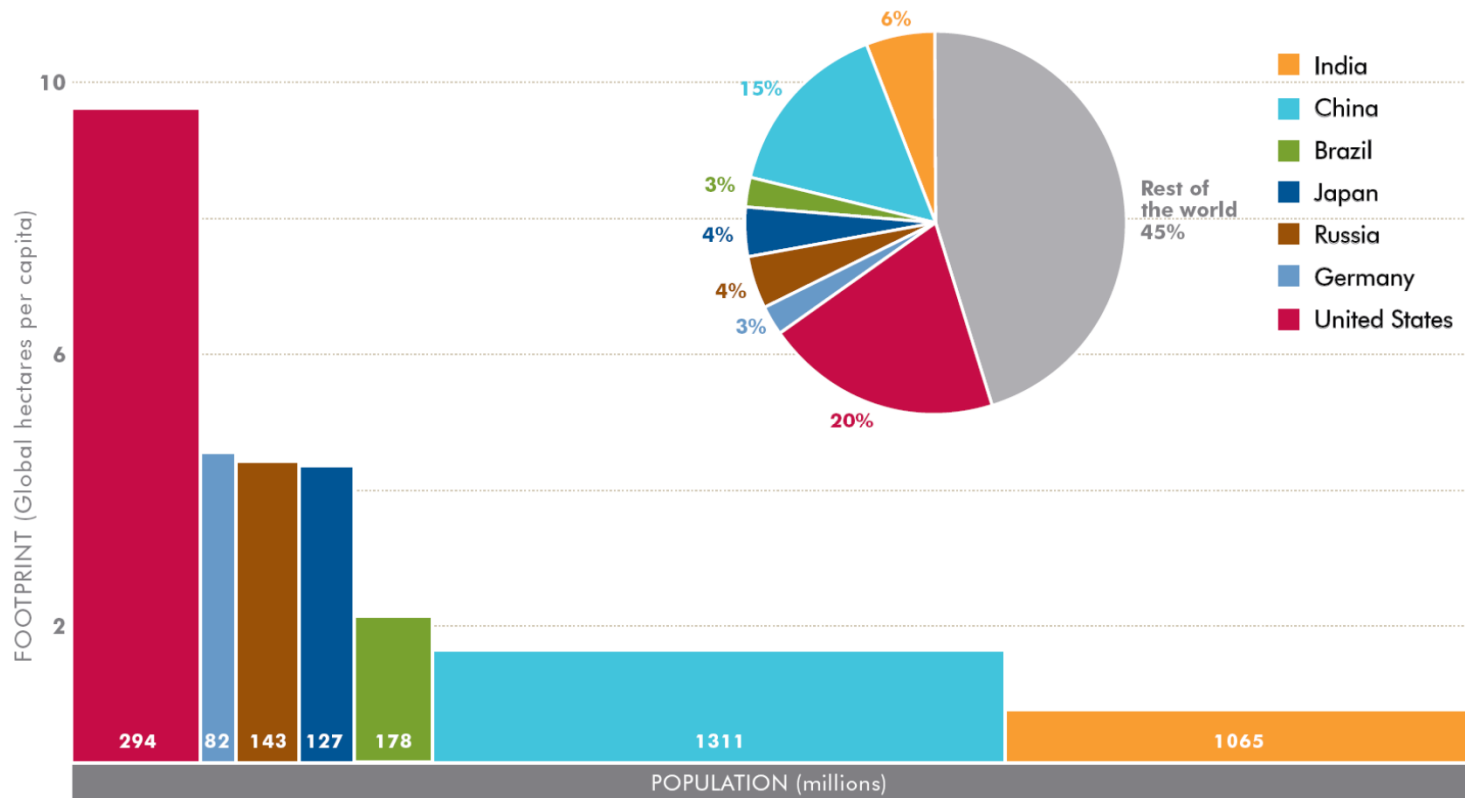
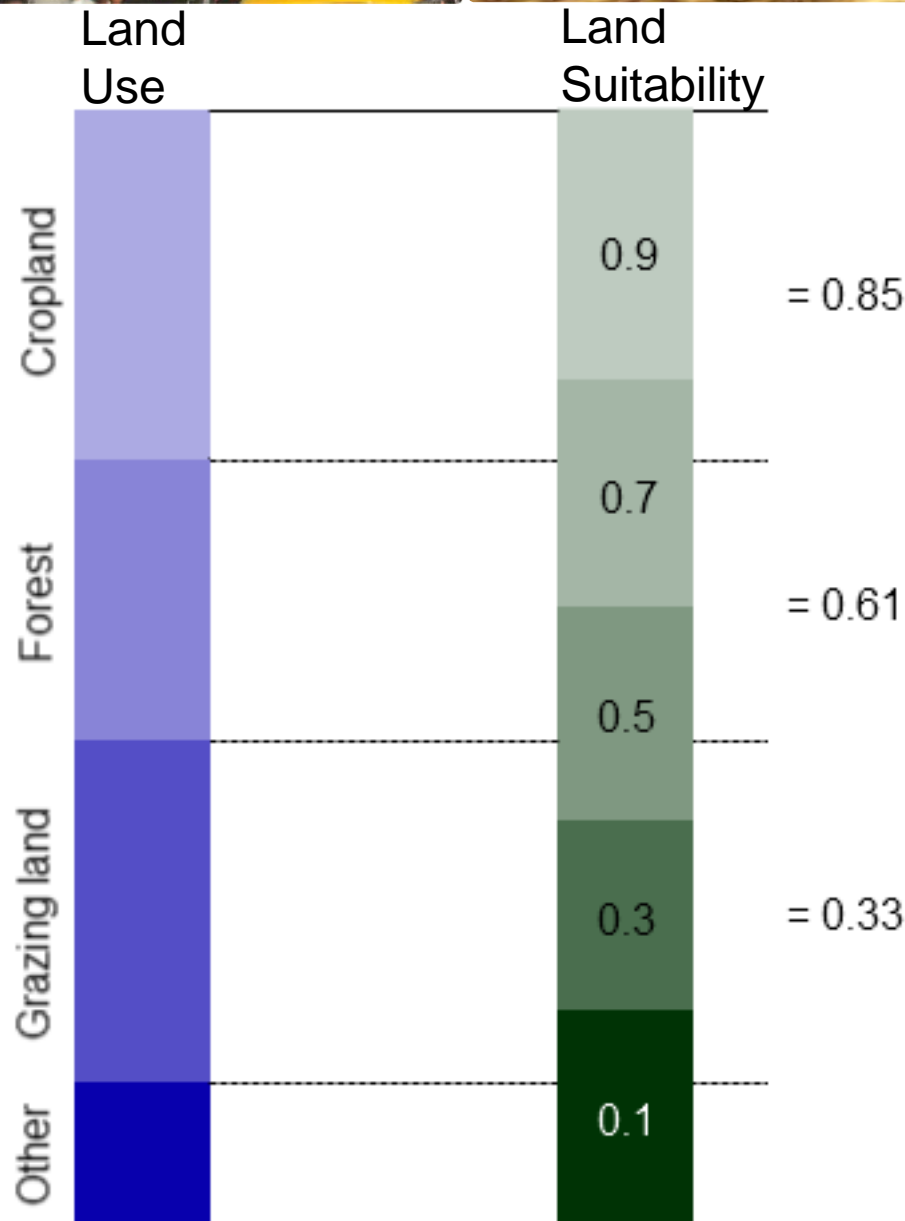


FIGURE 3: Ecological Footprint for selected nations, with population (2003)

Presentation Outline



For this country:

Average land suitability

= 0.5

Average suitability of cropland

= 0.85

For the world (sum of all countries):

Average land suitability

= 0.33

Average suitability of cropland

= 0.79

Equivalence factor of cropland

= $0.79/0.33 = 2.39$