$$\sum_{1}^{n} x_n y_n$$

Construyendo un CLUM
(Matriz de consumo del uso de tierra)

David Moore
Project Manager
Global Footprint Network

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Las Preguntas

¿Cuál será el impacto sobre la ***producción económica*** del país de un aumento de 10 dólares en la demanda de productos manufacturados?

¿Cuál será el impacto sobre la ***huella ecológica*** del país de un aumento de 10 dólares en la demanda de productos manufacturados?


INPUT OUTPUT TABLE

UNIT INPUT COEFFICIENTS

	Intermediate Demand		Final Demand	Gross Output
	Manuf	Agric		
Manuf	150	500	250	900
Agric	200	100	700	1000
Value Added	550	400		
Total Cost	900	1000		

150/900 = 0.17

COEFFICIENT MATRIX

Manuf	0.17	
Agric		
Value Added		
Total Cost		

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COEFFICIENT MATRIX

Manuf	0.17	0.50
Agric	0.22	0.10
Value Added	0.61	0.40
Total Cost	1.00	1.00

Directa los insumos necesarios por cada $1 de la producción

COEFFICIENT MATRIX

FIRST ANSWER

	Manuf	Agric
Manuf	0.17	0.50
Agric	0.22	0.10
Value Added	0.61	0.40
Total Cost	1.00	1.00

Since $1 of Manuf requires 17 cents of Manuf inputs, $10 requires:

$1.70 of manufacturing inputs

$2.20 of agricultural inputs

$6.10 of Value Added

COEFFICIENT MATRIX

FIRST ANSWER

	Manuf	Agric
Manuf	0.17	0.50
Agric	0.22	0.10
Value Added	0.61	0.40
Total Cost	1.00	1.00

¿Y los efectos en cadena?

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SPECIFY: FULL SYSTEM

	150	500	250	900
	200	100	700	1000
	550	400		

SPECIFY: FULL SYSTEM

	Intermediate Demand		Final Demand	Gross Output
	Manuf	Agric		
Manuf	$a_{11}X_1$	$a_{12}X_2$	F_1	X_1
Agric	$a_{21}X_1$	$a_{22}X_2$	F_2	X_2
Value Added	V_1	V_2		

Since $a_{ij} = \frac{Z_{ij}}{X_j}$, we can write $Z_{ij} = a_{ij} X_j$


SPECIFY: FULL SYSTEM

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Value Added	V_1	V_2		

So the full material balances can be written as:

Manufacturing $a_{11}X_1 + a_{12}X_2 + F_1 = X_1$

Agriculture $a_{21}X_1 + a_{22}X_2 + F_2 = X_2$


SPECIFY: FULL SYSTEM

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Value Added	V_1	V_2		

Or, in matrix terms:

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} F_1 \\ F_2 \end{bmatrix} = \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$

$$AX + F = X$$


"SOLVING" THE SYSTEM

$$AX + F = X$$

$$\therefore F = X - AX$$

$$\therefore F = (I - A)X$$

$$\therefore (I - A)^{-1} F = X$$

Si sabemos vector demanda final y la matriz de coeficientes técnicos, pueden trabajar, que se requieren salidas brutas

Debido a la linealidad, esto funciona también para los "pequeños" cambios en la demanda final:

$$\therefore (I - A)^{-1} \Delta F = \Delta X$$


Answering our Questions

¿Cuál será el impacto sobre la ***producción*** de un aumento de 10 dólares en la demanda de productos manufacturados?

$$\Delta X = (I - A)^{-1} \Delta F$$

$$\begin{bmatrix} 1.41 & 0.78 \\ 0.35 & 1.30 \end{bmatrix} \begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

$$= \begin{bmatrix} 14.09 \\ 3.49 \end{bmatrix}$$

Requerido cambio en la producción de la manufactura

Requerido cambio en la producción de la agricultura


Answering our Questions

¿Cuál será el impacto sobre la ***Huella Ecológica*** de una subida de 10 dólares en la demanda de productos manufacturados?

De las NFA, se determinó que 1 dólar de la producción del sector agrícola requiere de 5 gha de tierras de cultivo

$$\Delta EF^{cropland} = \Delta X^{agric} \cdot I$$

$$\begin{bmatrix} 1.41 & 0.78 \\ 0.35 & 1.30 \end{bmatrix} \begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

$$= \begin{bmatrix} 14.09 \\ 3.49 \end{bmatrix}$$

$$3.49 \cdot 5 = 17.45 \quad \text{global hectares}$$

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Ahora tenemos la Huella Ecológica aportados por la demanda final de cada sector

Utilice un cuadro de concordancia de traducir los sectores a algo más comprensible

- E.g. **C**lassification **O**f **I**ndividual **C**onsumption **A**ccording to **P**urpose (United Nations)

= CLUM

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Retos

- Atribución inicial de la Huella Ecológica a los sectores correspondientes
  ¿Cómo debemos asignar la huella de las tierras de cultivo?
  ¿Cómo debemos asignar la huella de la superficie construida?
  ¿Cómo debemos asignar la huella de carbono?

- Cartografía de los sectores industriales a las categorías de consumo final

- El mantenimiento de la coherencia en la información que complementa CLUM

Todos estos problemas se resuelven o reducido por tener alta resolución tablas I-O!

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Perú Input Output Tables

- Global Footprint Network tiene acceso a 57 IO mesa del sector para el Perú a través de la base de datos del GTAP
- Sobre la base de 1994 modificada por la tabla con datos de 2004
- Tablas de alta resolución contiene ~ 400 sectores

¿Pueden ayudarme?

Flowchart of calculation methodology

Step 1:
Initial Allocation

→

Step 2:
Input-output based Ecological Footprint analysis

→

Step 3:
Consumption Land Use Matrix (CLUM)

↓

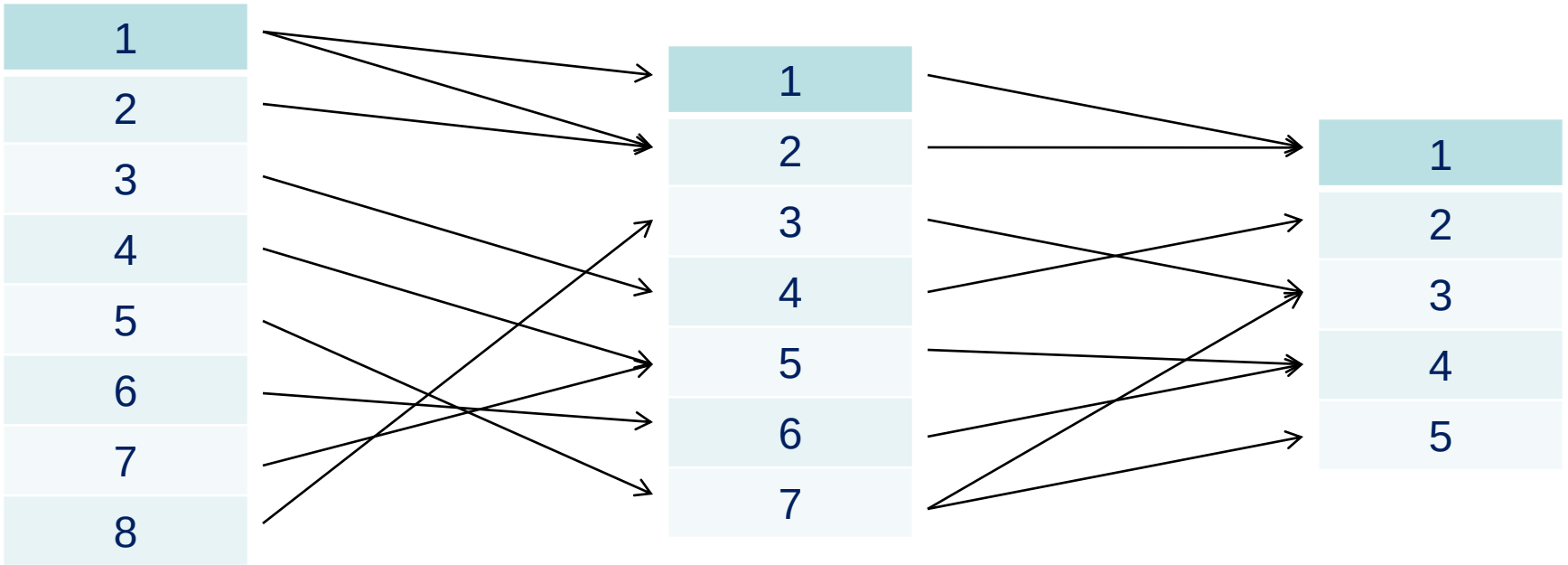
Footprint by industry sector

¿Cuál es el resultado?

[gha/cap]	Cropland	Grazing Land	Forest Land	Fishing Grounds	Carbon Uptake	Built-up Land	Total
Food	**0.65**	**0.13**	**0.32**	**0.15**	**0.24**	**0.01**	**1.50**
Food	0.60	0.12	0.29	0.14	0.20	0.01	1.36
.plant-based	0.60						
.animal-based		0.12					
Non-alcoholic beverages	0.03	0.01	0.01	0.01	0.02	0.00	0.07
Alcoholic beverages	0.03	0.01	0.01	0.01	0.02	0.00	0.08
Housing	**0.05**	**0.01**	**0.02**	**0.01**	**0.62**	**0.01**	**0.73**
Actual rentals for housing	0.01	0.00	0.00	0.00	0.03	0.00	0.05
Imputed rentals for housing	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Maintenance and repair of the dwelling	0.02	0.00	0.01	0.01	0.31	0.01	0.36
Electricity, gas & other fuels	0.02	0.00	0.01	0.00	0.15	0.00	0.19
.electricity	0.00	0.00	0.00	0.00	0.15	0.00	0.15
.natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00
.fuelwood	0.02	0.00	0.01	0.00	0.00	0.00	0.04
.fuel oil, kerosene, LPG, coal	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service for household maintenance	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Direct household consumption (Heating)					0.13		0.13
Mobility	**0.05**	**0.01**	**0.02**	**0.01**	**0.60**	**0.01**	**0.71**
Purchase of vehicles	0.01	0.00	0.00	0.00	0.17	0.00	0.19
Operation of personal transport equipment	0.03	0.01	0.02	0.01	0.15	0.01	0.22
Transport services	0.01	0.00	0.01	0.00	0.16	0.00	0.18
.buses and rail transport	0.00	0.00	0.00	0.00	0.12	0.00	0.13
.passenger air transport	0.00	0.00	0.00	0.00	0.01	0.00	0.02
.passenger boats	0.00	0.00	0.00	0.00	0.01	0.00	0.01
.other	0.00	0.00	0.00	0.00	0.02	0.00	0.03
Direct household consumption (Transport)					0.12		0.12
Goods	**0.11**	**0.02**	**0.05**	**0.02**	**0.64**	**0.02**	**0.87**
Clothing	0.02	0.00	0.01	0.00	0.12	0.00	0.16
Footwear	0.01	0.00	0.00	0.00	0.03	0.00	0.04
Furniture, furnishings, carpets etc.	0.01	0.00	0.00	0.00	0.06	0.00	0.08
Household textiles	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Household appliances	0.00	0.00	0.00	0.00	0.03	0.00	0.04
Glassware, tableware & household utensils	0.00	0.00	0.00	0.00	0.03	0.00	0.03
Tools and equipment for house & garden	0.00	0.00	0.00	0.00	0.02	0.00	0.03
Medical products, appliances & equipment	0.00	0.00	0.00	0.00	0.01	0.00	0.01
Telephone & telefax equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Audio-visual, photo & info. Processing equipmer	0.00	0.00	0.00	0.00	0.04	0.00	0.04
Other major durables for recreation & culture	0.00	0.00	0.00	0.00	0.03	0.00	0.04
Other recreational equipment etc.	0.01	0.00	0.01	0.00	0.09	0.00	0.11
Newspapers, books & stationery	0.00	0.00	0.00	0.00	0.05	0.00	0.06
Goods for household maintenance	0.02	0.00	0.01	0.00	0.10	0.00	0.14

Additional Challenges

- How do you match CLUM categories to expenditure and price data?



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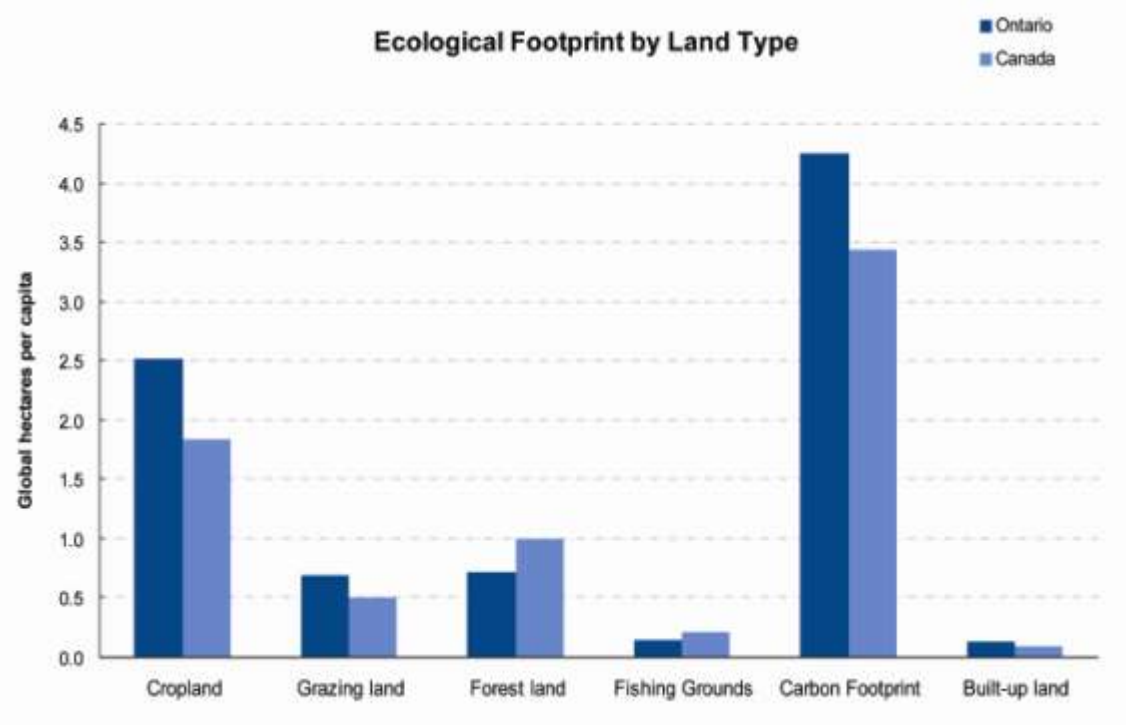
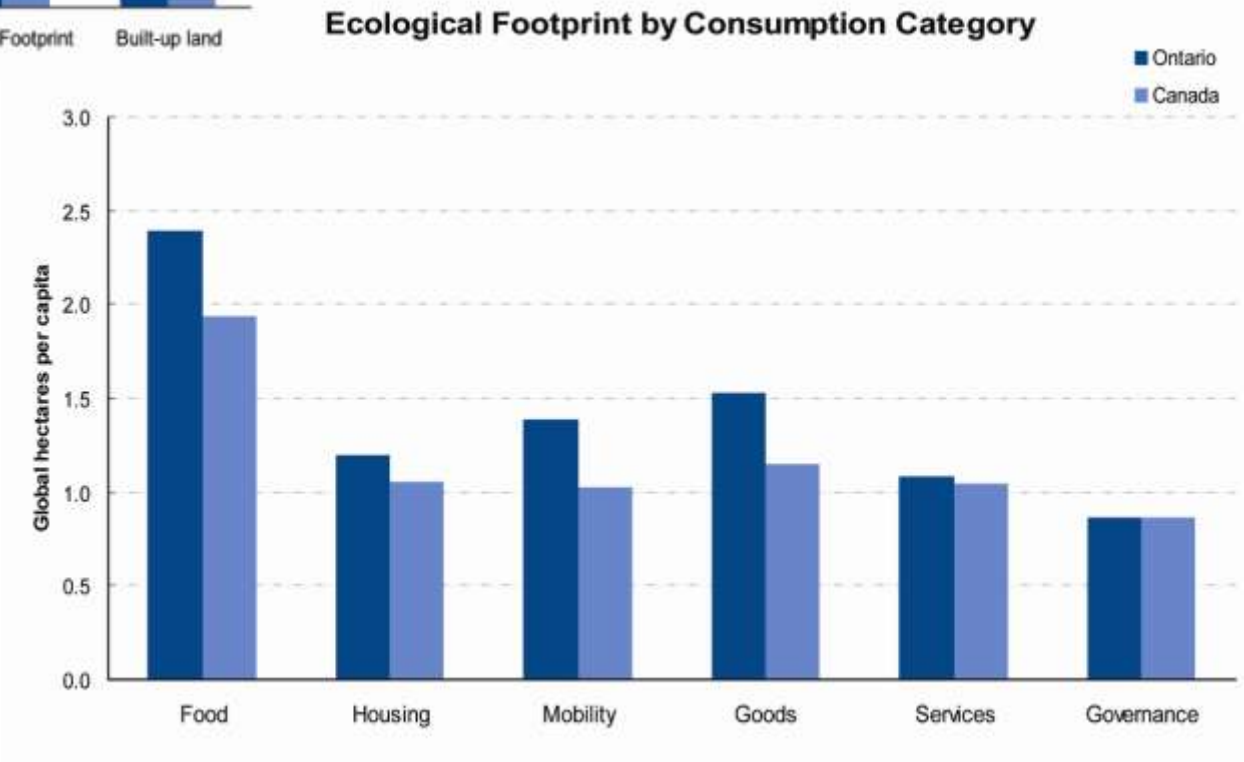
¿Cuál es el resultado?





Thank you !!!

For more information please contact:

David Moore
Project Manager
Global Footprint Network
david@footprintnetwork.org

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