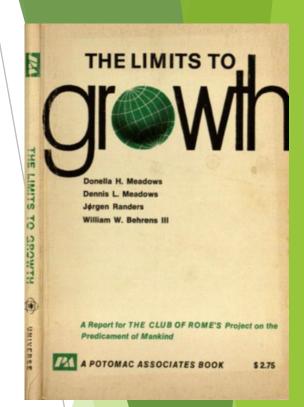
PEGADA ECOLÓGICA - APENAS UM OUTRO CHAVÃO?

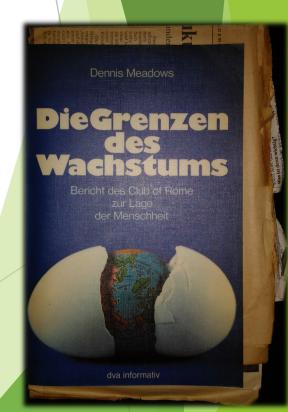
Ou porquê é impossível continuar a agir como se nada fosse



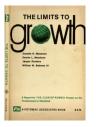
"Os Limites de Crescimento"

- Limits to growth" Report for the CLUBE OF ROME'S Project on the Predicament of Mankind (1972)
 - Equipa do MIT liderada por Donella H. Meadows, Dennis
 L. Meadows, Jorgen Randers e William W. Behrens III
 - Modelo informático do crescimento contínuo mundial
 - População
 - Produção agrícola
 - Depleção de recursos não-renováveis
 - Produção industrial
 - Poluição



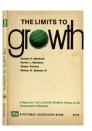


"Limits to growth"

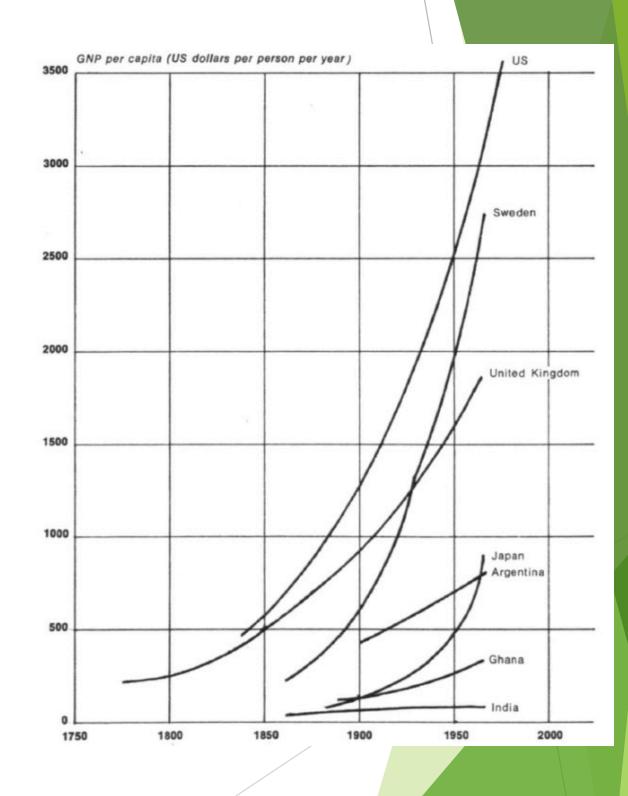


- "Limits to growth" Report for the CLUBE OF ROME'S Project on the Predicament of Mankind (1972)
 - Cenários
 - "Business as usual"
 - Limites de crescimento serão atingidos dentro 100 anos
 - Colapso abrupto
 - Mas é possível alterar as tendências de crescimento
 - Atingir estabilidade económica e ecológica sustentável
 - Satisfazer as necessidades materias básicas de cada um
 - Dar oportunidades iguais para a realização do potencial humano individual

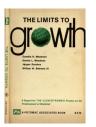
"Limits to growth"



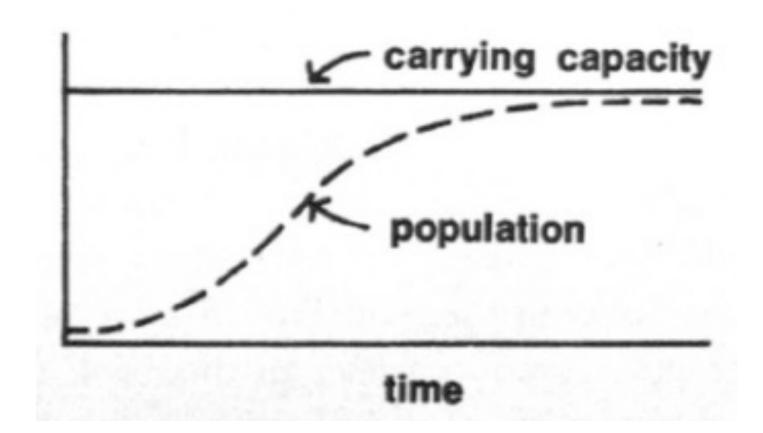
- Crecimento exponencial versus linear
 - Atinge números extremos muito depressa
 - "Artesão e o tabuleiro de xadrez"
 - Brusquidão de acontecimentos
 - "Nenúfares num lago"
 - ► Tempo de duplicação
 - Crescimento 2% 35 anos
 - Cresicmento 4% 18 anos



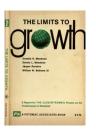
"Limits to growth"



Capacidade de suporte







Modelo Mundial

Figure 35 WORLD MODEL STANDARD RUN

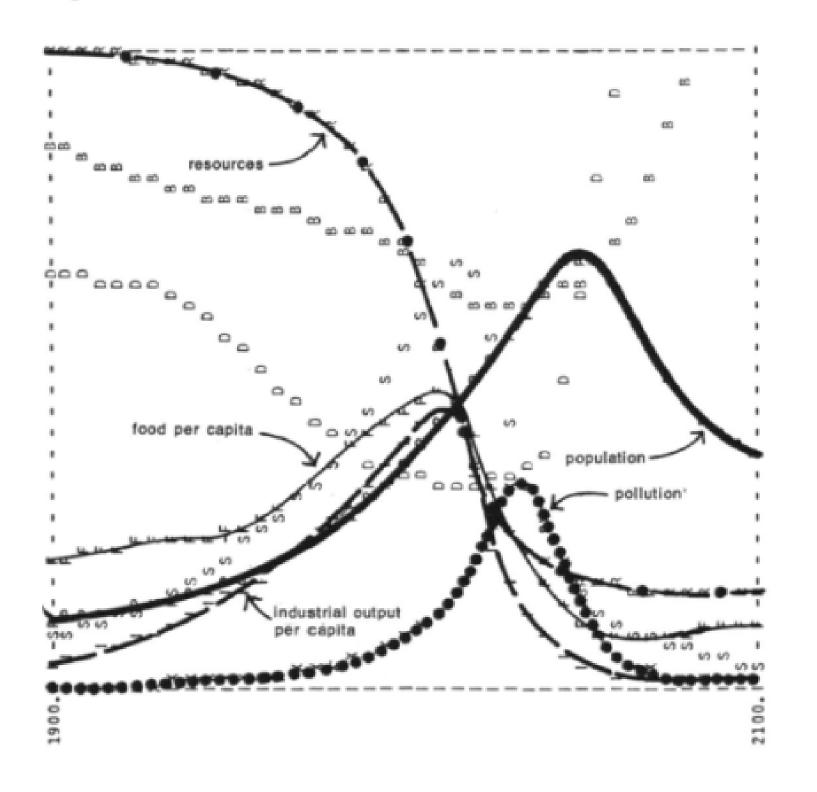
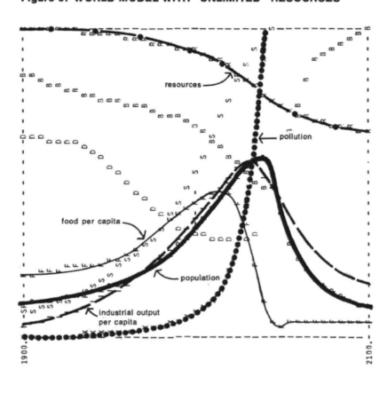
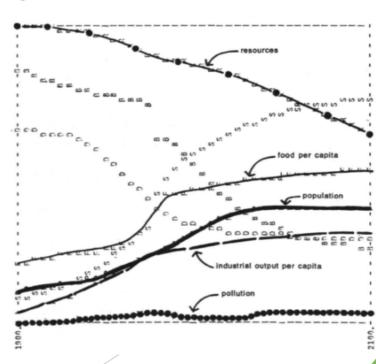
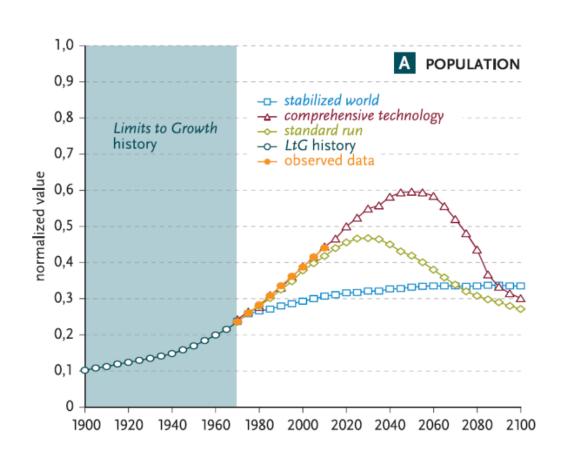


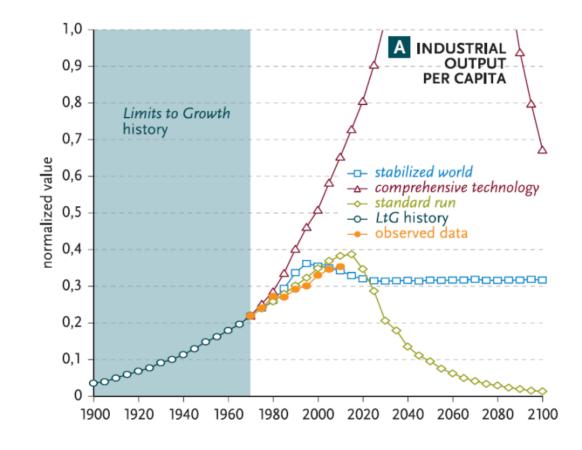
Figure 37 WORLD MODEL WITH "UNLIMITED" RESOURCES

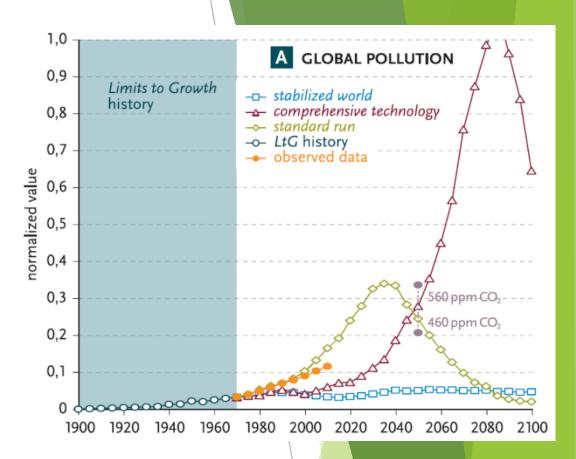


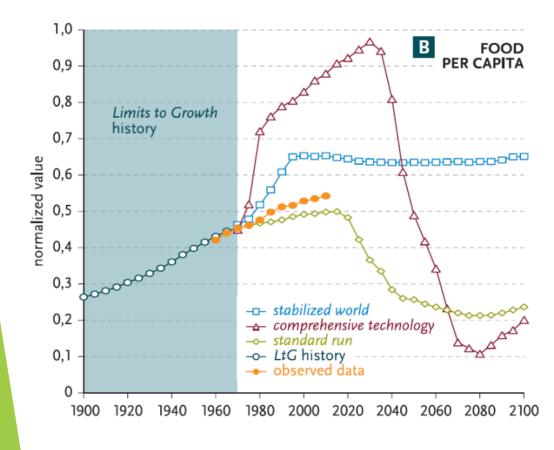


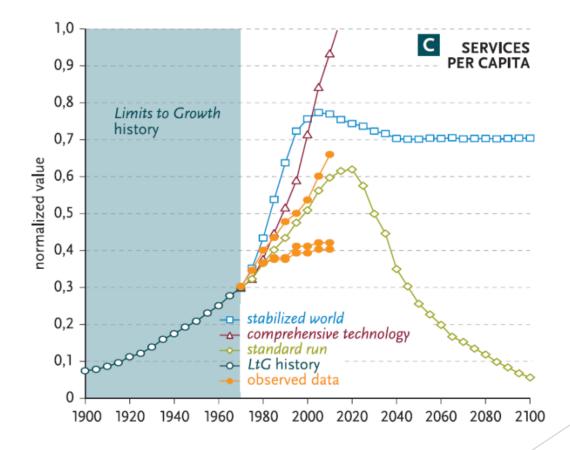
LtG e dados históricos (Turner 2014)

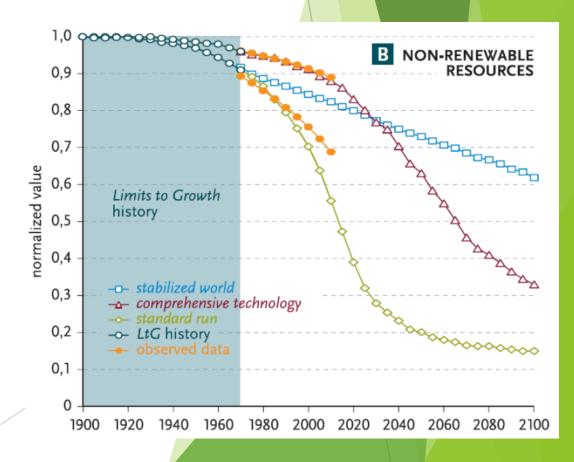












- William Rees
 - University of British Columbia, Vancouver, Canada
 - Ecological footprints and appropriated carrying capacity: what urban economics leaves out (1992)
- Mathis Wackernagel
 - PhD -Student 1990 1994
 - Ecological Footprint and Appropriated Carrying Capacity: A Tool for Planning Toward Sustainability (1994)
- Our Ecological Footprint: Reducing Human Impact on the Earth (1996)





- Mathis Wackernagel & Susan Burns
 - ► Global Footprint Network (2003)



- Dados & metodologia¹
 - Contas nacionais de pegada ecológica
 - Dados das Nações Unidas, FAO, UN Comtrade, UN Statistics Division, International Energy Agency
 - Área biologicamente produtiva necessária (gha)
 - Absorver as emissões de carbono
 - Gerar todos os recursos consumidos
 - Somar importações e subtrair exportações

¹Michael Borucke, David Moore, Gemma Cranston, Kyle Gracey, Katsunori Iha, Joy Larson, Elias Lazarus, Juan Carlos Morales, Mathis Wackernagel, Alessandro Galli, Accounting for demand and supply of the biosphere's regenerative capacity: The National Footprint Accounts' underlying methodology and framework, Ecological Indicators, Volume 24, 2013, 518-533



 EF_{c}











EF_{E}

Ecological Footprint of Consumption

The Ecological Footprint of consumption indicates the consumption of biocapacity by a country's inhabitants.

In order to assess the total domestic demand for resources and ecological services of a population, we use the Ecological Footprint of consumption (EF_c). EF_c accounts for both the export of national resources and ecological services for use in other countries, and the import of resources and ecological services for domestic consumption.

EFc is most amenable to change by individuals through changes in their consumption behavior.

Ecological Footprint of Production

The Ecological Footprint of production indicates the consumption of biocapacity resulting from production processes within a given geographic area, such as a country or region.

It is the sum of all the bioproductive areas within a country necessary for supporting the actual harvest of primary products (cropland, grazing land, forestland and fishing grounds), the country's built-up area (roads, factories, cities), and the area needed to absorb all fossil fuel carbon emissions generated within the country.

This measure mirrors the gross domestic product (GDP), which represents the sum of the values of all goods and services produced within a country's borders.

Net Ecological Footprint of Trade

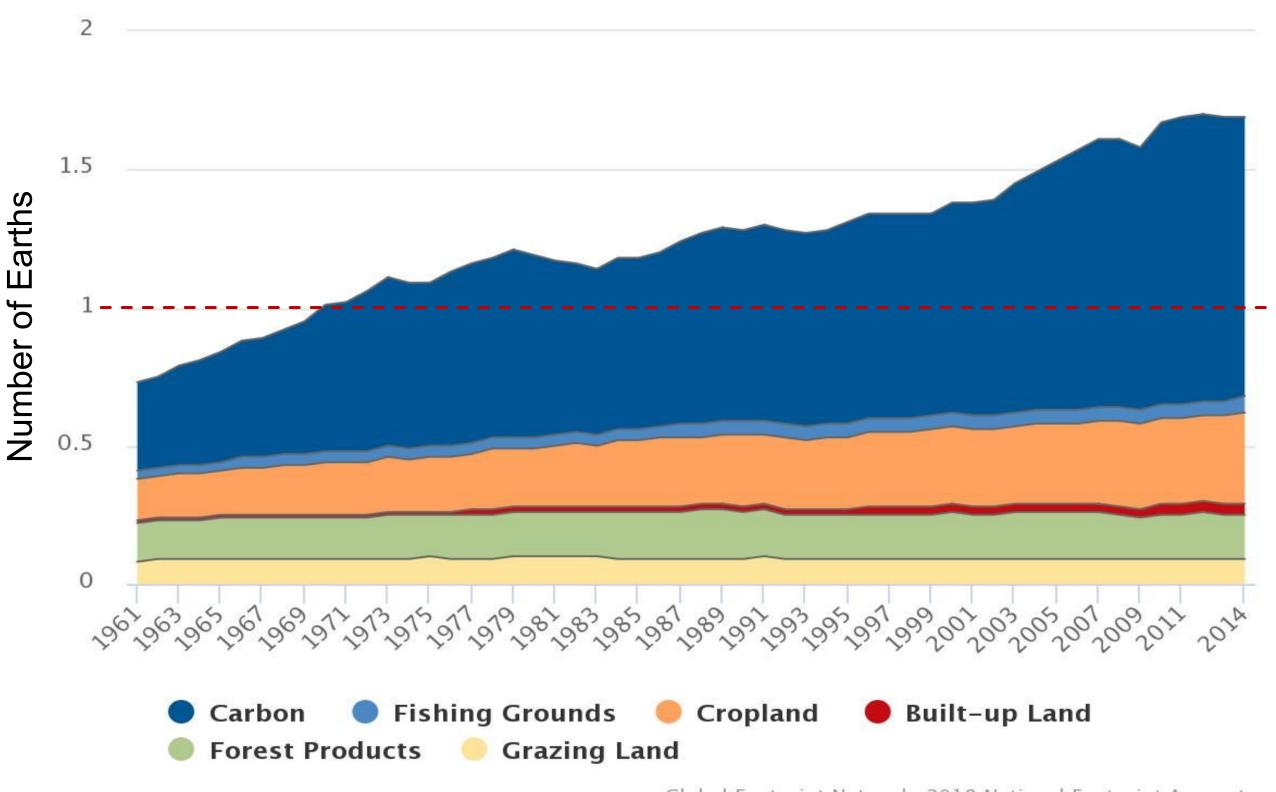
The Ecological Footprint of imports and exports indicate the use of biocapacity within international trade.

Embedded in trade between countries is a use of biocapacity, the net Ecological Footprint of trade (the Ecological Footprint of imports minus the Ecological Footprint of exports). If the Ecological Footprint embodied in exports is higher than that of imports, then a country is a net exporter of renewable resources and ecological services.

Conversely, a country whose Footprint of imports is higher than that embodied in exports depends on the renewable resources and ecological services generated by ecological assets from outside its geographical boundaries.

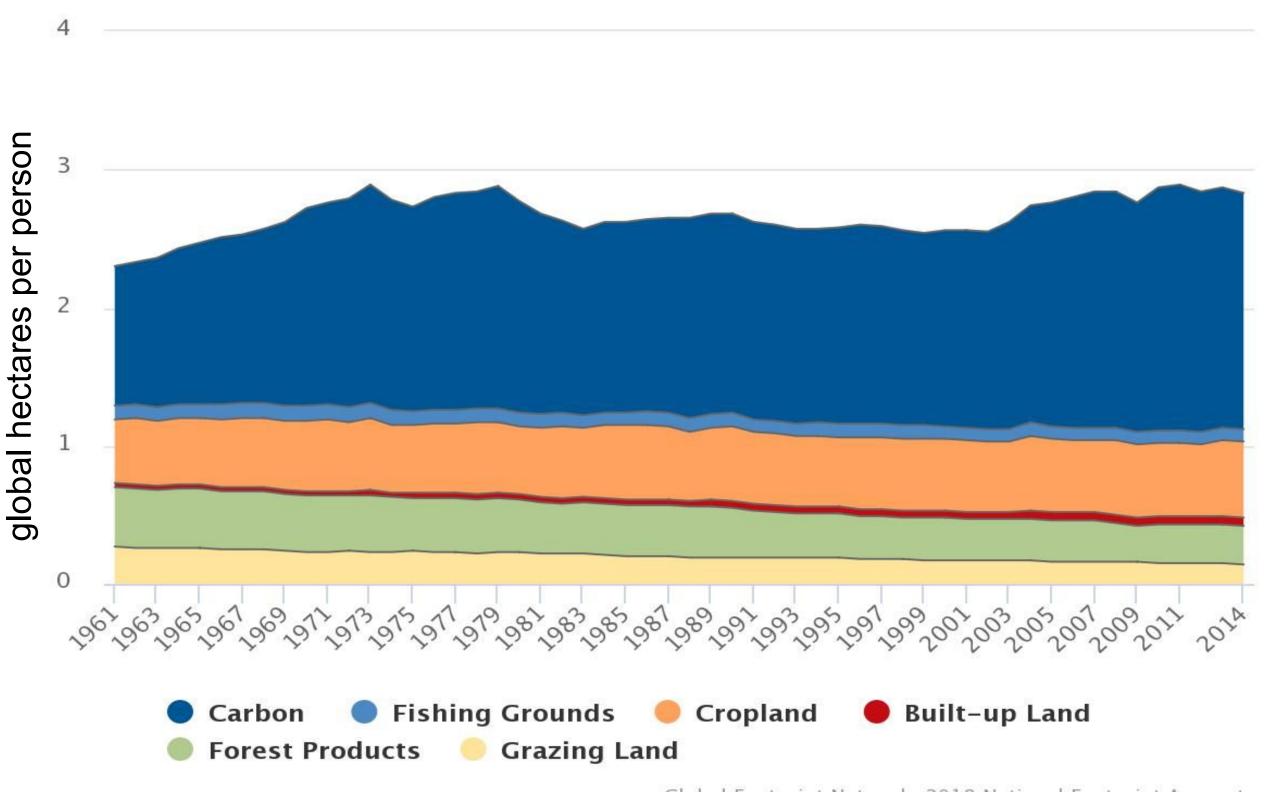


O World Ecological Footprint by Land Type



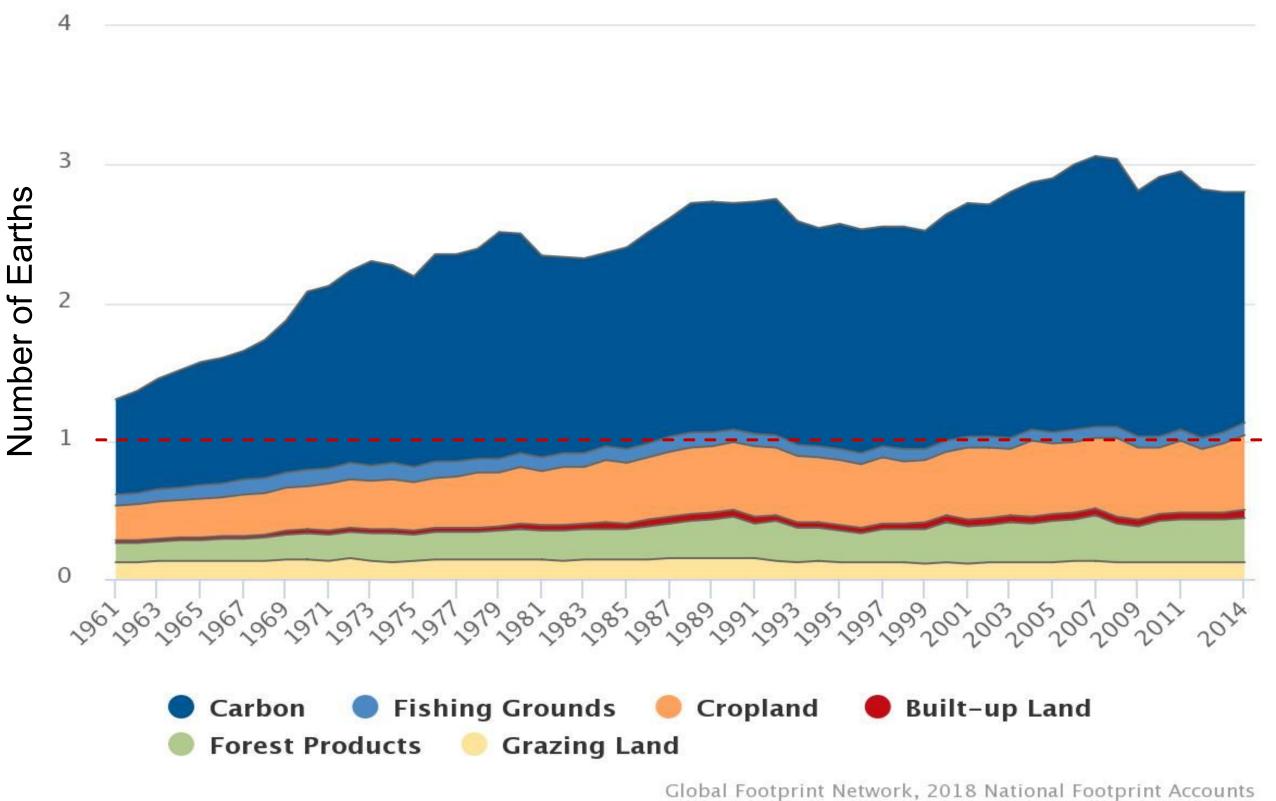


O World Ecological Footprint by Land Type





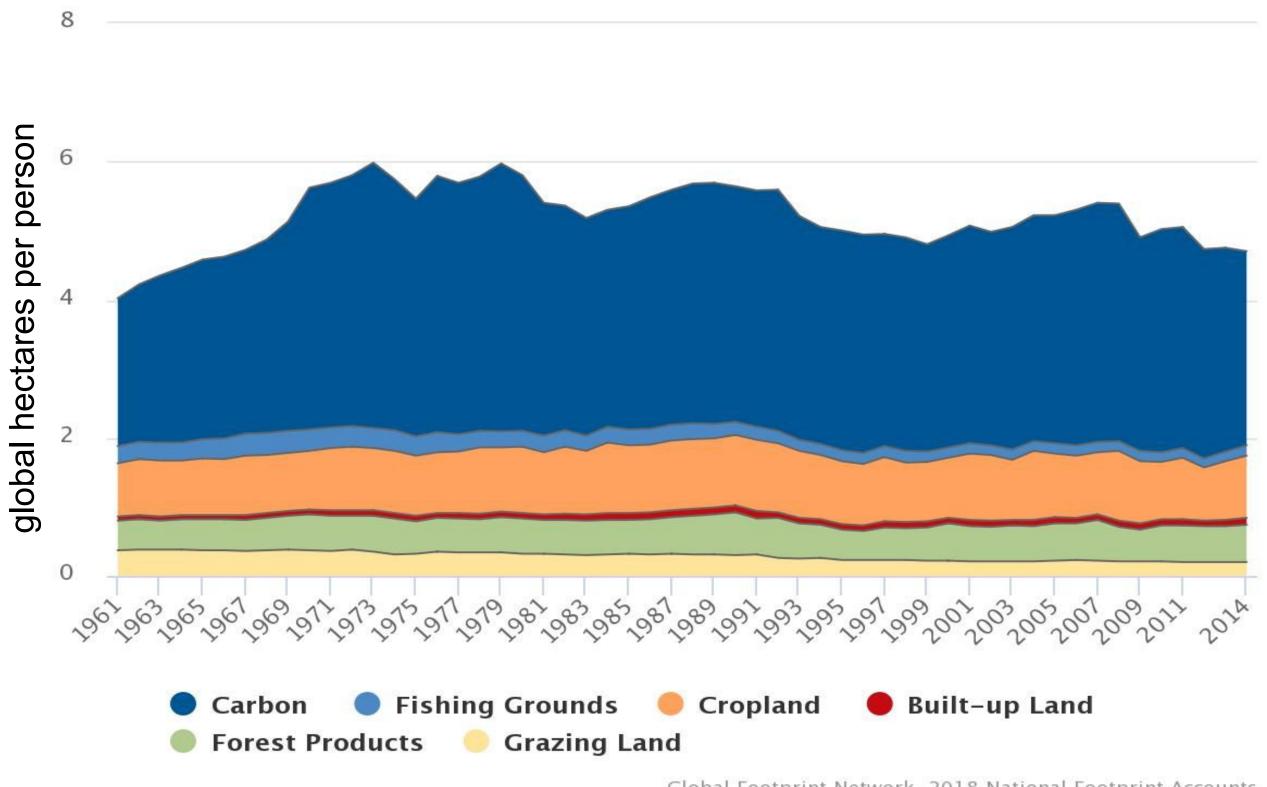
^o Europe Ecological Footprint by Land Type







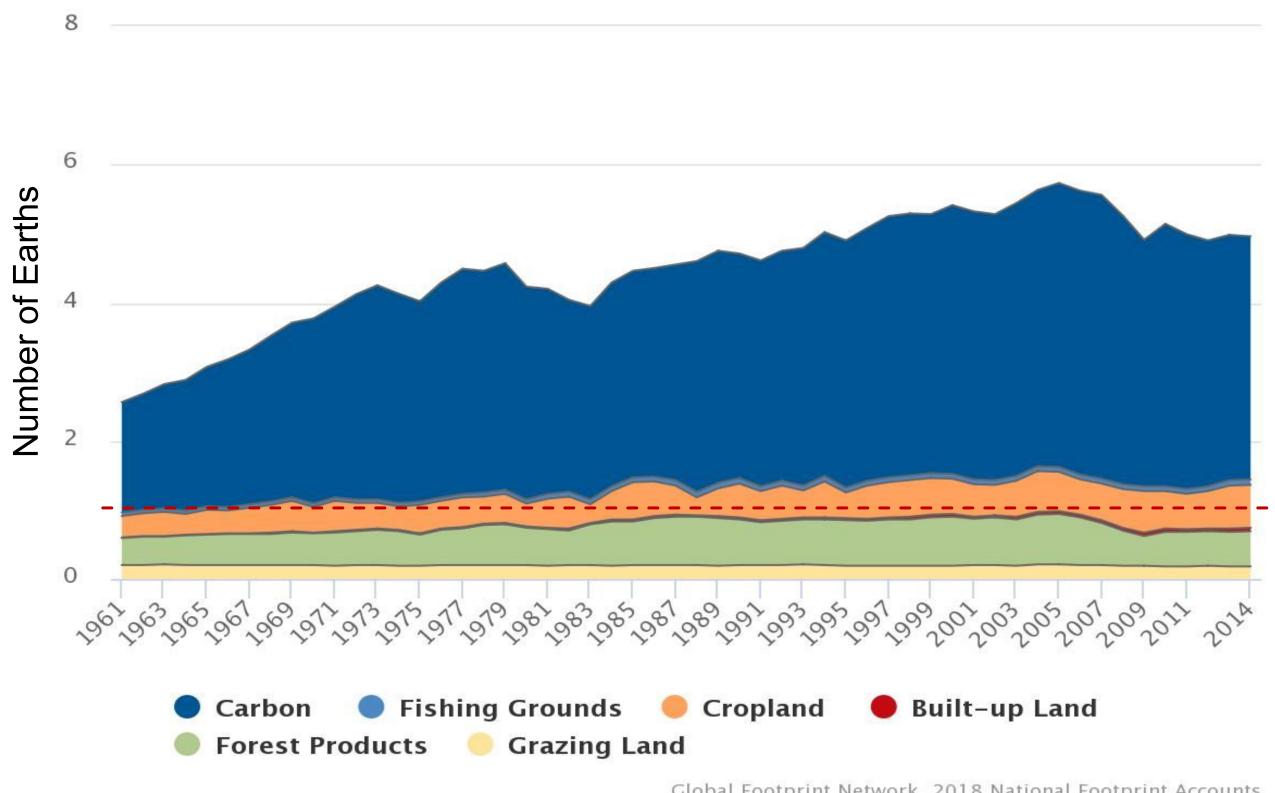
^o Europe Ecological Footprint by Land Type







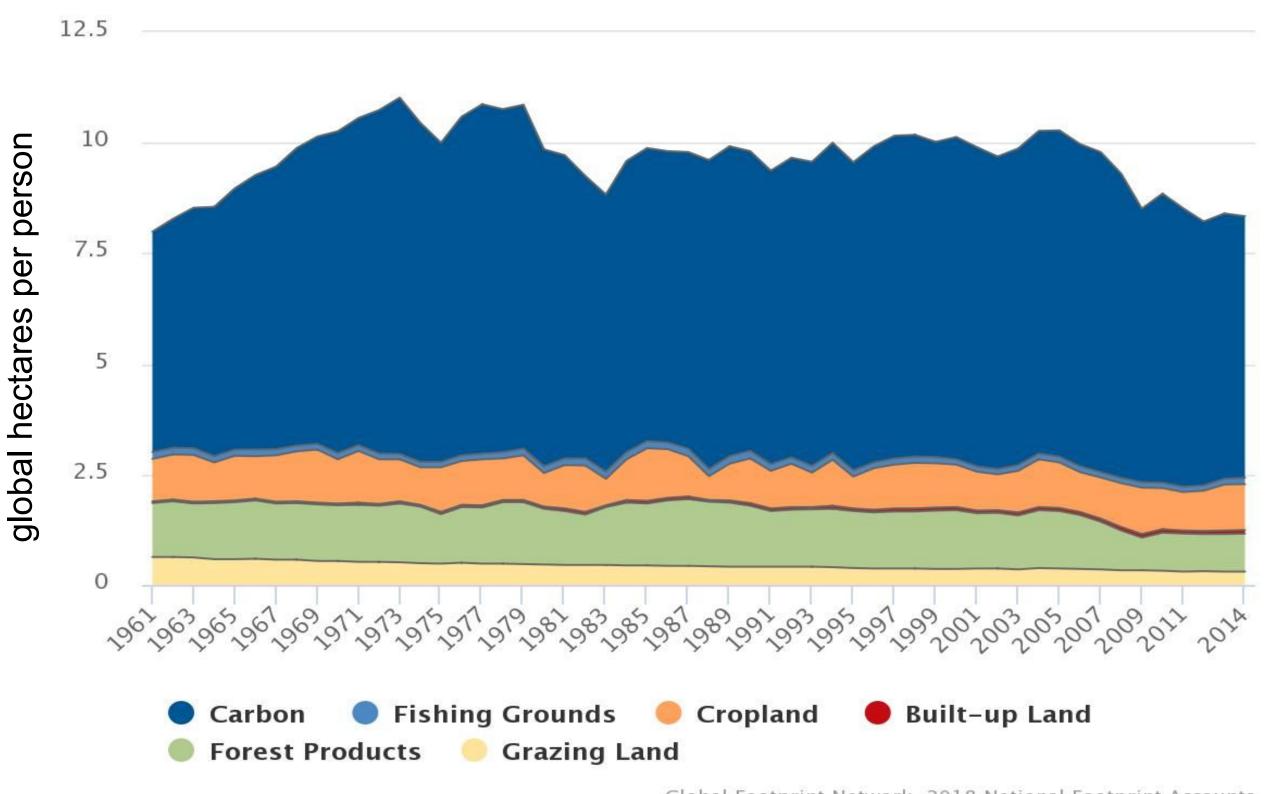
^o North America Ecological Footprint by Land Type







On North America Ecological Footprint by Land Type

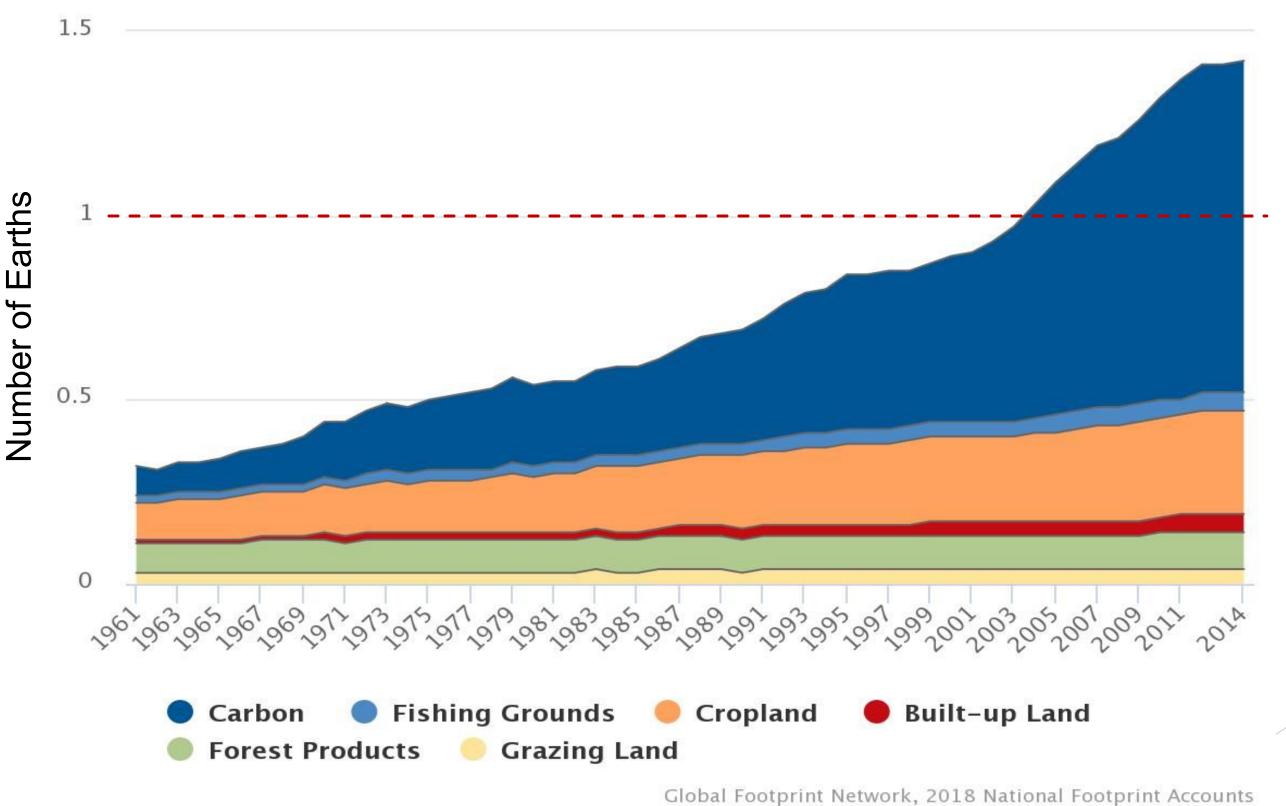






Global Footprint Network Advancing the Science of Sustainability

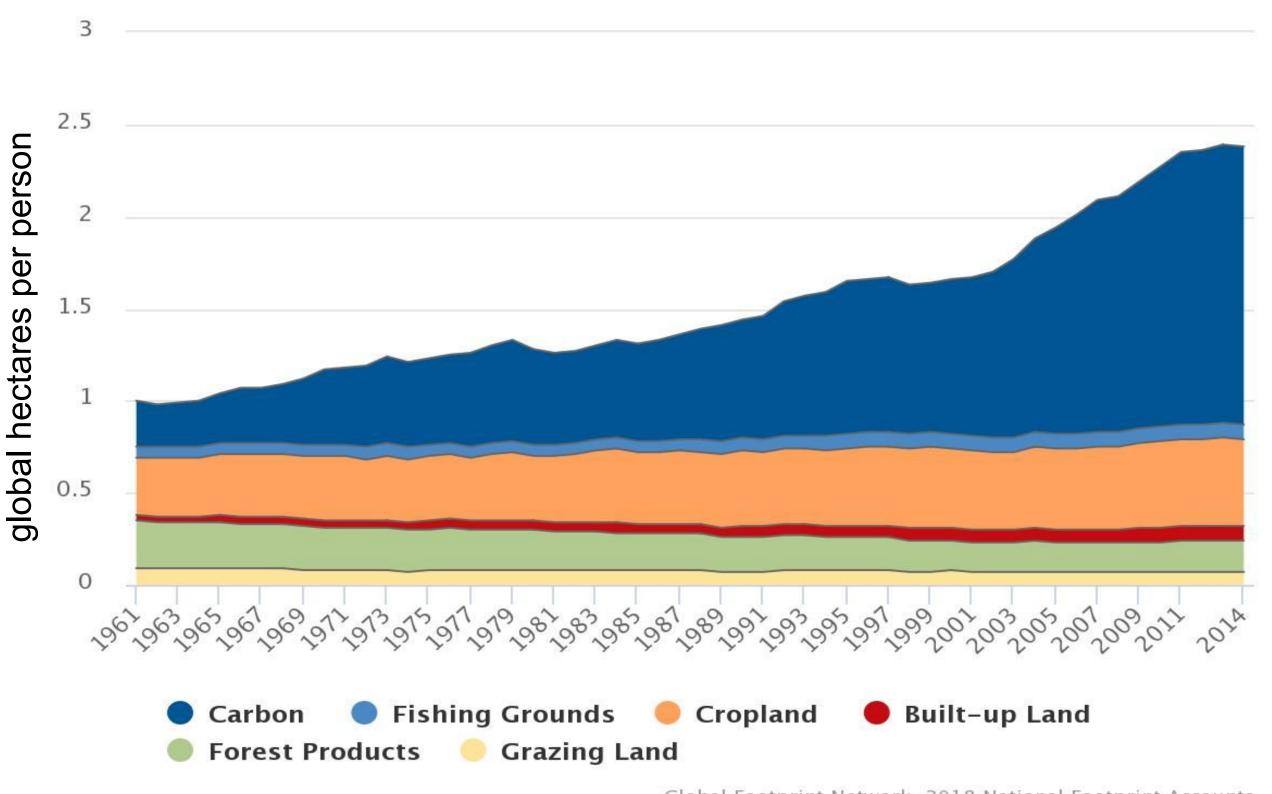
^o Asia Ecological Footprint by Land Type







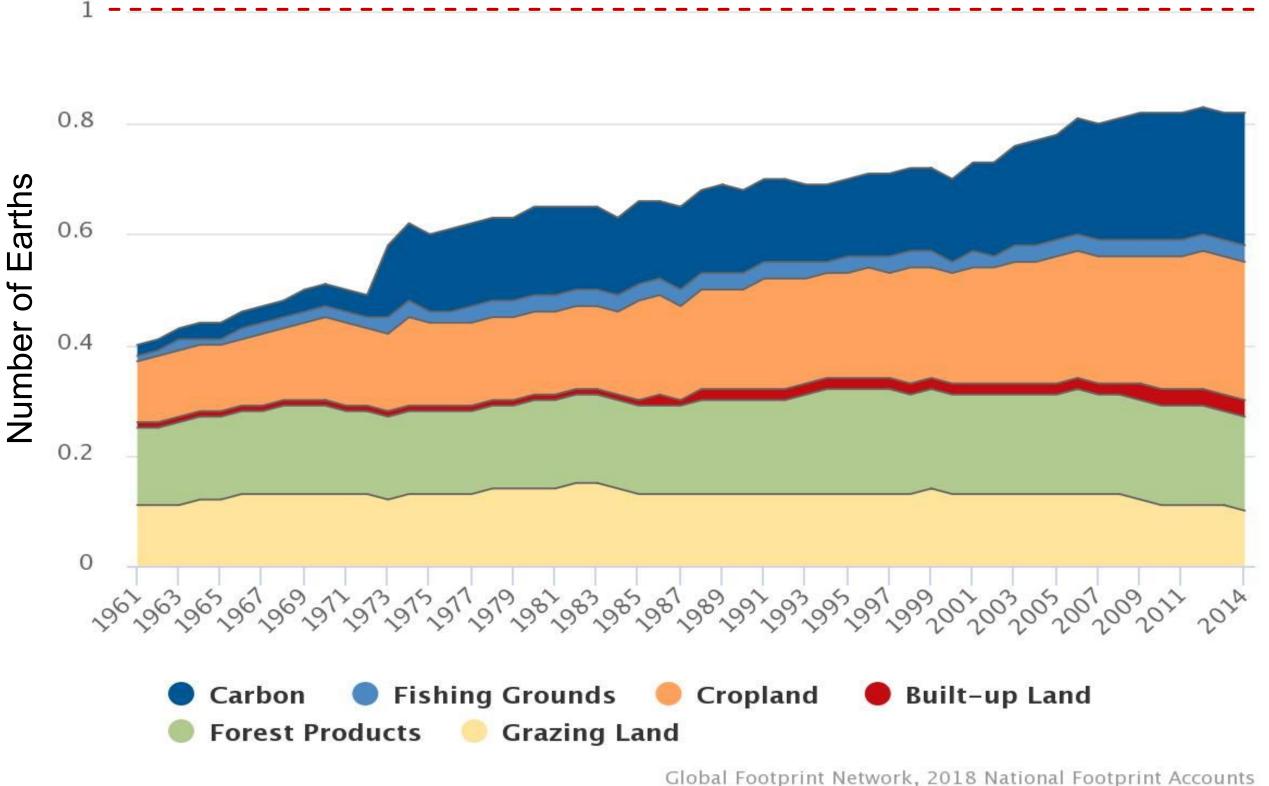
^o Asia Ecological Footprint by Land Type







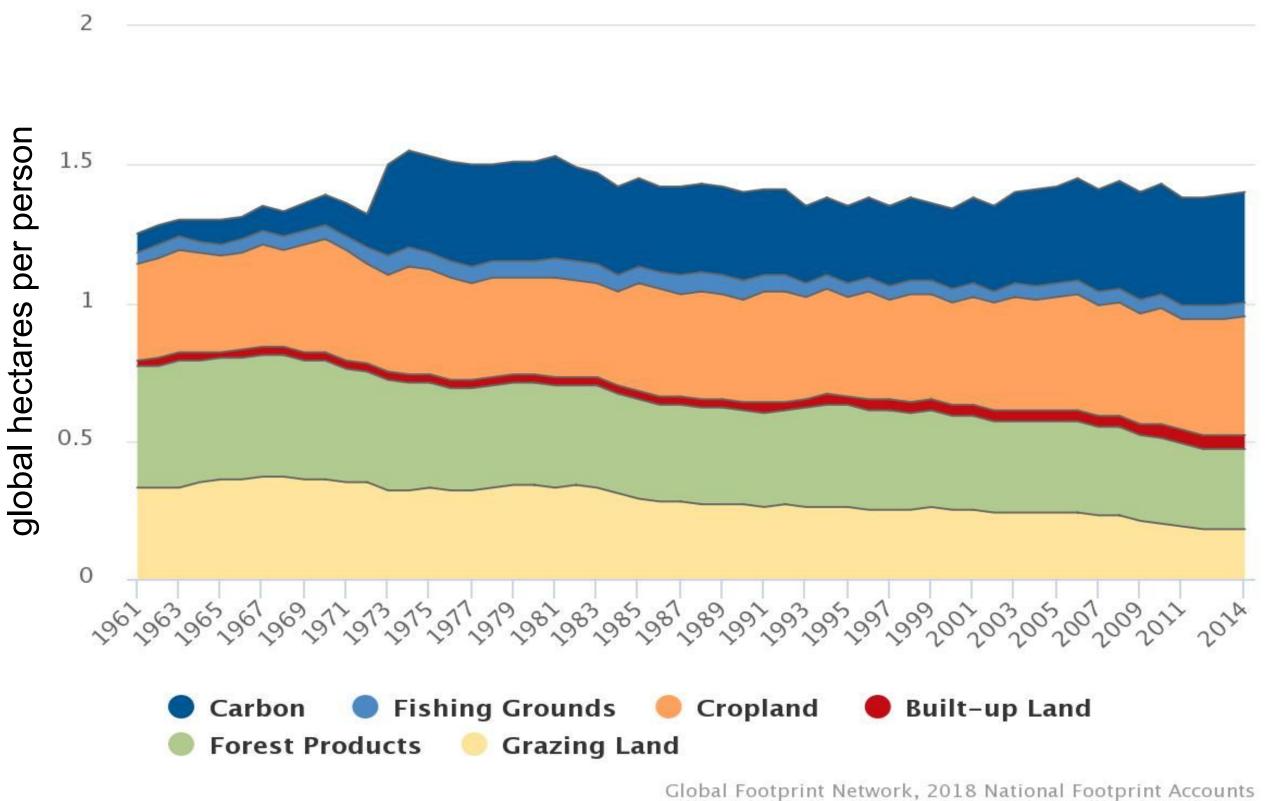
^o Africa Ecological Footprint by Land Type







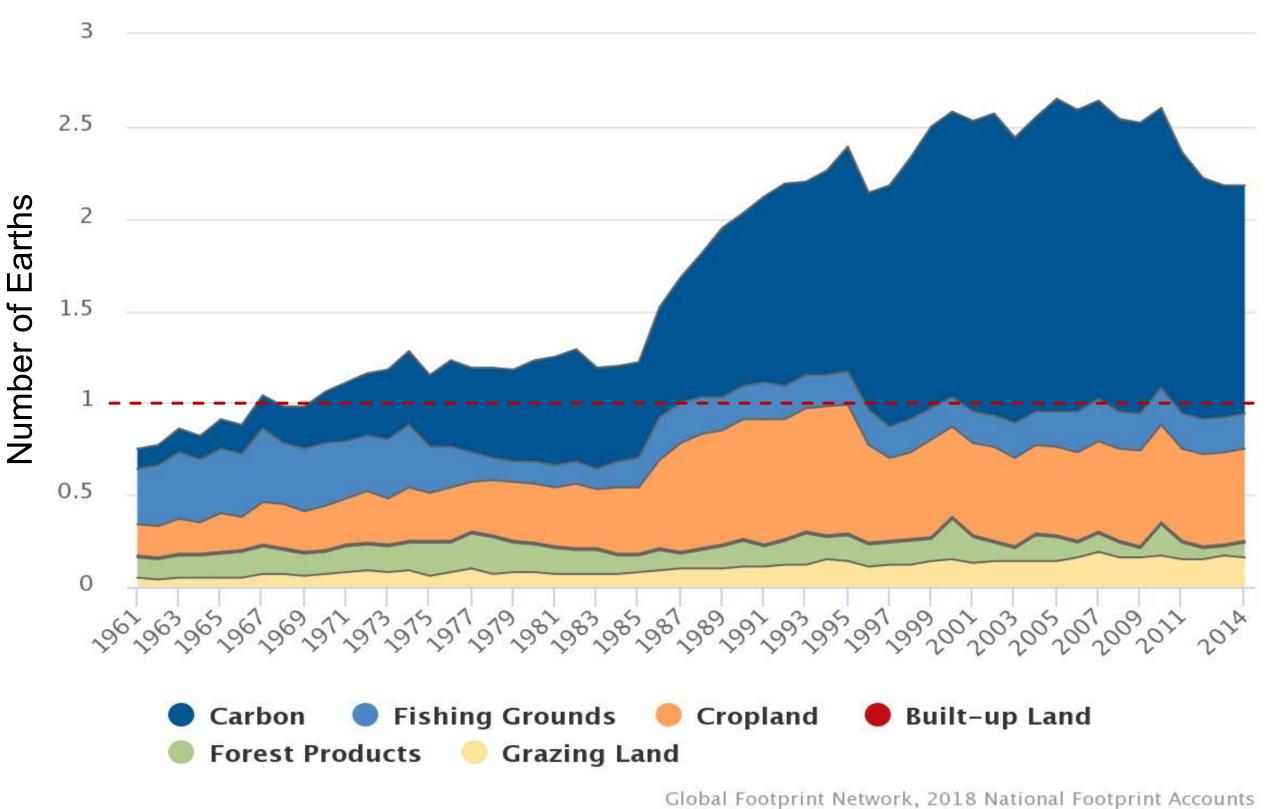
^o Africa Ecological Footprint by Land Type







Portugal Ecological Footprint by Land Type





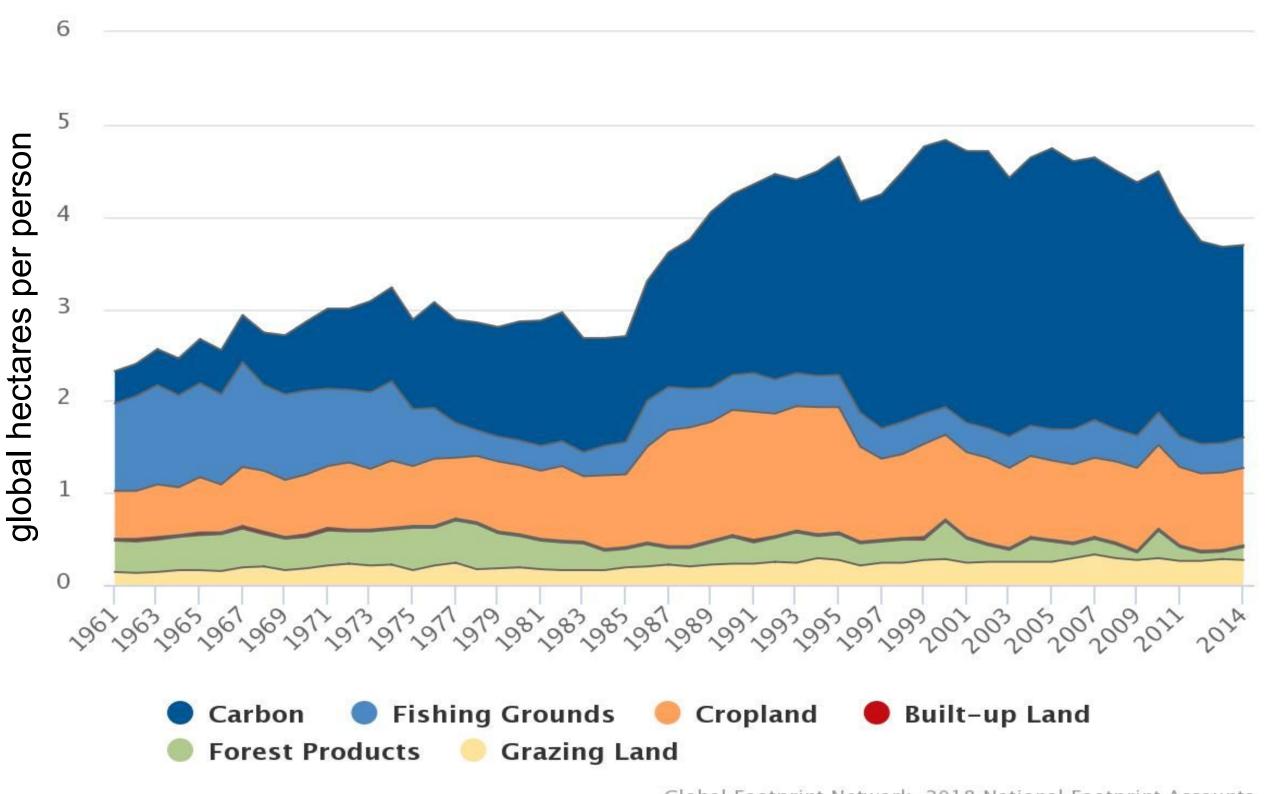


Global Footprint Network

Advancing the Science of Sustainability

Pegada ecológica

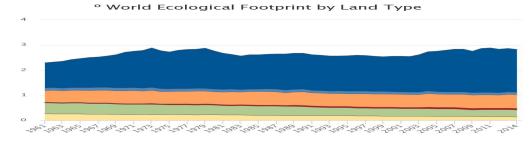
Portugal Ecological Footprint by Land Type



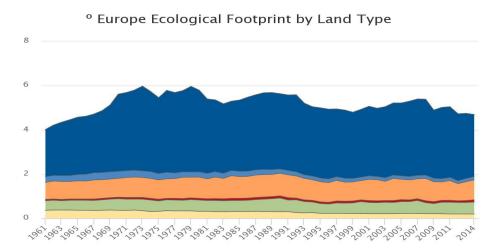




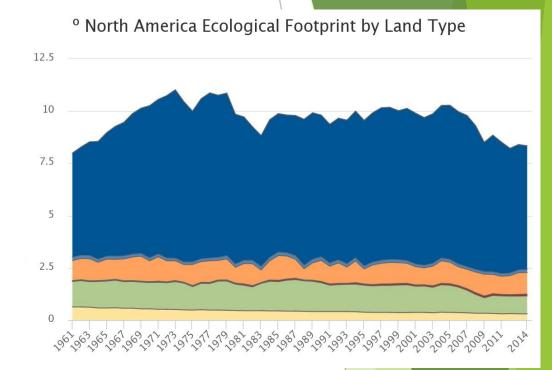
Mundo



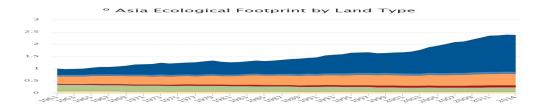
Europa



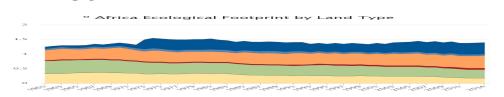
América do Norte



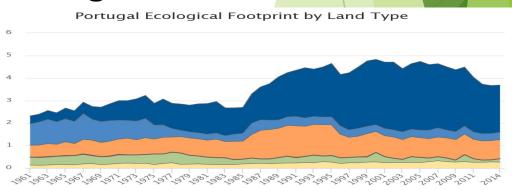
Ásia



África



Portugal



gha por pessoa







- **ZERO Associação Sistema Terrestre Sustentável**
 - Fundada em 2015
 - Construção de uma sociedade assente nos princípios do desenvolvimento sustentável, em pleno respeito pelos limites do planeta
 - Zero combustíveis fósseis
 - Poluição zero
 - Desperdício zero (www.zerowasteeurope.eu)
 - Zero destruição de ecossistemas e da biodiversidade
 - Zero desigualdade social e económica





- ZERO Associação Sistema Terrestre Sustentável em associação com a Global Footprint Network
- A Pegada Ecológica (PE) é uma importante ferramenta de avaliação e monitorização para os governos nacionais e locais que estão trabalhar para mitigar os riscos, para se adaptar às alterações climáticas e para fomentar uma sustentabilidade global.
- O cálculo da PE pode fornecer um roteiro para uma comunidade que se está a tentar tornar ambientalmente saudável, economicamente próspera e equitativa - agora e nos próximos 20 anos.



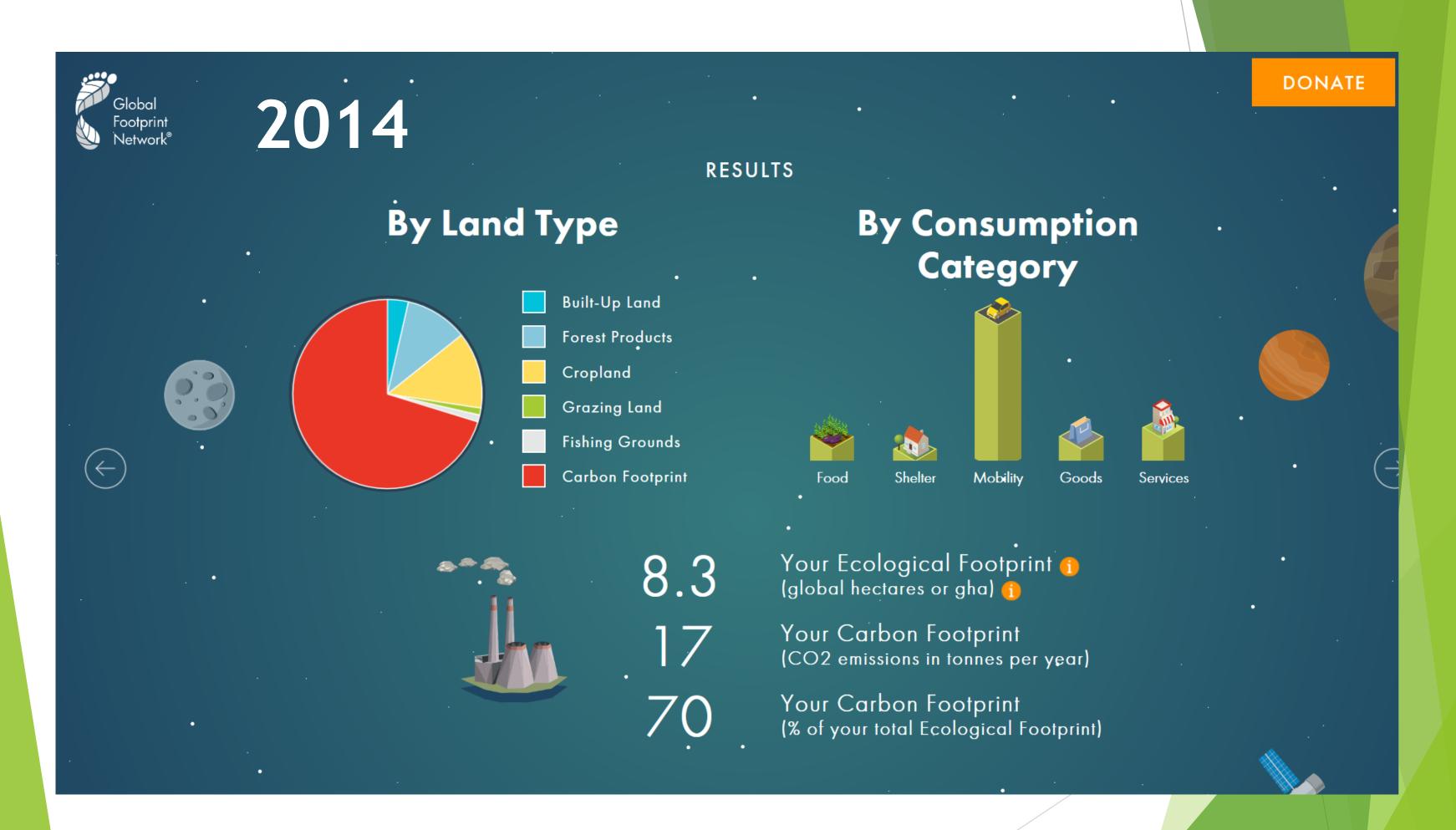


- ZERO Associação Sistema Terrestre Sustentável em associação com a Global Footprint Network
- Cálculo da Pegada Ecológica para os Municípios Portugueses em 6 cidades
 - Guimarães
 - > 2013, a pegada ecológica média de um residente em Guimarães era de 3,76 hectares globais (gha) per capita
 - Esta procura é 3% mais baixa do que a média de um cidadão português (com uma pegada ecológica média de 3,87 gha per capita)
 - 2,5 vezes maior do que a média da biocapacidade de Portugal (aproximadamente 1,52 gha)
 - Seriam necessários 2,2 Planetas Terra para suportar esta pegada, se toda a população mundial tivesse em média o mesmo valor desta Pegada















CIDADE

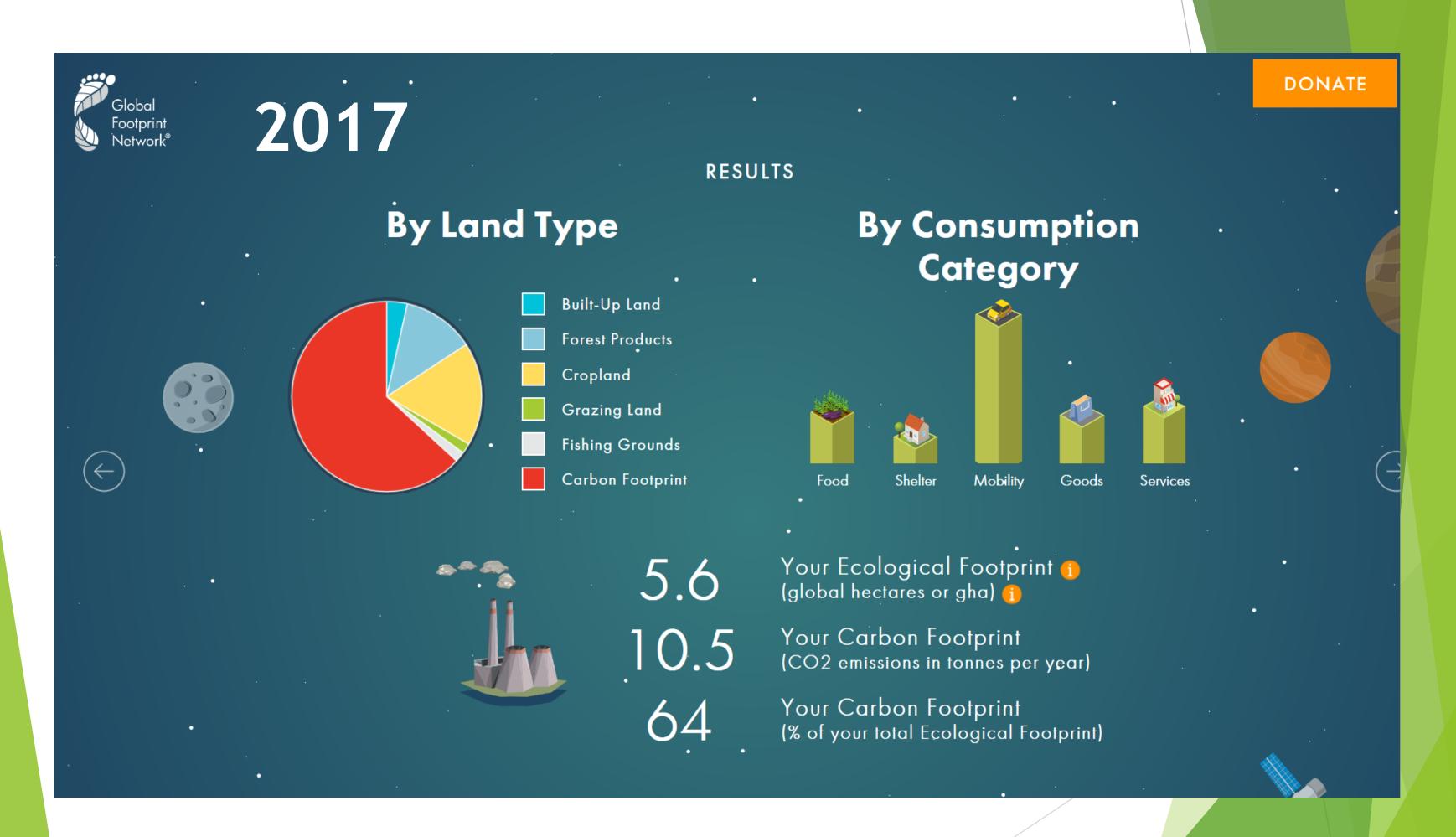
If we reduce driving by 50% around the world and opt for walking, biking or taking public transit instead, Earth Overshoot Day would move back 10 days.

ENERGIA

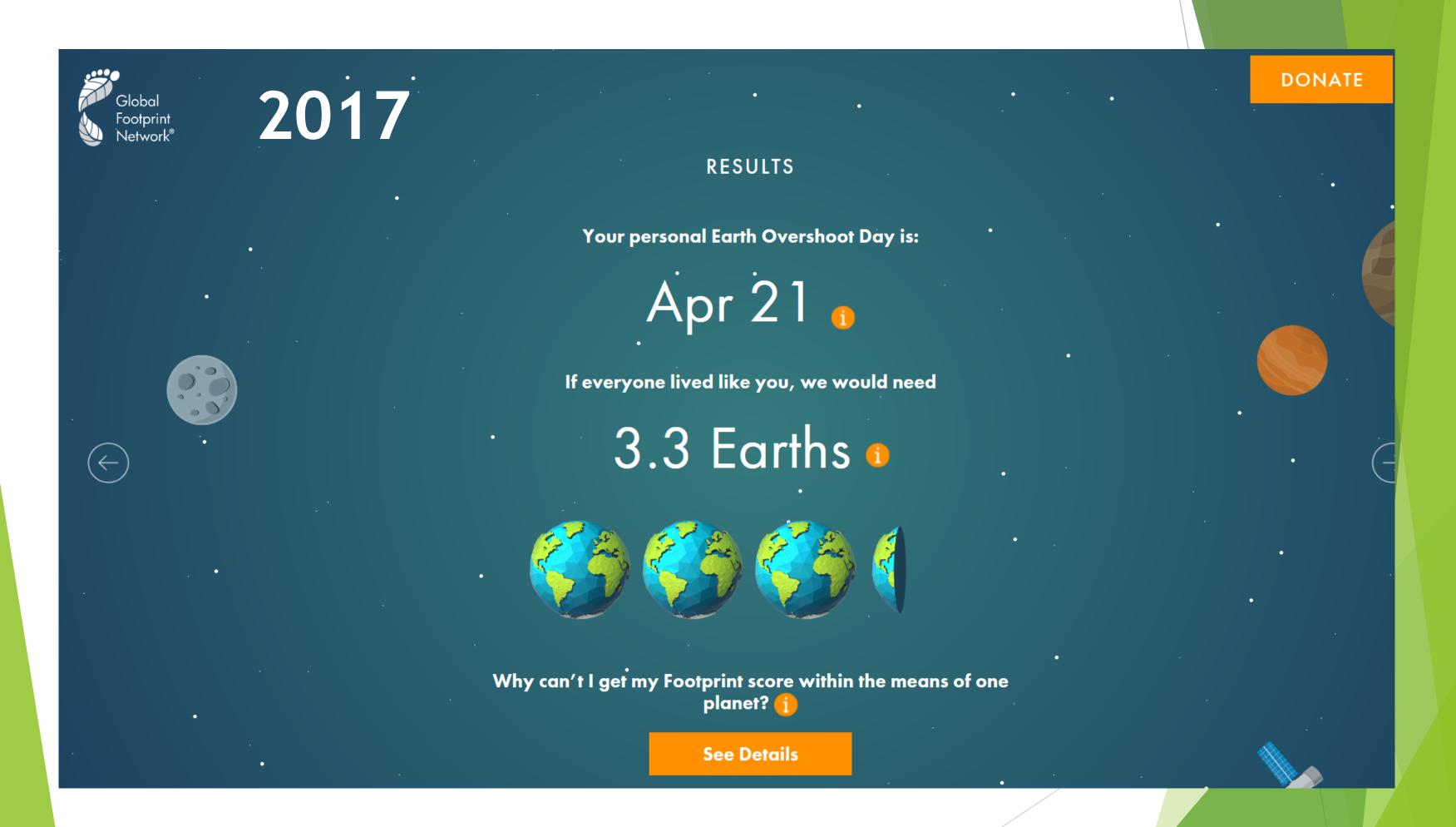


Reducing the carbon component of humanity's Ecological Footprint by 50% would move Earth Overshoot Day by 89 days, or about three months.

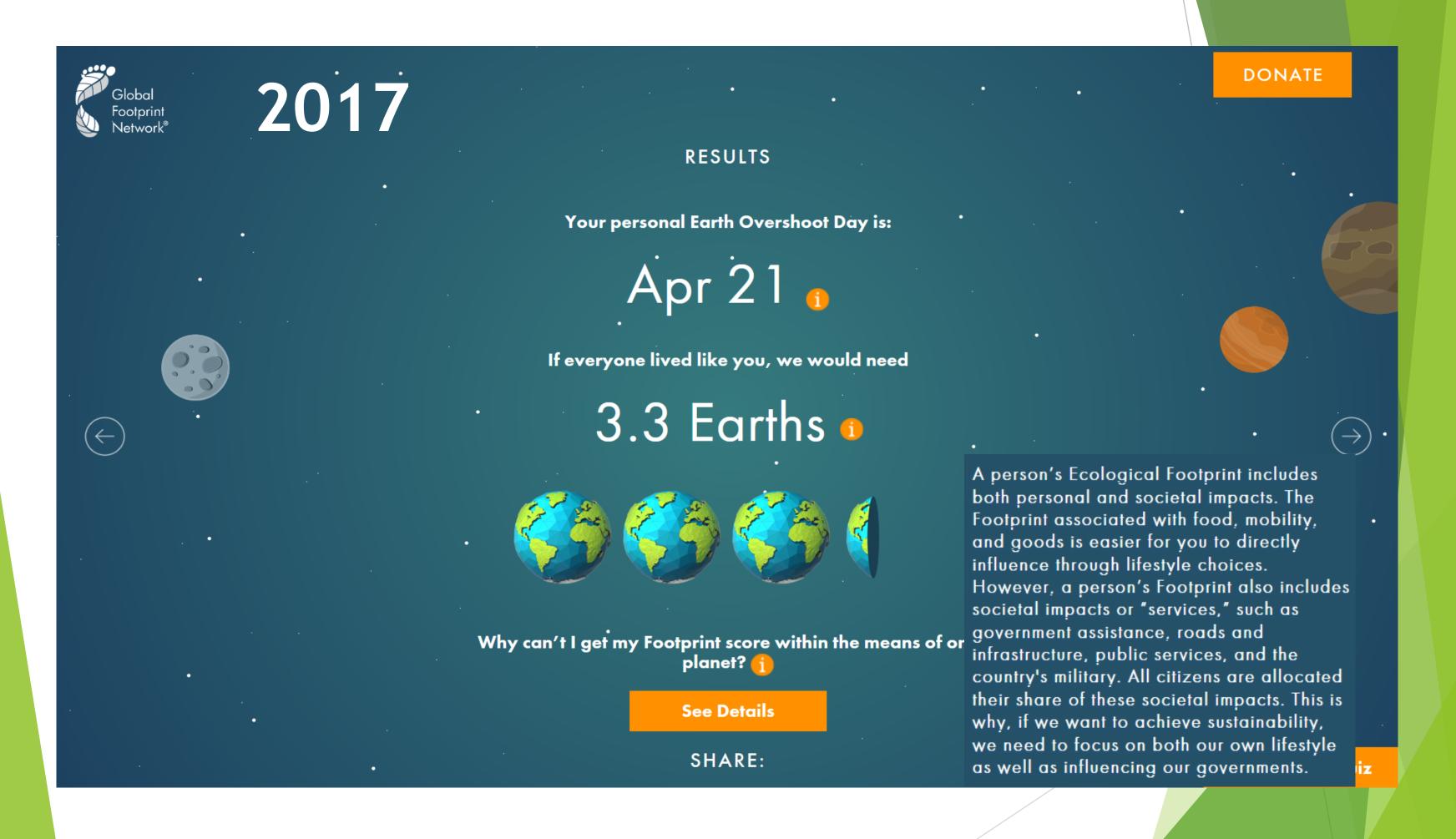








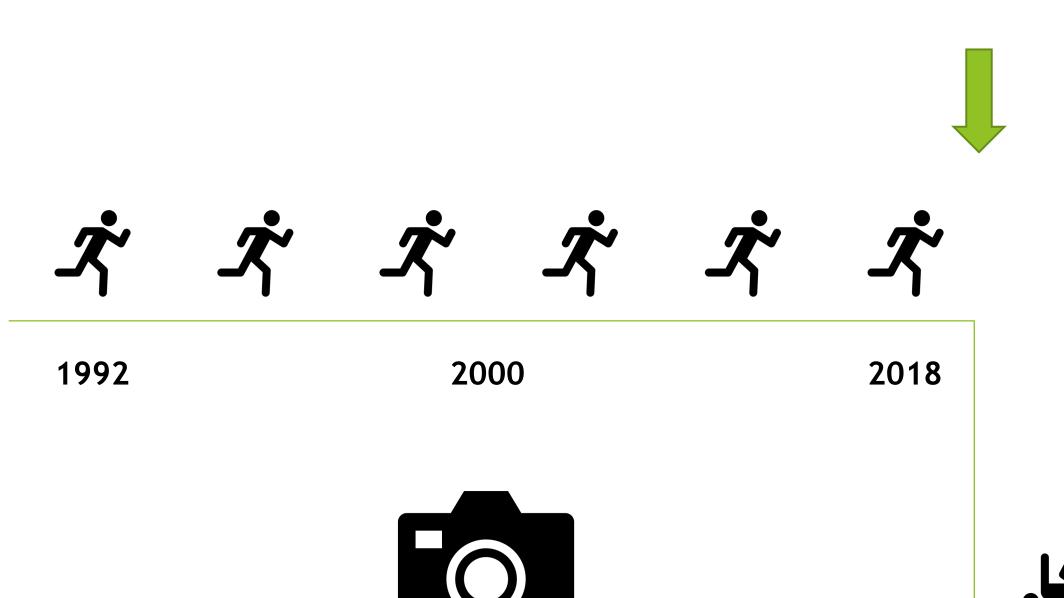




A "pegada ecológica" tem defeitos e não mede:

- Poluição
 - Atmosférica (a não ser emissão de CO2)
 - Aquíferos, lagos, rios, oceanos
 - Solos agrícolas e zonas industriais
 - Radioatividade
 - Metais pesados e compostos químicos (Disruptores endócrinos)
 - Lixo electrónico, plásticos
- Disponibilidade e utilização de recursos
 - Matérias primas
- (Redução da) biodiversidade

A "pegada ecológica" não é um modelo preditivo:





E agora...

















E agora...



Pontos de alavancagem

Leverage Points: Places to Intervene in a System

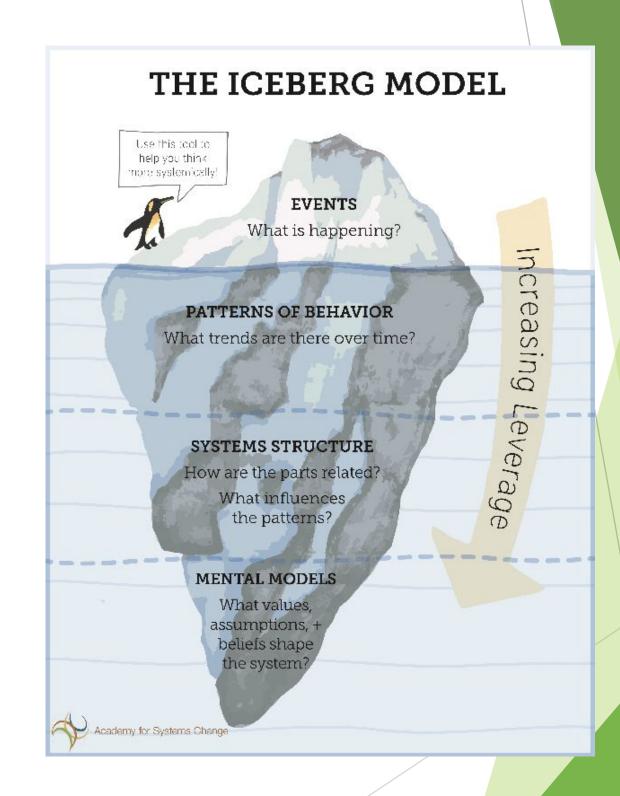
© The Sustainability Institute, 1999. A shorter version of this paper appeared in *Whole Earth,* winter 1997.

by Donella H. Meadows

- ► 12 pontos de alavancagem
 - Sistemas complexos, comunidades, etc.
 - Não intuitivos / contra-intuitivos
 - "(...) já é dada muita atenção ao problema, mas toda a gente está a empurrar na direção errada."

Pontos de alavancagem

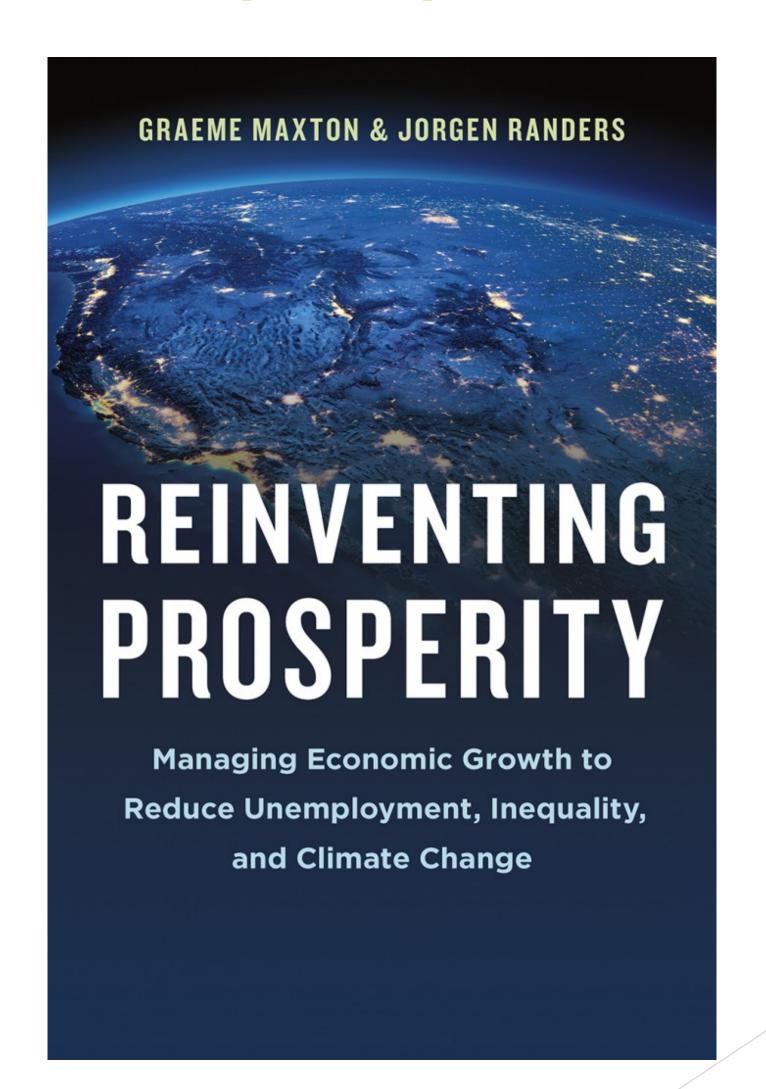
- ► 12. Parâmetros, números
- ▶ 11. Dimensão da zona tampão
- ▶ 10. Infra-estruturas, população
- 9. Intervalo de ocorrência, atrasos
- ▶ 8. Força da realimentação negativa
- > 7. Peso da realimentação positiva
- 6. Fluxos de informação
- > 5. Regras do sistema
- 4. Capacidade de se reinventar
- > 3. Objetivo intrínsico do sistema
- 2. Paradigma subjacente
- ▶ 1. Capacidade de transcender

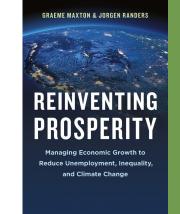


E agora...



Reinventar a prosperidade





Reinventar a prosperidade

THIRTEEN PROPOSALS TO REDUCE UNEMPLOYMENT, INEQUALITY, AND CLIMATE CHANGE

- 1. Shorten the length of the work year to give everyone more leisure time.
- Raise the retirement age to help the elderly provide for themselves for as long as they want.
- 3.Redefine "paid work" to cover those who care for others at home.
- 4.Increase unemployment benefits to maintain demand during the transition.
- Increase the taxation of corporations and the rich to redistribute profits, especially from robotization.
- 6.Expand the use of green stimulus packages by printing money or raising taxes to help governments respond to climate change and the need for redistribution.
- 7.Tax fossil energy and return the proceeds in equal amounts to all citizens to make low-carbon energy more competitive.
- 8. Shift taxes from employment to emissions and resource use to reduce the ecological footprint, protect jobs, and cut raw materials use.
- Increase death taxes to reduce inequality and philanthropy while boosting government income.
- 10. Encourage unionization to boost incomes and reduce exploitation.
- 11.Restrict trade where necessary to protect jobs, improve well-being, and help the environment.
- 12.Encourage smaller families to reduce the pressure of humanity on the planet.
- 13.Introduce a guaranteed livable income for those who need it most and give everyone peace of mind.