ESRC-NERC Transdisciplinary Research Seminar Series: 'Sustaining Future Ecosystem Services – From Understanding to Action', University of Bath, Tuesday 23 September 2008

Carbon and Environmental Footprinting – Thinking Globally, Acting Locally

FOOTPRINTS ON THE LANDSCAPE: Environmental and Sustainability Appraisal of Urban and Rural Communities

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Institute for Sustainable Energy and the Environment

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SUSTAINABLE DEVELOPMENT

- Balancing economic and social development with environmental protection

→ **“people, planet, prosperity”**

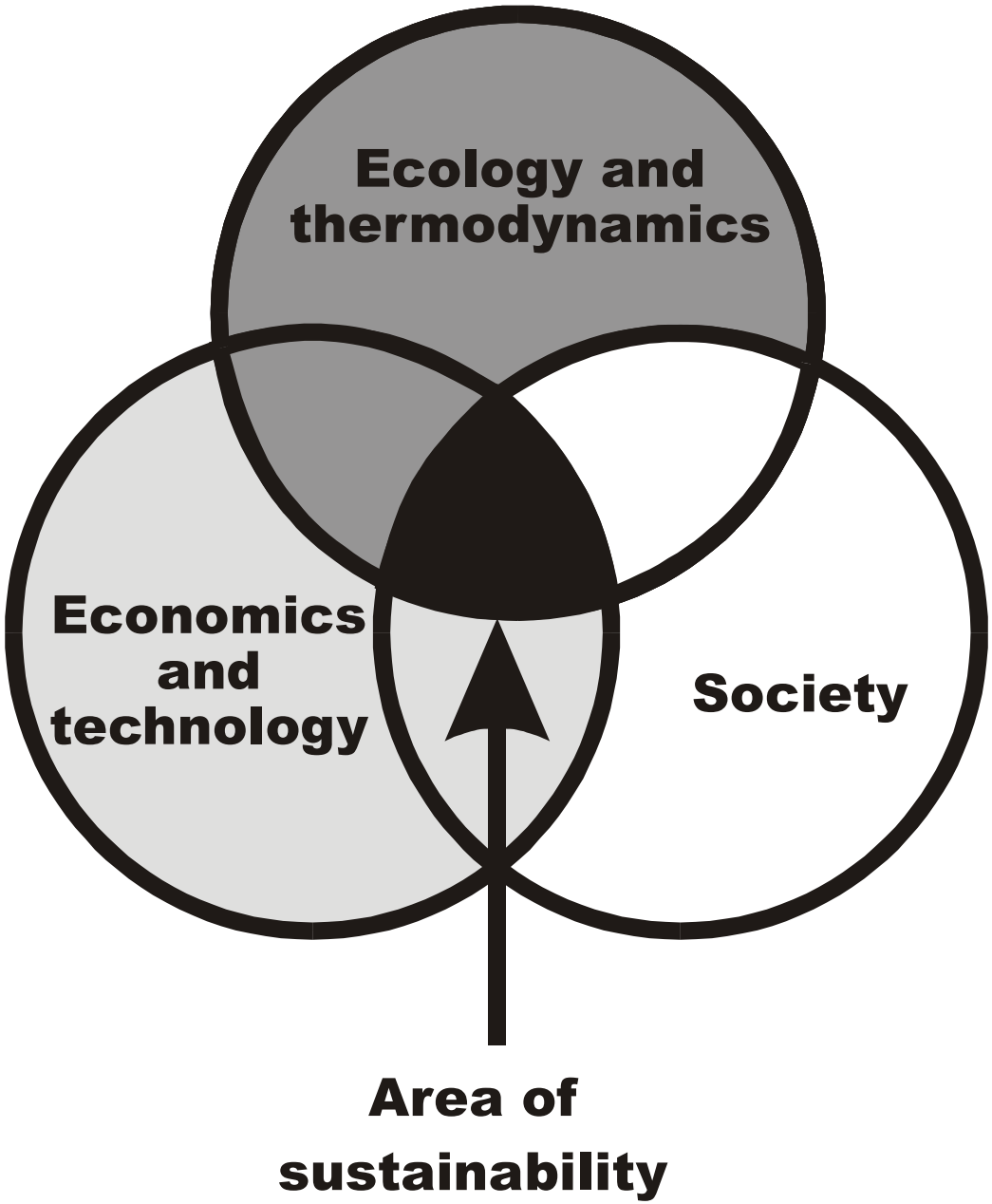
- Meeting the needs of the present without compromising the ability of future generations to meet their own needs [Brundtland Report (1987)]

- Sustainable Development versus ‘Sustainability’

↓ Process or journey

↓ destination

After Jonathan Porritt (2000)


Ecology and thermodynamics
Economics and technology
Society
Area of sustainability

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UK SUSTAINABLE DEVELOPMENT PRINCIPLES

- ACHIEVING A SUSTAINABLE ECONOMY
- ENSURING A STRONG, HEALTHY AND JUST SOCIETY
- LIVING WITHIN ENVIRONMENTAL LIMITS

  ⇒ the 'Three Pillars' of Sustainable Development

- PROMOTING GOOD GOVERNANCE
- USING SOUND SCIENCE RESPONSIBLY

❖ Source: '*One future – different paths*', TSO, London, 2005; a shared framework for sustainable development jointly produced by the UK Government and the Devolved Administrations.

A NEW ERA IN LOCAL GOVERNMENT

- SUSTAINABLE COMMUNITY STRATEGIES

  ⇒ Shift in emphasis: “a revolution in local government”
  ⇒ Local Area Agreements (LAAs) as the delivery mechanism: targets with money attached
  ⇒ DCLG principles/examples of good practice

- EVIDENCE-BASED APPROACHES

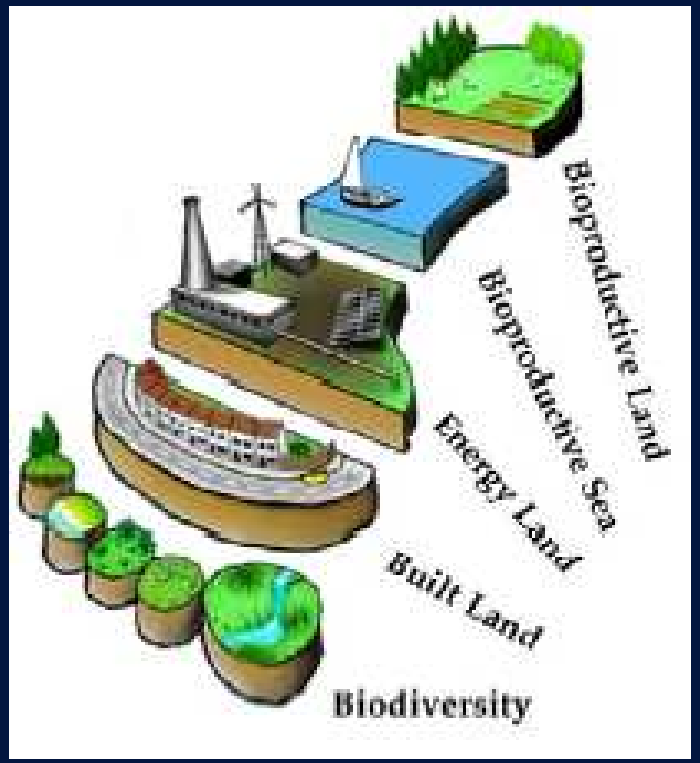
- THE NEED FOR ‘*SUSTAINABILITY PROOFING*’ OF POLICIES AND PRACTICES

  ⇒ Checklist approach
  ⇒ ‘Ecological’ or environmental footprinting
  ⇒ Sustainability maps or ‘tortilla’ diagrams
  ⇒ Sustainability appraisal framework (Forum for the Future/ Swindon Borough Council)

ENVIRONMENTAL FOOTPRINTING: THE BASICS

- ***Definition:*** Resources used and wastes produced by a defined population are converted to a common basis - the area of productive land and aquatic ecosystems sequestered (in hectares) from whatever source in global terms.

- ***Land Types***
  - Bioproductive Land
    - Crops
    - Pasture
    - Forest
  - Bioproductive Sea
  - Built Land
  - Energy Land
  - Biodiversity Land



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EARLIER FOOTPRINT STUDIES IN THE SOUTH WEST OF ENGLAND

- '***Stepping Forward***': A Resource Flow and Ecological Footprint Analysis of the South West of England, Best Foot Forward, April 2005.
- Limitations:-
  - Regional coverage, not broken down into local government areas.
  - Largely based on the use of proxy data, e.g., from 'National Footprint Accounts' and energy statistics (DUKES).
- ***Next steps:*** In order to obtain information of sufficient granularity to aid sustainability proofing by local authorities, it is necessary to employ local data – particularly for energy use and waste arisings.

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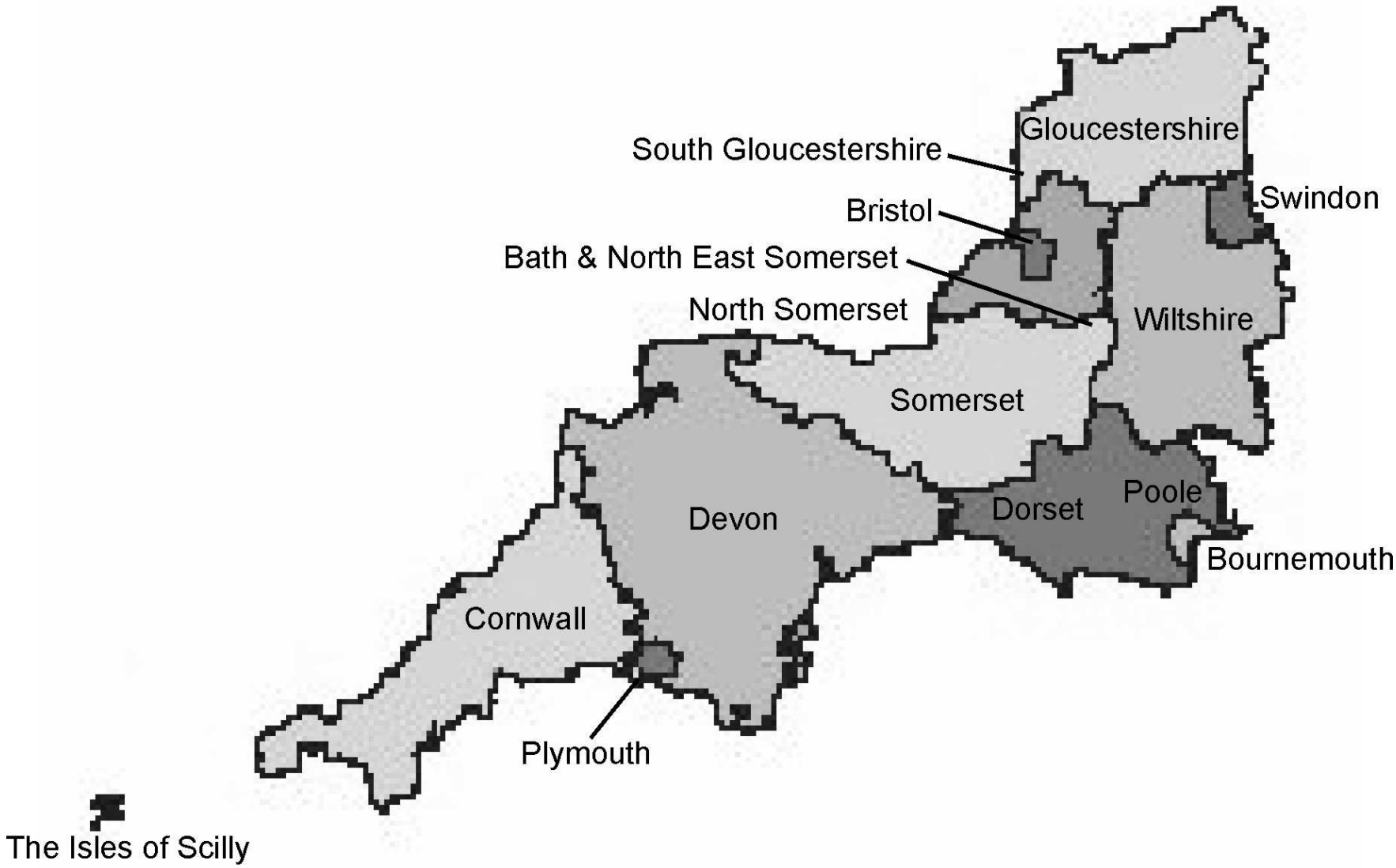
Gloucestershire
South Gloucestershire
Swindon
Bristol
Bath & North East Somerset
North Somerset
Wiltshire
Somerset
Poole
Dorset
Devon
Bournemouth
Cornwall
Plymouth
The Isles of Scilly

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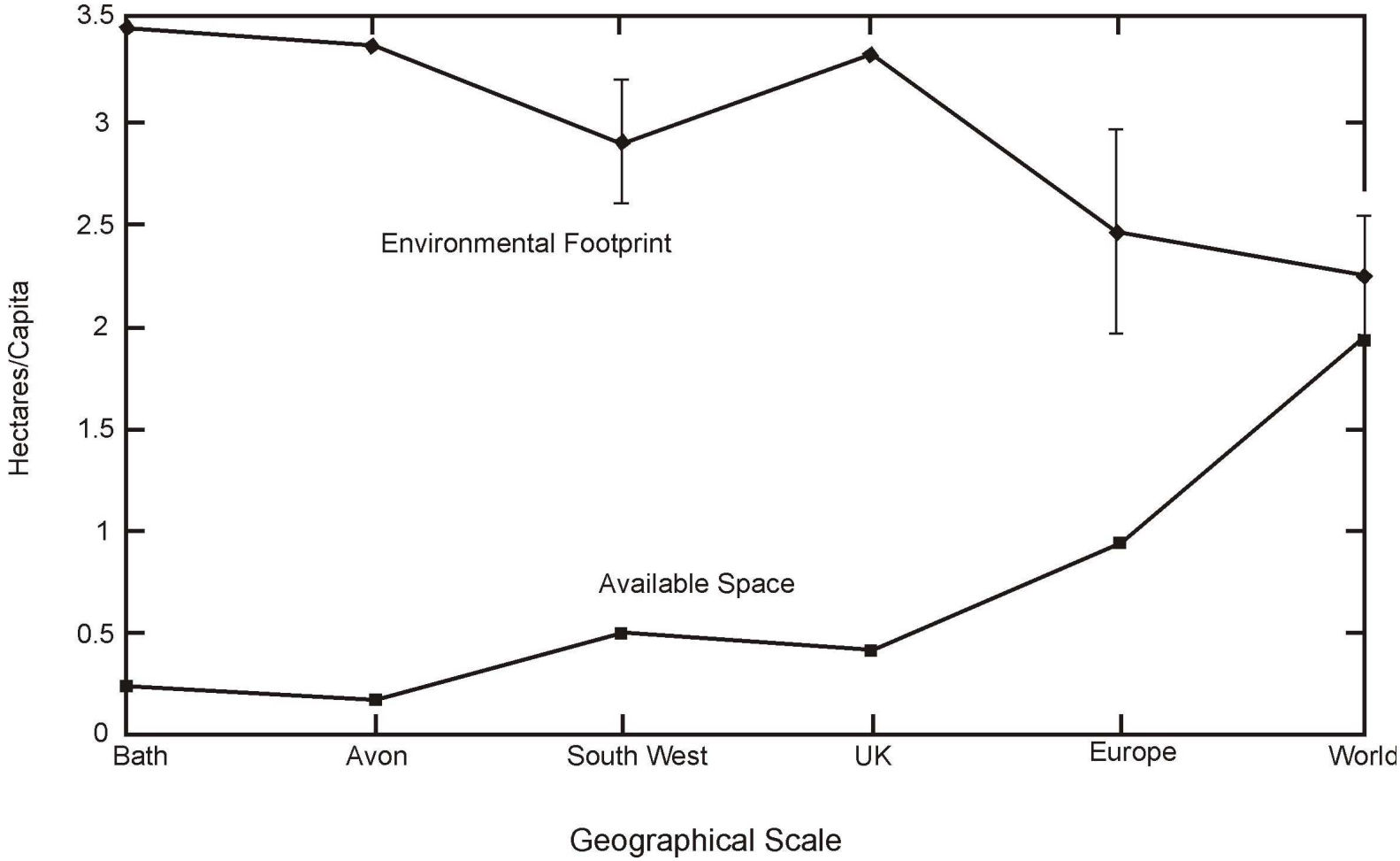
ENVIRONMENTAL FOOTPRINT ANALYSIS OF BATH

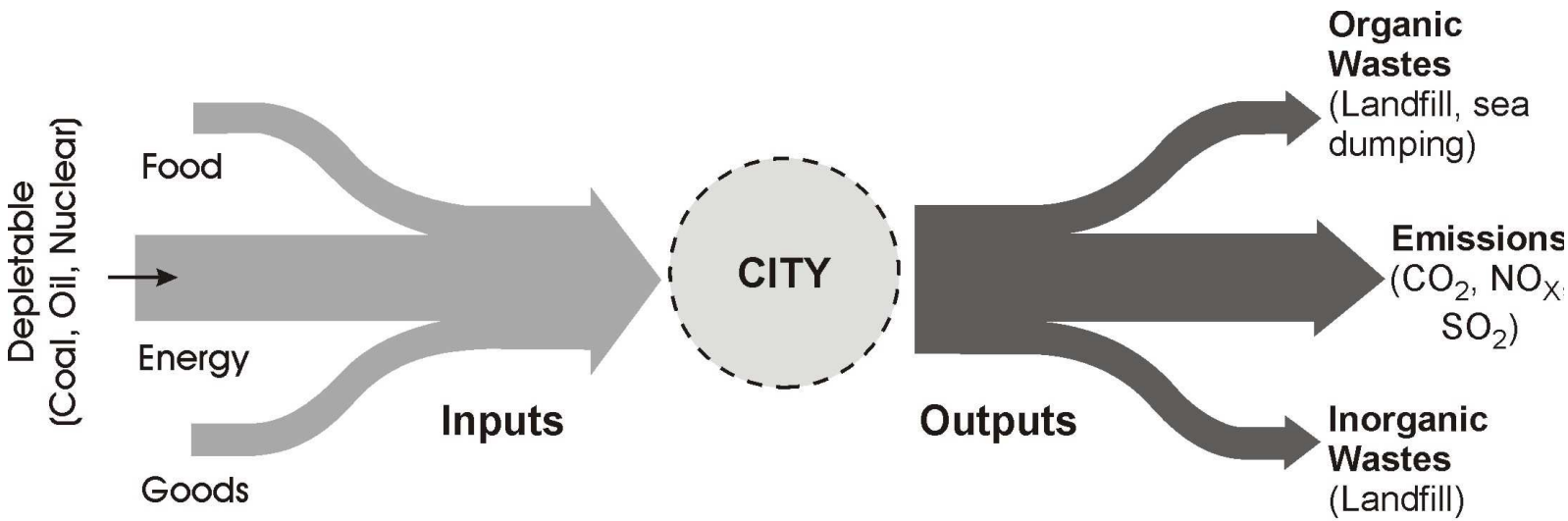
- Consumption patterns in most western lifestyles, such as those in Europe and North America, result in footprints which are far greater than the amount of geographically available land.
  Overshoot factors for cities -

  20 for Bath, 125 for London, 16 for Santiago de Chile, 200 for Vancouver

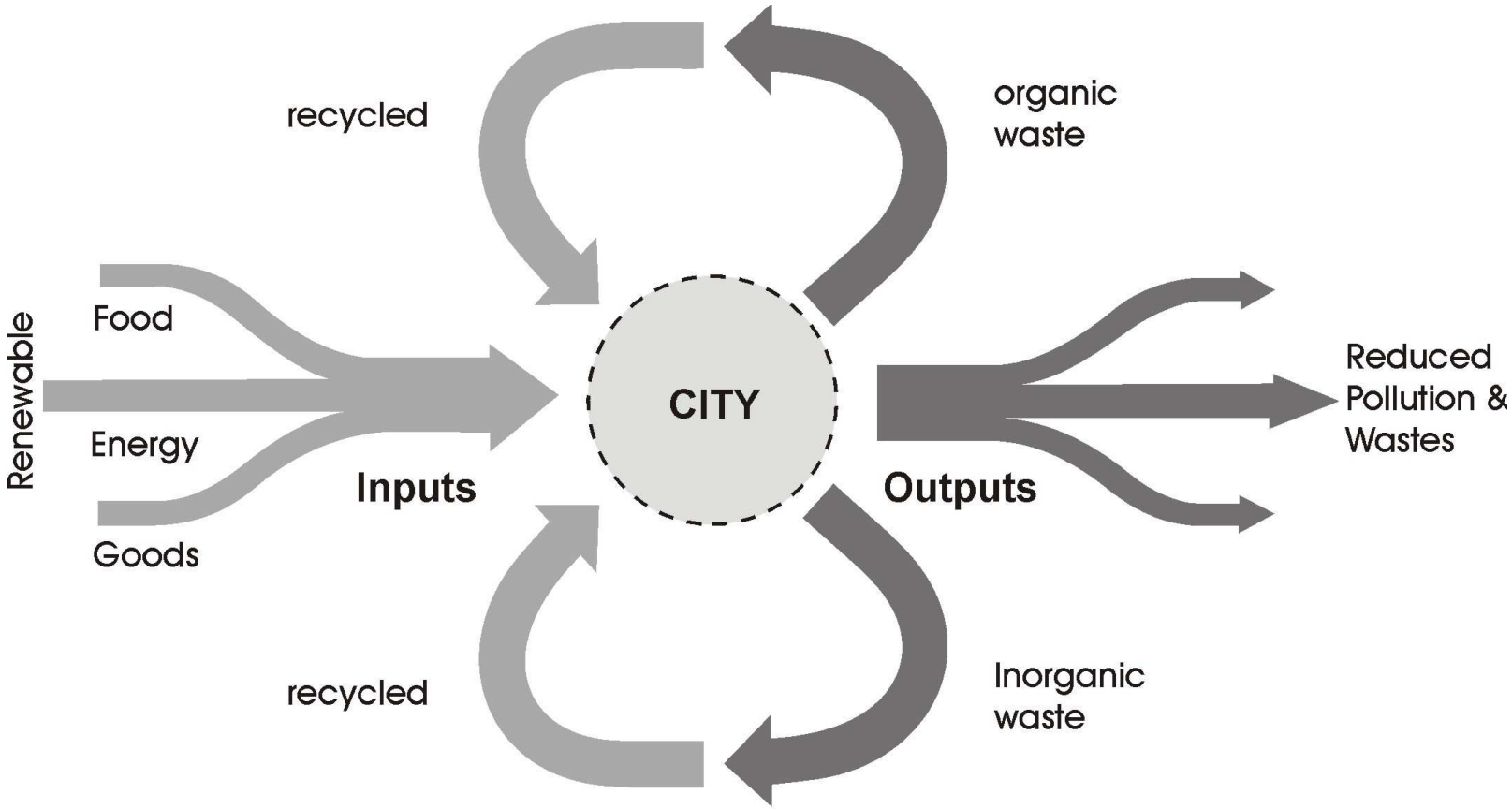
- 'Sustainable cities'? Cities only survive because of human, material, and communications networks with their hinterlands or bioregions.

Sources: Doughty & Hammond (1997 & 2004), Wackernagel & Rees (1996)


3.5
3
2.5
2
1.5
1
0.5
0
Hectares/Capita
Environmental Footprint
Available Space
Bath
Avon
South West
UK
Europe
World
Geographical Scale



(a) ' **Linear** metabolism' cities (consume and pollute at a high rate)



(b) '**Circular** metabolism' cities (minimise new inputs and maximise recycling)

RECENT STUDY: SWINDON AND WILTSHIRE

- Wiltshire – mainly rural
  - County area of Wiltshire
  - Including the four districts of Salisbury, Kennet, North and West Wiltshire

- Swindon – mainly urban
  - The unitary authority of the Borough of Swindon

- Base Year: 2003

Source: Eaton, Hammond & Laurie (2007)

FOOTPRINT ANALYSIS OF SWINDON AND WILTSHIRE

- Wiltshire – mainly rural
  - **2,594,000** global hectares.
  - **5.94** global hectares per Wiltshire resident.
  - This amounts to an overshoot ration of **2.01:1**
  - If the world's population reflected this consumption, then we would need the equivalent biocapacity of **2.3** extra Earths:

- Swindon – mainly urban
  - **1,024,000** global hectares.
  - **5.65** global hectares per Swindon resident.
  - This amounts to an overshoot ration of **10.35:1**
  - If the world's population reflected this consumption, then we would need the equivalent biocapacity of **2.0** extra Earths:

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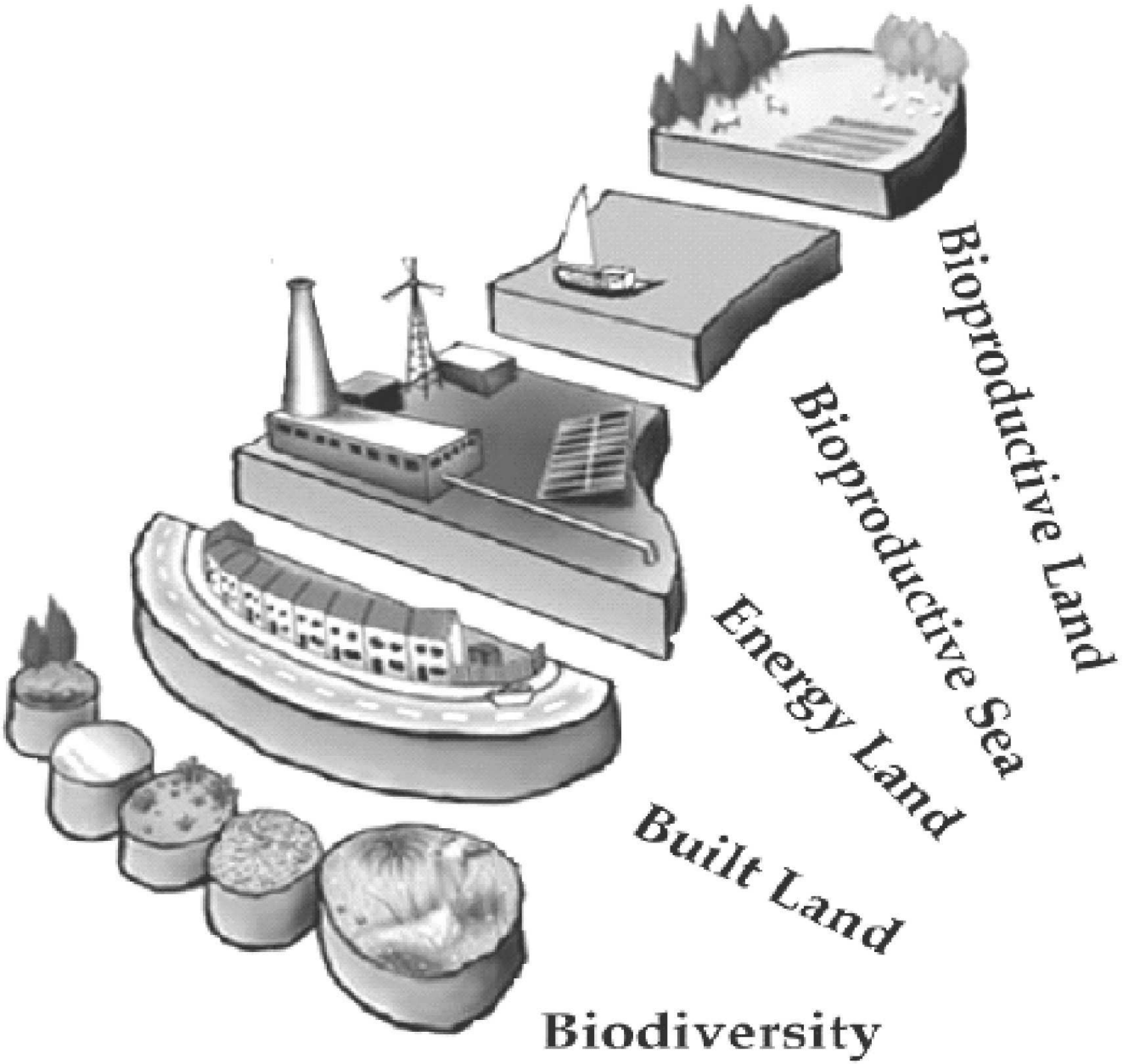
Bioproductive Land
Bioproductive Sea
Energy Land
Built Land
Biodiversity

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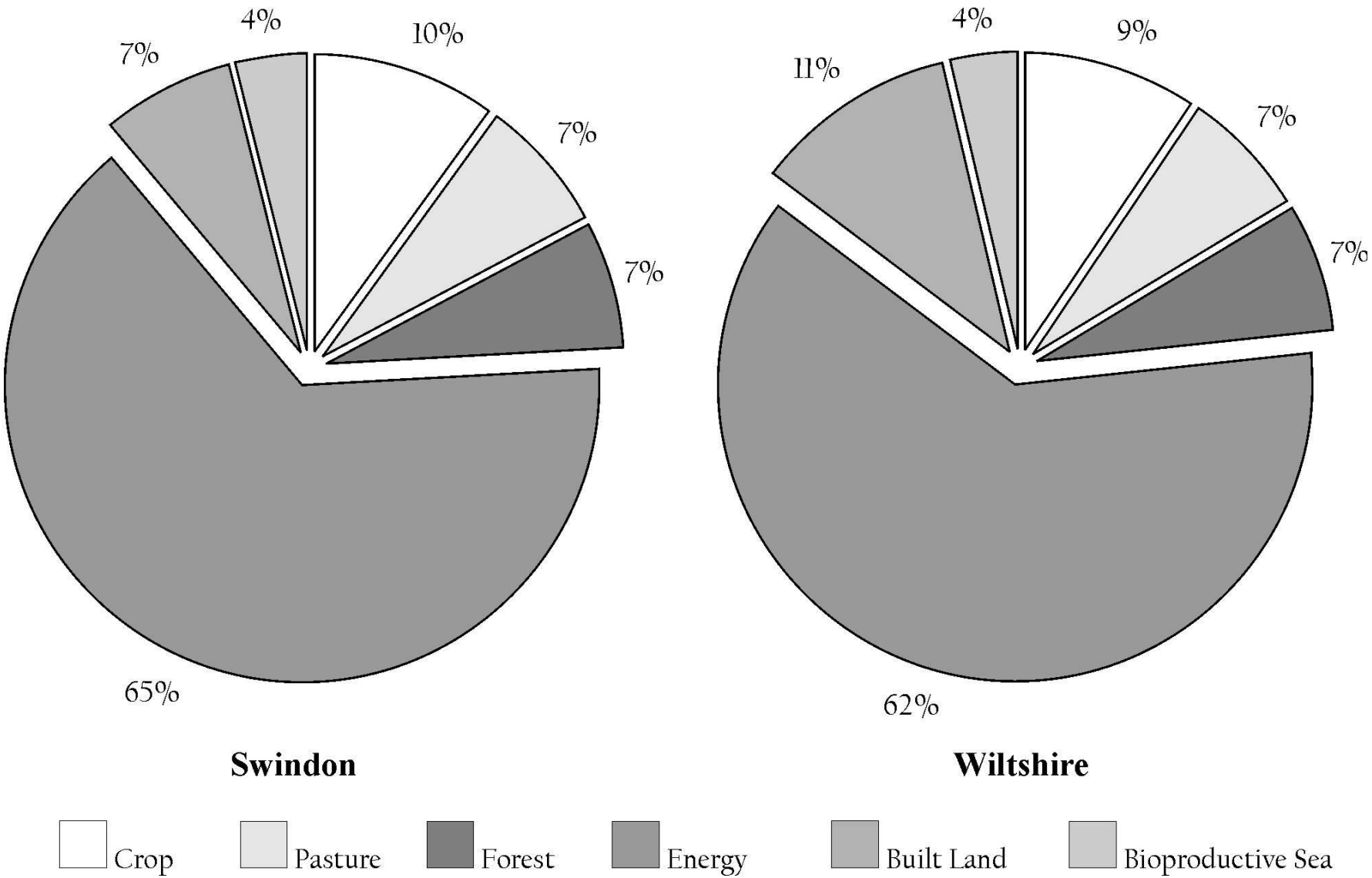
4%
10%
7%
7%
7%
65%
Swindon
4%
9%
11%
7%
7%
62%
Wiltshire
Crop
Pasture
Forest
Energy
Built Land
Bioproductive Sea

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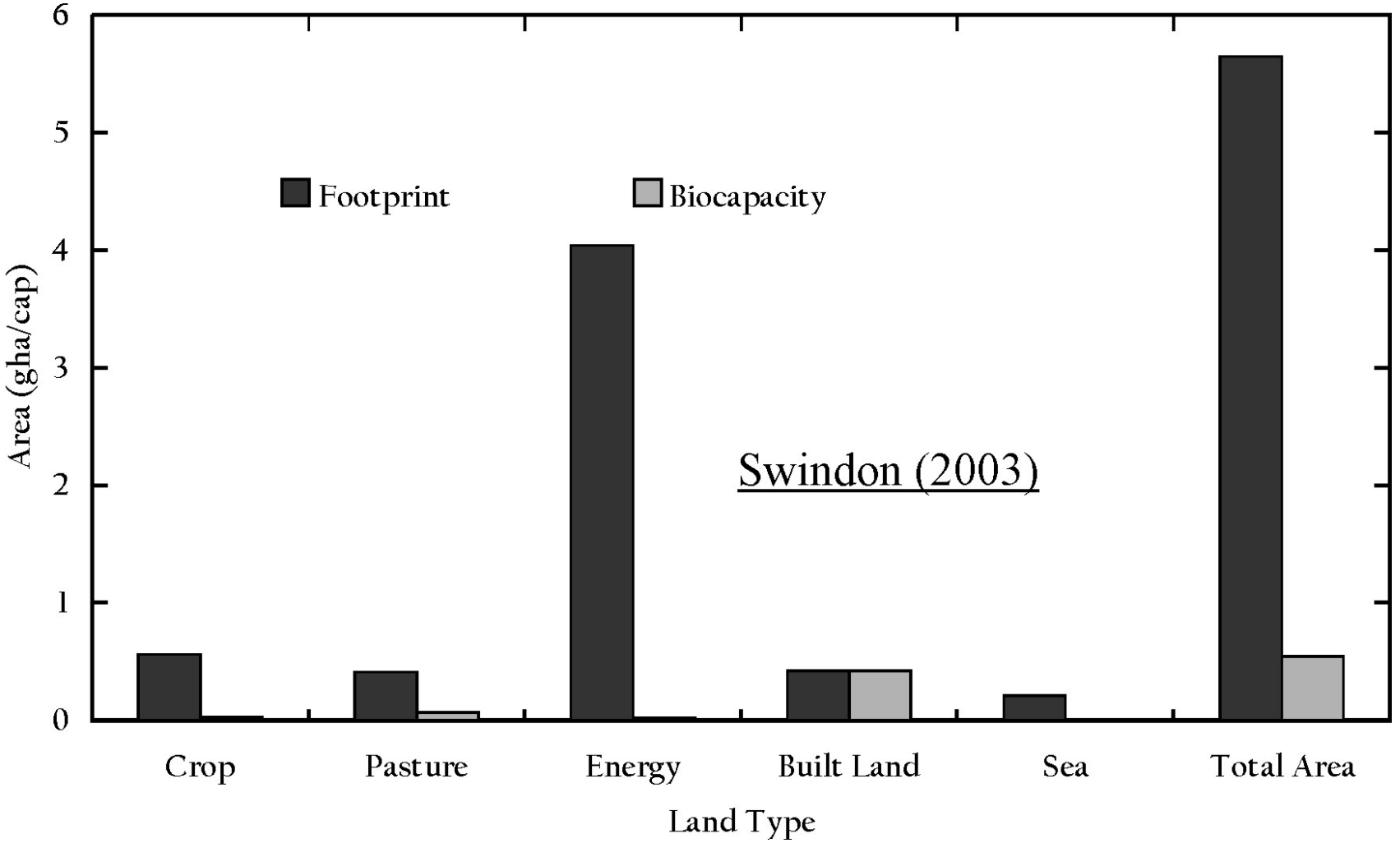
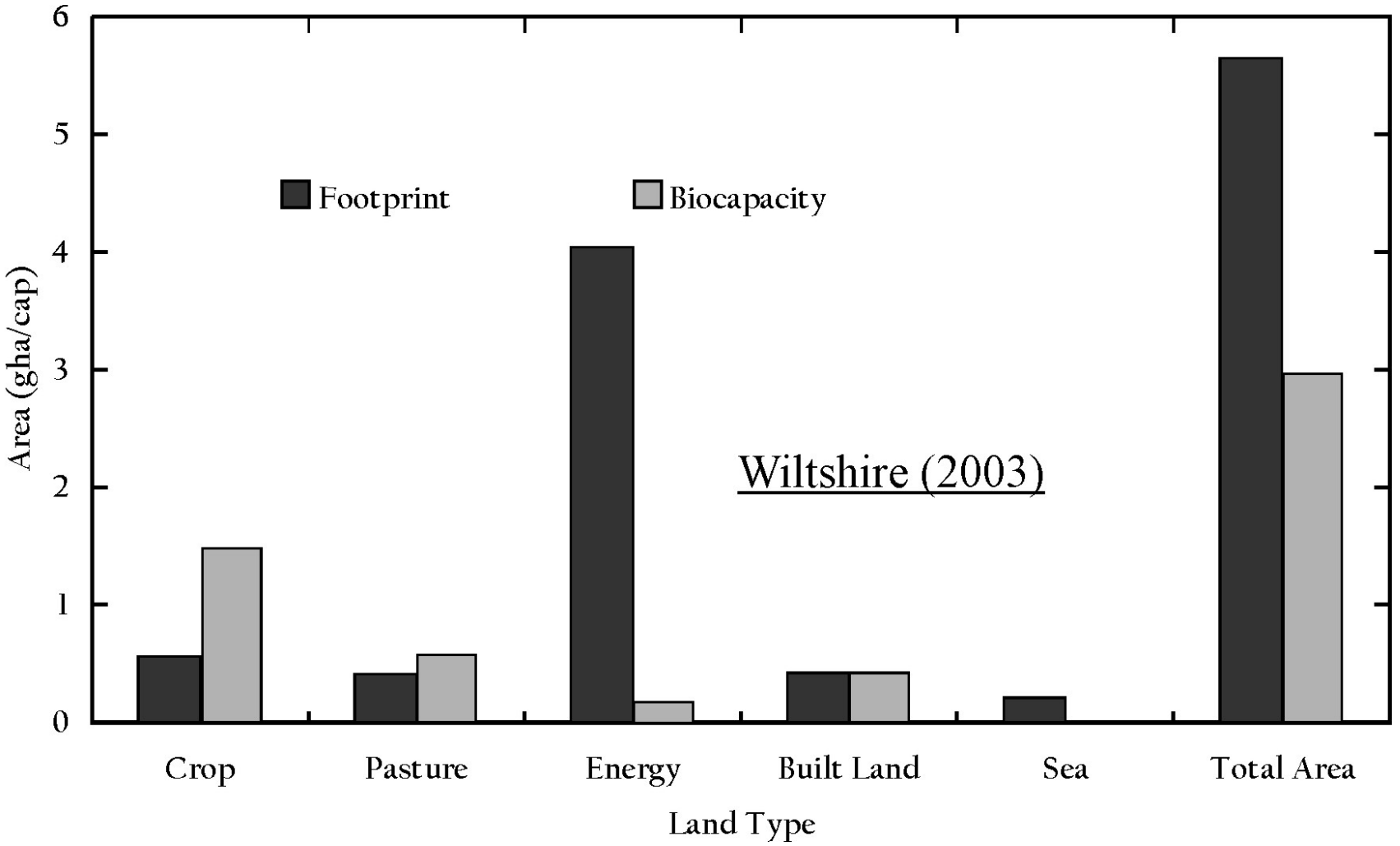
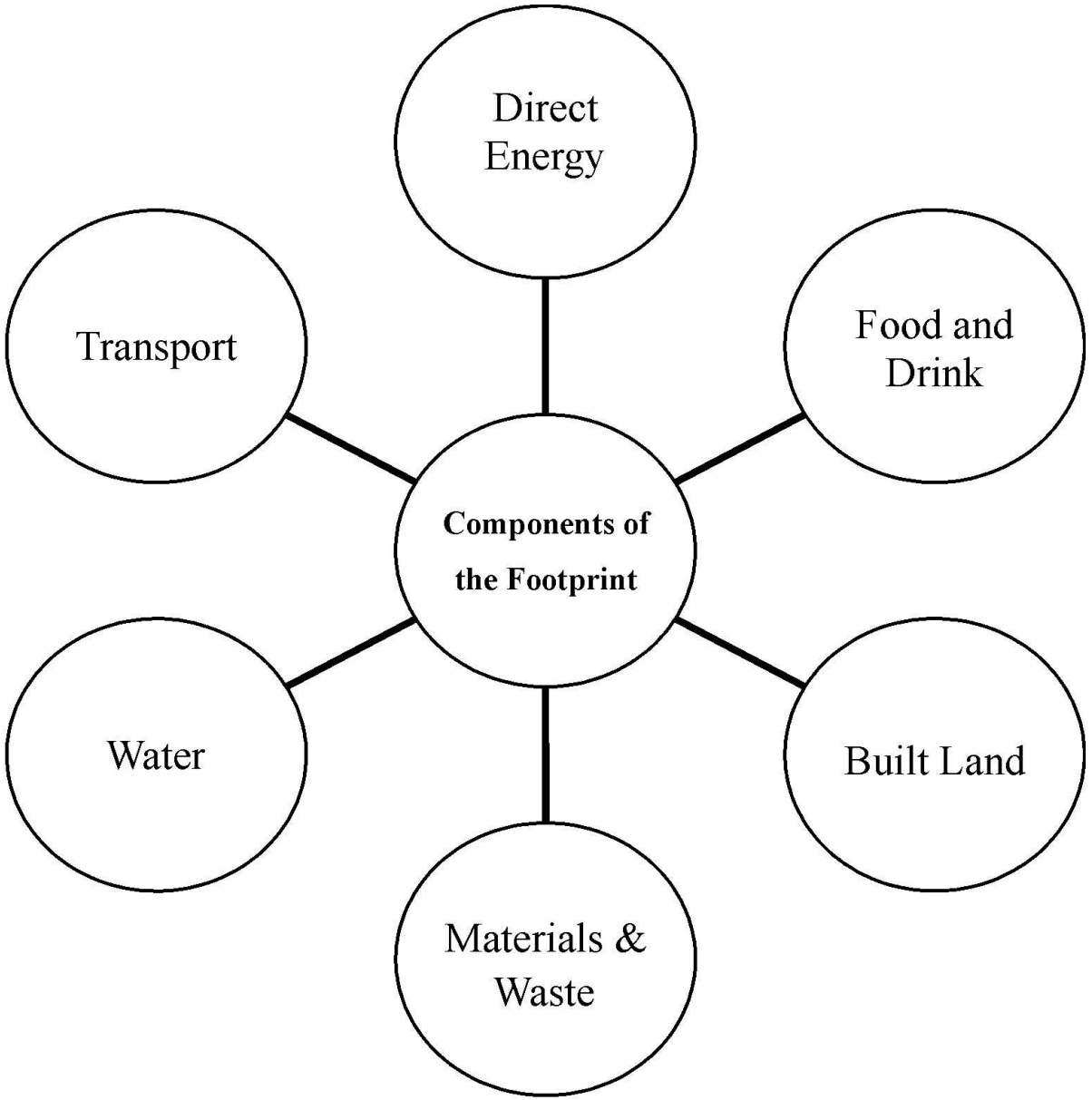
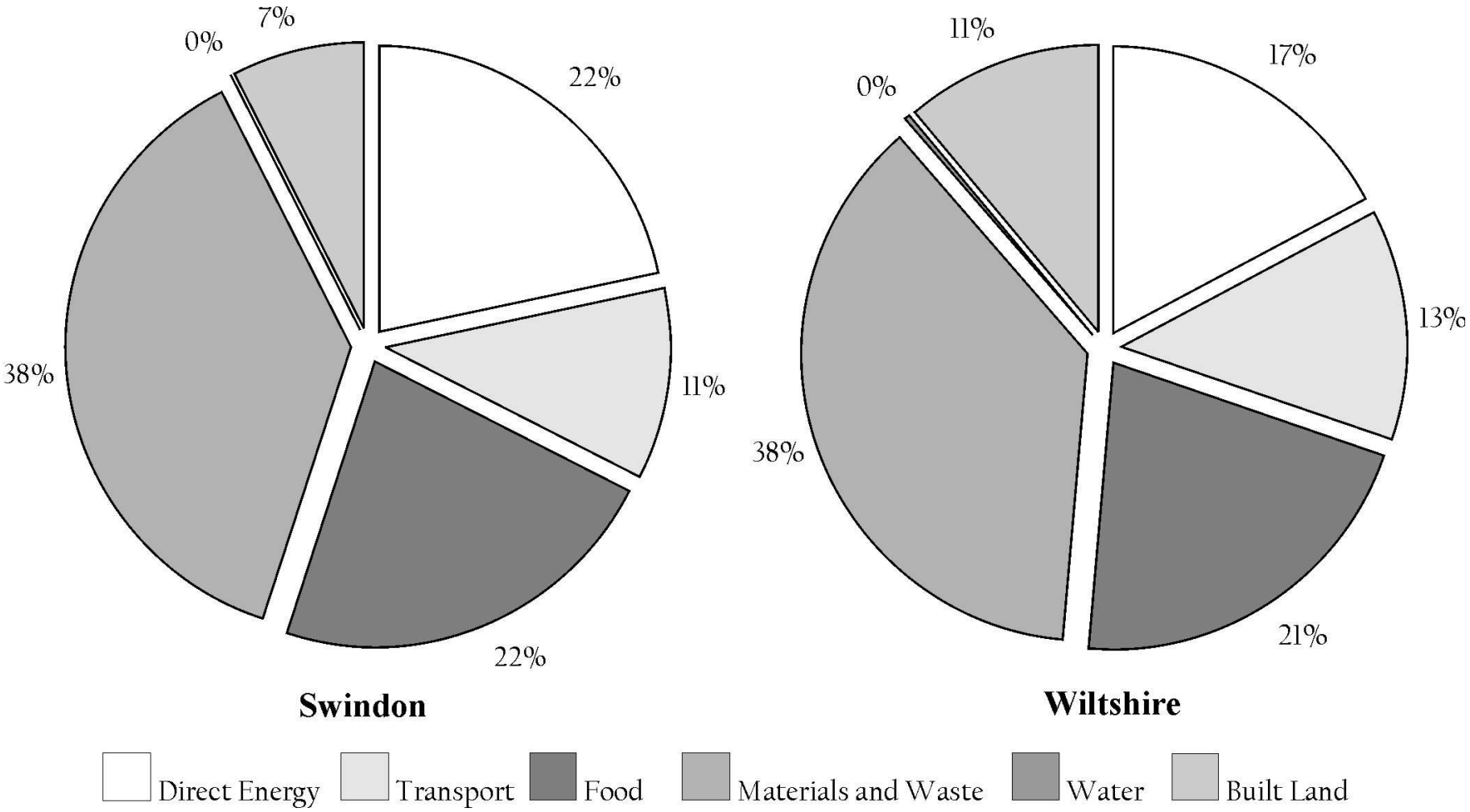

6
5
4
3
2
1
0
Area (gha/cap)
Footprint
Biocapacity
Swindon (2003)
Crop
Pasture
Energy
Built Land
Sea
Total Area
Land Type


6
5
4
3
2
1
0
Area (gha/cap)
Footprint
Biocapacity
Wiltshire (2003)
Crop
Pasture
Energy
Built Land
Sea
Total Area
Land Type


Direct Energy
Transport
Food and Drink
Components of the Footprint
Water
Built Land
Materials & Waste


7%
0%
22%
38%
11%
22%
Swindon
11%
0%
17%
13%
38%
21%
Wiltshire
Direct Energy
Transport
Food
Materials and Waste
Water
Built Land

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THE ROLE OF FOOTPRINT ANALYSIS

- Planning
  - Model alternative scenarios – but a simple measure are rarely adequate tools for predicting the future, particularly the consequences of technological innovation.
  - Prioritise actions to address adverse impacts.
- Monitoring
  - Determine trends in resource use and ecological impacts over time.
  - Evaluate local strategies to combat climate change.
- Education and Awareness Raising
  - Simple to understand. They show how much natural capital we use in relation to how much we have.
  - Promote behavioural changes.

CONCLUSING REMARKS 1: THINKING GLOBALLY, ACTING LOCALLY

- Footprint Analysis
  - Shows that there is growing pressure on global ecosystems due to humanity activities
  - This is leading to the destruction of natural capital, rather than to global sustainability
  - It also results in global inequity in resource consumption
  - Footprint analysis highlights the challenge of achieving ‘One Planet Living’
- We must think globally, but act locally - both to reduce our individual footprints and as an example to others.

CONCLUSING REMARKS 2: FOOTPRINTING AND SUSTAINABILITY APPRAISAL

- Improved local footprint calculations could be achieved by obtaining comprehensive local statistics. The accessibility of such local data is improving.

- Experience in trying to use the environmental footprint at a local level by the staff of the *Wiltshire Wildlife Trust* suggested that it was quite a complex idea for the general public to grasp.

- The environmental burdens caused by urban and rural living in developed countries feedback onto each other. Cities and towns require resources from beyond their geographic boundaries, but rural communities also take advantage of the economic, educational, employment, health care, and leisure facilities typically provided in an urban setting.

- There has been a recent tendency in the UK to adopt what is sometimes called the ‘carbon footprint’ as an alternative indicator of sustainability. The property that is often used is actually a 'carbon weight' not a footprint!

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CONCLUSING REMARKS 3: THE LIMITS TO FOOTPRINTING

The role of environmental footprinting has not gone without challenge:-

- The uncertainties and deficiencies of using footprints (and related parameters) as, albeit partial, sustainability indicators include problems associated with boundary definitions, data gathering, and the basis for weighing the various consumption and associated impacts.
- Its adoption as a tool for decision-making in a policy or planning context depends on an understanding of these assumptions and uncertainties.
- Criticisms have also been made concerning the dominant influence of fossil fuels in footprint calculations. It may underestimate the potential of a switch to renewable energy technologies as a means of lowering humanity's footprint.
- The notion of sustainability can only realistically be applied in a broad geophysical context, and consequently land use planning might more appropriately be focussed on a regional scale.

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- Hammond, G., 2007. 'Correspondence: Time to give due weight to the 'carbon footprint' issue', *Nature*, **445**: 256 (18 January) [DOI:10.1038/445256b].
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“DON’T TAKE ANYTHING BUT PHOTOGRAPHS,
DON’T LEAVE ANYTHING BUT FOOTPRINTS”
Signpost seen by the speaker,
Sinharaja Rainforest Reserve,
Sri Lanka (June 2001)
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