

OBJECTIVES FOR THEME 1

1. Explain the reason for employing environmental indicators to compare the environmental effects of different human activities and why the use of different indicators produces results.

Environmental indicators are employed to show our impact on the environment. The studies are designed to show various 'ecological footprints', which illustrate our use of resources and depletion of them and how they have affected the earth. Indicators depend on how they are defined and measured.

2. List the three household activities, which according to the various indicators are likely to have greatest impacts on the natural environment.

Transport (especially use of cars for travel to work, shopping, etc.) – 40% of total

Energy Consumption (heating, lighting) – 30% of total

Food and other goods – 15% of total

3. Outline, using an **input-output diagram**, the main demands placed on the natural environment by a typical household in a industrialised country.

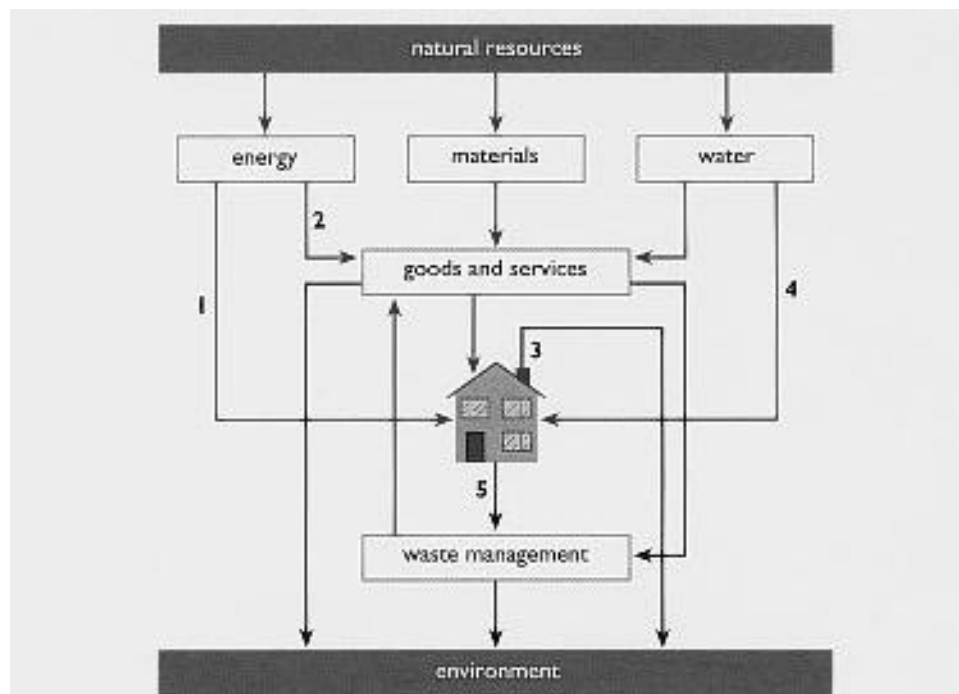


Figure 2.1 Physical inputs and outputs related to households.

Key:

- 1 = direct energy consumption i.e. the energy consumed directly in or by households;
- 2 = indirect energy consumption, i.e. the energy involved in the production and supply of goods and services;
- 3 = CO₂ emissions related to direct and indirect energy consumption;
- 4 = domestic water consumption;
- 5 = solid waste from households.

Diagram from Section 2, Theme 1.

4. Explain why one of the most significant environmental effects of households arises from their energy consumption. Give examples of how the extent of those effects depends on the energy statistics chosen.

Environmental effects rises due to the household consumption of goods and services, household size is also a factor. DETR's statistic of domestic energy consumption for heating, cooking, lighting and so on accounted for about 30% of all delivered energy used in the UK. Yet Environmental Agency said about half the energy used in the UK was from households. Conflicting with each statement. Have to look closely at who and what is being said.

5. Briefly outline the main factors (technical, economic and social) that have influenced energy and other demands that households in the industrialised countries place upon the environment.

Working, shopping and education patterns have changed over the years. Technology has resulted in many goods and services being produced and used more efficiently – however consumption has risen over these small gains. As households grow so does impact on environment.

6. Read data from line graphs and bar charts. Calculate percentage changes using data expressed in different (energy) units.

Can do – for conversions see T172 Notes.

7. Briefly outline, using examples, why actions to improve the environment may involve balancing environmental gains against losses and how those trade-offs may be resolved.

8. Give examples of simplified, and more detailed, environmental indicators that may be used to measure the pressures upon and the state of the environment and track progress towards sustainable development. Identify some limitations of such indicators.

Examples of simple environmental indicators are green house gas emissions, air pollution, water pollution. More detailed environmental indicators are air quality, road traffic, state of wildlife, land use. EcoCal study is a good example of combining different measures of environmental impacts into a single indicator which can be used to find out the amount of land required to suppose that household. The one limitation for this study would be that not every thing could be taken into account. Some areas, which the household is environmentally friendly on, might not be included in the survey. Maybe some of their bad habits also might not be taken into account.

7. Explain, using examples, what is meant by the ecological footprint of a particular place, product or human activity and how it is calculated.

Ecological footprint is the area of land required to provide the resources for, and to absorb the CO₂ emissions and wastes produced by a particular product, settlement or human activity at a given level of technology. It is calculated by taking various measurements of what a household uses in relations to the people who live there. Where your groceries come from, how much land your house occupies your water usage patterns. 100 EcoCals equals 1 hectare of land or roughly how much land you consume.

10. Summarise the strengths and limitations of the ecological footprint as a method of assessing the environmental sustainability of the lifestyle of a given country's population.

Strengths are that it can easily give you a snapshot of your own household impact. With the computerised version you can easily manipulate the numbers to see how they affect your score.

Limitations are that if you do something's more environmentally friendly there is no way for it to be taken into account. For example, using Eco-friendly wash powder, products, line drying your laundry, and light bulbs. Also test was very biased and the paper version was less complicated than the computer version (e.g. the computer version used different calculations than the paper one).

11. Gather the necessary information and use the paper or computer-based version of EcoCal to calculate how the ecological footprint of a chosen household in the fields of Transport, Energy, Water, Shopping, House and Garden, and Waste compares to typical UK households of a similar size.

Done – Placed in with EcoCal survey papers. Did both computer and paper version of EcoCal. Interesting how we got lower points for being veggie with the computer option and not the paper one! Although the scores were relatively the same (about a ten point difference).

12. Identify, generate and select ideas for reducing the ecological footprint of your chosen household. Model the effects of, and explain the reasons for, your choice of particular ideas for implementation. Identify how the reduced household ecological footprint compares to a globally sustainable level.

Have done and have put ideas into TMA.

13. List various types of model used by engineers, scientists and technologists and explain their common feature and purpose.

Models are simplifications of reality. Common features: compromises have to be made to accommodate all types of data. Purpose is to try and get a reading of how Eco-friendly a household is.

14. Outline major assumptions and simplifications of the ecological footprint technique, and the EcoCal model, as a method of assessing the environmental impacts and sustainability of a particular household, product or human activity. Give examples that illustrate the strengths and limitations of EcoCal.

Strengths are that it quite easily shows you your ecological impact your household is having on the environment. You can quickly alter your habits to change your impact and you will see the differences in these impacts both in the short-term and long-term.

Limitations is that it does not take into account individual efforts of those willing to go a bit further in their Eco-friendliness. To be a broad-based survey it can't. Limitations listed above.

15. Compare the ecological footprint with the concept of environmental space for assessing the sustainability of a given region, or the whole earth. Identify the value and limitation of calculations of the 'fair share of environmental space' per person.

Environmental space assess the amounts of energy, non-renewable materials, land, water, wood and other resources that can be used at a global or regional level without exhausting the Earth's resources or causing long-term environmental damage. The value of the 'fair share of environmental space' is that it gives targets to aim for. Limitations are that it is difficult given the realities of global power and distribution of resources.

16. Explain what is meant by the energy efficiency of homes and why there is great potential for improving the energy efficiency of existing housing, especially in the UK. Briefly outline the relationship between energy efficiency and fuel poverty.

Energy efficient homes are homes that use less energy and can be sustained by using natural resources. Insulating homes with today's requirement in the UK would drastically reduce heating costs thereby placing a lesser burden on the National Grid.

Fuel poverty is spending 10% or more of their income on domestic fuel. If houses were insulated more this would also drastically reduce heating bills and not place people in fuel poverty.

17. Give the measure used in the NHER and the SAP systems to rate the energy efficiency of a UK dwelling. Explain why these systems rate the efficiency of a dwelling on the basis of standard occupancy and give some additional assumptions for the SAP rating.

The NHER rating is given from 0 to 10. 10 being the most energy efficient and 0 being the worst. The SAP rating is given from 0 (the worst) to 100 (the best). My SAP was 50 with my NHER at 5.9. Middle of the road given that this building is old.

The standard occupancy was used because just about everyone fits into this category. There are fluctuations on either end but if using a mean/median figure/households this would not affect the values.

18. Explain in general terms why an energy survey is required, and the data fed into a sophisticated computer model, to provide an NHER or SAP rating of a particular dwelling.

The model uses different calculations according to zip code something that can't be included in the paper version and it has assigned values for different categories. Someone who doesn't know their insulation level will click that box and the computer model will default to the rating for the year the house was built.

19. Explain why answers to the questions listed on the NHER Site Survey Form about a particular dwelling are needed to calculate its fabric and ventilation heat loss and hence its energy rating.

Fabric and ventilation loss is due to warm air escaping up and out of the house. House age (loss is higher in older homes) and postcode (outside temp has its effects) determine part of this.

Fabric loss is heat escapes through the actual 'fabric' or material of the building.

Ventilation heat loss is heat escaping as a result of air flow into and out of a house.

20. Define the U-value of a building element and perform simple calculations of the heat loss through building elements with different U-values.

Rate of heat loss per second through a building element (in watts) = U-value of the element x area of the element (in m²) x temperature difference between its 'hot' inner and 'cold' outer surfaces (in °C).

Heat loss rate = U-value x area x temperature difference.

21. Briefly outline why answers to the questions listed on the NHER survey form about the heating and control system plus other information (e.g. about lights and appliances) in the dwelling are used to calculate its energy rating. List the most important factors that determine the energy rating.

heating and its control system contribute to the majority of the heating bill for the household. Heating, lights, and appliances are the most important factors in determining an energy rating.

22. Carry out an energy survey of a chosen dwelling (or obtain the information from a sketch and description of an example UK house) in order to complete a NHER survey form. Identify areas for energy improvement not included on the form.

Done. Weather stripping is about the only improvement we could make as this is rented accommodation.

23. Enter the data from the form into the NHER *Surveyor* program (or send off the form for processing) in order to obtain energy ratings, annual fuel costs, etc. of the dwelling and suggestions for improving its energy efficiency.

Done.

24. Identify, generate and select ideas for improving the energy efficiency of your chosen dwelling. If possible, use the *Surveyor* program to model the effects of particular improvement options, both short and longer-term. Decide upon and explain the reasons for, your choice of particular improvement options in terms of payback and other factors.

Didn't choose this option in TMA but unlikely we'd make any improvements as it is a rented accommodation. If things went wrong though we would encourage landlord to use environmentally sound products.

25. Outline the main ways of improving the energy efficiency of existing homes in countries with temperate or cold climates.

Minimise fabric and ventilation heat losses through installing more insulation and by eliminating draughts. Maximise heating and hot water system efficiency through choice of fuels, efficient appliances and good controls.

26. Outline the strengths and limitations of the NHER model as a method for rating and improving home energy efficiency.

Strengths are can calculate the energy rating quite accurately, can adjust the data to see the impact immediately, allows adjustment of the annual fuel costs according to 'occupancy' of the dwelling.

Limitations are makes a number of assumptions and simplifications, assumes peak efficiency of appliances, not very accurate on radical design of homes.

27. Identify issues associated with the design and use of housing, other than energy consumption, that give rise to environmental impacts. Briefly outline how some of these impacts might be reduced.

Avoiding high 'embodied' energy products for building the house, pick Eco-friendly building materials, design homes that fit into their surroundings, reduce household water consumption, use CFC-free appliances, reduce solid wastes from construction and demolition.

They can be reduced if you think through your plan and try to anticipate the future – recycle and re-use where you can. Investment is needed and commitment to the project has to be on going.

28. List the main technical approaches, both basic and more advanced, for low energy housing design.

Basic would be minimising fabric and ventilation loss along with maximising heating and hot water system.

Advanced approaches would be maximising incidental gains (e.g. solar energy, suitably oriented and insulated conservatory). Active solar energy systems, further reducing fabric and ventilation losses via super insulation, using renewable energy sources such as wind power, cycling, etc.

29. Distinguish between low energy and ecological design of housing, giving examples of each.

Low energy homes have been planned to have minimal loss of heat through fabric and ventilation loss. They also use low energy appliances, water saving appliances, double glazed windows. They will have a very high standard of insulation as well. Usually will have central heating as a feature because of the research into this subject - Most people want it.

An ecological designed house will utilise all the natural resources and be a nearly self-sufficient house. It will work in harmony with nature and have a low impact on the surrounding wildlife. It will have a design for the most efficient use of heat. It will also use solar energy to a high degree if not return some to the National Grid.

30. Outline features of, and trade-offs involved in planning, an environmentally sustainable community, including the potential use of zero CO₂, zero heating and autonomous housing.

Features would be it is a small capsulated community. They can plan their own community and dictate what will work best for the whole community.

their impact of zero CO₂ can be realised by effort from everyone and usually requires a commitment from the whole household and not certain individuals.

31. Explain the roles of domestic appliance design in reducing the environmental impacts of households.

Domestic appliances place the greatest demand on our energy usage.

Energy labelling enables the consumer to pick greener choices. If appliance utilises less energy and provided it isn't drastically expensive than counterparts it will be picked. Banning HCFC's and HFC's from appliance manufacture will greatly reduce ozone impacts.

32. Explain what is meant by factor 10 reductions in impacts on the environment for global sustainability. Give the two broad approaches for achieving such reductions and outline the barrier posed by the 'rebound effect'.

Factor 10 is a 90% reduction in the amounts of energy and materials consumed and pollution produced per head in the industrialised world. Whether this is attainable is questionable. Resources are there but are the commitments?

Rebound effect is what money is saved by buying energy efficient products will be spent doing other highly inefficient activities. Examples would be more holidays' abroad, bigger homes, bigger appliances, etc.

33. Briefly outline what can be done 'beyond the household' to move towards environmental sustainability, including existing technical and financial measures and more radical changes to the socio-economic system.

Concepts need to change. People's idea of environmentally friendly need to change and a commitment has to be there. Government can play a role by being a leader and showing others how it can be done. A physical example of sustainability will show others it can be done with a minimal impact on daily living. This is where people will be converted.

34. Study more effectively through practice and application of reading and note taking skills.

This document proves it!