Department of Geography

University of Leicester

GY3154 Contemporary Environmental Challenges



Lecture 1

Eco-housing and architectural geographies

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Module themes

- Environmental issues – energy, pollution, climate change, resources
- Scale – looking at household (eco-housing) and global (energy)
- Solutions focused, hopeful
- But to do this need to understand cause and complexity of problem
- Case studies and examples
- Place within geographic literature but often use material from other disciplines
- Human Geography focused

PART 1: ECO-HOUSING

- **Explores eco-housing from a social and political perspective**.
- It starts from the premise that we already know how to build good eco-houses and we already have the technology to retrofit existing housing. Yet relatively few eco-houses are being built and often expensive technology, rather than good simple design, is relied upon to make a house more ecologically friendly.
- This module conceives (eco-)housing as significantly more than the physical structure alone and explores the ongoing dynamic relationships between people and their homes.
- By taking this novel social approach this module examines the ways in which radical change to our houses requires social changes in how we live.

Structure of Part 1

1. Eco-housing and architectural geographies
2. Politics of building - **POLITICS**
3. Low Impact Development - **ECONOMICS**
4. Transition, scale and replication – **CULTURAL**

A. Why housing?

“There is no survival value in pessimism. A desperate optimism is the only attitude that a practical environmental philosopher can assume”

(Callicott, quoted in Callicott and Rocha, 1996, p.157)

“No one is untouched by the emerging environmental agenda; everyone has an interest in shaping the development of environmental politics (for good and bad)”

(Connelly and Smith, 2003, p.358)

Slow progress?

Society is taking action: policies are being designed and implemented at global, regional and local scales. But there are issues that still dog progress:

- Remediation and restoration of many types of environmental damage takes years
- The costs of environmental remediation and protecting environments are often enormous
- Our incomplete knowledge about many aspects of the environment, and how environment–society linkages work, can act as a barrier to finding effective solutions
- The speed of economic and cultural change is rapid, the desire and drive for economic development strong; in contrast, the negotiation and implementation of global and regional environmental policies are slow.

Changing values?

- *What needs to change?*

- ‘Kinder values; the determination to re-affirm the basic values of humanity, community, locality and respect for life and nature’ (Schwarz and Schwarz, 1998, 364)
- ‘Reform and regulation, however well-intentioned, cannot change values’ (Schwarz and Schwarz, 1998, 368)
- ‘A change of direction can only come if it is perceived, in North and South, as progress’ (Schwarz and Schwarz, 1998, 367)

- Shift in values, culture and behaviour
- Key way is how we live daily in our homes

Solutions?

- While we always need to know more about how environmental problems are caused we also need to be finding solutions now
- What solutions can we envisage and then how practical do they need to be?
- Use of language – need to be critical of the terms we use, i.e. ‘sustainable development’ (see Bluhdorn and Welsh, 2007)
- **Housing is something we all need, something we know how to build better, and thus is a useful focus as geographers to understand**

4 key steps to reduce our environmental impact

1. Understand our environmental impacts better: globally, regionally, locally and individually - ecological footprint
2. *Participate* in environmental decision-making - only way to achieve environmentally sustainable practices is through "a commitment to both justice and participation" (Connelly and Smith p.361).
3. Recognise and make use of innovative grassroots solutions - Low Impact Development
4. Improve our management of the current situation.

Given these choices, which pathways forward are you going to take?

Future visions

1. **Deep green** – deep ecology, consuming less and more locally produced goods, producing less waste, travelling less and being conscious of our impact on the environment in our daily lives

2. **Ecological modernisation** – economic growth does not need to be slowed to ensure environmental protection, 'reorient' economic growth and use technological solutions for environmental problems

3. **Ecological democratisation** - extensive citizen participation and development of democratic institutions

Housing is key to sustainability

- We all need housing
- Geographers have long studied housing, especially urban settlement patterns and rural land use
- Now growing field of architectural geographies, and myriad of ways to understand housing, home and dwelling
- Housing is central to societies understanding of comfort, security and progress, and good housing is a basic fundamental need which has significant implications for health and well being
- Yet housing contributes significantly to climate change and in Britain today is expensive and thermally inefficient – costing the environment and occupants
- The quest for good affordable eco-housing needs to be at the heart of any attempts to mitigate or adapt to climate change

DEFRA Climate Change Risk Assessment 2012

Selection of impacts on...

Buildings & Infrastructure

Although it may lead to benefits such as lower heating demand in winter, the serious threats that climate change presents to UK buildings and infrastructure are likely to outweigh the positive effects. Large cities with high concentrations of vulnerable people may be most at risk. Interdependencies between different critical infrastructure networks mean that damage or disruption to one could impact others through a cascade effect.

Confidence

L

Energy demands for heating are projected to decrease

Milder winters may lead to a reduction in energy demand for domestic heating, with the largest decreases in the south of the UK. The economic and social benefits of a reduction in winter heating demand are potentially very large, perhaps exceeding £1 billion per year by the 2050s.

H

Energy demands for cooling are likely to increase.

Higher summer temperatures are projected to result in rising energy demand for cooling, again particularly in the south of the UK. Currently, cooling of buildings (including air conditioning, refrigeration and cooling of information and communications technology infrastructure) accounts for around 4% of total UK electricity use and demand for cooling is already increasing.

H

Flood risks to buildings and key infrastructure are anticipated to increase.

Annual damage to UK properties due to flooding from rivers and the sea currently totals around £1.3 billion. £1.2 billion of this is accounted for by England and Wales – a figure projected to rise to between £2.1 billion and £12 billion by the 2080s.[12] Without action, a range of important infrastructure such as roads and railways could be affected by a significantly increased risk of flooding.

Confidence

H

Overheating is projected to pose an increased risk to building occupants.

Summer overheating is projected to emerge as a significant risk, potentially contributing to heat-related health problems. In London, for instance, the number of days in an average year when temperatures rise above 26°C is projected to increase from the current figure of 18 to between 27 and 121 by the 2080s.

H

The Urban Heat Island Effect could become more pronounced.

Large cities in the UK already experience higher night-time temperatures than the surrounding countryside due to their absorption of heat during the day. Increased urbanisation and increased energy use would cause this phenomenon to become even more noticeable over the course of the coming century, exacerbating potential health problems and impacts on biodiversity (e.g. in aquatic ecosystems) caused by overheating.

M

Water resources are projected to become scarcer.

Reductions in water availability, particularly during the summer, may lead to more frequent water use restrictions and, in the longer term, water shortages. The gap between demand and availability could potentially widen, impacting homes, businesses, schools and hospitals, for instance. By the 2050s, between 27 million and 59 million people in the UK may be living in areas affected by water supply-demand deficits (based on existing population levels).

Confidence

L Sewers are projected to fill more frequently and spill into rivers and the sea.

Many sewers in the UK are part of combined systems (i.e. the sewers carry both sewage and surface water runoff). When they are full they can spill into rivers and the sea. Although heavily influenced by socio-economic factors such as population growth, significant increases in spill frequency may occur in future due to changes in rainfall patterns (e.g. more heavy winter downpours) and may impact biodiversity (e.g. in aquatic ecosystems).

M Damage to road and rail bridges is projected to increase.

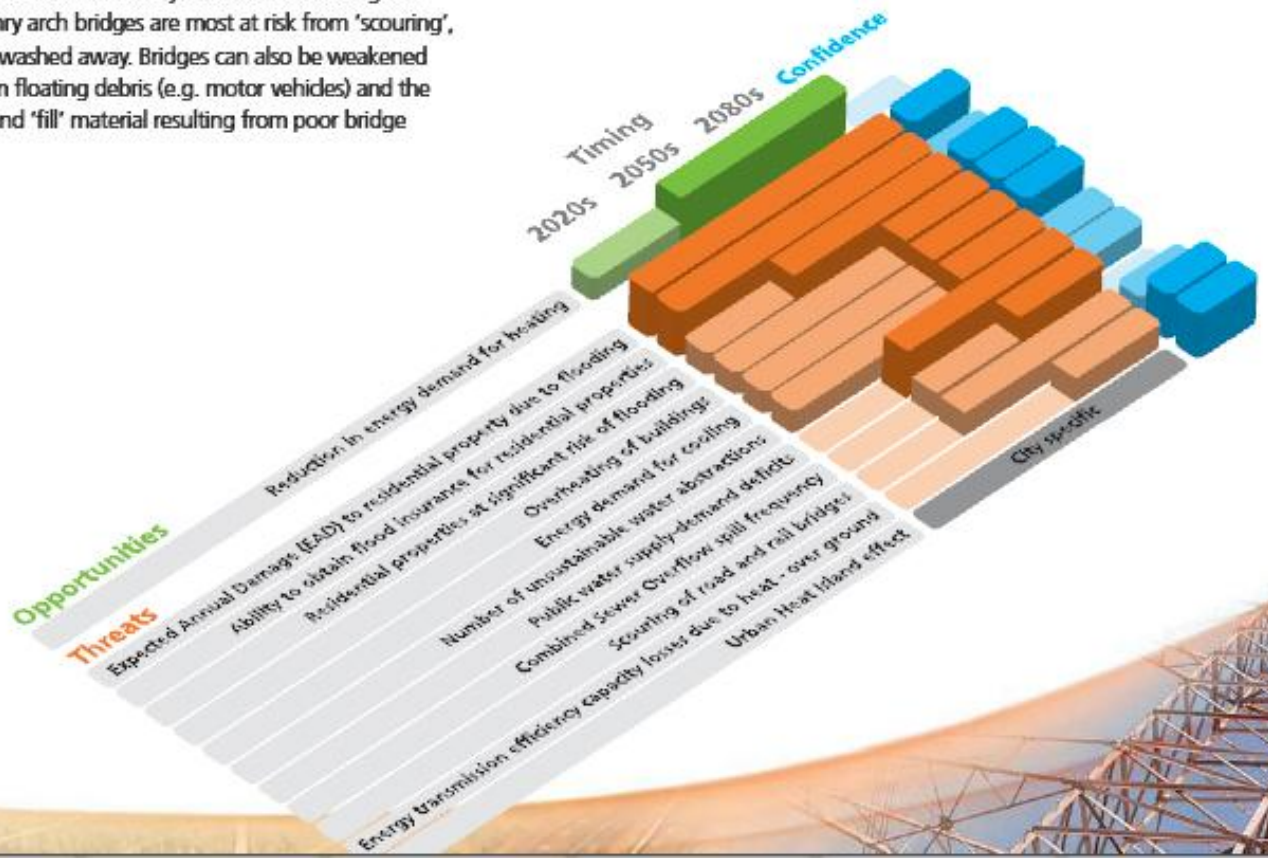
Increased winter rainfall and higher river flows may lead to more damage to road and rail bridges. Old masonry arch bridges are most at risk from 'scouring', where their foundations can be washed away. Bridges can also be weakened during floods by the impact from floating debris (e.g. motor vehicles) and the washing-out of loose masonry and 'fill' material resulting from poor bridge maintenance.

Confidence

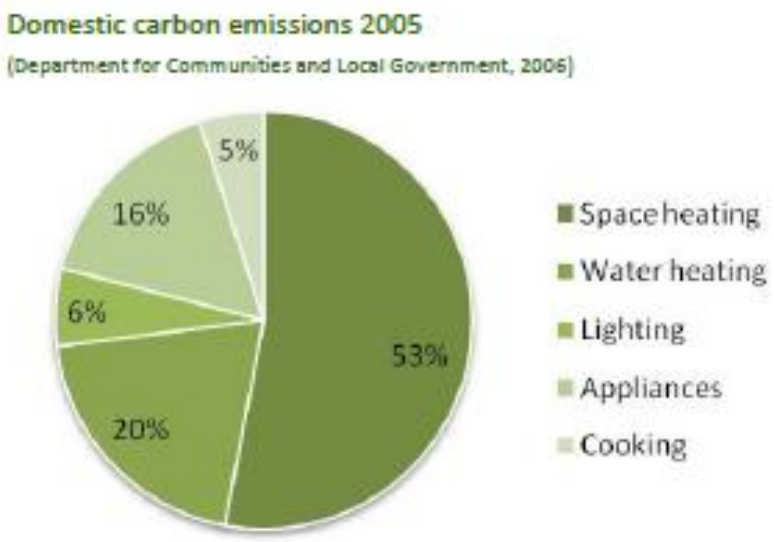
H Electricity network capacity losses are projected to increase.

Higher air temperatures may make it necessary to reduce the amount of electrical current passing through overhead power lines, in particular, as well as through underground cables and power transformers. Known as 'de-rating', this ensures that the equipment does not overheat. Although helping to prevent power outages, de-rating effectively decreases transmission capacity.

[12] This projection includes population growth.



What is wrong with our current housing?



- High environmental impact
- Our housing is very expensive
- It is of poor quality and not energy efficient
- Our houses do not make use of ‘free’ energy
- Poor inflexible internal design
- Limited possibilities for retrofitting
- Increased pressure to provide more housing
- Is not suitable to adapt to climate change

Defining eco-building

- An eco-building minimises resource use (in construction and life-cycle) while also providing a comfortable environment in which to live.

- A good eco-building balances our need for comfort with ecological impact. An extremely ecological house that provides no comfort does not satisfy our human need for a home.

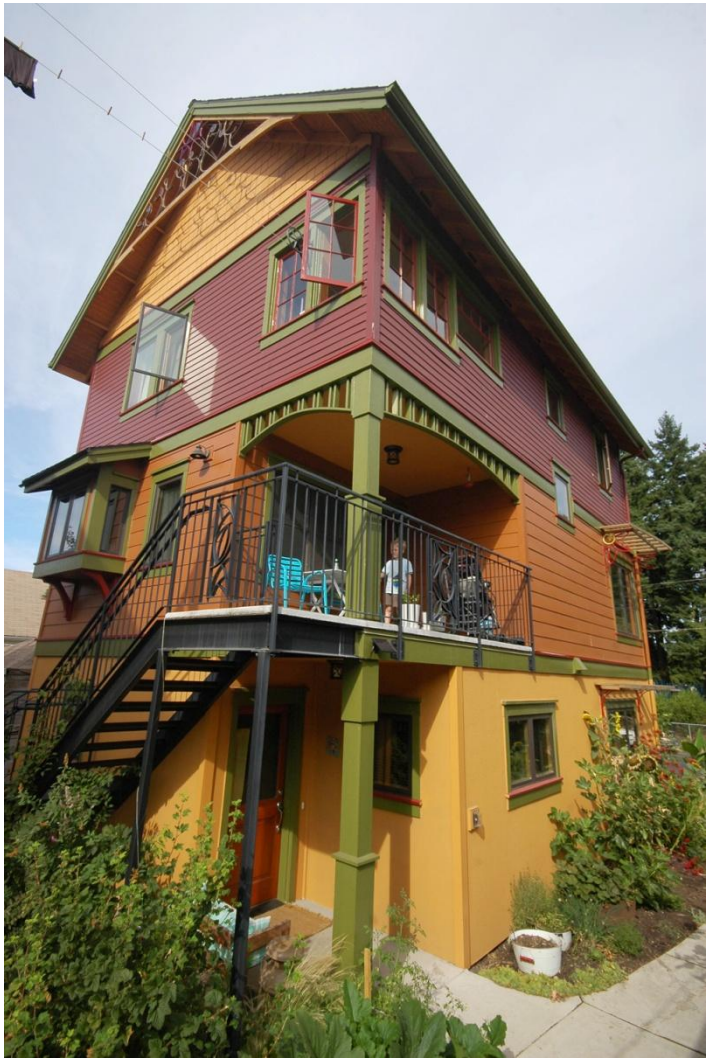
Breadth of approaches between;

- Buildings which use technology to reduce their environmental impact and those which rely upon natural materials and a low impact lifestyle.
- The more natural buildings can actually have a negative carbon footprint because materials like straw actually store CO_2.
- Eco-building thus requires careful consideration of location, materials, resource use, toxicity, durability, reclamation potential, biodiversity, aesthetics, relation to community, and the ongoing dynamic relationships between people and their homes

What is eco-construction?

In Britain:

- Building materials and structure – good design as key
- Air tightness
- Heating systems – can reduce use by 75% less than current building regulations, use insulation rather than heating
- Lighting – saves money too
- Renewable energy systems
- Saving water



Types of eco-housing materials

- Natural materials: Straw, bamboo, earth, clay, wood, leaves etc
- Local materials
- Recycled materials
- Anything ecologically sound

Straw bale

- Ideally suited to British Climate
- Increasingly used in British house building
- Now have first straw bale council houses
- Have lots of straw available
- Cheap, easy to build, and highly thermal efficient

- The Story of Straw animation

Types of eco-housing structures

- Designed differently – small, compact
- Sharing spaces
- Thermal efficiency
- Climate appropriate
- Unique shapes
- Home-made look and feel
- Visually embedded in landscape

Why focus on eco-housing

- Good housing should be available to all
- Ecological building methods remain marginalised and often misunderstood
- Perceived additional costs of eco-building
- We need more eco-building to adapt to climate change
- Economics will likely be the key driver to greater mainstream adoption of eco-housing and thus it is important to understand how we can make eco-houses cheaper and thus more desirable
- New houses are still being built
- More technology is not the answer

B. Understanding housing

Key perspectives in understanding housing

Broad way in which we could seek to understand eco-housing. Perspectives include:

- Affordability, economics and cost
- Accessibility and equality, opportunity for all
- Political support, encouragement and planning barriers
- Gender, feminism perspectives, dwelling, home
- Crisis? And climate change, energy use

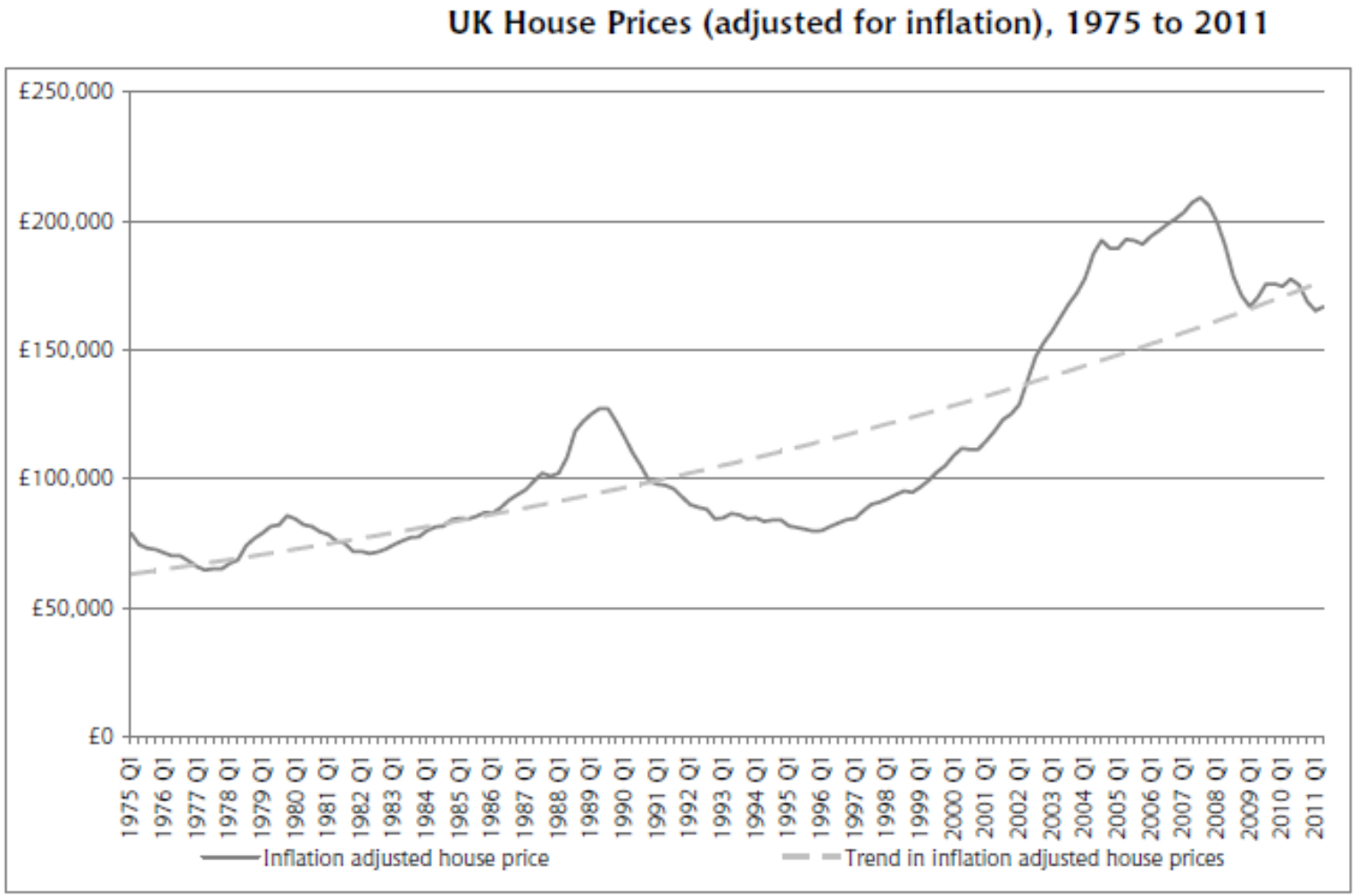
Less about materials and engineering, but social, economic and political questions

Barriers often economic and political

Barriers to more eco-construction:

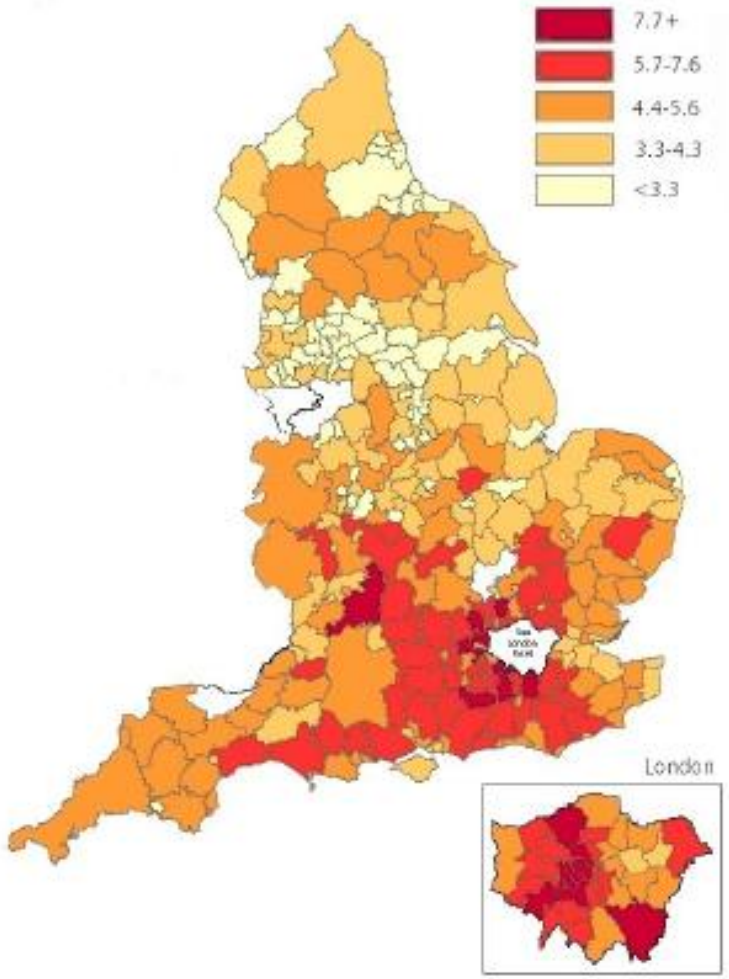
1. Perceived premium costs for environmental building
2. Attachment to high technology solutions
3. Micro-renewable currently expensive (despite tariffs)
4. Lack of stipulation by building regulations
5. Restrictions within planning policy
6. Lack of political willpower

Economic issues

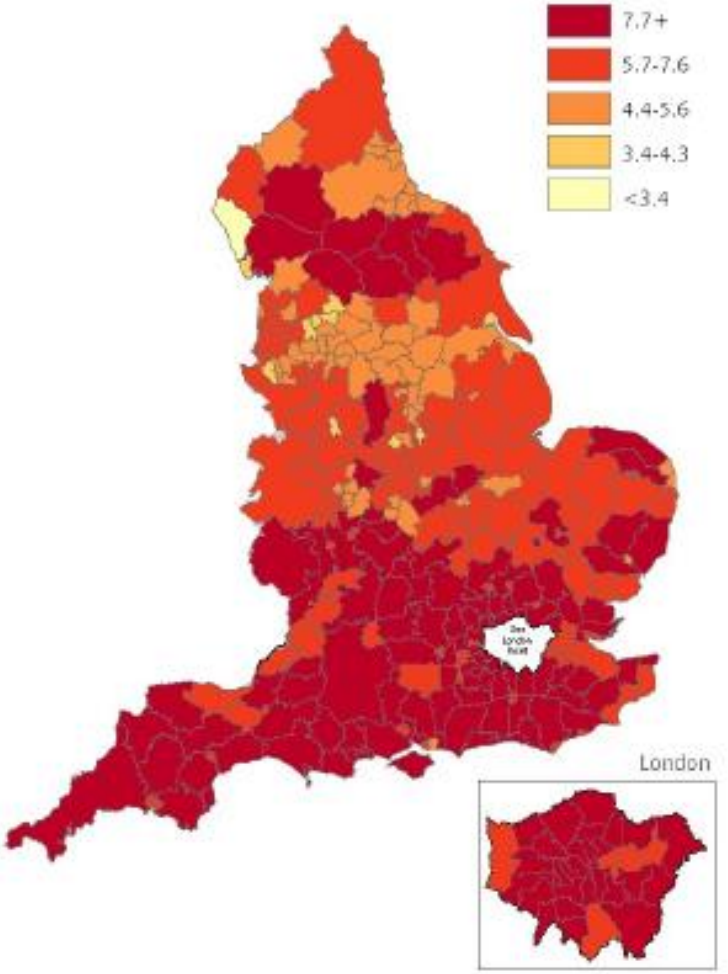


Affordability ratios in 2000 and 2010, in England[109]

Affordability ratio England **2000 = 4.21**
6% of local authorities had affordability ratios greater than 7.7



Affordability ratio England **2010 = 7.01**
44% of local authorities had affordability ratios greater than 7.7



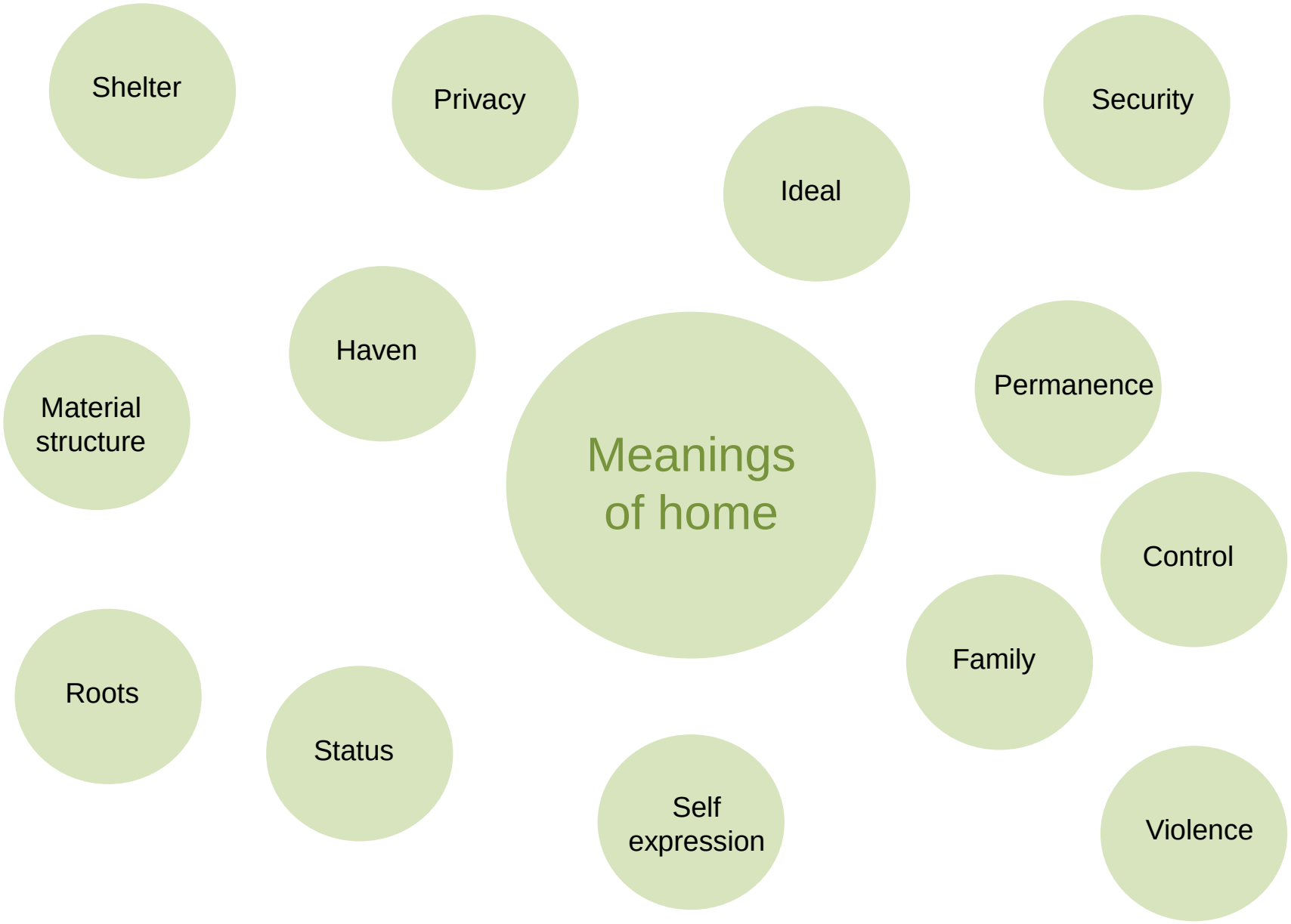
Why are houses so expensive?

- Land prices at premium
- Seen as investment opportunity rather than shelter
- Free market – little price adjustment
- Lack of supply
- Increasing demand – especially from single occupiers
- Demand for bigger houses
- Empty homes – not good use of existing stock
- Opposition to new development
- Profit by large scale construction companies
- Lack of tax on house asset
- Spatially unequal demand for housing – pressure in the south of England

What does home mean to you?

What is a house or home?

- We need to know how people perceive a house:
  - Security, both the physical act of having somewhere safe to live and sleep, and financially as an investment.
  - Homes as refuge.
- These values shape not just how households operate but how houses themselves are perceived
  - People want houses to be:
  - aesthetically pleasing;
  - comfortable and to offer convenient facilities (water, bathrooms, heat, refrigeration);
  - solid and long-lasting;
  - cheap and easy to run and maintain;
  - financially secure;
  - spacious and flexible in function;
  - private from others;
  - and a place worthy of investing emotion, time and money


Shelter
Privacy
Security
Ideal
Haven
Material structure
Meanings of home
Permanence
Control
Family
Roots
Status
Self expression
Violence

Cultural approach to eco-housing

Lama Foundation, New Mexico, USA

Dignity Village, Portland, USA

- Eco-housing can challenge social conventions
- The growth of eco-housing needs to be accompanied by a cultural shift in how we perceive a home
- There are dynamic relationships between physical structures and individual behavioural practices, culture, history and place, which we need to understand and accept if we are to expand eco-housing

How do houses challenge conventions?

- being smaller than conventional housing
- requiring people to share space
- can be less robust than brick or concrete constructions
- require more maintenance
- require more manual operation

- Need to understand the diversity in what people consider ‘normal’ for a house

Eco-housing challenges our conceptions of home


Green Hills, Scotland


La ecoaldea del Minchal, Spain

- Eco-building will only be adopted if it offers what people demand from a house and that they can live how they want to within it

- Eco-houses need to be designed to meet needs but also to re-conceptualise what needs it is desirable to meet, and what needs are too environmentally costly. This involves challenging social conventions

Example 1: Comfort

Bathrooms in eco-houses in Spain, USA and Thailand

- The problem is that houses without bathrooms challenge social norms
- What is missing from these eco-houses is not cleanliness, but rather the comfort and leisure of bathing that social norms demand
- We use bathrooms to satisfy multiple demands - cleanliness, health, comfort and convenience
- Potential intervention into challenging what is considered normal and what a house should provide
- Ensure that people are not asked to forgo too much and that low cost eco-housing is not perceived to be too basic and somehow lacking the essentials of a home

Importance of bathrooms

- Eco-houses in Spain, Thailand and the USA had prioritised the importance of building good bathrooms with hot water—using solar or propane

- This contrasted with examples in Britain where bathrooms were often the last to be built (and were often unfinished) and few communities had ready access to hot water

- Different priorities are most likely cultural but they serve to reinforce the unhelpful perception that eco-houses are less comfortable to live in

Example 2: Aesthetics

Earthship, Taos, New Mexico, USA

Finding compromise?

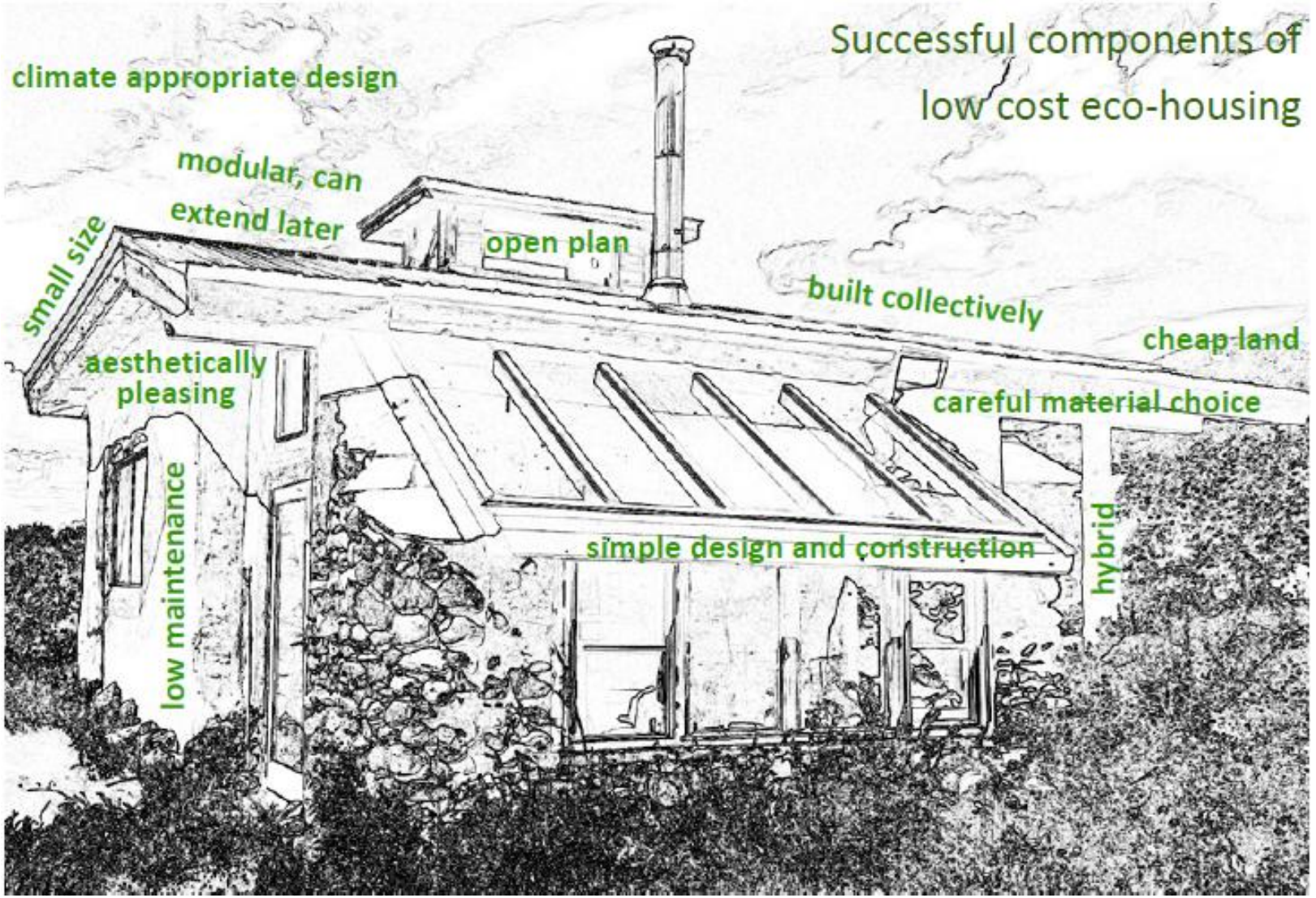
- The most successful examples of eco-housing negotiate the tensions between ecological impacts and the purpose and cost of comfort, privacy, size of dwelling, and time-saving electronic devices
- Living in an eco-house need not mean a spartan existence
- A good eco-house is actually more comfortable—with more even internal temperatures through well balanced passive heating or plentiful hot water through solar thermal panels

How we live in houses

1. What room do you spend most time in?
2. Are there rooms you do *not* use daily?
3. Are all your rooms heated to the same temperature?
4. Would you like an extra room, and if so what would it be?
5. What is the most frustrating thing about the layout of your current house?

What are the environmental implications of this?

- Wasted energy in rooms you do not use
- All rooms do not need to be same temperature (bedrooms less)
- Housing not suiting our needs
- Heat and cool air not flowing easily between rooms
- Not benefiting from heat from some areas like kitchen



What aspects are economic, political, and cultural?

What aspects are economic, political, and cultural?

Economic	Political	Cultural
Careful material choice	Cheap land	Simple design and construction
Built collectively?		Built collectively
Modular, can extend later	Climate appropriate design	Aesthetically pleasing
Hybrid	Hybrid?	Small size
Low maintenance		Open plan

How we study homes and housing

- Can take economic, political and cultural approaches to understanding homes and housing
- This influences both what questions we ask *and* what solutions we suggest
- Need to incorporate an understanding of all three AND environment
- Balance material structure with how people live in the space
- Complex and complicated but necessary in order to properly understand eco-housing

Lecture summary

- Why studying eco-housing is important
- Why our housing is not fit for purpose
- What eco-building is
- Different approaches to understanding buildings – economic, cultural and political
- Importance of case studies and examples
- Importance of context of place, climate and culture
- Living in an eco-house need not mean a spartan existence. A good eco-house is actually more comfortable

- NEXT WEEK: Politics of building

- Why is eco-housing important to environmental debates?

Key readings this week

- Kraftl, P. (2010) Geographies of architecture: the multiple lives of buildings, *Geography Compass* 4: 402-415.

- Klinker, S (2004) Shelter and Sustainable Development, in Kennedy, J, F (ed.) *Building Without Borders: Sustainable Construction for the Global Village*. New Society Publishers, Canada. Chapter 1

- Pickerill, J. (2011) We have to adapt culturally to climate change. *Leicester Exchanges blog*: http://leicesterexchanges.com/2011/02/25/we-have-to-adapt-culturally-to-climate-change/