



University of HUDDERSFIELD

University of Huddersfield Repository

Armitage, Rachel and Monchuk, Leanne

Reconciling Security with Sustainability: The Challenge for Eco-Homes

Original Citation

Armitage, Rachel and Monchuk, Leanne (2009) Reconciling Security with Sustainability: The Challenge for Eco-Homes. *Built Environment*, 35 (3). pp. 308-327. ISSN 02637960

This version is available at <http://eprints.hud.ac.uk/5694/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>

Reconciling Security with Sustainability: The Challenge for Eco-Homes.

RACHEL ARMITAGE and LEANNE MONCHUK

The importance of sustainable development is clear. The United Kingdom needs more homes, yet the impact upon the environment must be minimised. Planning policy has begun to reflect this challenge, and the Code for Sustainable Homes (albeit voluntary) sets standards to improve the sustainability of new homes and offers a tool for developers to differentiate themselves within the market, based upon their green credentials. Although there is no doubting the importance of sustainable development, it is essential to ensure that a step forward for the green agenda does not present a step back for crime prevention and designing out crime. This paper presents the findings from a recent project to establish the extent to which security and sustainability criteria might conflict. Through a detailed analysis of both planning and crime prevention policy, as well as a review of existing eco-homes throughout the United Kingdom, conflicts are identified and recommendations are made for aligning the two agendas.

There are many definitions of sustainability and sustainable development. One of the first and most oft-cited definitions of sustainability is that created by the Brundtland Commission, convened by the United Nations in 1983, and led by the former Norwegian Prime Minister Gro Harlem Brundtland. The Commission defined sustainable development as development that ‘...meets the needs of the present without compromising the ability of future generations to meet their own needs’ (UN Department of Social Affairs Division for Sustainable Development, 1987 p. 54). A review of the literature, however, suggests that this resource-based definition may fail to encompass the deeper meaning of sustainable development, which many see as creating places where people want to live and where people feel content. The Office of the Deputy Prime Minister (now Department for Communities and Local Government) document *Defining Sustainable Communities* (2005) states that sustainable communities are: ‘...places where people want to live and work now and in the future. They meet the diverse needs of existing and future residents, are sensitive to the environment, and contribute to a high quality of life’ (Office of the Deputy Prime Minister, 2005 p. 1).

Sustainable means capable of being maintained, therefore, development which requires extensive regeneration or even demolition due to design or policy errors, is not sustainable. As Hemingway (2007) highlights: ‘The main thing we want is places where we can live for a long time and don’t have to bloody regenerate. The fact that we’ve got regeneration departments in all our councils says that we fail and that we are unsustainable’ (Hemingway, 2007 p. 1-2). The importance of this view is supported by Edwards (2000) who contends that although we focus upon the production of carbon emissions and waste, we are failing to see the wider picture regarding sustainability. Although the figure that buildings contribute half of the UK total CO₂ emissions is often quoted, little is said about the fact that buildings generate sixteen percent of the nation’s waste in the construction phase. Therefore, a development which is not designed to last, which has to be demolished or regenerated, is failing to address the issue of sustainability. As Symes and Pauwels (1999) suggest: ‘The longer a building lasts, the longer the period of time over which the environmental impacts of building it can be spread’ (Symes and Pauwels, 1999 p.104).

Many authors have expressed concern that the sustainability agenda has become too closely focused upon environmental concerns at the expense of wider social issues such as education, health and, crucial to this paper, crime (Edwards, 2000; Cozens, 2002, 2007; Hemingway, 2007). Edwards (2000) expresses concern that the focus has been too closely placed upon energy and carbon emissions: ‘Energy efficiency is not the only issue with regard to housing, and for many tenants of social housing schemes, the priority is staying warm, living in safe neighbourhoods and keeping water bills down’ (Edwards, 2000 p. 20). According to Edwards, a more accurate definition of sustainability would be: ‘Housing that meets the perceived and real needs of the present in a resource efficient fashion, whilst providing attractive, safe and ecologically rich neighbourhoods’ (Edwards, 2000 p.20).

The present writers take the view that the sustainability issue has become too narrowly focused. Virtually all the aspects of life associated with local contentment will diminish unnecessary energy use. People will move less in pursuit of better schools or a less crime-challenged environment, thus avoiding the carbon costs of moving home. They will be less prone to stress-related disorders, thus reducing health service costs. They will be more prepared to walk or take public transport rather than driving their cars through fear of trouble on buses or pedestrian routes. Finding the area congenial will lead to a greater proportion of leisure time being spent locally.

Sustainability via Security

The line of argument set out above aligns the present writers with Poyner (1996), Cozens (2002, 2007), Du Plessis

(1999), Edwards (2000), Dewberry (2003) and Black (2004) in arguing that crime and the fear of crime are integral elements of the lack of sustainability, yet explicit reference to their reduction are rarely referred to in discussions of this issue. Cozens (2002) argues that ‘...the environmental movement may stand accused of ecocentrism’ and goes on to argue that ‘...the criminogenic capacity of the built environment has consistently been ignored within this conceptual framework’ (Cozens, 2002 p.130). Cozens (2007) argues that crime reduction alone will not necessarily contribute significantly towards sustainability objectives, yet the inclusion of such key issues will help to achieve what he refers to as a ‘...more holistic form of urban sustainability’ (p.193).

Whilst crime and the fear of crime are considered to be key elements in achieving sustainable development, many argue that current policy and guidance has failed to recognise the importance of these issues (Cozens, 2007), and that the focus upon environmental issues has been at the expense of wider concerns. Hemingway (undated) argues that the introduction of the Code for Sustainable Homes has led to a rush to score ‘eco-points’ at the expense of true sustainable development.

“The government has introduced the Code for Sustainable Homes, so expect to see more ‘rabbit hutches’ with solar panels *et al.* In fact, I am pretty confident that public realm, landscape and house design will suffer because of the rush towards scoring eco-points to get planning permission” (Hemingway, undated p. 1).

A brief review of the content of the Code for Sustainable Homes would support this point. The Code is a voluntary standard designed to improve the sustainability of new homes by setting a single framework which can be used to measure standards of sustainable design. It measures the sustainability of a home against the nine categories of: Energy and CO² emissions, Water, Materials, Surface Water Run-Off, Waste, Pollution, Health and Wellbeing, Management and Ecology. Each category is weighted and assigned mandatory or non-mandatory status according to its importance in contributing towards the production of a sustainable home. Unfortunately, although the Code states that: ‘The sustainability rating which a home achieves represents its overall performance across nine Code design categories’ (Department for Communities and Local Government, 2008 p. 7), the nine categories are not given equal importance and security, which is located within the management section, is both non-mandatory and relatively low-scoring.

The Code for Sustainable Homes

The Code for Sustainable Homes uses a rating system of one to six stars - one star being entry level (thirty six points) and six stars being the highest level of sustainable design (ninety points). The four mandatory issues for which no credits are available (environmental impacts of materials, management of surface water run-off from developments, storage of non-recyclable waste and recyclable household waste and construction site waste management) must be met to achieve a minimum one star rating. Two further issues are mandatory, but do receive credits – these are dwelling emission rate and indoor water use. With the exception of these mandatory standards the Code is flexible and developers can choose how they make up their credits. The credits awarded for each category vary and each credit is weighted dependent upon the section to which it applies. For example, for standards included within the Health and Wellbeing category, credits are weighted at 1.17 points. Therefore, compliance with, for example, the daylighting criteria contained within this section will contribute 3.51 points (three multiplied by 1.17) towards the thirty six points required for one star - up to ninety points required for six stars. In the Water section, credits are weighted at 1.50 points per credit; Ecology standards are weighted at 1.33 points per credit, Energy and CO² Emissions at 1.26 and Management (the section in which security is included) at 1.11 points per credit. Categories weighted at less than 1.11 (thus considered to be less important than security), include Waste (0.91), Pollution (0.70), Surface Water Run-Off (0.55) and Materials (0.30). The Code states that the weighting system is based upon ‘...extensive studies involving a wide range of stakeholders who were asked to rank...a range of environmental impacts’ (Department for Communities and Local Government, 2008 p. 12). This suggests that these stakeholders would consider security (which is based within the management section and therefore weighted at 1.11 points per credit) to be less important in achieving sustainable development than categories such as Water, Health and Wellbeing, Ecology and Energy and CO² Emissions.

The main reference to crime reduction or security within the Code can be found within the Management section. A maximum of two credits (weighted at 1.11 per credit) are available for security. Two credits (2.22 points) are obtained where an Architectural Liaison Officer (ALO) or Crime Prevention Design Advisor (CPDA) from the local police force is consulted at the design stage and their recommendations are incorporated into the design of the dwelling and by complying with Section Two (Physical Security) of SBD New Homes (an actual SBD certificate is not required).

Secured by Design (SBD)

Although there are many different methods of crime reduction, it is the SBD scheme (and the advice associated with ALO or CPDAs) which the Code recommends as a tool for maximising the security of a property. SBD is a UK based initiative, managed by ACPO Crime Prevention Initiatives Ltd. (ACPO CPI Ltd.), which aims to encourage the

building industry to design out crime. SBD was devised in 1989 by police forces based within the South East of England, with the aim of countering the rise in household burglary (Pascoe and Topping, 1997). SBD includes both the Developers' Award and Licensed Products. The Developers' Award is a certificate given to building developments which are built to the SBD standard. That is, following consultation with the police ALO or CPDA, the development is deemed to conform to the appropriate ACPO guidelines. SBD guides exist for a variety of buildings and spaces including new homes, refurbishments, sheltered accommodation, multi-storey dwellings, car parks, railway stations, caravan parks and play areas. Although the SBD scheme requires the input of a variety of agencies such as local authority planning departments, registered social landlords (RSLs) and architects, it is managed and promoted primarily by the police. Each police force has a number of ALOs or CPDAs who work in consultation with these different agencies to ensure that as many developments as possible are designed and built (or refurbished) to the SBD standard. It is the responsibility of ALOs and CPDAs to assess planning applications from a security perspective and to work with developers to attempt to address any design weaknesses which emerge.

The principles of SBD draw largely upon the New Opportunity Theories of crime (Routine Activity Theory, Rational Choice Theory and Crime Pattern Theory) and upon crime prevention measures such as situational crime prevention (SCP) and crime prevention through environmental design (CPTED) which assume that crime is a response to opportunity, therefore removing the opportunity can reduce crime. These theories also place an emphasis upon the role of the environment in creating or impeding these opportunities. The principles of SBD fall largely into the following categories:

- Physical Security: SBD sets standards of physical security for each property and its boundaries.
- Surveillance: SBD estates are designed to achieve maximum natural surveillance without compromising the need for privacy.
- Access/Egress: SBD estates are designed to include a minimum number of access/egress points in an attempt to avoid unnecessary entry onto the estate by non-residents and potential offenders.
- Territoriality: In an attempt to achieve maximum informal social control, SBD draws upon Newman's principles of Defensible Space (Newman, 1973). If space has a clearly defined ownership, purpose and role, it is evident to residents within the neighbourhood who should, and more importantly who should not be in a given area.
- Management and Maintenance: SBD estates should have a programmed management system in place to maintain the area. This includes the removal of litter and graffiti.

There have been three evaluations of the effectiveness of the SBD scheme (Brown, 1999; Pascoe, 1999; Armitage, 2000) each concluding that SBD confers a crime reduction advantage. In addition to evaluating the effectiveness of the scheme as a crime reduction measure, several studies have established that the scheme is cost-effective (Armitage, 2000; Association of British Insurers, 2006) - the ABI concluding that implementing the scheme would yield benefits of over £1170 per household – a net saving of £540 (with the scheme costing an additional £630 per homes). The ABI report suggests that over a period of 20 years, the introduction of SBD would generate more than £3.2 billion of savings to the economy as a whole.

As well as evaluations of the scheme as a whole, there is an abundance of literature to show that the principles upon which SBD is based, each work to reduce crime, disorder and the fear of crime – increasing physical security (Brown and Altman, 1983; Cromwell and Olson, 1991), minimising access (Brantingham and Brantingham, 1975, 1993, 2000; Brantingham *et al*, 1977; Brown and Altman, 1983; Newlands, 1983; Greenberg and Rohe, 1984; Cromwell and Olson, 1991; Bevis and Nutter, 1997; Mirlees-Black *et al*, 1998) and increasing surveillance (Repetto, 1974; Brown and Altman, 1983; Cromwell and Olson, 1991; Brown and Bentley, 1993).

Research Questions

This paper presents the findings of research conducted in 2008 and funded by ACPO CPI. ACPO CPI manages the SBD initiative which all evaluations have identified as being successful in reducing crime relative to homes not so designed. Keen to marry their security success with sustainability standards, ACPO CPI commissioned this research with the aim of establishing the extent to which security and sustainability criteria might be in tension, or be mutually reinforcing.

The main objectives of the research were:

- To review existing literature relating to security/crime reduction and to assess the extent to which SBD design guides reflect current research.

- To identify potential points of tension and synergy between security and sustainability.
- To establish the extent to which SBD and sustainability guides may be revised and where necessary reconciled.

Methodology

The project utilised a variety of different methods to collect the data presented within this paper. These were:

- **A field trip to Freiburg, Germany to gather perceptions of existing eco-towns and to set the research in context.**
- **A review of the literature relating to crime reduction and sustainability.**
- **Interviews with key personnel from agencies such as the Department for Communities and Local Government (DCLG), the Commission for Architecture and the Built Environment (CABE) and the Eco-Towns Expert Panel.**
- **Consultation with an Expert Group designed to elicit tensions and synergies between the Code for Sustainable Homes and the SBD New Homes Design Guide.**
- **Review of Case study areas where there had been noteworthy issues relating to the two agendas of sustainability and security.**

Field Trip to Freiburg, Germany

In an attempt to gather perceptions of existing eco-towns and to set the research in context, the authors (as well as ACPO CPI team) visited the towns of Vauban and Rieselfeld in Freiburg, Germany.

Literature Review

Government policy and academic literature were reviewed in attempt to identify any areas of tension/pinch points as well as synergies between the two agendas.

Interviews with Key Personnel

Interviews took place with key personnel from the DCLG, CABE and the Eco-towns Expert Panel (interview schedules are available from the authors). A further three individuals were contacted and asked to take part, but were unable to complete the questionnaire or conduct an interview (these were two further contacts from the DCLG as well as English Partnerships). The interviews were designed to elicit views relating to:

- **Defining sustainability.**
- **The Code for Sustainable Homes.**
- **SBD.**
- **Building for Life.**
- **Eco-Towns.**
- **Tensions/pinch points and synergies between sustainability and security.**
- **Aligning the two agendas.**

Interviews took place either face-to-face (CABE), via telephone (Eco-Town Expert Panel) or electronically (DCLG). Although face-to-face was the preferred method, this was very much reliant upon individual availability, and where this was not possible, the research team were satisfied to utilise alternative methods.

Consultation with Expert Group

The consultation with experts within the field of crime reduction, planning, design and sustainable development was designed to identify any potential tensions or synergies between the Code for Sustainable Homes and the SBD New Homes Design Guide.

Experts were identified using a snowball method starting with the ACPO CPI Regional

Officers, who were asked a) if they were willing to take part, and b) if they could name three other experts within the fields of planning, design, crime reduction or sustainable development. A period of three weeks was set aside to recruit members of the group. Individuals who were recommended as experts were contacted via e-mail or telephone to a) explain the project and b) ask if they were happy to take part. Once this period had ended, further individuals could only be added to the group if they were happy to complete the questionnaire within a shorter period of time – to meet the tight timescales.

Individuals who agreed to take part were contacted via e-mail or telephone to introduce them to the project, to verify their agreement and to advise them that taking part would not involve travel commitments, but that the questionnaire was fairly extensive and would require approximately one day of their time to complete (a copy of the questionnaire is available from the authors). The questionnaire was sent electronically with a covering e-mail re-iterating the aims and objectives of the project, the task they were asked to complete and the date by which the questionnaire needed to be returned. Participants were also sent an electronic copy of the SBD New Homes Design Guide and a link to the Code for Sustainable Homes and associated Technical Guide (sending these documents electronically was prohibited by file size restrictions on many participants' inboxes, particularly those from the police).

Participants were given a period of two weeks to complete the questionnaire and asked to return the completed questionnaire electronically, or by post. Participants were advised that, should they have any queries, they should contact the research team. Approximately one week prior to the deadline, a reminder e-mail was sent to all members of the group with details of the date by which the questionnaire should be returned. Individuals who did not return the questionnaire by the deadline were sent another reminder e-mail asking if they required additional time. This allowed a further number of individuals who had been restricted by the deadline to return their questionnaire. Those participants who did not ask for an extension and did not return the questionnaire were sent several reminders until the stage where time would not allow their inclusion. To this end, it is suggested that every step was taken to accommodate as many participants as possible.

Fifty-six individuals were asked to take part in the expert group consultation. Thirty-six individuals agreed to take part and sixteen completed and returned the questionnaire. Of the sixteen participants who responded, ten were ALOs or CPDAs, one was a Regional Development Officer for ACPO CPI, one was a designer and four were academics specialising in either crime, design or sustainability.

Review of Case Study Areas

As well as eliciting views regarding potential tensions and synergies between the two agendas of sustainability and security, the research team also wanted to investigate the actual experiences of those working on the ground through a review of case study sites. The research team initially aimed to select ten case study areas – two from each of the areas covered by each ACPO Regional Development Officer. However, this method proved to be more difficult than first envisaged. Therefore a snowball method was used, whereby one case study area was selected, then individuals from that area were asked to identify other noteworthy sites. The criteria for inclusion was that the site had to have experienced either tensions between the two agendas of sustainability and security, or have found that the two agendas were mutually reinforcing.

For each case study site, the research team visited the site with key individuals from either the police (CPDA/ALO), the planning department and or the housing association. Where possible, and in most instances, all three representatives were interviewed together (a copy of the interview schedule is available from the authors). Below is a brief summary of each of the case study areas. It should be noted that the identities of each site have been anonymised to protect the confidentiality of individual participants.

Case Study Site A (West Midlands)

Designed in 2003, case study site A is part of the English Partnerships programme and is jointly owned by English Partnerships and the local Borough council. This development is still under construction and is being built on a thirty-five hectare brownfield site. Owing to the site previously consisting of predominantly mineshafts, the site had to undergo a series of mineshaft treatments before development could commence. There are also a large number of newts living in area; therefore 'green' areas are evident throughout the development. Built by Taylor Woodrow, this development, when completed, will consist of around 675 homes, small offices, retail outlets and leisure services and will be a mix of different housing types and tenures. Thirty per cent of the housing will be affordable housing and managed by the Beth Johnson Housing Group. This development aims to achieve EcoHomes Excellent (in April 2007 The Code for Sustainable Homes replaced EcoHomes as a means of assessing a property's level of sustainability) and the Housing Association are also working towards obtaining SBD accreditation.

Case Study Site B (North England)

Built in 2006, case study site B, was designed and developed by Yorkshire Housing Association. This area had previously consisted of local authority housing that was proving hard to let. The area was also renowned for its high crime problems and was known to locals as 'Death Row'. The area was therefore identified for re-development by the local council. The development consists of a forty-eight flats (eight are for Shared Ownership) and thirty-one houses (twelve are for Shared Ownership). The development has achieved EcoHomes Excellent, but has been unsuccessful in obtaining SBD accreditation.

Case Study Site C (South England)

Completed in 2002, case study site C is managed by the BioRegional Development Group. Case study site C is the largest carbon-neutral eco-community in the UK. The development is built from natural, recycled or reclaimed materials and relies on renewable energy. This development has a strong emphasis on roof gardens. The development is of mixed-tenure and mixed-use and comprises of eighty-two residential homes – thirty-four for outright sale, twenty-three for shared ownership, ten for key workers and fifteen at affordable rent for social housing. Case study site C was the first development in the UK to incorporate a car club scheme, in an attempt to promote car sharing. Case study site C was awarded EcoHomes Excellent in 2004, but did not seek SBD accreditation.

Case Study Site D (North East England)

Case study site D is located in North East England and is being developed by George Wimpey and Hemingway Design. The aim of this development was to prove that affordable, but yet sustainable homes can be built on a large scale and can differ from other generic large-scale developments. Once completed, case study site D will consist of 777 homes. Phase one was completed in April 2005 and consists of 158 homes. Case study site D was awarded a silver Building For Life Award in 2005 and is the first HomeZone scheme in the UK. The development has not considered SBD accreditation.

Case Study Site E (North England)

Case study site E was selected for re-development by the local market renewal programme as the area was made available following the clearance of former properties. The development, completed in July 2008, consists of seventy-one homes. These are a mix of two, three and four bedroom two storey family houses and two bedroom bungalows. This reflects the housing needs of the local community. It is a mixed tenure development with forty-five homes for rent and twenty-six for Homebuy sale. This development has achieved an EcoHomes Very Good rating and is on course to be SBD accredited.

Case Study Site F (South England)

This development in the South of England consists of two flats. These flats are owned by the local housing association, and are the first homes to score Level five on the Code for Sustainable Homes. The flats consist of a number of sustainable elements. These include; solar panels; under-floor heating, triple glazed windows and a biomass boiler. This development has successfully received SBD accreditation.

Case Study Site G (East England)

Case study site G has been developed as part of English Partnerships' Millennium Communities Programme. Built on

a forty-eight and a half hectare brownfield site, this development is still underway. Once completed, the whole development will consist of 700 homes, with twenty-five per cent being allocated to affordable housing. Phase one was completed in 2006 and consists of flats and houses. This phase has been designated a HomeZone and has successfully achieved EcoHomes Excellent and SBD accreditation.

Case Study Site H (Midlands)

When completed, case study site H will consist of about 2,500 homes. Development started at case study site H a number of years ago and residents have been living in Phase one for approximately three years. Most of the houses within Phase one have achieved some form of EcoHome rating, with some being SBD accredited. Six homes within Phase one are extremely sustainable and are hoping to score level six on the Code for Sustainable Homes. These six houses are about to achieve SBD accreditation (part two only). The developers are seeking SBD Part two in order to earn the two points available in order to achieve level six rating. Some other parts of development have achieved a lower scoring in the Code for Sustainable Homes and achieved SBD accreditation.

Key Findings

The consultation with the expert group, interviews with key personnel and case study visits revealed several key findings relating to tensions and synergies between sustainability and security, key issues relating to the content and format of the Code for Sustainable Homes and SBD New Homes Guide and issues relating to the process of developing secure yet sustainable homes.

Tensions/Pinch Points between Sustainability and Security

Although the research found many synergies between the general aims of sustainability and security, there were several specific tensions or pinch points identified by both the case study visits and the expert group consultation.

Orientation

One of the main problems identified through the interviews, consultation with the expert group and the case study site visits was that of orientation. Case study site B perfectly illustrates many of the issues arising from problems with the orientation of developments. The photo below (figure one) highlights the positioning of rooms within the development and can be used to demonstrate some of the problems.

The building is generally orientated in a southerly direction to ensure that maximum sunlight is captured by the solar panels and the large living room windows which face out onto the communal (semi-private) gardens.

Figure One: Case Study Site B

Although the large southerly facing living room windows meet both sustainability and security needs - by maximising surveillance over the semi-private gardens and capturing light and heat from the south, the small north facing windows may act to reduce heat loss, but their positioning has serious security implications. By positioning the rooms to ensure that the living room is at the south (but rear) of the property, the north facing front windows which face onto the front door, the deck access, the car parking and the entrance to the development, are not only small - thus minimising surveillance, they are also the rooms from which residents are less likely to spend time naturally surveilling the area.

'In a way when you are stood at the development looking in, you are stood at the backs... it means that to some extent the development has turned its back on these areas out here, so the cars are vulnerable [ALO, Case Study Site B].

Figure Two: Metal Posts at Case Study Site B

Deck access

Another tension identified (in particular at case study site B) was the use of decking - supported by metal posts, which was used by the developers as a means of maximising daylight and to reduce the use of less sustainable materials.

One of the main concerns regarding this design was that the metal posts were being used by offenders to access the upper floors to either break into the properties or simply to congregate.

'...they [offenders] were using the column areas to climb up and get in via the first floor doors and then in bad weather, they were congregating in the lobby areas and doing the usual anti-social behaviour' [ALO, Case study site B].

The lack of consideration for security at the design stage had led the Housing Association to seek retrofit solutions such as applying anti-climb paint to the metal posts.

As well as providing access via the metal posts, a second concern was that the deck access was acting as a shelf to block sight of both the car parking and the main entrance to the development.

'The presence of these [balconies] of course limits surveillance out anyway because even if you were in your bedroom looking out, this is like a shelf thing that covers most of the car park' [ALO, Case Study Site B].

Figure Three: Decking at Case Study Site B

The final concern with the deck access was that it brings the public very close to the flat doors and windows – effectively acting as a public footpath running right outside these properties. This problem is compounded by the fact that the flats are designed ‘back to front’ so the windows which look out onto the decks, the car park and the road accessing the flats are the bedroom and kitchen windows. As the ALO highlighted, these windows are small and do not allow sufficient surveillance over this walkway. The kitchen and bedroom windows are also those which residents are likely to leave open to vent the property. This has again caused problems with burglars gaining access through these windows.

‘So when the weather is warm you vent that window but in effect, it feels like you are venting it onto a public footpath with people walking straight past’ [ALO, Case Study Site B].

As was highlighted by the Housing Association, the open decks were a key part of achieving sustainable design. Not only do they provide an open feel which encourages exchanges between residents, they are also light (thus cutting down on the need for lighting) and require less concrete than internal corridors.

Car parking

One of the issues raised at many of the case study sites was the problem of car parking. Sustainable development aims to reduce reliance upon the car and create car-free zones where children can play safely. SBD prefers to have parking within the curtilage of the property, allowing maximum natural surveillance from residents.

‘Case study site D is a Home Zone, that means that the streets are places for kids to play and for people to walk and talk and cycle and not car dominated. When we said that we weren’t going to allow cars to park outside people’s front door but they were going to be slightly remote of people’s houses to keep the streets free of cars, the police said, well you can’t do that. We love what you are planning to do in terms of what you want, this interaction, but if people don’t have a car in front of their house it will lead to car crime and people will come on and break into cars’ [Case Study Site D].

This conflict in views had led to some tensions between the key agencies involved.

In an attempt to ensure that Phase one of the development at case study site G became a designated HomeZone area and to ensure that cars could be observed by residents, provision for car parking was heavily discussed by the police and council.

‘When we first started working on this application, SBD had never dealt with this concept before [HomeZone] so there was an awful lot of Dutch trading to get that achieved. The thing that we found the most difficult to resolve really was parking issues. What we tried to achieve was that the person whose car it was could see it from their home – which is what people want isn’t it? And I think we got upto about 75 – 80% where we were able to achieve that and with about 20% they couldn’t, so they resolved that with a camera. So the person could switch onto a channel on their

telly and see their car' [ALO, Case Study Site G].

Several participants also raised the issue that limited car parking can lead, or had led, to confrontation between neighbours.

Cycle storage

Part of the sustainability agenda is to move people away from solely relying upon car use, and to encourage people to use public transport and bicycles. Obviously, to encourage the use of bicycles, safe, secure and convenient cycle storage is required. One of the main tensions identified regarding cycle storage was that the Code for Sustainable Homes awards two points for the provision of cycle storage within the boundary of a property. However, if the cycle has to be carried through the house to exit the boundary of the property (or through the house to enter the storage area), then the two points are forfeited. The two points can only be achieved if access from the cycle store to a public right of way is not through the dwelling. In effect, this means that to achieve those two points, developers of terraced properties have to introduce a footpath/alley to allow access to storage at the rear of the property. Rear access is not recommended by SBD and research suggests that the presence of a gate leading from a rear footpath into a rear garden is the environmental factor most likely to predict prior burglary amongst residential properties (Armitage, 2006).

Lighting

One of the more common tensions identified was that of lighting. Many highlighted how SBD is keen to maximise lighting, whilst sustainable development aims to minimise the energy used by lighting. One of the main concerns/tensions specifically arising from the lighting section of the Code for Sustainable Homes was that a default point could be awarded if no external security lighting was installed. Within the Code, one point is awarded where security light fittings are designed for energy efficiency – with a maximum wattage of 150W and movement detecting control devices and daylight cut-off sensors or timers. However, where no security lighting is installed, a default of one point can also be awarded. Therefore, a developer who complies with the rigorous standards set out above would be awarded the same number of points as a developer who did not install any security lighting. In this instance, why would any cost-conscious developer opt to install security lighting?

Ecology

The issue of planting was raised on several occasions at case study site visits. Participants had very different views about planting, with ALOs often keen to ensure that the SBD one-metre rule was complied with, whilst others felt that the shrubs and trees had a positive impact upon the area. One participant felt that SBD always assumes the worst-case scenario - what can go wrong, rather than what is likely to go wrong.

'And also they [ALO] said: well, you can't have streets that have got lots of greenery and bushes on them, because people will hide behind them! So there is kind of a gap between liveability and SBD and often by the very nature SBD looks at the worse scenario and kind of takes its lead from places that have kind of gone wrong' [Case Study Site D].

Many respondents expressed the view that the importance of ecology was taking precedence over security issues. Examples included the view that hedges above one metre are deemed more ecological than those not so, whilst SBD requires hedging to be below the one metre level. Other concerns related to the provision of movement routes for wildlife, which may affect the integrity of fences and lighting and the promotion of native species of plants and hedges to attract wildlife, with SBD stating that the selection of plant species should focus upon minimising the impact upon natural surveillance and avoiding unnecessary management requirements.

Permeability

As was alluded to within the introduction to this paper, one of the major concerns surrounding the sustainability and security debate is that of permeability (or through movement) – specifically the tension between limiting access (from a security perspective) and encouraging through movement, walking and cycling (from a sustainability point of view).

However, although this issue has been much debated over the last decade (Fairs, 1998,; Stungo, 1998; Summerskill, 2000; Armitage, 2006a, 2006b) and was frequently raised in interviews with key participants, case study visits revealed that, in practice, this issue was not problematic. Although the potential tension between the desire to maximise through movement (to encourage walking and cycling) yet minimise access and egress (by misusers of the development) had arisen at all case study sites, the problem had either been resolved through early dialogue, or where tensions had not been resolved, the presumption of future crime problems had not transpired. The photo in figure four (below) reveals how case study site D had managed to maximise through movement whilst ensuring that properties retained private and semi-private space.

Figure Four: Through Movement at Case Study Site D

Synergies between Sustainability and Security

It should be highlighted that, as well as tensions, there were a large number of synergies/mutually reinforcing elements between sustainability and security. These included the focus upon sound insulation to minimise noise nuisance, the requirement to include private space, the focus upon home working and the emphasis upon security (SBD physical security) within the management section.

Several participants highlighted the benefits to surveillance of large light/heat capturing windows. Larger windows allow residents to survey the area as long as rooms are positioned with security considerations in mind. Participants also highlighted the synergy between the sustainability requirements for triple glazed windows and the benefits this would have in terms of security.

In terms of the reduction of noise nuisance, the Code for Sustainable Homes awards four credits if specified levels of sound insulation are incorporated into the dwelling. Participants welcomed the consideration for the reduction of noise related neighbour complaints, however, several raised concerns that an over zealous approach to achieving effective sound insulation could impact upon audio surveillance where crimes are taken place at neighbouring properties.

Summarising the Findings

The following section summarises the specific tensions/pinch points identified throughout this research. These are also summarised in table one (below)

Poor Design not Sustainable Design

The first point which the authors would like to highlight is that many of the tensions identified within existing developments, which had prevented that development achieving the SBD standard, were simply a result of poor design as opposed to sustainable design. Should these features have been removed or rectified, this would not jeopardise the sustainability of the development.

Defining Sustainability

The research raised concern that the definition and understanding of sustainable development has become too focused upon environmental issues at the expense of social sustainability. Many participants raised the issue that sustainable development is about creating places where people want to live, where they feel content and which will not need to be regenerated or demolished. It was highlighted within the literature review that the longer a development exists without regeneration or rebuilding, the longer the period of time over which the environmental impact of construction can be spread. Caution should be taken to ensure that policy does not deter from this wider meaning, and that developers are not simply scoring 'eco-points'. All premature refurbishment and regeneration, and all costs derived from moving home from crime-challenged areas, along with other health and transport consequences of resident discontent will be reflected in an increased carbon footprint.

Security within the Code for Sustainable Homes

The Code for Sustainable Homes (2008) states that: ‘*The sustainability rating a home achieves represents its overall performance across nine code design categories*’ (Department for Communities and Local Government, 2008 p.7). Yet, it is possible to score as high as Code six without even considering security. Consulting with the local ALO/CPDA and implementing their recommendations will provide two credits (2.22 points). This does not require the developer to gain a SBD certificate, but to meet the Physical Security standards of SBD. Given that these points are more easily gained through simpler, less costly and less time intensive measures (for example, installing a water butt!), it is unlikely that developers will select this as an option to score more points. The authors would recommend that security should be given more weight within the Code, or more favourably, become a mandatory category. It seems that sustainable communities are viewed as those which are safe and secure, yet a development can score six (the highest rating) on the Code for Sustainable Homes and do nothing to address security issues.

SBD and Sustainability – Specific Tensions

Deck Access

Deck access was selected by one developer/housing association for sustainability reasons. They felt that the materials (wood) were more environmentally friendly, that the open decks encouraged residents to mix and interact and that the open decks allowed natural lighting -avoiding the need for the use of more electricity. In terms of security, the ALOs felt that this design was not acceptable for several reasons. Firstly, the deck ran very close to the windows and doors, effectively creating a public footpath next to windows and doors. Secondly, the ALOs felt that the windows looking out onto the deck access were too small (because they were north facing) and did not provide adequate surveillance over the deck. Thirdly, that the windows opening out onto the deck (kitchen and bedroom) were the windows most likely to require venting and therefore be left open. The fourth concern was that the decks were built with metal posts providing access from the ground floor to the top floor. These posts were being used by offenders to climb onto the decks to access the flats and the atrium area. The final concern was that the decks acted as a shelf, shielding residents’ view of the car parking and the entrance to the building. Unless a resident stepped out onto the deck and looked over the edge, they would not be able to see the car parking or entrance area.

Orientation

To maximise natural light and minimise unnecessary materials and heat loss, sustainability aims to use small north facing windows and larger south facing windows. In terms of security, this posed a problem where north facing (and therefore small) windows were front facing - looking out over car parking and the entrance to the estate. This causes additional problems as sustainable development would encourage these north-facing rooms (with small windows) to be the rooms less likely to be inhabited in the daytime (and therefore require the least light). As one ALO described, these developments are effectively turning their back on the car parking and entrance area.

Lighting

The Code for Sustainable Homes currently awards a default of one credit (1.26 points) for NOT installing security lighting. In practice, this means that a developer gets the same points for installing security lighting which meets the strict guidance as they do for NOT including any security lighting at all. This is surely a disincentive to address security issues.

Permeability

Sustainable development encourages people to get out of their car and walk, cycle and play within the development. SBD prefers to limit through movement which can increase the ease with which offenders can enter and escape the area. Although permeability was raised as one of the most noticeable potential tensions between sustainability and security, in practice, this issues was either resolved through early dialogue, flexibility and communication.

Car Parking

Sustainable development prefers car parking to be away from properties so that children (in particular) can play in a car-free zone. Sustainable development also limits car parking spaces to discourage car use and encourage the use of public transport. In terms of security, this poses concerns. SBD prefers cars to be parked within the curtilage of the property or within a garage. Participants also raised concerns that limiting car parking spaces was causing disputes between neighbours.

Materials

It was suggested that SBD should consider whether the requirement for materials such as metal fencing is necessary and whether these could be replaced by timber - without jeopardising security. The research also raised the issue that some developers were purchasing eco-friendly windows from outside the UK, as these were not available in the UK. Although these windows were triple-glazed and perhaps as secure as BS7950 windows, they would not gain SBD because they were not British standard.

Surface water run-off

Several participants identified a tension between sustainability and security relating to surface water run-off. SBD recommends the inclusion of in-curtilage car parking, yet this promotes the use of paving directly adjacent to properties. This can reduce the opportunity for surface water run-off and increase the risk of flooding. It was suggested that SBD should promote the use of materials in front gardens that allow for dual use. For example, spaced out blocks which allow grass to grow and vehicles to be parked without affecting surface water drainage.

Planting

Within the Code for Sustainable Homes, hedges above one metre high are deemed to be more ecological than hedges less than one metre. This directly clashes with SBD which states that hedges should be kept to a maximum of one metre in height.

Cycle Storage

The Code for Sustainable Homes awards two credits for having cycle storage in the occupants' garden. To obtain these points, the access from the store to a public right of way must not be through the dwelling, otherwise the points are forfeited. This means that a developer wishing to gain points for cycle storage must either place the cycle storage at the front of the property (less likely), or include rear access to the properties. Rear access is not recommended by SBD. To ensure that rear access is secure (or more secure) it would require additional lighting, fencing and locks. This would require additional costs less likely to be accepted by the developer.

Sustainability and Security – Synergy

It should be highlighted that, as well as tensions, there were a large number of synergies/mutually reinforcing elements between sustainability and security. These included the focus upon sound insulation to minimise noise nuisance, the need to include private space, the focus upon home working and the emphasis upon security (SBD physical security) within the management section.

Table One: A Summary of the Main Tensions between Security and Sustainability

Tension	Security	Sustainability
Deck access	Deck access using metal support posts allows offenders to gain access to upper levels by climbing up the posts. It also creates a footpath directly in front of each property. Deck access can act as a 'shelf', obstructing the view of residents' parked cars.	Wood decking uses environmentally friendly materials. It also opens up walkways to encourage communication between neighbours and maximise natural light.
Orientation	Properties should be oriented to maximise natural surveillance. Rooms at the front of the property facing the car, entrance and street, should be those likely to be utilised throughout the day.	Orientation is often dictated by the need to maximise natural light. Southerly facing windows (irrespective of positioning within the development) are large; with small north facing windows to reduce the loss of heat.

Lighting	Windows should be large enough to allow surveillance. Security lighting encouraged.	One point is awarded for installing security lighting which meets strict criteria. However, a default of one point can also be achieved for not installing security lighting.
Car Parking	Preferably within the curtilage of the property.	Prefers parking to be away from properties to encourage use of outside space. Car parking spaces are limited to encourage the use of public transport.
Planting	Hedges should be below one metre in height.	Sustainable developments encourage planting with no restrictions on height.
Cycle Storage	Avoids the use of rear footpaths which can act as access and escape routes for offenders. Where footpaths or alleys are necessary, they should be overlooked and well lit.	The Code awards two credits for having cycle storage in the occupants' garden. However, to obtain these points the access from the store to a public right of way MUST NOT be through the dwelling. This requires the developer to include rear access from the public highway to the rear garden. The Code does not include recommendations for maximising the security of rear access points.

Discussion and Conclusions

The aims of this research were to identify tensions and synergies between security and sustainability and to establish the extent to which SBD and sustainability guides may be revised and where necessary reconciled. The methodology involved an extensive review of the literature relating to sustainability and security, consultation with experts to review the SBD New Homes Design Guide and the Code for Sustainable Homes, and visits to eight case study sites to investigate problems experienced in aligning the two agendas.

Through the review of the Code for Sustainable Homes and SBD New Homes Design Guides, experts were asked to thoroughly scrutinise two documents in an attempt to identify potential and real pinch points between the aims of sustainable and secure development. In addition, practitioners were probed regarding problems they had faced, tensions they had identified and conflicts they had experienced in principle and practice. This methodology may over emphasise the negative, but the aim was to identify as many problems as possible, thereby allowing these issues to be addressed at both policy level – through amending policy and guidance, and in practice – ensuring that the guides are correctly interpreted and implemented on the ground.

Although very specific issues were raised through the expert group and case study visits, no tensions were identified between the wider aims and principles of sustainability and security. One of the key findings of the research was that problems identified by practitioners attempting to develop sustainable and secure developments did not relate to tensions between the two agendas, but rather to either poor design or poor processes. To elaborate, the research did not identify any features of sustainable design which would prevent a development from achieving SBD. Equally, no features of SBD were identified which would make it difficult to achieve a high rating on the Code for Sustainable Homes. Achieving SBD does not prevent a developer from achieving high levels of sustainability. Achieving high levels of sustainability does not prevent a developer from achieving SBD. Developments which had failed to align the two agendas had failed because of poor processes – a lack of communication and consultation between key partners, not because a design feature which was essential for sustainability made it impossible to achieve a secure development (or visa versa). Common features of these developments were a lack of communication between developer/planning department and ALO/CPDA, a lack of flexibility by the ALO/CPDA and/or misinterpretations of the aims and principles of the two agendas. In contrast, developments which had met the requirements of both the Code for Sustainable Homes (or EcoHomes) and SBD had ensured that the ALO/CPDA was consulted at the concept/pre-planning stage, had excellent systems of communication (for example, basing the ALO/CPDA within the planning department) and had individuals who were able to see beyond their own remit, to understand the requirements of those working to a different agenda. As is highlighted by the following quote from the case study visit to case study site E (which received EcoHomes Excellent and SBD) the features of sustainable development do not necessarily have to increase security within a home, equally the features required by SBD do not have to reduce a development's impact upon the environment. The main aim is to achieve both goals even if this requires some element of compromise.

'I don't necessarily think, you know, this idea of trying to save rainwater or making a property retain more heat, having better windows for heat conservation and that will make any contribution to security but I think what you have to do is adopt the opposite view and say, well it may not help, but it is certainly not hindering either. If all the rainwater is retained and they are using sustainable materials and things like that but you can still factor security in, we should all pat one another on the back and be pleased by that' [ALO, Case Study Site E].

The specific tensions which were identified within the research can be resolved, but to do so, key individuals and agencies must ensure that policy

is aligned and that partners on the ground are able to compromise in the pursuit of secure and sustainable developments. Although revisions should be made to the SBD and Code for Sustainable Homes *products*, focus should also be placed on the *processes* involved, particularly those involved in achieving SBD. Problems of poor communication and a lack of flexibility between partners need to be addressed to ensure that sustainable and secure developments can be built. Although the production of guides and awards can go a long way towards ensuring that developments meet the aims of agendas such as security and sustainability, care must be taken to avoid a tick-box system where individuals become preoccupied with meeting set criteria, rather than thinking about the wider aims and principles. Whilst achieving SBD or Level six on the Code for Sustainable Homes are the most appealing outcomes, letting the completion of checklists jeopardise the wider principles of building desirable places to live is the least desirable outcome. Perhaps contentious but extremely valuable, this quote from an ALO at a development which achieved both SBD and EcoHomes excellent, summarises the philosophy that the ultimate aim is to build safe and secure developments which minimise the impact upon the environment, not building the most sustainable site which has given no thought to crime, or the most secure site which has given no thought to sustainability. The most important outcome is the production of a sustainable and secure development, not to achieve SBD at the expense of other factors.

'At the end of the day, I would rather take the council half of the way than try and take them 100% and finish with a zero' [ALO].

References

Armitage, R. (2000) *An Evaluation of Secured by Design Housing within West Yorkshire – Briefing Note 7/00*. London: Home Office.

Armitage, R. (2006a) Predicting and Preventing: Developing a Risk Assessment Mechanism for Residential Housing. *Crime Prevention and Community Safety: An International Journal*. Vol 8 (3), pp. 137-149.

Armitage, R. (2006b) Sustainability Versus Safety: Confusion, Conflict and Contradiction in Designing out Crime, in G. Farrell, K. Bowers, S. Johnson and M. Townsley (Eds.) *Imagination for Crime Prevention: Essays in Honour of Ken Pease*. Crime Prevention Studies, Vol. 21. Monsey, New York and Cullompton, Devon: Criminal Justice Press and Willan Publishing.

Association of British Insurers (2006) *Securing the Nation*, London: Association of British Insurers.

Bevis, C. and Nutter, J.B. (1997) *Changing Street Layouts to Reduce Residential Burglary: Paper presented to the American Society of Criminology*. Atlanta.

Black, A. (2004) The Quest for Sustainable Healthy Communities. Paper presented at the *Effective Sustainability Education: What Works? Why? Where Next? Linking Research and Practice Conference*, Sydney, Australia, 18-20th February, 2004.

Brantingham, P.L. and Brantingham, P.J. (1975) Residential Burglary and Urban Form. *Urban Studies*, 12, pp. 273-284.

Brantingham, P.L. and Brantingham, P.J. (1993) Environmental Routine and Situation: Towards a Pattern Theory of Crime. *Advances in Criminological Theory*, 5, pp. 259-294.

Brantingham, P.L. and Brantingham, P.J. (2000) *A Conceptual Model for Anticipating Crime Displacement: Paper presented at the American Society of Criminology Conference*. San Francisco.

Brantingham *et al*, (1977) Perceptions of Crime in a Dreadful Enclosure. *Ohio Journal of Science*, 77, pp. 256-261.

Brown, J. (1999) *An Evaluation of the Secured by Design Initiative in Gwent, South Wales*. Unpublished MSc. dissertation, Scarman Centre for the Study of Public Order, Leicester.

Brown, B.B. and Altman, I. (1983) Territoriality, Defensible Space and Residential Burglary: An Environmental Analysis. *Journal of Environmental Psychology*, 3, pp. 203-220.

Brown, B. and Bentley, D. (1993) Residential Burglars Judge Risk: The Role of Territoriality. *Journal of Environmental Psychology*, 13, pp. 51-61.

Cozens, P. (2002) Sustainable Urban Development and Crime Prevention Through Environmental Design for the British City. Towards an effective Urban Environmentalism for the 21st Century. *Cities*. 19 (2), pp. 129-137.

Cozens, P. (2007) Planning, Crime and Urban Sustainability. *Transactions on Ecology and the Environment*, 102, pp. 187-196.

Cromwell, P.F. and Olson, J.N. (1991) *Breaking and Entering: An Ethnographic Analysis of Burglary*. Newbury Park, California: Sage.

Department for Communities and Local Government (2008) *The Code For Sustainable Homes: Setting The Standard In Sustainability For New Homes*. Available at: <http://www.communities.gov.uk/publications/planningandbuilding/codesustainabilitystandards>. Accessed 04 June 2008.

Dewberry, E. (2003) Designing out Crime: Insights from Eco-Design. *Security Journal*, 16, pp. 51-62.

Du Plessis, C. (1999) The Links Between Crime Prevention and Sustainable Development. *Open House International*. 24 (1), pp. 33-40.

Edwards (2000) Sustainable Housing: Architecture, Society and Professionalism, in B. Edwards and D. Turrent (Eds.) *Sustainable Housing Principles and Practice*. London: E & FN Spon.

Fairs, M. (1998) End of Road for Cul-de-Sac. *Building Design*, 1373, p. 1.

Greenberg, S. and Rohe, W. (1984) Neighbourhood Design and Crime: A Tale of Two Perspectives. *Journal of American Planning Association*, 50 (1), pp. 48-61.

Hemingway, W. (2007) *Sustainable City Design*. Available at: http://www.hemingwaydesign.co.uk/html/wayne_talks.htm. Accessed 04 June 2008.

Hemingway, W. (undated) *Sustainability, And Low Carbon Footprints Aren't All About Solar Panels , Wind Turbines And Ground Heat Sources*. Available at: http://www.hemingwaydesign.co.uk/html/waynes%27s_mouthings.htm. Accessed 04 June 2008.

Mirlees-Black, C. et al. (1998) *The 1998 British Crime Survey – England and Wales*. London: Home Office.

Newlands, M. (1983) *Residential Burglary Patterns in a Vancouver Neighbourhood*. Unpublished honors thesis, Simon Fraser University.

Newman, O. (1973) *Defensible Space: People and Design in the Violent City*. London: Architectural Press.

Office of the Deputy Prime Minister (2005) *Defining Sustainable Communities*, London: HMSO.

Pascoe, T. (1999) *Evaluation of Secured by Design in Public Sector Housing – Final Report*. Watford: BRE.

Pascoe, T. and Topping, P. (1997) Secured by Design: Assessing the Basis of the Scheme. *International Journal of Risk, Security and Crime Prevention*, 2 (3), pp. 161-173.

Poyner, B. (1996) Crime Prevention and Sustainability. Paper Presented at 5th *International Seminar on Environmental Criminology and Crime Analysis*, Tokyo.

Repetto, T.A. (1974) *Residential Crime*. Cambridge, MA: Ballinger.

Secured by Design – New Homes Design Guide (undated). Available at: http://www.securedbydesign.com/pdfs/SBD_New_Homes_2007.pdf. Accessed 05 June 2008.

Stungo, N. (1998) Culs-de-sac hit the Skids. *Building Design*, 1377, p. 2.

Summerskill, B. (2000) How Brookside Boom Helped the Burglars. *Observer*, Sunday July 16, p. 16.

Symes, M., and Pauwells, S. (1999) The Diffusion of Innovations in Urban Design: The Case of Sustainability in the Hulme Development Guide. *Journal of Urban Design*. 4 (1), pp. 97-117.

United Nations Department of Economic and Social Affairs, Division for Sustainable Development (1987) Report of the World Commission on Environment and Development (The Bruntland Report). Available at: <http://daccessdds.un.org/doc/UNDOC/GEN/N87/184/67/IMG/N8718467.pdf?OpenElement>. Accessed 04 June 2008.