

# Factors affecting environmental attitudes and volunteering in England and Wales

**Working Paper as at 8<sup>th</sup> Nov 2010:  
Please do not quote without permission**

Craig Anderson, Duncan Lee, Gwilym Pryce\* and Michelle Taal

- Craig Anderson - [0701017a@student.gla.ac.uk](mailto:0701017a@student.gla.ac.uk)  
School of Mathematics and Statistics,  
University Gardens,  
University of Glasgow,  
Glasgow  
G12 8QW
- Duncan Lee - [Duncan.Lee@glasgow.ac.uk](mailto:Duncan.Lee@glasgow.ac.uk)  
School of Mathematics and Statistics,  
University Gardens,  
University of Glasgow,  
Glasgow  
G12 8QW
- Gwilym Pryce\*** - [Gwilym.Pryce@glasgow.ac.uk](mailto:Gwilym.Pryce@glasgow.ac.uk)  
School of Social and Political Sciences,  
25 Bute Gardens,  
University of Glasgow  
Glasgow  
G12 8RS
- Michelle Taal - [msmtmail@gmail.com](mailto:msmtmail@gmail.com)  
School of Social and Political Sciences,  
25 Bute Gardens,  
University of Glasgow  
Glasgow  
G12 8RS

\*contact author

*Word count: 7,169*

## **Abstract**

This paper investigates the demographic, social, political and religious factors that affect people's attitudes to the environment and their involvement in environmental volunteering in England and Wales, using data from four waves of the Home Office Citizenship Survey between 2003 and 2009. Approximately 14,000 people were included in each wave of the survey, with around 85%-90% of people having a positive attitude to the environment, while 7%-8% were involved in volunteering. The data were analysed using logistic regression models. Covariates included sex, ethnicity, age, income, education, religion and region. We found that positive attitude and volunteering increased up to the age of 65 before decreasing sharply. People on middling incomes between £20k and £60k were the most likely to have positive environmental attitude and activity. We found no evidence of behavioural change—the results on both environmental attitudes and volunteering remained stable across all four waves of the survey.

## Section 1: Introduction

Over the last ten years we have seen a rapid increase in the volume of research on environmental issues, as well as a corresponding rise in media coverage. Between 2001 and 2009, for example, there was a fivefold (fourfold) increase in the number of scholarly research publications on “climate change” (“global warming”)<sup>1</sup> and a sevenfold (fourfold) increase in the number of UK newspaper articles referring to “climate change” (“global warming”).<sup>2</sup> Even since 2003 there has been a 637% increase in the number of newspaper articles and a 343% increase in the number of scholarly papers on the theme of “climate change”.

The burgeoning publicity and research activity is likely the result of growing scientific awareness of the existence and dangers of climate change, which is reflected in the publication of major reports such as Stern (2006) and IPCC (2007). There have also been a number of large scale environmental disasters over the course of the decade (notably the 2004 Indian Ocean tsunami which killed over 200,000 people (BBC, 2005), Hurricane Katrina in 2005, and, more locally, the UK summer floods of 2007). In addition, there have been two major environmental summits: the World Summit on Sustainable Development in Johannesburg in 2002 and UN Copenhagen Climate Change Conference in 2009.

---

<sup>1</sup> We used the ISI Web of Knowledge database. Searching all subject areas, in 2009 there were 15,824 scholarly articles with the words “climate change” listed in the topic search field, compared with 3,415 articles in 2001, representing a 463% increase. Similarly, there was a 412% increase in the number of articles on “global warming” (from 931 articles in 2001 to 3,833 in 2009).

<sup>2</sup> The newspapers considered were The Guardian, The Times, The Sun, and the Daily Mail. Together, these papers published 8,918 articles in 2009 referring to “climate change”, compared with 1,324 articles in 2001, representing a 674% increase. Of these four newspapers, the largest rise (2,782%) in any one newspaper in the number of articles referring to “climate change” was for The Sun. Across all four newspapers, there was also a 212% (384%) increase in the number of articles referring to “environment” (“global warming”).

All this begs the question of whether there is any evidence that attitudes and behaviours of the UK general public towards the environment have changed. Certainly, Stern, 2006, and IPCC 2007 provides an unequivocal imperative for change—we have been warned that anticipated climatic changes could “transform the physical geography of the world. A radical change in the physical geography of the world must have powerful implications for the human geography—where people live, and how they live their lives.” (Stern, 2006, p.iv). But is there evidence that people’s attitudes and actions are any different as a result of such foreboding? Do the drivers of UK environmental attitudes and behaviour, in fact, have the same effect in 2009 as they did in 2003 (the latest and earliest years of our data)?<sup>3</sup>

The remainder of this paper is organised as follows: section 2 reviews the existing literature, identifying the major shortcomings and how we intend to address them; section 3 summarises the data used in this paper, and describes the methods of analysis used; section 4 presents the results of our study, and section 5 gives a concluding discussion.

## **Section 2: Drivers of Environmental Concern and Action**

There has been a large body of work over the last 40 years exploring the determination of attitudes and actions towards the environment. Four main categories of determinant have emerged: age, education, income/social class, race/ethnicity, and religion.

---

<sup>3</sup> That these questions are considered topical and important by UK policy makers is demonstrated by the recent establishment of a Lords Select Sub-Committee on Behaviour Change ([www.parliament.uk](http://www.parliament.uk)).

Age or birth-cohort effects are among the most commonly used variables in models of environmental concern. Of the eleven studies reviewed in Van Liere and Dunlap (1980), all reported predominantly negative Pearson correlation coefficients between age and environmental concern. A more recent study by Franzen and Meyer (2010) confirmed this effect, finding age to be a significantly negative driver of environmental concern in all four of their models. However, in other studies, such as Dietz et al (1998) and Steel (1996), the results are mixed or not statistically significant.

The confusion may be attributable to two separate processes at work: cohort effects and life-cycle effects. To analyse life-cycle effects we would need to follow a particular birth-cohort over time and observe how their attitudes towards the environment, and their propensity to engage in environmental volunteering, change over the life-cycle. Such effects need to be distinguished from the era into which one is born. More recent birth-cohorts may have different attitudes and behavioural patterns because they have been exposed to different social and environmental events. Malkis and Grasnick (1977), for example, proposed that the “youth movement” of the 1960s may have explained the greater levels of environment concern among those in the appropriate age range.

Unfortunately, most data sets in the literature (including our own) are cross-sectional, precluding the possibility of distinguishing between life-cycle and cohort effects. What we, and most previous studies, observe is the complex interaction of the two. This may, we argue, yield potentially non-linear effects. For example, one might expect environmental concern and action to initially rise with age as individuals’ exposure to socialisation and

capacity to empathise increase with progression to adulthood. However, although individuals at this stage in their lives have reached a degree of moral and ethical maturity, they are not yet “integrated into the ... dominant social order” (Van Liere and Dunlap, 1980, p.183). Because “solutions to environmental problems ... [threaten] the existing social order” it follows that young people will more readily “support environmental reform and accept pro-environmental ideologies” (Van Liere and Dunlap, 1980, p.183). Other things being equal (including cohort effects), this predisposition will wane over the life-cycle as individuals become more integrated into existing social structures. Such non-linearities are likely to be exacerbated by interactions with cohort effects. For example, environmental concern may appear to diminish and even reverse with age because older respondents in cross sectional data will represent earlier cohorts who, during their formative years, were exposed to a less environmentally engaged cultural context. We are not aware, however, of any study that has tried to model the non-linear effect of age on either environmental attitudes or volunteering.

Education is potentially an important driver of environmental awareness, and it is also of particular policy interest because, while government cannot (easily) change factors such as religion, age, ethnicity, or wealth distribution, it can intervene in the provision of education. Environmental processes are complex and difficult to understand, as are the data used to describe them. Intuitively, one would therefore expect greater levels of education to increase a person’s capacity to grasp the complex arguments surrounding environmental risk. Indeed, Franzen and Meyer (2010) find that years in

education have a positive effect on environmental concern, and this is consistent with most earlier studies (Steel 1996, Kanagy and Willits 1993).

Although few UK studies consider this effect, there is evidence that education may be a particularly strong driver for the British. Hayes finds that “the two most notable and consistent factors” in determining attitudes towards the environment in Britain are “educational attainment and particularly levels of scientific knowledge about the natural environment” (Hayes 2001, p.139).

Income and social class have also been put forward as key determinants of environmental concern. A possible theoretical justification is Maslow’s (1970) hierarchy of needs, which suggests that environmental concern and activism is perceived to be “something of a luxury which can be indulged only after more basic material needs (adequate food, shelter, and economic security) are met” (Van Liere and Dunlap, 1980, p.183). Low income households are likely to see such risks as low priority, given the pressing needs of paying the rent, finding stable employment, and bringing up children in difficult socio-economic conditions.

As with age, however, there may be countervailing forces at work which can lead to the net effect of income being non-linear. Rising income implies a higher opportunity cost of time, making wealthy individuals less likely (*ceteris paribus*) to be involved in environmental volunteering. If we combine this effect with Maslow’s hierarchy, we might postulate that high earners will have higher levels of concern about the environment, but not necessarily higher rates of volunteering. However, the wealthy may also be more strongly allied with the dominant social order and more resistant to environmental

ideologies and solutions that serve to undermine that order. That they can afford to consume more goods and services, means they have more to lose from lifestyle changes or policies that limit carbon emissions or waste.

High income households may also show less concern for the environment because they are better able to insulate themselves from the effects of environmental risks—they can afford insurance premiums and the costs of moving to, and living in, low-risk areas (Pryce et al 2011). Finally, the insulation of the rich from environmental risks and other social hazards such as crime and deprivation (evinced by the proliferation of gated communities), may lead to detachment and reduce empathy.

It is not apparent, *a priori*, at what levels of income these different effects will dominate. Again, we are not aware of any studies that make a thoroughgoing attempt at testing for and modelling non-monotonic effects.

Race and ethnicity effects are also commonly considered in studies of environmentalism. The results, however, vary across studies. Early studies (reviewed in Van Liere and Dunlap, 1980) found that black people had lower levels of environmental concern than white people. Subsequent research demonstrated the need to distinguish between attitudes and behaviour: greater ethnic differences were found for the latter but not the former (see review by Johnson et al (2004, pp. 161-162)). According to Dietz et al (1998), “the best evidence suggests that Blacks have a higher absolute concern for the environment than Whites”. This is confirmed by Dietz *et al*'s own finding based on US data, though the results of subsequent US studies have been

more ambiguous. Johnson et al (2004), for example, find that minorities have lower levels of environmental engagement (see also Sherkat and Ellison 2007).

These ambiguities are not helped by the fact that race effects have tended to be under-theorised—many studies do not even say why race is included in the model. Given the particularly high levels of racial segmentation and inequality in the USA, there are also questions about how representative US results on race effects are of other countries.

One theoretical justification for including race is that differences in world-views across ethnic groups could lead to different conceptualisations of human interaction with the non-human world. It is difficult, however, to anticipate what the effect will be of a dominant secular culture on the attitudes of minorities. For example, Johnson et al (2004, p.163) conclude that, “we have little understanding of how Asian environmentalism translates or manifests in the American context ... [T]he extent to which historical forces ... influence how Asian Americans perceive their relationship and responsibility toward the environment is not known”.

Another avenue for developing a theory of race is to apply the dis-engagement hypothesis, noted above with respect to age effects. Like young adults, ethnic minorities may be less integrated with the dominant social order, and therefore more open to environmental ideologies and solutions that threaten to undermine the *status quo*. On the other hand, applying Maslow's hierarchy of needs, might lead us to expect minority groups—particularly those that feel alienated and marginalised—to be *less* likely to be concerned about environmental issues which will seem remote in comparison with their

immediate challenges and concerns. Unfortunately, these countervailing theoretical forces appear to run in the opposite direction to the empirical findings of Sherkat and Ellison (2007), which suggest that being black has a negative effect on political environmental activism (contradicting the dis-engagement hypothesis) but a positive effect on private environmental activism (which appears to be at odds with the implications of Maslow's hierarchy).

Interest in the *Effects of Religion* has spawned an entire literature of its own. The debate was sparked by White's (1967) seminal article, which asserted that Western Christianity (as differentiated from other religions as well as other forms of Christianity) is 'the most anthropocentric religion the world has seen' (White 1967, p.1205), and a destructive force in the non-human world. In interpreting Genesis as setting humanity apart from the rest of creation, White traces an inevitable line to the devaluing of the non-human world and the destructive utilitarianism that characterises the attitude of modern individuals, corporations and governments. Interestingly, however, White sees it as both vital and possible that Christianity be reinterpreted, as the only way out of the ecological crisis. He asserts that other relationships with the world are possible within a religious worldview, citing the theology of Francis of Assisi as an ecological alternative.

White's controversial thesis has catalysed a long line of empirical research, predominantly North American. Early studies (such as Eckberg and Blocker 1989) tended to verify White's thesis, but more sophisticated and nuanced subsequent research has either found a positive or insignificant

effect (Kanagy and Willits 1993; Hayes 2001, Hayes and Marangudakis 2001).

The growing empirical evidence against White's thesis has been ascribed to theoretical weaknesses in White's understanding of Christianity, notably that it is limited to one aspect of creation theology whereas religion, and Christianity in particular, is a complex phenomenon that can be gauged and accounted for in many different ways (Eckberg and Blocker 1996, p.346). Indeed, some scholars have argued that it is not religion, but the lack thereof that is at the root of environmental problems. Northcott (1996, p.83), for example, cites the rise of instrumental views of nature as going hand in hand with the demise of the traditional Christian view of creation as the sphere of God's influence, and with the gradual secularisation of European civilisation, beginning at the close of the Middle Ages and reaching its lowest point in the modern secular individual. Hayes and Marangudakis (2001) likewise note that, given that atheists are often seen as representing the most utilitarian expression of the relationship between humans and nature, is it not possible that it is them, not Christians, who hold the most destructive view of nature? Northcott (1996, p.38) further asserts that, without a spiritual aspect, environmental protest cannot endure; that peace within the natural order requires an anchor, a spiritual sustenance in order to survive.

Further limitations of existing work on religion include (1) the failure to consider the effects of religions other than Christianity; (2) North American bias, and (3) a failure to consider changes over time. Regarding (1), sample sizes have often precluded empirical comparison of different faiths (many western surveys will contain only a small number of Hindus or Sikhs, for

example). Regarding (2), the UK—the focus of the present study—has a very different socio-religious make-up compared to the US (Hayes and Marangudakis 2000). The results from the USA studies are therefore significant but cannot be immediately translated to any other country, even where the same religions exist. With regard to (3), the dynamics of religious belief, there is anecdotal evidence of growing environmentalism among UK religious groups, to the extent that in 2009, UK politician, Roger Helmer, accused the Church of England of having "abandoned religious faith entirely and taken up the new religion of climate alarmism instead" (Stratton, 2009).

In addition to these five main categories of determinants, some studies have also suggested that gender is a potentially important determinant because "males are more likely to be politically active, more involved with community issues, and have higher levels of education than females, they will be more concerned over environmental problems" (Van Liere and Dunlap, 1980, p186). Others have reached the opposite conclusion on the basis that "males are more likely than females to be concerned about jobs and economic growth, and thus less concerned than females with protecting environmental quality" (op cit p.186). Van Liere and Dunlap (1980, p.191) find that the theoretical ambiguity is reflected in the empirical results and conclude that gender "is not substantially associated with environmental concern". More recently, Hayes (2001) used the 1993 International Social Survey Program's (ISSP) Environment survey to carry out a multi-national study into the effect of gender on environmental knowledge and attitudes in the United States, Japan, West Germany, East Germany, Norway, the United Kingdom and the

Netherlands, with around 1,000 respondents from each nation. The study showed that, while in each of these countries men have more knowledge of environmental issues, in the majority of countries there were no differences between the sexes in terms of attitude.

In summary, we identify five important limitations with respect to the existing literature:

1. Existing studies are predominantly US orientated and there is a need to expand the evidence base for other countries, including the UK.
2. Sample sizes in many existing studies are either selective (e.g. based on student questionnaires) or insufficiently large to study certain effects (particularly the effect on non-Abrahamic faiths).
3. Few studies examine whether effects have changed over time—most are based on a single year of data. A notable exception is Franzen and Meyer (2010), who compare the 1993 and 2000 waves of the International Social Survey Programme, but much has happened since the turn of the millenium and we are not aware of any recent inter-temporal comparisons.
4. The literature has tended to assume linear effects which may be an important oversight for variables such as age and income.
5. There are relatively few studies that compare, within a consistent methodological framework, the determination of environmental *attitudes* with the determination of environmental *volunteering*.

This study aims to address these shortcomings where possible:

1. we use UK data (Home Office Citizenship Survey of people in England and Wales);
2. our data has large samples (each wave of our survey contains around 14,000 people);
3. we use four years of data (2003, 2005, 2007, 2009) allowing us to explore whether the burgeoning media and research interest in environmental issues in recent years has translated into material effects in behaviour;
4. we use generalised additive modelling methods to trace out the non-linear effects of age and income;
5. where possible, we build separate models for attitudes and behaviour for each year of the survey, using the same variables and methods, estimating non-linear effects in both sets of models.

### **Section 3: Data and Methods**

Our study makes use of the Home Office Citizenship survey, which has been conducted biennially between 2003 and 2009. The survey is carried out in England and Wales, and gauges opinions and attitudes on a wide range of issues including the local community, volunteering, politics, rights, responsibilities and demographics. The survey is carried out via a face-to-face interview, with 14,057 (2003), 14,076 (2005), 14,095 (2007) and 14,917 (2009) respondents in each of the four waves. A summary of the response variables and the covariates used in our study is given below.

### 3.1 Response Data

Our aim is to investigate the factors that affect people's attitudes and behaviour with respect to the environment, which are measured by two separate response variables, one for environmental attitudes, and one for environmental volunteering. To identify attitudes, we looked at responses to the question:

*"To follow are things which some people feel should be the responsibility of every person living in the UK. Which, if any, do you feel should be the responsibility of everyone living in the UK?"*

for which one of the categories was

*"To respect and preserve the environment."*

For volunteering, we looked at responses to the question:

*"Which of the following groups, clubs or organisations have you been involved with during the last 12 months? That's anything you've taken part in, supported or that you've helped in any way, either on your own or with others. Please exclude giving money and anything that was a requirement of your job"*

for which one of the categories was

*"The environment, animals".*

Table 1 summarises the responses in each year of the survey. The question relating to attitude was not included in the 2007 or 2009 surveys, so we were unable to study attitudes from these two years. The table shows that the majority of people surveyed have a positive environmental attitude, with 85% (2003) and 93% (2005) responding positively from the two surveys. The majority of people answered this question, with only 7.4% (2003) and 0.6%

(2005) of respondents not providing an answer. It appears, however, that few people follow up this attitude by volunteering, with only 8% (2003), 8.4% (2005), 7.8% (2007) and 7.1% (2009) responding positively from our four surveys. Very few people failed to answer this question, with 0% (2003), 0.2% (2005), 0.1% (2007) and 0% (2009) having missing answers. These results suggest there has not been a change in public attitude or behaviour towards the environment over the timescale of the surveys, despite the increased media attention about environmental issues over the last few years.

### **3.2 Covariates**

Thirteen covariates were selected from the survey as being potential explanatory variables for our study. These covered the demographics of the respondents, measures of wealth and deprivation, religion, and measures of involvement in the community. Yearly income was available as a categorical variable, with 15 groups ranging between £0-£2499 and £100,000+.

However, in order to explore the non-linear effects of income, we treat it as pseudo-continuous, and take the midpoint of the category as the income value. The exception was the £100,000+ category, where a value of £100,000 was used. By converting income to a continuous scale we can allow its estimated relationship with our environmental response variables to vary smoothly as income increases. This would not have been possible if we had treated it as a categorical variable, because the estimated relationship with the environmental response would have been discontinuous at the category boundaries.

Figure 1 shows that the distribution of income over the survey population

is skewed, with most people earning between £10,000 and £30,000 and only between 0.5% and 1% of people earning £100,000+. The median income is consistent at around £15k over the years, but the upper quartile is lower in 2003 than in the other years, which may indicate a slight increase in wealth since 2003.

The other continuous variable that was available was age, and figure 1 also shows its distribution in each year. There is little difference in terms of age over the period of the surveys, with the median age being in the early 40s for each survey. There are almost no missing values for age (table 2), but the income variable has 4.4% (2003), 10.0% (2005), 13.5% (2007) and 12.6% (2009) missing answers.

The remaining covariates were categorical, of which the demographic measures included the respondent's sex, ethnic group ("White", "Black" or "Other") and marital status ("Single", "Married/Cohabiting", "Widowed" or "Divorced/Separated"). In addition to income, we measured social class by including occupation ("No Job", "Routine", "Intermediate" or "Management"). We also include educational attainment ("Degree", "Higher Education", "A Level", "Foreign or Unknown" and "Below A Level"). We were also interested in which religions people practiced, and the faith groups allowed in the survey were "None", "Christian", "Hindu", "Muslim", "Sikh" or "Other". This variable was created by combining the answers to two questions from the survey, one asking which religion a person belonged to, and another asking whether they actively practiced that religion. Two measures of community involvement were also available in our study, including a measure of how strongly the

respondent felt they belonged to their immediate neighbourhood (“Very strongly”, “Fairly strongly”, “Not very strongly” and “Not at all strongly”), and also a measure of whether the respondent had any involvement in local politics at any level (for example completing questionnaires or attending public meetings), as a binary Yes/No response. In addition to these, we had a covariate identifying which of 10 government office regions of England and Wales the respondent lived in, which are shown in figure 3. The regions are North East (NE), North West (NW), Yorkshire and Humber (YH), Wales (Wal), West Midlands (WM), East Midlands (EM), East of England (EE), South West (SW), South East (SE) and London (Lon).

These covariates also contained a small percentage of missing values in each wave of the survey, and these are again summarised in table 2. Missing values can occur for a number of reasons including refusal to answer, missed out by mistake or because the true answer was “Don’t know”. Apart from income and education there is no real problem with missing data in the covariates, because the percentages of missing observations are generally less than 1%.

### **3.3 Methods**

Each of the environmental responses is a binary variable, which has been coded as 1 for a positive response (i.e. the respondent has a positive environmental attitude or participates in environmental volunteering) and zero for a negative response. Therefore a logistic regression model is appropriate for these data, where the probability of a

person having a positive environmental response is related to both the categorical and continuous covariates. Each categorical covariate is modelled by a series of dummy indicator variables for all but one of the groups, with the last group being used as the baseline or reference category to compare the other groups against.

The continuous variables are modelled as having smooth non-linear relationships to the response, rather than naively assuming the relationships are linear. These smooth non-linear relationships are represented by penalised splines (Eilers and Marx, 1996), which is one of the standard statistical approaches for representing smooth non-linear relationships. This approach has the advantage that the shape of the relationship between each covariate and the response is specified by the data, rather than being forced to follow a pre-determined shape such as quadratic. The model is given by

$$Y_i \sim \text{Bern}(P_i)$$

$$\ln(P_i/1 - P_i) = \beta_0 + s_1(\text{age}_i) + I_i s_2(\text{income}_i) + X_{1i}\beta_{1i} + X_{2i}\beta_{2i} + \dots + X_{ni}\beta_{ni}$$

and is within the class of generalised additive models (Hastie and Tibshirani, 1990). In this model  $Y_i$  is the binary environmental response, while  $P_i$  is the probability of a positive environmental response. In addition,  $\beta_i$  are the regression coefficients for the dummy variables, and  $X_i$  are the covariates. The function  $s(\cdot)$  represents the smooth non-linear relationship between each of the continuous covariates and the environmental response. The smoothness of these functions depends on the number of degrees of freedom used, which can be specified by the investigator or

chosen automatically by optimising a data driven criteria such as Akaike's Information Criterion (AIC). The variable  $I_i$  is a zero-one indicator variable, which takes the value one if the income for person  $i$  is available and zero if it is missing. This variable is included so that people whose income is missing (the only covariate with a non-negligible amount of missing data) can still be included in the analysis, rather than having to remove them from the study population.

## **Section 4: Results**

### **4.1 Model Building**

Initially all covariates were included in every model except the measure of neighbourhood, which was removed from all models because it was not significant. All of the other covariates were left in as they were significant for at least one survey and response, and it was preferable to keep all models the same for ease of comparison. As previously described, an indicator variable, set at 0 for missing and 1 for present, was used to deal with the problem of missing data for income. This prevented the loss of the other data from respondents for whom we did not have income data. The continuous variables age and income were treated as smooth functions with 5 degrees of freedom, because it allowed fairly smooth but non-linear effects to be estimated.

We analysed the data on a complete case basis, by simply disregarding any respondents who had missing values. This is appropriate because the percentage of missing values is small, and hence should not

affect the substantive conclusions. For the environmental attitude response variable, this resulted in using 90.4% (2003) and 94.4% (2005) of the approximately 14,000 people in the survey, while for volunteering it is 97.2% (2003), 94.5% (2005), 93.7% (2007) and 94.1% (2009). All four years of the survey contained survey weights, which quantify the representativeness of the survey with regards to the total population of England and Wales. We therefore fitted all logistic regression models to the data with and without the survey weights, and compared the results. However, as no substantive differences were found from using the weights, the simpler unweighted results are shown here.

#### **4.2 Results - Environmental Attitude**

Odds ratios for each of our covariates are shown in table 3. Odds ratios measure the proportionate change in the odds of a person having concern for the environment as a result of a unit increase in the explanatory variable in question. In 2003, the sex of the respondent was not significant in terms of their environmental attitude, but in 2005 males were significantly less likely to care, with an odds ratio of 0.80 (that is, the odds that a male respondent in 2005 showed environmental concern was 80% of the odds for women).

In both years of the survey black people and people from other ethnic groups were less likely to have a positive environmental attitude compared to white people, with odds ratios ranging between 0.64 and 0.82 for black people and 0.55 and 0.68 for other ethnic groups. People who are married or cohabiting were more likely to have a positive environmental attitude than single people in both years of the survey. Divorced or separated people were

also significantly more likely than single people to care about the environment in 2003 (odds ratio of 1.23), but the effect was not significant in 2005.

People in management and intermediate jobs were far more likely to have a positive environmental attitude than people without a job, with the effect being greater in management jobs, where people were twice as likely to care (odds ratios between 2.02 and 2.09). In both years people with any form of education above GCSE were more likely to have a positive environmental attitude than those whose highest qualifications were GCSEs or below. The size of the effect becomes greater as the level of education increases, as people with degrees are more than twice as likely to have a positive environmental attitude compared to people with only GCSEs (odds ratio of 2.12 and 2.15). People who are actively involved in local politics are also more likely to care about the environment than people who are not.

Practicing Christians are more likely to have a positive environmental attitude than people who do not practice a religion in both years of the survey. There are no other consistent, significant religious effects. The 2003 survey shows practicing Hindus to be significantly more likely to care about the environment than people who do not practice a religion, but there was no significant difference in 2005. The 2005 survey shows practicing Sikhs care almost three times as much (odds ratio of 2.72) as people who do not practice a religion, but there was no significant effect in 2003. This discrepancy between the years may be down to the relatively small number of respondents in this group, which contains only 236 in 2003 and 271 in 2005.

Figure 2 shows the non-linear effects of our continuous variables from 2005, with the solid lines being the estimates while the dashed lines are 95%

confidence intervals. The graphs for the other years follow similar patterns and are not shown. The graphs show how the odds ratios change as income and age vary across the range of the population, where the odds ratio is fixed at one for the median income/age. It appears that until the age of 65 people's attitudes to the environment become more positive as they age, but that after the age of 65 their attitude becomes more negative. People with middle incomes (£20-60k) appear to have more positive environmental attitudes than those who earn more or less than these amounts.

Figure 3 shows the differences in attitude between people living in the government office regions of England and Wales for 2005. London is treated as the baseline region and has an odds ratio of 1. People from the East and South East of England both cared significantly more than people from London, with odds ratios of 1.22 and 1.45 for the East, and 1.53 and 1.43 for the South East for 2003 and 2005 respectively. There are no consistent significant effects for any of the other areas.

### **4.3 Results - Environmental Volunteering**

Odds ratios for each of our covariates are shown in table 4. It appears that males are less likely to become involved in environmental volunteering, with odds ratios ranging from 0.71 to 0.91. This is consistent with the attitude results, which also showed odds ratios less than 1. People from both black and other ethnic groups appear to be significantly less likely than white people to become involved in environmental activity. This effect is strongest in black

people, who are around a fifth as likely as white people to become involved, with odds ratios ranging from 0.18 to 0.22. Again, this agrees with the attitude results. Widowed people appear to be less likely to be involved in environmental volunteering than single people, with odds ratios ranging from 0.57 to 0.88.

People working in management appear to be more likely than those without a job to be involved in environmental volunteering, with odds ratios ranging from 1.38 to 2.08. People in routine jobs appear less likely to be involved in volunteering than people without a job, with significant odds ratios less than 1 in three of the years, although there is an anomalous ratio of 1.15 in 2005. People with any level of education above GCSE are more likely to be involved in environmental volunteering than those with GCSEs or below. As with the attitude results, people with degrees have the largest odds ratios, ranging from 1.83 to 2.18. People who are actively involved in local politics are more than twice as likely to be involved in environmental volunteering, with odds ratios between 2.17 and 2.48 over the years of the four surveys.

Practicing Hindus, Muslims and Sikhs all appear to be less likely to be involved in environmental volunteering than people who do not practice any religion. The odds ratios for Hindus range from 0.40 to 0.75, the odds ratios for Muslims range from 0.23 to 0.78, and the odds ratios for Sikhs range from 0.23 to 0.59. This in part disagrees with the results for attitude, where Sikhs and Hindus were more likely to be positive towards the environment compared to non-religious people for one of the years of the survey. Once more we have wide confidence intervals for Sikhs, due to the relatively small number of respondents in this group, which contained 236 in 2003, 271 in

2005, 242 in 2007 and 250 in 2009. Practicing Christians appear more likely to be involved in environmental volunteering than non-religious people, with odds ratios between 1.06 and 1.26, which agrees with the attitude results.

Figure 2 shows smooth curves for our continuous variables. As before, environmental volunteering appears to increase up to the age of 65, then decrease sharply after the respondents reach that age. Again, people with middle incomes are most likely to become involved in environmental volunteering than those who earn more or less money.

The differences between the government office regions in terms of volunteering in 2005 are shown in figure 4. People in the East Midlands and East of England are significantly more likely to become involved in environmental volunteering than people living in London. The odds for the East Midlands range from 1.26 to 1.52 over the four surveys, while the East of England has odds ratios ranging from 1.01 to 1.68. People in the South East and South West are also more likely to be involved in environmental volunteering in comparison to London, with odds ratios ranging from 1.26 to 1.97 in the South East and 1.32 to 1.70 in the South West. People from the North East are involved in less environmental volunteering than people from London, with odds ratios ranging from 0.63 to 0.93.

## **Section 5: Conclusion**

We have attempted to address four principal limitations of the existing literature:

- (1) Given the relative shortage of non-US studies, our use of the UK Citizenship Survey helps to deepen the evidence base of European

research in this field. The data constitutes a new source of evidence in the sense that it has not, to our knowledge, been used previously to analyse the determinants of environmentalism. We confirm the finding by Hayes (2001) that education appears to have a particularly strong effect in the UK.

(2) The large and broad samples in our data enabled us to consider the effects of non-Abrahamic faiths and to derive robust, generalisable empirical results. While Sikhs and Hindus were more likely to be positive towards the environment compared to non-religious people for one of the years of the survey, we found that practicing Hindus, Muslims and Sikhs all appear to be less likely to be involved in environmental volunteering than people who do not practice any religion. Practicing Christians were found to be more likely to have positive environmental attitudes, and more likely to be involved in environmental volunteering than non-religious people. These findings are generally at odds with the Lynn White thesis.

(3) A key motivation for this paper was to establish whether the rapid proliferation in recent years of environmental research, media coverage and political debate has had a material effect on the propensity and determination of environmental attitudes and volunteering. In the event, we found little change—results from four waves of the survey (2003, 2005, 2007 and 2009) were generally stable, with no indication of a significant shift in attitude or volunteering. This is quite remarkable given the amount of ink that has been spilt and hot air generated over

environmental issues over the past few years. The two most obvious explanations for this surprising result are as follows. First, many of the headline environmental issues remain controversial—much of the media coverage of global warming, for example, has been devoted to discussing the objections raised by climate sceptics. Perceived ambiguities blunt the imperative for action. Second, human responses to complex risks are not always rational. Individuals underestimate major risks that seem distant in space or time (Zeckhauser 1996; DellaVigna, 2009). Rather than coming to terms with environmental risks and taking action, people may have a tendency to flip between extremes, switching from outright denial to fatalistic inertia (Pryce et al 2011).

(4) We postulated that there are strong theoretical grounds to expect the effects of age and income to have non-linear effects on environmental attitudes and behaviour. In both cases, our results confirmed these hypotheses: both environmental attitude and action rise with age and income, reach a zenith and then decline. We were surprised, however, at how late in life both attitudes and volunteering tend to peak—in both cases it seems that it is not until we approach retirement age that our environmentalism becomes most potent. While we were not able to disentangle life-cycle from cohort effects, we would have anticipated that cohort effects would, if anything, have decreased the age at which environmentalism peaks (anecdotally, there has been an increase in environmental content in school curricula, for example). More work is needed to explain this phenomenon.

(5) We investigated whether there exist differences between the determination of attitudes and actions. Generally, the results were consistent between the two sets of models. A notable exception was religion (Sikhs and Hindus tended to have more positive attitudes than the non-religious, but were less likely to volunteer). In our review of the literature we suggested that there may be theoretical grounds for a discrepancy to emerge between attitude and action for high-earners (on the basis that rising income implies a higher opportunity cost of time, making the rich less likely to be involved in environmental volunteering, but they will be more likely to afford the “luxury” of environmental concern because their basic needs are met). There is tentative evidence for this from the non-linear graphs for income which show that volunteering appears to peak at a lower level of income than attitudes, but the confidence intervals are too wide for us to draw firm conclusions.

## References

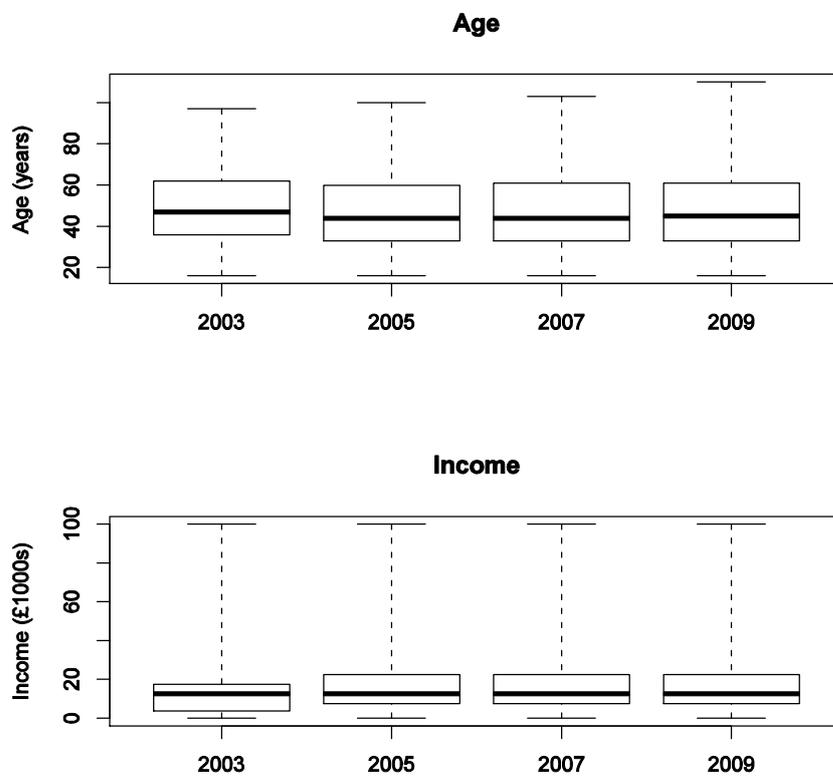
- Arcury T, 1990, Environmental attitude and environmental knowledge, *Human Organization* **49** 300-304
- BBC, 2005, *Tsunami: Anatomy of a disaster*, BBC News Online, 27 March 2005 <http://news.bbc.co.uk/1/hi/sci/tech/4381395.stm>
- Biel A, Nilsson A, 2005, Religious values and environmental concern, *Social Science Quarterly* **86** 178-191
- Chan K, 1996, Environmental attitudes and behaviour of secondary school students in Hong Kong *The Environmentalist* **16** 297-306
- DellaVigna S, 2009, Psychology and economics, *Journal of Economic Literature* **47** 315-372
- Dietz T, Stern, P, et al, 1998, Social structural and social psychological bases of environmental concern, *Environment and Behavior* **30** 450-470
- Eckberg D, Blocker T, 1996, Christianity, Environmentalism, and the Theoretical Problem of Fundamentalism, *Journal for the Scientific Study of Religion* **35** 343-355

- Eilers P, Marx B, 1996, Flexible Smoothing with B-Splines and Penalties, *Statistical Science* **11** 89-121
- Franzen A, Meyer, R, 2009, Environmental Attitudes in Cross-National Perspective, *European Sociological Review* **26** 219-234
- Hastie T, Tibshirani R, 1990, *Generalized Additive Models* (1<sup>st</sup> ed), Chapman and Hall/CRC, London
- Hayes B, 2001, Gender, scientific knowledge, and attitudes toward the environment, *Political Research Quarterly* **54** 657-671
- Hayes B, Marangudakis, 2000, Religion and Environmental Issues within Anglo-American Democracies, *Review of Religious Research* **42**(2): 159-174
- Hayes B, Marangudakis, 2001, Religion and attitudes towards nature in Britain, *British Journal of Sociology* **52**(1): 139-155
- IPCC, 2007, *Climate Change 2007: The Physical Science Basis*, Cambridge: Cambridge University Press
- Johnson C, Bowker, J, Cordell, H, 2004, Ethnic Variation in Environmental Belief and Behavior, *Environment and Behavior* **36** 157-186
- Kanagy C, Kwillits, F, 1993 A greening of religion? Some evidence from a Pennsylvania sample, *Social Science Quarterly* **74** 674-83
- Malkis A, Grasmick, H, 1977, Support for the ideology of the environmental movement, *Western Sociological Review* **8** 25-47
- Maslow A, 1970, *Motivation and Personality*, 2<sup>nd</sup> ed, New York: Viking Press
- Northcott M, 1996, *The environment and Christian ethics*, Cambridge, Cambridge University Press
- Pryce G, Chen, Y, Galster, G, 2011, The Impact of Floods on House Prices, *Housing Studies* **26** (forthcoming).
- Sherkat D, Ellison C, 2007, Structuring the religion-environment connection, *Journal for the Scientific Study Of Religion* **46** 71-85
- Steel B, 1996, Thinking globally and acting locally?: Environmental attitudes, behaviour and activism *Journal of Environmental Management* **47** 27-36
- Stern N, 2006, *Stern Review on the Economics of Climate Change*, HM Treasury, London
- Stratton A, 2009, Climate Change Denial MEP Attacks Church, *Guardian*, 20 Nov 2009
- Van Liere K, Dunlap R, 1980, The Social Bases of Environmental Concern: A Review of Hypotheses, Explanations and Empirical Evidence, *Public Opinion Quarterly* **44** 181-197
- White L, 1967, The Historical Roots of Our Ecological Crisis *Science* **155** 1203 -1207
- Zeckhauser, R, 1996, The economics of catastrophes, *Journal of Risk and Uncertainty* **12** 113-140

## Tables and Figures

**Table 1 - Summary of the environmental response data.**

		<b>2003 survey</b>	<b>2005 survey</b>	<b>2007 survey</b>	<b>2009 survey</b>
<b>Attitude</b>	<i>Yes</i>	84.8%	92.5%	-	-
	<i>No</i>	7.8%	6.9%	-	-
	<i>NA</i>	7.4%	0.6%	-	-
<b>Volunteering</b>	<i>Yes</i>	8.0%	8.4%	7.8%	7.1%
	<i>No</i>	91.9%	91.4%	92.1%	92.9%
	<i>NA</i>	0%	0.2%	0.1%	0%



**Figure 1 - Boxplots of the continuous covariates, age and income by year.**

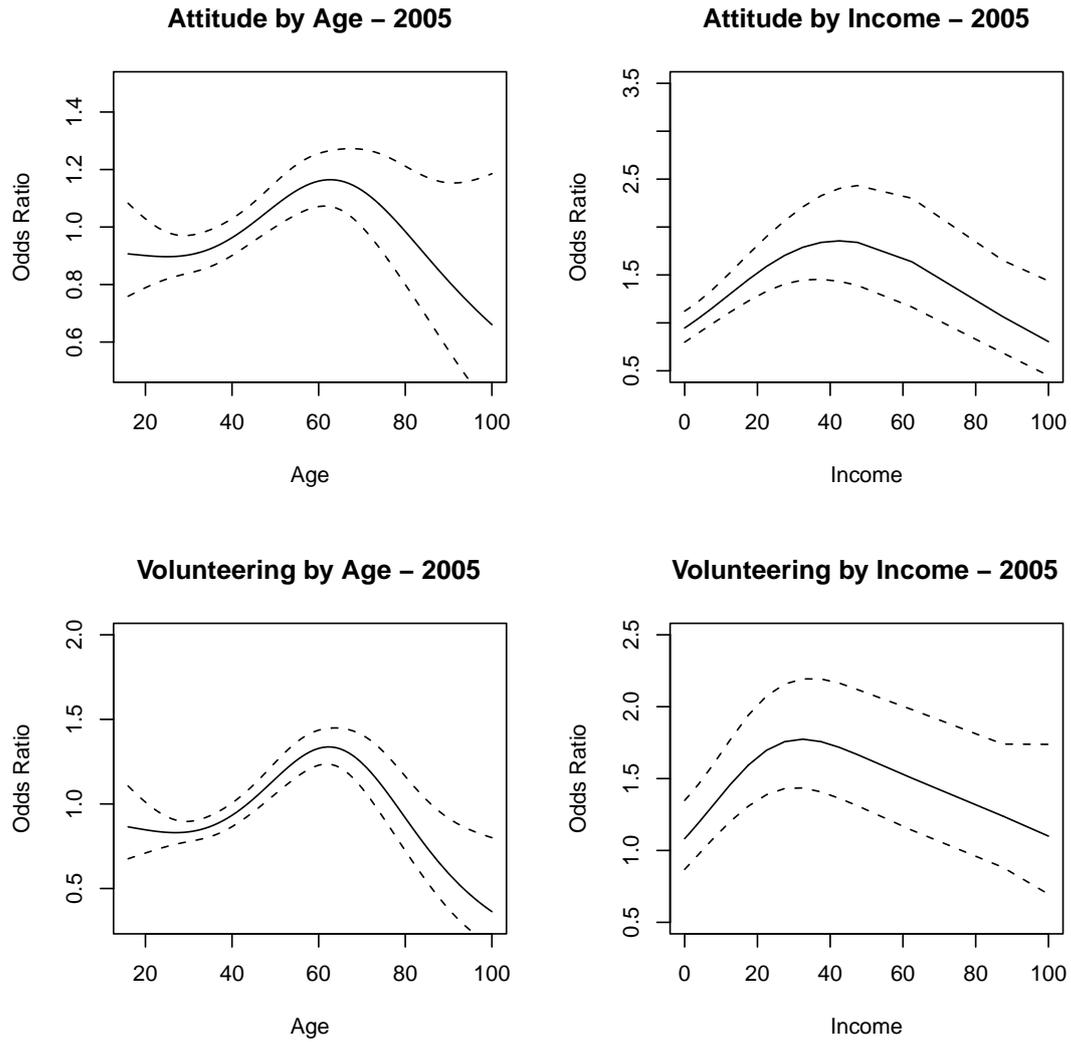
**Table 2 – Percentage of missing values by covariate.**

<b>Covariate</b>	<b>2003</b>	<b>2005</b>	<b>2007</b>	<b>2009</b>
<b>Age</b>	0%	0%	0.1%	0%
<b>Income</b>	4.4%	10.0%	13.5%	12.6%
<b>Sex</b>	0%	0%	0%	0%
<b>Ethnic group</b>	0%	0%	0%	0.1%
<b>Marital status</b>	0%	0%	0.1%	0%
<b>Occupation</b>	1%	0%	0.1%	0.6%
<b>Education</b>	0.3%	4.4%	5.0%	4.3%
<b>Practicing/Religion</b>	0%	0.5%	0.4%	0.3%
<b>Neighbourhood</b>	1.5%	1.0%	0.9%	0.9%
<b>Political</b>	0.1%	0%	0%	0%
<b>Region</b>	0%	0%	0%	0%

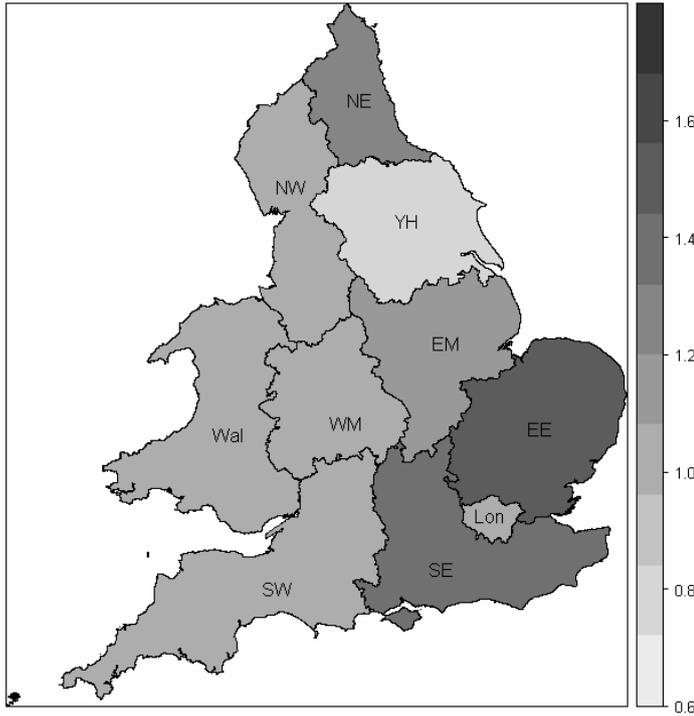
**Table 3 - Odds Ratios for the categorical covariates' relationship to environmental attitude.**

(Statistically significant results are shown in bold)

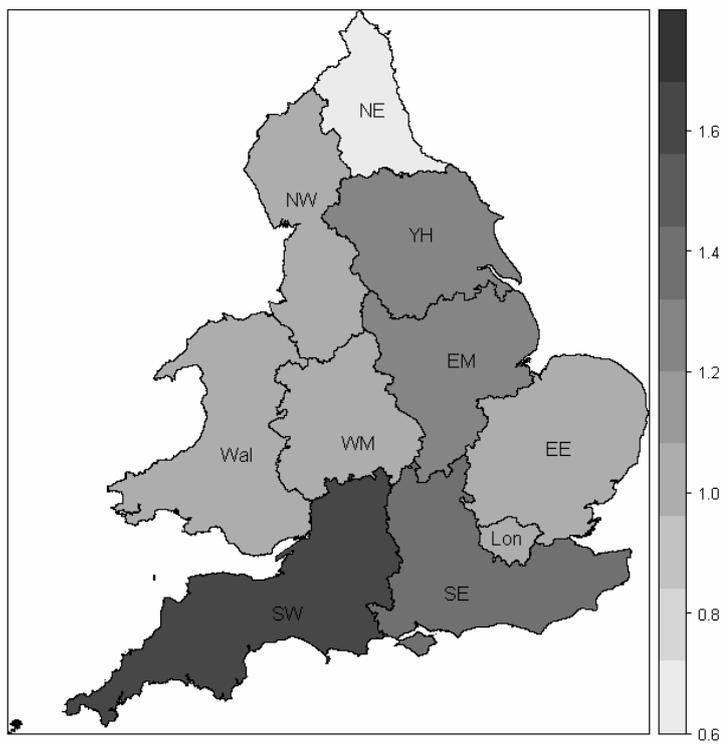
	<b>2003</b>	<b>2005</b>
Sex - Male	1.03 (0.92, 1.15)	<b>0.80 (0.72, 0.95)</b>
Ethnic - Black	<b>0.64 (0.54, 0.76)</b>	<b>0.82 (0.69, 0.98)</b>
Ethnic - Other	<b>0.55 (0.47, 0.65)</b>	<b>0.68 (0.58, 0.79)</b>
Marital - Divorced	<b>1.23 (1.03, 1.46)</b>	1.07 (0.90, 1.27)
Marital - Widowed	0.89 (0.72, 1.09)	0.95 (0.76, 1.18)
Marital - Married	<b>1.21 (1.05, 1.40)</b>	<b>1.49 (1.31, 1.70)</b>
Occupation - Management	<b>2.02 (1.66, 2.45)</b>	<b>2.09 (1.72, 2.54)</b>
Occupation - Intermediate	<b>1.52 (1.27, 1.81)</b>	<b>1.53 (1.30, 1.79)</b>
Occupation - Routine	1.15 (0.97, 1.36)	1.10 (0.95, 1.26)
Education - Degree	<b>2.12 (1.77, 2.54)</b>	<b>2.15 (1.79, 2.58)</b>
Education - High Ed	<b>1.55 (1.30, 1.85)</b>	<b>2.02 (1.62, 2.53)</b>
Education - A Level	<b>1.68 (1.44, 1.97)</b>	<b>1.53 (1.31, 1.80)</b>
Education - Other	0.96 (0.82, 1.14)	<b>1.29 (1.06, 1.56)</b>
Political - Yes	<b>1.52 (1.36, 1.69)</b>	<b>1.33 (1.15, 1.53)</b>
Practicing - Christian	<b>1.39 (1.22, 1.59)</b>	<b>1.15 (1.01, 1.30)</b>
Practicing - Hindu	<b>1.36 (1.01, 1.83)</b>	1.05 (0.81, 1.36)
Practicing - Muslim	0.85 (0.71, 1.02)	0.94 (0.79, 1.13)
Practicing - Sikh	1.23 (0.84, 1.80)	<b>2.72 (1.76, 4.19)</b>
Practicing - Other	0.94 (0.66, 1.32)	<b>1.56 (1.05, 2.31)</b>



**Figure 2 - Odds ratios for the continuous covariates that have non-linear effects. The curves have been scaled so that the median age/income is the baseline level with an odds ratio of one.**



**Figure 3 - Odds ratios by region for environmental attitude. London is the baseline category with an odds ratio of 1.**



**Figure 4 - Odds ratios by region for environmental volunteering. London is the baseline category with an odds ratio of 1.**

**Table 4 - Odds ratios for volunteering.**

	<b>2003</b>	<b>2005</b>	<b>2007</b>	<b>2009</b>
Sex - Male	<b>0.84 (0.75, 0.93)</b>	<b>0.71 (0.64, 0.79)</b>	0.91 (0.82, 1.01)	<b>0.83 (0.75, 0.91)</b>
Ethnic - Black	<b>0.22 (0.17, 0.28)</b>	<b>0.18 (0.14, 0.24)</b>	<b>0.21 (0.17, 0.27)</b>	<b>0.18 (0.13, 0.23)</b>
Ethnic - Other	<b>0.38 (0.31, 0.47)</b>	<b>0.44 (0.36, 0.53)</b>	<b>0.36 (0.30, 0.43)</b>	<b>0.36 (0.30, 0.44)</b>
Marital – Divorced	0.91 (0.76, 1.09)	0.99 (0.83, 1.18)	<b>0.73 (0.61, 0.88)</b>	<b>0.83 (0.69, 0.99)</b>
Marital – Widowed	<b>0.57 (0.46, 0.71)</b>	<b>0.71 (0.57, 0.90)</b>	<b>0.63 (0.50, 0.79)</b>	0.88 (0.71, 1.10)
Marital –Married	0.87 (0.75, 1.00)	0.99 (0.86, 1.13)	<b>0.76 (0.67, 0.87)</b>	0.90 (0.79, 1.03)
Occupation –Management	<b>1.42 (1.10, 1.84)</b>	<b>2.08 (1.60, 2.70)</b>	<b>1.38 (1.12, 1.71)</b>	<b>1.43 (1.17, 1.74)</b>
Occupation – Intermediate	1.01 (0.78, 1.30)	<b>1.53 (1.18, 1.98)</b>	1.09 (0.88, 1.34)	1.07 (0.87, 1.30)
Occupation – Routine	<b>0.60 (0.46, 0.78)</b>	1.15 (0.88, 1.50)	<b>0.75 (0.60, 0.93)</b>	<b>0.68 (0.54, 0.84)</b>
Education – Degree	<b>1.83 (1.59, 2.11)</b>	<b>2.11 (1.83, 2.43)</b>	<b>2.18 (1.89, 2.51)</b>	<b>2.17 (1.89, 2.48)</b>
Education – High Ed	<b>1.37 (1.17, 1.60)</b>	<b>1.79 (1.53, 2.10)</b>	<b>1.74 (1.46, 2.06)</b>	<b>1.53 (1.29, 1.81)</b>
Education – A Level	<b>1.71 (1.47, 2.00)</b>	<b>1.77 (1.52, 2.08)</b>	<b>1.33 (1.12, 1.57)</b>	<b>1.42 (1.21, 1.66)</b>
Education – Other	1.01 (0.83, 1.22)	<b>1.42 (1.14, 1.78)</b>	<b>1.64 (1.32, 2.03)</b>	<b>1.30 (1.05, 1.62)</b>
Political - Yes	<b>2.48 (2.26, 2.72)</b>	<b>2.17 (1.97, 2.39)</b>	<b>2.25 (2.04, 2.48)</b>	<b>2.24 (2.04, 2.47)</b>
Practicing - Christian	<b>1.26 (1.13, 1.40)</b>	<b>1.21 (1.09, 1.35)</b>	1.06 (0.95, 1.18)	<b>1.15 (1.03, 1.27)</b>
Practicing – Hindu	0.69 (0.43, 1.09)	0.66 (0.44, 1.00)	<b>0.40 (0.24, 0.65)</b>	0.75 (0.51, 1.09)
Practicing – Muslim	0.78 (0.58, 1.06)	<b>0.47 (0.32, 0.70)</b>	<b>0.23 (0.14, 0.36)</b>	<b>0.66 (0.49, 0.90)</b>
Practicing – Sikh	0.59 (0.29, 1.22)	<b>0.43 (0.21, 0.90)</b>	<b>0.23 (0.09, 0.63)</b>	0.59 (0.29, 1.16)
Practicing – Other	<b>1.62 (1.17, 2.23)</b>	<b>1.39 (1.02, 1.90)</b>	<b>1.85 (1.42, 2.40)</b>	<b>2.04 (1.59, 2.63)</b>